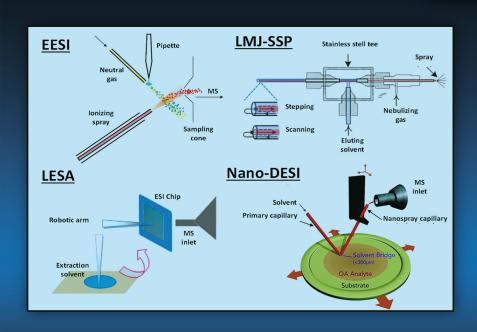
Ambient Mass Spectroscopy Techniques in Food and the Environment



EDITED BY LEO M.L. NOLLET • BASIL K. MUNJANJA



Ambient Mass Spectroscopy Techniques in Food and the Environment

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Edited by
Leo M.L. Nollet
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Series Preface

There will always be a need for analyzing methods of food compounds and properties. Current trends in analyzing methods include automation, increasing the speed of analyses, and miniaturization. The unit of detection has evolved over the years from micrograms to pictograms.

A classical pathway of analysis is sampling, sample preparation, cleanup, derivatization, separation, and detection. At every step, researchers are working and developing new methodologies. A large number of papers are published every year on all facets of analysis. So, there is a need for books that gather information on one kind of analysis technique or on analysis methods of a specific group of food components.

The scope of the CRC series on Food Analysis and Properties aims to present a range of books edited by distinguished scientists and researchers who have significant experience in scientific pursuits and critical analysis. This series is designed to provide state-of the-art coverage on topics such as

- 1. Recent analysis techniques on a range of food components
- 2. Developments and evolution in analysis techniques related to food
- 3. Recent trends in analysis techniques of specific food components and/or a group of related food components
- 4. The understanding of physical, chemical, and functional properties of foods.

The book *Ambient Mass Spectroscopy Techniques in Food and the Environment* is the ninth volume of this series.

I am happy to be a series editor of these books for the following reasons:

- I am able to pass on my experience in editing high-quality books related to food.
- I get to know colleagues from all over the world more personally.
- I continue to learn about interesting developments in food analysis.

I dedicate this series to

- My wife, for her patience with me (and all the time I spend on my computer)
- All patients suffering from prostate cancer; knowing what this means, I am hoping they will have some relief

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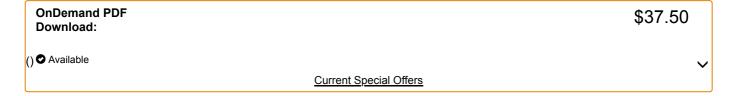
A Survey of Tasks Scheduling Algorithms in Distributed Computing Systems

Nutan Kumari Chauhan (KIET Group of Institutions, India) and Harendra Kumar (Gurukula Kangri Vishwavidyalaya, India) Source Title: Encyclopedia of Information Science and Technology, Fifth Edition (/book/encyclopedia-information-science-technology-fifth/242896)

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Abstract

Distributed computing system (DCS) is a very popular field of computer science. DCS consists of various computers (processors) located at possibly different sites and connected by a communication link in such a manner that it appears as one system to the user. Tasks scheduling is a very interesting field of research in DCS. The main objectives of tasks scheduling problems are load balancing of processors, maximization of system reliability, minimizing the system cost, and minimizing the response time. Obviously, it is very complicated to satisfy all of the above objectives simultaneously. So, most of the researchers have solved the tasks scheduling problem with one or more objectives. The purpose of this chapter is to produce an overview of much (certainly not all) of tasks scheduling algorithms. The chapter is covering the little much valuable survey, tasks scheduling strategies, and different approaches used for tasks scheduling with one or more objectives.

Chapter Preview

Top

×

Introduction

There are various causes for using DCS. The nature of equipment may involve the utilization of a communication network which connected by some computers: for eg, data created in one site and needed in another site. There are various cases in which only one computer is required, but DCS is very helpful for practical causes. For eg., it may be extra cost-efficient to get the inclined level of performance by applying cluster of numerous low-end computers, in similarity with only high-end computer. DCS has no

single point of failure, so it can offer additional reliability than a non-distributed system. DCS may be simple to expand and run than a uni-processor system. DCS have used in a large scale due to several characteristics such as communication, computational speedup, fault tolerance, increased throughput, resource sharing etc.

Tasks scheduling is very important phase in DCS, mainly it is assigning of tasks onto processors as a manner so that some efficiency actions are optimized. An effective tasks scheduling policy avoid too much inter-tasks communication and utilize the precise effectiveness of the processors. It is extremely important step in exploiting the capacity of system and it may be done in two ways: **Dynamic Scheduling** and **Static Scheduling**. The most important plan of tasks scheduling is toward decrease the running cost of a program. The cost can be characterized by time, money or some other measure of resources usage.

In DCS, resources of system can be split by users at different sites through the communication link. However in proper utilization of total computing power of DCS, a fundamental problem arises. It may happen that a certain processor has very few workloads while another processor has more workload at a given time. It is required to distribute total workload of DCS of its overall processors. This evades under use of power and further it decreases response time for deputize at more heavily loaded processor. Generally, the form of computing power sharing with the intention of getting better performance of a DCS by rearranging the workload between the available processors called load balancing. The progress in the presentation of system through redistributing the workload among processors is the main aim of load balancing policies.

The reliability of DCS is probability that system can run the whole application successfully. If system is complex then it is very difficult to system in it's entirely. The logical technique is applied to crumble the entire system into function entities compiled of subsystems and units. Each entity is either operational or failed. The sub-division generates the block diagram of system. Models are prepared to fit the logical arrangement and calculus of probability is applied to figure out reliability of system in terms of sub-division reliabilities. There are two types of reliabilities in DCS: first is processor-related reliability, for example reliability of resources and reliability of computation; another is the path / link-related reliability, for example reliability of communication paths between allocated processors.

The processing of a program is of two types: serial processing or parallel processing.

Difference between serial processing and parallel processing are given in the following table-1:

Table 1. Difference between serial and parallel processing

S. No.	Serial Processing	Parallel Processing
	There exist several tasks and processors even	More than one task of the program may execute
1.	although only single task is active on a processor	concurrently for various periods during the lifetime of a
	at a given time	program
	The main concern in a serial processing of	The main concern of parallel processing is to reduce the
2.	programs is variability or non-uniformity of	total time of the program by running different parts of the
2.	computation requirements and the overhead of	program
	communication	
	The challenge of distributed processing lies in	In parallel processing, arranging the order of execution of
3.	matching requirements against resources without	the various tasks on the processors is a major problem
	incurring excessive communication overhead	
4	Generally, serial processing is used for long	Generally, parallel processing is used for short distance
4.	distance	

Key Terms in this Chapter

Honeybee Mating Optimization (/dictionary/honeybee-mating-optimization/89665): Search algorithm based on swarm approach to optimization.

Genetic Algorithm (/dictionary/genetic-algorithm/12063): An algorithm that mimics the genetic concepts of natural selection, combination, selection, and inheritance.

Communication Network (/dictionary/communication-network/46636): Prototype of paths in which information flows in the organization.

Tasks Scheduling (/dictionary/tasks-scheduling/29281): Method by which work is assigned to resources that complete the work.

Load Balancing (/dictionary/load-balancing/17297): Distribution of workloads across multiple computing resources.

Particle Swarm Optimization (/dictionary/particle-swarm-optimization/21953): Computational method that optimizes a problem by iteratively trying to improve a solution with regard to a given measure of quality.









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Fabrication and characterization of Cd_{0.98}Zn_{0.02}O film by inventive sol-gel screen-printing technique

AIP	Conference	Proceedings 2	2136 , 040014	(2019);	https://do	i.org/10.	.1063/1	1.51	20928

Renu Kumari^{1,*} and Vipin Kumar¹

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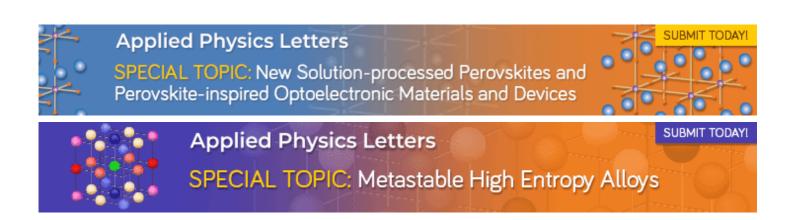
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ABSTRACT

In this paper Cd_{0.98}Zn_{0.02}O film was fabricated via sol-gel screen-printing technique on the clean glass substrate. The consequence of Zn doping (2%) on structural and optical properties was analyzed by X-ray diffraction, EDAX, UV-visible spectroscopy and photoluminescence spectra. XRD result exhibits the polycrystalline nature of film. The composition of the film was confirmed through the EDAX analysis. The optical band gap of prepared film was studied by transmittance spectra. Peak near edge emission around 520 nm corresponding to green emission was exhibited by PL spectra of the Cd_{0.98}Zn_{0.02}O film.

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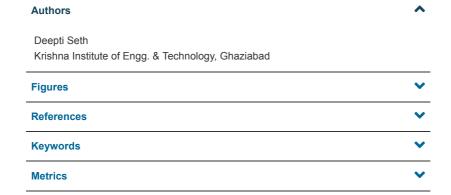
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Introduction:

Retina is tissue layer at the back of the eye that responsible for light detection. Retinas generated by many layers of photoreceptor and nerve cells. The mathematical models used dates have reflected the dual nature of the oxygen supply to the retina in most mammals [1]. The sign in to Continue Reading retina receives its oxygen supply exclusively from the Choroid. In applying existing oxygen supply and consumption models to these data, we realized that the total dependency on chorodidal approach oxygen delivery allowed a modified for approach to the mathematical analysis.



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Effect of Water Temperature on the Compressive Strength of Silica Fumes based Porous Concrete

Aniket Kumar Sharma, Shobhit Pandey, Ayush Jain and Shreya Shekhar

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Effect of Water Temperature on the Compressive Strength of Silica Fumes based Porous Concrete

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Abstract— Pervious concrete is a zero droop solid, which comprises of coarse aggregates, water and different cementitious materials. As there is no fine utilized in the concrete so it's at some point referred as no-Fine concrete. Also pertaining to its water draining capacity it is also known as called permeable concrete. Pervious concrete is special kind of high porosity solid which permits water from precipitation to either infiltrate into the ground water or to the other storage facility. Since it provides better friction to vehicle tyres and hence also prevents skidding. It utilized for asphalt since it gives a genuine presentation against sliding for vehicles in stormy days and a far superior sound retention property. In this examination the concrete supplanted with silica fumes with different mixing water temperature were tested, so as to arrive at an optimum level of workability and strength. Concrete Blocks of Standard Sizes were prepared and relieved at a standard time period of 7, 14 and 28 days and then the compressive strength was tested. Distinctive solid blend extents, for example, OPC and SPC are set up to the check the compressive quality of pervious concrete. The outcomes show the Pervious Concrete containing 5%,10%,15% silica smoke can accomplish compressive quality of 14.4 N/mm2, 17 N/mm2, 19.1 N/mm2 for 28 days of relieving individually and at low mixing water temperature 10°c the workability and slum value enhances. With addition of more silica fume in mixer the value of permeability was decreasing.

Keywords—OPC(ordinary pervious concrete); SPC(silica fume pervious concrete); PC(pervious concrete)

INTRODUCTION

Pervious concrete is a specific kind of high porosity concrete. Due to presence of voids, the required interlocking is not achieved and its strength is less than conventional concrete. However It can be used in areas of low traffic and high rainfall accounting for its permeability. When mixed with asphalt, it also provides better protection against skidding of vehicles. However it is difficult to work with as no fine aggregates are present, Also durability of this type of concrete can be put into question. To encounter the solution, Pozzolanic materials like silica fumes can be added to increase the mechanical properties and strength. Different mixing water temperature also has an effect of workability and strength [1]. Countries like India have seasonal characteristics; hence the temperature

of the aggregates as well as water can vary with seasons. Hence this study was carried out to check the compressive strength, workability and permeability of the porous concrete in the presence of silica fumes with different mixing water temperatures. Silica fume is a byproduct resulting from the reduction of pure quality of quartz with coal or coke and wood chips in electric arc furnace during the production of silicon metal or silicon alloy. The use of silica fume is desirable as it enhances the durability of the concrete. There are differences among researchers on how workability is affected after addition of silica fumes as a cement replacement. Strength and Wear Resistance of Sand -Replaced Silica Fume Concrete Hamidou and gafoori 2007 [2], Compressive quality of 10% SF supplanted pervious concrete expanded around 30%. but the wanted porosity was not accomplished so ideal level of silica fume for 20% porosity was 8% [3], Khayat investigate that Blended silica fumes also contribute to increased strength, cohesiveness and enhancing scaling resistance. It also have a diminishing effect on permeability [4], Kadri and Dual reported that workability is increased when silica fumes is added as an replacement to the cement [5], Vikas have discovered that an ideal degree of silica fume expanded strength is around 5% by weight. Anyway beyond that there is a misfortune in compressive quality anyway the workability is seen as expanded [6]. The experiment was done on OPC and SPC with varying water temperatures as 10 degrees and 25 degrees. A fixed water cement ratio i.e. 0.33 was used in all the experiment with variation of silica fumes as 5% 10 % and 15 % of the total cementitious materials. In the end, the permeability of the attained concrete after 28 days was tested . This paper presents the results of this investigation.

MATERIALS

SILICA FUME: It is a side-effect accomplished by gathering fumes gas essentially of non-crystalline silicon dioxide (SiO2), and the normal molecule distance across of every essential molecule is around 0.1 to 1.0 μ m. By including the superfine particles of silica smoke to solidify and different materials, the holes between the particles are filled. This impact picked up the creation of thick, high-quality items.

AGGREGATE: Pervious cement has almost no fine totals inside the blend. Total size is normally between 3/8 to 1/2 inch at maximum. Bigger total probably won't be reasonable in light of the fact that it might make the surface be excessively coarse, which cannot be adequate regarding surface unpleasantness. When all is said in done, adjusted total would require less compaction exertion than squashed total. The total ought to be saved damp particularly when high temperatures are recognizable. On the off chance that dry total is utilized, the ingestion and dampness content must be considered as pervious solid blend structures work with low w/c proportion.

WATER: Water satisfying guideline necessities for regular cement are frequently utilized for the gathering of pervious cement. No unique prerequisites as far as water quality are fundamental. The water substance of pervious cement is chosen inside a similar path as ordinary cement. Testing has shown that a water/concrete proportion inside the scope of 0.27–0.35 takes into account best scattering of concrete glue/mortar and best covering of total particles. With lower w/c proportion, balling of the mix are frequently watched. For this situation, 0.33 w/c is taken and water temperature is changed for mixing

CEMENT: Concrete is utilized as a coupling material in concrete having some property given beneath in table. Type Ordinary pressure driven concrete 53 evaluations is utilized as essential fastener. SF is utilized as a concrete substitution to switch the cover properties. Compound creation of Cement was as appeared in table admixtures were utilized for this examination.

TABLE 1. Binder ingredients

SERIAL.	CONSTITUENTS	BINDER (%)
1	Calcium oxide	63
2	Silicon Di-oxide	20.2
3	Aluminium Oxide	4.7
4	Ferric oxide	3.2
5	Tri-Oxido silicate	2.4
6	Magnesium oxide	2.3
7	Potassium Oxide	0.8
8	LOI	1.9

METHODOLOGY

At first preliminary investigation of silica fumes and cement were done and the details provided by manufactures were studied in detail. After this investigation, Cement, silica fume, aggregates are selected for this experiment.

Weigh batching had adopted for weighing of materials. And weight machine was used for the calculation of weights. Blending is achieved in a lab clump Mixer. After mixing the samples, slump test has done to check the workability of the samples. For the preparation of specimen, cubes of size $15 \, \mathrm{cm} \times 15 \, \mathrm{cm} \times 15 \, \mathrm{cm}$ are utilized. Concrete Prepared from the mix was filled in the mould in layers of 5 cm thick and each layer is compacted after applying 35 strokes for every layer with the assistance of packing pole. Top surface is leveled and smoothened with a trowel.

Finally curing was done for 7, 14 and 28 days respectively for these samples by keeping these samples into water. Finally compressive strength test was done by putting the specimen in the compression testing machine.

This process was repeated for all the specimens.



Fig. 1. Cubes of Pervious Concrete

MIX DESIGN

For the experiment the moderate exposure condition was assumed and M20 grade of concrete chosen to be designed. Specific gravity of cement and aggregates were measured and they were 3.15 and 2.65 respectively. Ordinary Portland cement of grade 53 was used. Four types of samples are prepared with varying silica fumes content of 0% 5%, 10% and 15% .w/c ratio is kept 33 percent in all those samples. The further details are tabulated below

TABLE2. Quantities of Material per 1 M³ of PC

Mix Type	Aggregates	Cementitiou	w/c	
	kg	Cement(kg)	SF(kg)	
Blend 1	1669.73	391	0	0.33
Blend 2	1669.73	370.5	19.5(5%)	0.33
Blend 3	1669.73	351	39(10%)	0.33
Blend 4	1669.73	331.5	58.5(15%)	0.33

RESULTS

The consequences of droop and unit weight for all Blends are given beneath in table

TABLE3. Test result for slump and unit weight

BLEN DS	Blen	nd1	Bler	nd 2	Bler	nd 3	Blen	nd 4
Temper ature (°C)	10	25	10	25	10	25	10	25
Slump (Cm)	3	2.5	4	2	5	4.5	8	4.8
Unit weight (kg/m³)	2170	2170	2178	2178	2181	2180	2199	2179

For Blend 1 and Blend 2 blends the droop (slump) worth and usefulness (Workability) is low having the worth reaches between 0-4 cm at various blending water temperatures as 100c and 250c. While the Blend 3 and Blend 4 included with huge estimation of silica smoke and afterward 5-8 cm estimation of droop was recorded when the trial is finished. Same outcomes

are seen at the temperature 100c blending water as produces increments in droop worth and usefulness and onwards. The estimation of unit weight was determined somewhere in the range of 2170 and 2199~kg/m3.

TABLE4. Compressive Strength of Different blends at 10^oc

BLENDS	Compre Strengtl	Permeability (mm/sec)		
	7 Days	14 Days	28 Days	
Blend 1	5.2	7	10.1	16.23
Blend 2	8.5	10.6	14.4	14.81
Blend 3	10.2	13.4	17	13.1
Blend 4	11.4	14	19.1	12.3

TABLE5. Compressive Strength of Different Blends at 25°c

	Compressive Strength(MPA)			Permeability (mm/sec)	
	7 Days	14 Days	28 Days		
Blend 1	5.1	6.9	10.0	16.12	
Blend 2	8.4	10.5	14.3	14.35	
Blend 3	10.1	13.30	16.9	12.90	
Blend 4	11.2	13.8	18.9	12.25	

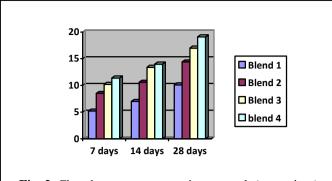


Fig. 2. Chart between compressive strength (on y-pivot) and Time (on x-pivot) of various blends at 10^oC.

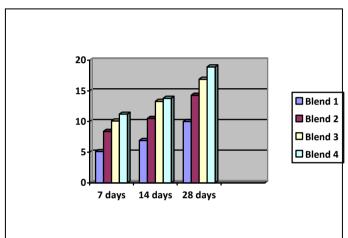


Fig. 3. Chart between compressive strength (on y- pivot) and Time (on x-pivot) of different blends at 25°C.

CONCLUSION

From the trial, the significant ends were noted as underneath

- With increment in blending water temperature compressive quality decreases marginally for the solid blend.
- As increment in silica fume content the compressive quality increments for the pervious cement.
- For increment in silica content the penetrability of solid demonstrating noteworthy diminishing
- As increment in the blending water temperature the workability and slump esteem upgrades.

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Land Use Land Cover Dynamics in Indore District Using Remote Sensing and GIS

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LAND USE LAND COVER DYNAMICS IN INDORE DISTRICT USING REMOTE SENSING AND GIS

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ABSTRACT: The city/district of Indore is located on the south edge of Malwa plateau in the Madhya Pradesh state of India. The objective of this study is to follow the change in the dynamics of land use and land cover in the Indore District from 1998 to 2019. The study was conducted using the multi-spectral satellite image. It is based on the pixel-based unsupervised classification of Landsat satellite images of the year 1998, 2009, and 2019 using ArcGIS pro. The unsupervised classification of an image using Arcgis pro gives the ability to support image classification without the requirement of the training sample which reduces processing time and cost, but it has low accuracy which can reclassification methods reduced by supervised by visual comparison of classified images with their false-color composites(FCC) image in different spectral band combinations. The results obtained showed a negative overall variation of the types of occupation of the territory of our study area. Thus, over this period, the study showed an increase in the areas of the urban agglomerations, bare mountain, and crop and/or grassland and water classes by 4.483% to 11.493%, 5.336% to 19.936%, 65.075% to 66.850%, 1.503% to 2.042% respectively, in addition, there is a decrease in the area of vegetation from 8.371% to 2.026% of the overall area. The Anthropogenic activities due to rapid urbanization, industrialization, and migration and population growth contribute substantially to this situation.

KEYWORDS:

Land use land cover dynamics; Remote sensing; unsupervised classification; Indore district; GIS; ArcGIS pro; climate change.

1. INTRODUCTION

Land and water resource degradation are the major problems in the Indian sub-continental region. The increase in the human population intensifies the utilisation of land resource that puts a significant load on the ecosystem and environment. Poor land practices and their management by concerned authorities' results in the loss of productivity, loss of organic rich matters and nitrogen enrichment on the top layers of soils which decrease the overall productivity of the crop in the region. Since the economic reformation in India dynamics of land use has changed significantly, the acceleration of urbanization and industrialization under this process has led to serious ecological destruction [1].

Indore district is one of the major districts of India in terms of population and economy in the central Indian region. It comes under India's tier-2 cities which make it one of the first cities which are going through India's "smart city mission" program. Under these programs major investment would come, expansion of urban agglomeration and transportation has to be done like metro railway and grand townships. But nothing has come without sacrifices due to this

development program region is facing massive climate change, degradation of vegetation and water resources. In the past decades' not much researches has been focused in this region and only a few authors have previously highlighted the impact of population growth on the degradation of natural resources. This is why periodic monitoring and quantifying the dynamics of land use in this densely populated area is necessary.

Remote sensing (satellite) is the process of detecting and monitoring the physical characteristics of an area by measuring its reflected and emitted radiation at a distance from the targeted area using remote sensing satellites. The applications of satellite imagery, coupled with GIS are very diverse. Indeed, several studies have shown the importance of space tools for measuring forest cover changes, to characterize and quantify urban sprawl, to simulate and predict changes in land use [2]. Satellite images are the only available tools that allow, at relatively low cost, and in a short time, to obtain images of a large territory and to follow its evolution over time [3]. The main objective of this study is to evaluate the Spatio-temporal evolution Indore district/city and evaluate the impact of anthropogenic pressures, namely population growth and rapid urbanization in the region [4], using remote sensing technology with the help of unsupervised classification of an image using GIS platforms like ArcGIS PRO.

2. DESCRIPTION OF THE STUDY AREA

Indore district/city (study area) is found in the south edge of Malwa plateau in the Madhya Pradesh state of India. At spatial referenced location of 22.7196° N and 75.8577° E at an altitude of 550 meters above sea level, it covers an area of 3892 km². It is located at a distance 872 km from the national capital Delhi and 544 km from the financial capital Mumbai. The study area contains the main Indore city, "11" blocks, and "118" villages. The study area lies on a

borderline between a humid subtropical climate and a tropical savanna climate in which three season were observed summer, monsoon, and winter. the study areas have a mean annual rainfall of 1062 mm, and the minimum, maximum, and an average(yearly) temperature of the area are 17.9°C, 46.5°C, and 31.9°C, also having average humidity and sunshine hours are 50%(yearly) and 2885 hours(yearly) [5]. The landscape of the study area mostly contains plane crop or/and grass fields, urban agglomeration, and Rocky/Hilly region at the south with little vegetation.



Fig.1. Location and Geometry of study area

3. RESEARCH METHODOLOGY

3.1 Data and software used

The land use land cover multi-band satellite images of the study area were obtained from the **USGS** website Earth **Explorer** "https://earthexplorer.usgs.gov/". Data sets are: Landsat 4-5 TM (Thematic Mapper) and Landsat 8 OLI(Operational Land Image) with the cloud cover less than 10%, spatial resolution of 30 m × 30 m, pixel seize 16 bit unassigned, multi-band raster image, acquisition date: 15-03-2019, 15-3-2009, 15-3-1998 with path/row no 147/044 at UTM zone 43N. The satellite images were classified with the help of pixel based unsupervised image classification wizard using ISO cluster in ArcGIS pro. Table no 1 shows the details of the data used.

ArcGIS pro. ArcGIS pro is an GIS software developed by ESRI. It is a very powerful

software which can support 2d and 3d scenes for visualisation, editing, and spatial analysis including artificial intelligence. It is better than its old version ArcMap because it is a 64 bit multithread application which can allows it's user to executes multiple tools, multiple maps and tables at the same time which increase the productivity of the workflow.

process of supervised classification. There are further two methods for the classification of image available in unsupervised manner. In which method used is pixel based classification. In which classification is performed on a perpixel basis, where the spectral characteristics of the individual pixel determines the class to which it is assigned. Characteristics of neighbouring pixels are not considered in the pixel-based approach. This is considered the more traditional classification method, and can result in a salt-

and-pepper effect in the classified image.

Table.1. details of data used.	
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Year	No of images used (mosaic)	Acquisition date	Spatial resolution in meter square	No of band
1998	2	15/12/1999	30x30	6 bands
2009	1	10/11/2009	30x30	6 bands
2019	2	10/11/2019	30x30	6 bands

3.2. Method used for classification of satellite image using ArcGIS pro:

Image classification is the process of extracting information classes, such as land cover categories, from multiband remote sensing imagery. The workflow involves multiple steps to progress from pre-processing to segmentation, sample selection, and training training, classifying, and assessing accuracy. Each step may be iterative, and the process requires indepth knowledge of the input imagery, classification schema, classification methods, expected results, and acceptable accuracy. The method used in this study for classification of image is unsupervised classification in which the outcome of the classification is determined without training samples. Pixels or segments are statistically assigned to a class based on the ISO Cluster classifier [5]. Pixels are grouped into classes based on spectral and characteristics. Analyst provides the number of classes to compute, and the individual classes are identified and merged once the classification is complete. This process is basically the reverse

3.3 methods involving Extraction of spatial data using ArcGIS pro.

3.3.1 Mosaic Raster Dataset: Mosaicking is very useful when two or more adjacent raster datasets need to be merged into one entity [6]. Multispectral satellite images of neighbourhood areas were mosaic to cover the full extent of the study area. This is carried out by using a "mosaic to new raster" tool which is made available in the "data management" toolbox in ArcGIS pro. This will requires following steps in which, first Add all the raster dataset that has to merge and then fill all the empty fields using raster properties and source properties.

NOTE: Mosaic datasets consist of three layers: boundary, footprint, and image

Illustration no 1. Image shown in fig 2(a) and fig 2(b) are input raster dataset of 2019 dataset where

image shown in fig 3 is output image in which full extent of study_area_2019 is contain.

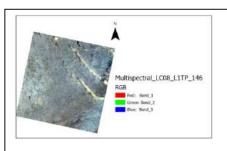


Fig.2 (A). Input Satellite image of Study Area_2019 (part 1)

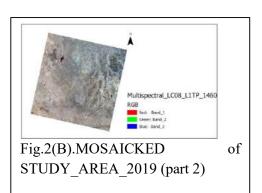




Fig.3.MOSAICKED IMAGE OF STUDY AREA 2019

3.3.2 Clip Raster Dataset: Clipping is used to cut out a portion of the required raster dataset from an existing mosaic raster data set [7]. This is carried out by using the "clip" tool which is made available in the raster processing data management toolbox in ArcGIS pro. This tool allows the extraction of a portion of the raster dataset based on a template extent (polygon). The clip output image includes any pixels that intersect the template extent (polygon) [8]. This will requires following steps in which, first Input the Mosaicked Raster Dataset that contains Study Area then Input polygon feature (vector dataset) that will define template extent. Geometry of this input feature will we used for clipping.

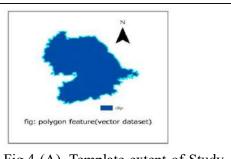


Fig.4 (A). Template extent of Study Area

Illustration no 2. Image shown in fig 3 is input mosaicked_raster_dataset_2019 and image shown in fig 4(A) is input polygon feature where fig 4(B) is final clipped image of 2019 dataset in which only study area 2019 is contains.

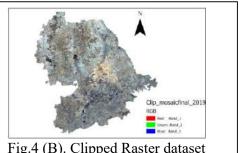


Fig.4 (B). Clipped Raster dataset (study area 2019)

3.3.3 Unsupervised classification of image using image classification wizard:

Unsupervised pixel-based classification of image is the fastest way of image classification though it is less accurate than supervised classification but this could be minimised by reclassify the image which can clean up the errors. This is carried out by using the image classification wizard in ArcGIS pro. This process will requires following inputs such that method (supervised or unsupervised) and type (pixel based or object based) of classification, classification schema (A classification schema determines the no and the types of classes used for classification, Referenced dataset, Number classes in which raster dataset has to classified, Max no of Iteration, max no of cluster merge per iteration, Max merge distance, Max sample per cluster, and skip factor.

NOTE: UNSUPERVISED CLASSIFICATION USES ISO CLUSTER WHICH DETERMINES THE CHARACTERISTICS OF THE NATURAL GROUPING OF THE CELLS IN MULTIDIMENSIONAL ATTRIBUTE SPACE [11].

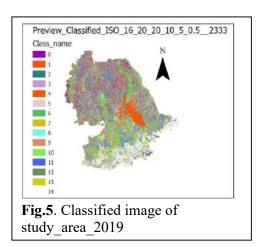


Illustration no 3. The classification is carried out by using pixel based unsupervised classification in which default schema (NLCD2011) is used, 15 classes were used to classify the referenced raster dataset_2019 shown in fig 4(b), Rest all the other fields were taken as default according to ISO

clustering. Click on run button to get classified image of study area 2019 shown in fig 5.

3.3.4 Reclassification of raster by visually comparing the classes with their False Color Composites (FCC) satellite image

In this process the classified raster dataset is reclassify with the help of visual comparison of classified image with their FCC image in different bands combinations which decides that which class goes to which group and the similar classes were merge together, This is carried out by using "reclassify" tool which is made available in data management toolbox. This process will requires following inputs such that the classified Raster Dataset that contains Study Area, Reclassified field (reclassified field denotes the field which is going to reclassified). Further fill the remap table to reclassify the classes working with table following parameters will we considered.

A. The table will display the class value all of them are unique integer values.

B. In Reclassification process the class_name with same integer value will be merged together. To modify table type empty cell in the table and press enter this will validate the table for new entries create a new empty row for subsequent input [9]. In which class_name with same integer value will be merge together. Further in the attribute table the merged classes will be named as water, vegetation, urban agglomerations, crop or/and grass\land, bare mountain etc according to the observation.

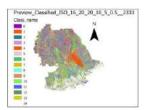
Illustration no 4. TO carry out reclassification process first input classified raster dataset_2019 shown in fig 5 in which class_name with same integer value will merge together, in addition following visual observation will be taken to categories classes:

A. Land use Analysis: ON comparing classified image of study_area_2019 with FCC(red = near IR, green=red, blue=blue) image of study_area_2019 shown in fug 6(A), clearly showing that class_name 04 would be urban agglomerations, class_name 14 will be mountainous region with light vegetation, class_name 10 and 06 will be vegetation. Also after deep observation it was found that class name 11, 1,7,5,3 is crop land.

B Water analysis: On comparing classified image study_area_2019 in fig 5 with FCC(Red=Shortwaveinfrared 2,

Green=Shortwaveinfrared_1, Blue=Nearinfrared) image of study_area_2019 shown in fig 6(B), clearly shows that class_name 08 would be water bodies.

After completely filling the remap table press run button to get reclassify raster dataset, further in the attribute table the merged classes will be named as water, vegetation, urban structures, crop land, mountain/unused land, and rock according to the observation output reclassify final image of study area 2019 shown in fig 7.



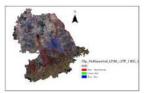
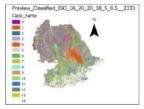


Fig 6(A): FCC image of study_area_2019 compatible for land use analysis



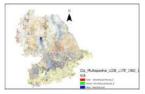
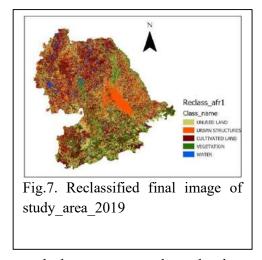


Fig.6(B). FCC image of study_area_2019 compatible for water analysis

3.3.5 Calculate fields in Attribute table using arithmetic operations in python

Attribute tables is made up of rows and columns, and all rows have the same columns. Rows are



commonly known as records, and columns are fields. Each field can store a specific type of data, such as a number, date, or piece of text. The information displayed in a table comes directly from the attribute information stored with in the geographic data [10]. This table is automatic generated by software but some arithmetic operation were required to calculate fields like total no of pixels, area covered by feature, percentage coverage by feature, This can be done by calculate field tool which uses python 3 to perform calculation, which is made available in data management toolbox.

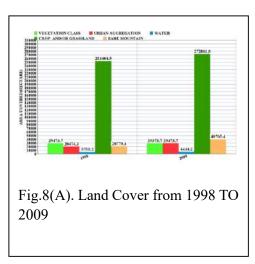
4. RESULT AND DISCUSSION

4.1 RESULT:

4.1.1 Mapping of the land use of the city/district of Indore from 1998 to 2019

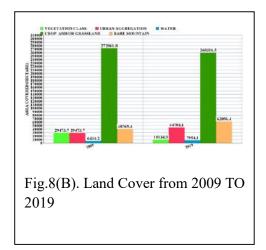
From 1998 to 2019, five classes of land use were identified. This is the vegetation class, crop grassy area, urban aggregation, mountainous region without vegetation and water class. Indeed, in 1998, the vegetation class had an area of 8.37%, 5.33% for the mountainous region without vegetation, 65.07% crops/grassland, 4.48% the urban agglomerations and 1.50% for water. In 2009, the class size of vegetation class, mountainous region without vegetation, crop/grassland, urban agglomerations and water changed to 7.54%, 10.468%, 70.05%, 5.23% and 1.65%. At this level, there is increase in the proportion of the area of thematic classes except that of the vegetation class. In 2019, this same observation is made. The proportion of the area of the other types of occupation is increasing while that of the vegetation category has decreased and is estimated at 2.02%. The graphs in **Figure 8(a)**-(c) show the evolution of the land use classes between 1998 and 2019. They show the different changes that took place during these years in the region.

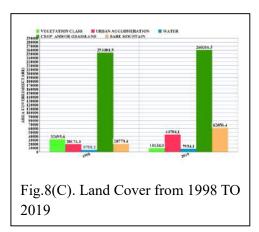
4.1.2 Dynamics of land use between 1998 and 2009



The observation of the graph in Figure 8(a) indicates a general incline in the area occupation classes except the vegetation class. Indeed, the class size of mountainous region without vegetation, crop/or grassland, urban agglomerations, vegetation class and water has increased from 20779.4 ha, 253404.5 ha, 20474.3 ha, 32695.6 ha and 5755.2 ha in 1998 to 40765.4 ha, 272861.8 ha, 29373.7 ha, 29373.7 ha and 6434.2 ha in 2009. At this level, the types of land use that have undergone more regression are the vegetation class and the urban aggregation class. The increase in the urban aggregation class and mountainous region without vegetation class, which is estimated at 20779.4 ha, 32695.4 ha in 1998 against 294793.7 ha, 40765.4 ha in 2000,

was followed by a decrease in the area of the vegetation class.





4.1.3 Dynamics of land use between 2009 and 2019: Figure 8(b) shows that the evolutionary trend is always the same as previous periods. There is a slight decrease in the area of crop and/or grassland which goes from 272867.3 ha in 2009 to 260316.5 ha in 2019. The area of other types of land use that has inclined is 29424.3 ha, 40765.4 ha, 6434.2 ha in 2009 against 44784.1 ha, 62056.4 ha, 6954.1 ha respectively for the urban agglomerations, mountainous region without without vegetation, and water classes. This increase is still due to the decrease in the vegetation category, which decreased from from 29373.3 hectare in 2009 to 10139.4 hectare in 2019.

4.1.4 Overall change in land cover types between 1998 and 2019: Figure 8(a) shows

the changes made between the different land cover classes between 1998 and 2019 in Indore district/city. From 1998 to 2019 the area of vegetation has increased from 20424.3 ha to 44784.1 ha, the degraded vegetation has gone from 32695.6 ha to 10134.9 ha, the area of cultivation and/or grassland has increased from 253404.3 ha to 260316.5 ha and the water class has increased from 5755.2 ha to 6954.1 ha. However, there is a significant increase in urban agglomerations class from 20424.3 ha in 1998 to 44784.1 ha in 2019. Table 1 summarizes the different transformations of the units of land use calculated in each of the five classes along with GDP and population growth between 1998 and 2019...

4.2 DISCUSSION

The method used for the production of land cover land use maps was based on pixel-based unsupervised classification using the ISO cluster. The unsupervised classification uses unsupervised machine learning with the help of different algorithms which allows it to classify image without the need of any training sample, so this method is very useful while handling larger and unstructured dataset in which

Table.2. Details of occupation of	different
land classes	

Percentage occupation			
1998	2009	2010	
8.37	7.54	2.02	
4.48	5.23	11.49	
65.07	70.05	65.80	
1.50	1.65	2.04	
5.33	10 47	19.93	
	1998 8.37 4.48 65.07 1.50	1998 2009 8.37 7.54 4.48 5.23 65.07 70.05 1.50 1.65	

processing time and cost should be low. There are further two methods are available for image classification in an unsupervised manner pixel-based and object-based. There are two methods are available for image classification in an unsupervised manner pixel base and object-based.

The object-based classification is performed based on color and shape characteristics where neighbouring pixel was grouped by the process called segmentation. The result from this process more closely resembles the real world features but it becomes less accurate when classification is done over the large scale area where natural as well as man-made features were present in a complex manner, here comes the pixel-based where classification the classification is performed on the bases on digital number of involving pixels and also characteristics of neighbouring pixels are not considered during classification which allows more complex and disorganized image to be classified more accurately. The use of 5 land cover classes was sufficient to implement a landscape mapping analysis [11]. These different maps were used to follow the spatio-temporal evolution of the study area. Classification is performed on a per-pixel basis, where the Characteristics of neighbouring pixels are not considered in the pixel-based approach, so it is very important to determine and input the proper number of classes in which the Raster Dataset (study area) has to classify because ArcGIS pro uses the very typical algorithm to perform pixel-based unsupervised classification [12]. Where if the number of input class is less, then in some cases pixels which belong to one class could be merged into other class, for example, dense-forest and light vegetation could be merged into same class, as a result, it's become very difficult to differentiate them and if number of input class is excessive then one class could be broken into many classes, as a result, it's become very difficult to reclassify the classes because some of the classes were overlapped with other class/category of land cover. The classification is done by using initially 15 classes and then further reclassify them into 5 classes which gives a satisfactory result.

5. CONCLUSION

Unsupervised classification of Landsat data from satellite imagery have yielded satisfactory and very quick results, and achieved the objectives of the study. Thus, the analysis of multi-spectral Landsat images from 1998 to 2019 made it possible to follow the spatio-temporal evolution of the land use land cover of our study area. The different land cover maps made on the basis of Landsat images (using ETM+and OLI dataset) between 1998 and 2019, showed an increase in the areas of the urban agglomerations, bare mountain, crop and/or grassland and water classes, respectively, 4.48% to 11.49%, 5.33% to 19.93%, 65.07% to 66.80%, 1.50% to 2.04%. In addition, there is a decrease in the area of vegetation from 8.37% to 2.02%. It emerges from this study that anthropogenic pressures, namely population growth and rapid urbanization, mainly explain the increment and the degradation of the mountain vegetation cover and ground vegetation cover. While rapid urbanization, population growth, and lack of employment in rural area encourage massive population migration towards cities and metropolitan regions, as a result, the area covered by urban agglomerations increased especially in the last decades and this increased population need water which may be apply pressure on authorities to increase the capacity of reservoirs, as a result, the area covered by water bodies increased. Table no 2 details of occupation of different land classes.

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"A Literature Review on Solid Waste Management: Characteristics, Techniques, Environmental Impacts and Health Effects in Aligarh City", Uttar Pradesh, India"

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Abstract. India is known as one of the most heavily settled countries in the world. It appears to be the second country to have the highest number of residents. With the total population of about expected data 1.37 billion in 2019. The management of Municipal Solid Waste (MSW) in India has encountered problems. Each year, the population grew by 3–3.5%, as this factor arises, the rate of solid waste generation also rise up to 1.3% in Aligarh city, Uttar Pradesh a large number of ingenious factors like, rapid urbanization, rapid population density, rapid commercialization, uneven living standards and also enlargement of industrialization has created destructive consequences in terms of biodegradable and non-biodegradable waste generations which are estimated at about 415 tons per day.

This paper emphasizes the waste characteristics, techniques, adverse environmental impacts, health risks, poor waste management practices and also problems associated with the solid waste management system at the municipal level.

The findings from this study indicates failure of the existing facilities due to lack of concern, high volume of waste generation, deficient collection space, delayed sanctioning of new landfill sites and a number of open-dump sites which generate fires. The innuendos of the waste management practices in the city are discussed.

Keywords: Sources of M.S.W \cdot Component of M.S.W \cdot Health risks and sustainable approaches

1 Introduction

"Let us keep our city clean"

In recent years fast population growth, increase in urbanization and industrialization in India has created severe problems for solid waste management in cities. The increased level of consumption characteristics of the population of cities lead to generation of enormous quantities of solid waste material. The impacts of such pollution are felt both at local, as well as, at distances from sources. Domestic and industrial discharges lead to contamination of air, eutrophication with nutrient and toxic materials which in turn lead to degradation of air, land and affect flora and fauna badly. Since olden times municipal bodies remained responsible for keeping the roads clean, collect city garbage and to carry out its safe disposal. Most of the elected bodies of the Indian cities employ largest number of employees for the purpose of cleaning the city, but only 50–70% of the waste generated is collected by the staffkeeping aside the tendency of nonworking of the employees. Many estimates of solid waste generation are available but on the average it is projected that under Indian conditions the amount of waste generated per capita will rise at a rate of 1–1.33% annually (Shekdar 1999). So, at present if we follow this presumption the calculated per capita waste generation on daily basis is 583.36 g in 2016. At such a stage solid waste generation will have significant impact in terms of land required for disposal of waste as well as methane emission. Such a large quantity of solid waste requires well managed system of collection, transportation and disposal. It is required that we have proper knowledge about the nature of waste material, its collection and disposal along with recycling and energy generation potential. The traditional routine approach to solid waste management is normally municipal bodies handle all aspects of collection, transport and disposal and this has emerged as a reality of mixed success all over the world in advanced or developing cities. The search for more efficient and economical solid waste collection agenda in most of the urban areas has taken shape adopting several directions towards better partnership with communities along with private sector combining adequate economic policies, e.g., recycling credits by paying the recycler, land-fill disposal levies at land-fill sites designed to minimize the quantity of waste being land-filled and product charges like packing tax to disallow over-packaging. Cities have a wide variety of arrangement under their control to lessen environmental burdens. Legal approach and restrictions on the quantity of pollutants a factory can discharge of minimum air and water quality standards are being particularly proved effective in monitoring pollution in many parts of the globe. The efficiency depends mainly on good enforcement capacities and proper monitoring procedures where urban growth pressures and pollution issues are far greater. The present scenario of solid waste management in Aligarh city shown in Table 1.

Functional element	Detail		
Segregation of storage	Generally absent, waste is thrown on streets		
at source			
Primary collection	Does not exist, waste is deposited on the streets and picked up through sweeping		
Waste storage deposits	Very unscientific, waste is stored on open sites/ Masonry enclosures. A few containers are however, is use		
Transportation	Manual loading is open trucks/ Partly dumper placers		
Frequency of removal	Irregular/Alternate day/ Once in three days/ Once in a week		
Processing	No processing is carried out except A to Z municipal power plant		
Disposal	Unauthorized dumping in open space		

Table 1. The present scenario of solid waste management in Aligarh city.

(Source solid waste management, NEERI vol. 35, 2004).

2 Study Area

The Aligarh is an ancient city in the north Indian state of Uttar Pradesh is situated in the middle of doab-the land between the Ganga and Yamuna rivers, at a distance of 130 km Southeast of Delhi on the Delhi- Howrah rail route and the Grand Trunk road. Aligarh lies between latitude 27° 54′ and 28° north and Longitude is 78° and 78° 5′ east, shown in Fig. 1. The Aligarh city is spread over an area of about 36.7 km². The area lies between the Karwan River in the west and the Senger River in the east and is a part of central Ganga basin. It is the administrative headquarter of Aligarh division. Aligarh is mostly known as a university city where the famous Aligarh Muslim University is located. The Aligarh city is an important centre of lock smithy and brassware

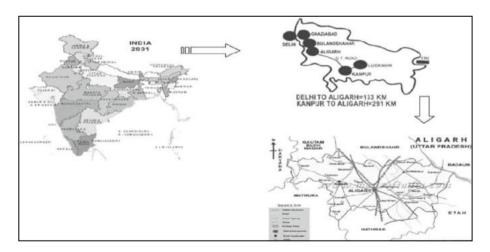


Fig. 1. Location of the study area (Aligarh city), Uttar Pradesh, India.

manufacturing. There are a total of 5506 industrial units in Aligarh city, of these; there are 3500 small scale industries, 2000 medium scale 6 large industries.

3 Objectives

The purpose of this study is to assess the current practices and state of solid waste management systems (SWMS) in one medium-sized Indian town, identifying main issues and problems to its ineffectiveness, inefficiency and to gain some suggestions and recommendations to improve the SWM infrastructure and practices in such Indian towns. Municipal solid material generation and their disposal is a major and critical issue in almost all municipal cities of India. It can harm local environment, as well as, pollute underground potable water. It may also become responsible for dissemination of various diseases in urban areas and its peripheries. Present investigation has been planned to include the target of municipal solid waste management by reducing the quantity of routine production of waste and proper disposal of waste along with recovery of materials and energy from solid waste. All such practices do not have much requirement of any kind of specific raw material and energy inputs technological processes. The proposed investigations have the following objectives of the study for proper management of municipal solid waste in Aligarh city:

- (1) To estimate quantum and prevailing treatment practices of municipal solid waste in study area.
- (2) To analyze various properties and environmental impact of municipal solid waste in study area.
- (3) To develop strategies for suitable collection, segregation, recycling treatment methods for municipal solid waste in study area.
- (4) To assess the use of municipal solid waste through eco-friendly methods and application of municipal solid waste for different uses in study area.
- (5) Develop strategy for mitigation of carbon-di-oxide potential through municipal solid waste disposal methods with the updated data in study area.

4 Scope of the Work

- 1. The study involves door-to-door survey in the residential area of the Aligarh city.
- 2. The primary data collection including: -
 - Generation of the solid waste in the Aligarh city.
 - Source of the solid waste in the Aligarh city.
 - Quantity of the waste generated in the Aligarh city.
 - Health Status of the city in the Aligarh city.
 - About the disposal methodology of the waste in the Aligarh city.
 - Help in the comparison of the previous data.

4.1 Methodology

A medium size city, Aligarh, having a population estimate 1.36 million in 2019, and situated 130 km from the capital city of India, Delhi, was selected for this study. An extensive literature review was conducted to establish a theoretical framework. Field visits were conducted to collect the primary data and to understand the solid waste management of the city.

5 Effects on Poor Waste Management

Health issue is the major problem in India as many of the disease came from the pollutions made by them Health issue arise due to poor waste management in study area for example is malnutrition, especially the children which is the condition that develops when the body does not get the right amount of the vitamins, minerals, and other nutrients it needs to maintain healthy tissues and organ function. (Medical dictionary, 2012) Furthermore, health issue such as dengue, fever, Hepatitis, tuberculosis, malaria, pneumonia, and also poor sanitation due to poor waste management. Due to poor waste management by the authorities, availability of clean and safe water is minimized because of people threw rubbish at the river and the quality of living will decrease.

6 Technique Action

6.1 Municipal Solid Wastes Collection

State government should enforce new strategies which prohibit littering of municipal solid waste in cities towns and urban areas. The following steps shall be taken by the municipal authority.

1. Organizing house-to-house collection of municipal solid wastes: Through any of the methods, for example community bin collection (central bin), house-to-house collection, collection on regular pre-informed timings and scheduling by using bell ringing of musical vehicle (without exceeding permissible noise levels), Planning a systematic way and united effort for collection of waste from poverty areas or localities including hotels, restaurants, office complexes and commercial areas. Biomedical wastes and industrial wastes shall not be combined with municipal solid wastes and such wastes should follow the rules separately specified for the purpose. Horticultural and construction or demolition wastes or debris shall be separately collected and disposed off following proper norms. Similarly, wastes generated at dairies shall be regulated in accordance with the State laws. Stray animals such as dogs and cats shall not be allowed to move around waste storage facilities or at any other place in the city or town and shall be managed in accordance with the State laws. The municipal authority shall notify waste collection schedule in neighborhoods.

- 2. Segregation of municipal solid wastes: Segregation materials should be done by municipal authority by promote recycling and reused waste by create or organized an awareness programs and campaign. The municipal authority shall take in charge phased programs to ensure community participates in waste segregation programmed. For this purpose, the municipal authorities shall arrange regular meetings at quarterly intervals with representatives of local resident welfare associations and non-governmental organizations.
- 3. Storage of municipal solid wastes: Municipal authorities shall establish and maintain storage facilities in such a manner as they do not create unhygienic and in sanitary conditions around it. There is some example criteria shall be taken to establishing and maintaining storage facilities.
 The quantities of waste generation should be counted in order to create enough storage facilities in a given area and the population densities. Furthermore, a storage facility shall be so placed that it is accessible to user. Storage facilities to be set up by municipal authorities or any other agency shall be so designed that wastes stored are not exposed to open atmosphere and shall be aesthetically acceptable and user-friendly.
- 4. Transportation of municipal solid wastes: Vehicles used for transportation of wastes shall be covered. Waste should not be visible to public, nor exposed to open environment preventing their scattering and unpleasant smell. The following criteria shall be met is the storage facilities set up by municipal authorities shall be daily attended for clearing of wastes. The bins or containers wherever placed shall be cleaned before they start overflowing.
- 5. Processing of municipal solid wastes: To minimize burden on landfill the municipal authorities shall adopt suitable technology or combination techniques to process the municipal solid waste. The biodegradable wastes shall be processed by composting, vermicomposting, anaerobic digestion or any other appropriate biological processing for stabilization of solid waste. Mixed waste containing recoverable resources shall follow the route of recycling. Incineration with or without energy recovery including pelletisation can also be used for processing wastes in specific cases. Municipal authority or the operator of a facility wishing to use other state-of-the-art technologies shall approach the Central Pollution Control Board to get the standards laid down before applying for grant of authorization.

7 Health Effects Due to Solid Waste

Over 3.6% annual growth in urban population and the rapid pace of urbanization, the situation is becoming more and more critical with the passage of time. Lack of financial resources, institutional weakness, improper choice of technology, and lack of support from public, towards Solid Waste Management (SWM) has made this service far from satisfactory. Waste generation ranges from 200 Gms to 500 Gms per capita per day in cities ranging from 1 lakh to over 50 lakhs population, as shown in Table 2.

As per above table per capita waste generation in Aligarh should be in the range of 270 gms (approximately). The larger the city, the higher is the per capita waste

Avg. per capita waste generation gms/capita/day
210
250
270
350
500

Table 2. Waste generation per capita

(Source www.jnnurm.com/india)

generation rate. The total waste generation in urban areas in the country is exceeded 39 million tons a year-by-year 2001, and estimated at 62 million tons a year-by year 2025. It is estimated that about 80,000 metric tons of solid waste is generated everyday in the urban centers of India. At present about 60% of the generated solid wastes is collected and unscientifically disposed off. The uncollected solid wastes remain in and around the locality or find its way to open drain, water bodies, etc.

The above information suggest that environmental pollution (specifically air pollution, water pollution and pollution due to waste) is a major health risks to humans, which is to be tackled on a priority basis. It is also essential to prepare compressive national health profile database on health effects due to pollution with respect to urban cities.

Solid waste not only affects the person living nearby it but also it used to affect other too. Actually solid waste due to the formation of the leachate and gases affect the water under the landfill site and also the air around it. Due to the formation of methane and other gases at the landfill site the atmosphere get distorted suddenly and harm the surrounding environment.

8 Discussion

Despite all efforts being made by the local municipality within their limited resources, the solid waste management situation in Aligarh is still not adequate. The waste is being dumped on low lying or open areas in the outskirts of the city without engineering and scientific methods. This situation of SWMS can be compared with other Indian towns of similar size. Management of municipal solid waste in the Aligarh city is far from satisfactory. There are problems in the solid waste management practices prevailing in the study area at every level, such as collection, transportation, processing and disposal. Mismanagement of solid waste is a matter of serious concern for public health and environment.

The generation of the organic manure to promote derivation manure from waste to reduce the quantity of waste going to landfill sites and also to help agricultural production, shown in Table 4. Aligarh Municipal corporation (AMC) tied up with A 2 Z for processing of 250 MT of garbage daily, out of which 42.5 MT of composed per day are produced by microbial compositing. AMC has further extended the waste processing facility to take one step ahead for sustainable waste management and to reduce the load on landfill sites. The following Field photographs (Figs. 2, 3, 4, 5, 6, 7, 8 and 9) are collected from study area.

9 Field Photographs

See Figures 10 and 11 and Table 3.



Fig. 2. Shows drains at Jamalpur, Aligarh.



Fig. 3. Shows cleaning drains at Goolar road, Aligarh.



Fig. 4. Shows drains at Jamalpur, Aligarh.

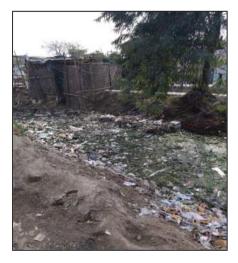


Fig. 5. Shows garbage FM tower near, Maheshpur.



Fig. 6. Goolar road Aligarh.



Fig. 7. Shows Trommel at A2Z Aligarh.



Fig. 8. Shows MSW spillage on the road (Bara Dwari).



Fig. 9. Pratibha Colony, infront of Nigam Workshop, Aligarh, U.P.

Table 3. Shows composition of waste

Composition of waste:	Percentage (%)
Organic	50
Recyclable	15
Silt & sand	15
Construction	10
Other waste	10

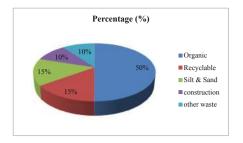


Fig. 10. Graphical representations on composition of waste in study area.

Table 4. Shows composition of manure.

Composition of manure:	Percentage (%)
Moisture	20
Particle size	91
Total organic matter	17.2
Total organic carbon	10
Density	0.95
Total nitrogen	0.48%
C:N ratio	10.65
Phosphores	0.4
Potash	0.4
Color	Black or brown
Odor	Odorless

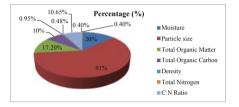


Fig. 11. Graphical representations on composition of manure in study area.

10 Conclusion

Some suggestions would be helpful in improving SWM system in Aligarh city these are as follow:

- 1. Open waste storage sites and other unhygienic street bins should not be allowed.
- 2. The placement of waste receptacles should be correct.
- 3. Door to door collection of waste must be made mandatory that will allow minimum of waste on roads and streets.
- 4. Land filling must be done properly after consideration of all the aspects of present and future of the city and its health
- 5. Alternative and better options for proper waste disposal method must be adopted regularly based on the needs and situation of the area,
- 6. There must be total ban on stray animals who wander on the roads which include cows, bulls, dogs, goats, etc. and these animals must be regularly trapped without any political or community influence. It will solve many of the problems associated with waste disposal.

- 7. Segregation of household waste at the source would reduce the burden of solid waste significantly while at the same time improve the supply of composite serving the nutrient poor farmer near Delhi.
- 8. Proper maintenance of vehicles and other equipments.
- 9. Government should adopt 4R's (Reduce, Reuse, Recycle and Resource Recovery) principle.
- 10. Government should increase the number of composting and energy generation plant.

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Preface

"The 19th Century was a century of empires. The 20th century was a century of nation states. The 21st century will be a century of cities". This was said, around 30 years back, by Wellington E. Webb Mayor of Denver USA.

United Nations estimates that 70% of the people in the world would be living in urban areas by 2050 (88% in developed countries and 67% in developing countries). Cities are growing both in numbers and in size, thus creating unprecedented demand for resources such as energy and water along with services like education, health care, transport, communication and sanitation. Cities are also driving the economic growth.

In India, the level of urbanization is expected to increase to 40.76% in 2030 from 31.2% in 2011. It emerged as the world's fastest growing economy in 2018, with a GDP growth rate of 8.4%. The urban sector in India contributes around 70–75% to the GDP. This dependency of the national economy on the urban sector will get stronger with an increase in the rate of urbanization and will open new opportunities. Cities, today, enjoy more economical, political and technological power than ever before but are facing a number of challenges and threats to their sustainability. To address these challenges to sustainable growth, what we require are "Smart Cities".

The concept of Smart City varies from people to people, city to city and country to country, depending on the requirements of the city residents, level of development, willingness to change and reform. Interest in Smart Cities is driven by major challenges, including climate change, economic restructuring, ageing populations and pressures on public finances. A number of definitions of the term "Smart City" exist, but there is still no consensus on what a smart city is, since several synonyms of the word "smart" are often used interchangeably such as "intelligent" or "digital" or "innovating" or "knowledge".

To deal with the challenges and opportunities during the development of new Smart Cities and renovation of the old cities, authors were invited to write and present their researches/articles in the International Conference on *Smart Cities—Opportunities and Challenges* organised by Department of Civil Engineering, Jamia Millia Islamia (A Central University) New Delhi, India. The selected papers/articles are presented in this book.

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This book contains chapters on urban planning and design, policies and financial management, environment, energy, transportation, smart material, sustainable development, information technologies, data management and urban sociology. Each chapter presents the research papers contributed by renowned researchers, professionals, policy makers of science, engineering, social, management and financial backgrounds. The research papers contribute towards improved governance and efficient management of infrastructure such as water, energy, transportation and housing for sustainable development, economic growth and better quality of life for its citizens, especially for developing nations.

This book will be useful for academicians, researchers, and policy makers interested in developing, planning, designing, managing and maintaining Smart Cities.

New Delhi, India

Sirajuddin Ahmed S. M. Abbas Hina Zia

Introduction

Cities for long are considered to be engines of growth. It is for this reason and the tremendous opportunities (along with a range of challenges) that cities offer that the population living in urban areas grew to 50% by 2008 and likely to grow to 70% by 2050 (UN Habitat 2009). Recognizing the ever-increasing relevance of cities in sustainable development and the urgent need to address the associated challenges, the United Nations in its post-2015 development agenda identified a new set of international development goals called the Sustainable Development Goals (SDG) with a vision of a more prosperous, sustainable and equitable world. For the first time, there is an exclusive goal on cities, Goal No. 11. The eleventh goal states "Make cities and human settlements inclusive, safe, resilient and sustainable". Out of 17 approved by the UN for 2016–2030, focuses on cities and calls for making cities and human settlements inclusive, safe, resilient and sustainable. Some of the specific targets under this goal include a focused approach to ensure the following by 2030¹:

- Ensure access for all to adequate, safe and affordable housing and basic services, and upgrade slums.
- Provide access to safe, affordable, accessible and sustainable transport systems for all, improving road safety with special attention to the needs of vulnerable population (children, women, elderly, differently abled).
- Enhance inclusive and sustainable urbanization.
- Prevention of deaths and number of affected people and economic losses relative to GDP caused by disasters.
- Reduction of environmental impact of cities with special attention to air quality, municipal and other waste management.
- Provide universal access to safe, inclusive and accessible, green and public spaces, particularly for women and children, older persons and persons with disabilities.

¹http://www.undp.org/.

viii Introduction

 Support positive economic, social and environmental links between urban, peri-urban and rural areas by strengthening national and regional development planning.

 Integrated plans and policies towards inclusion, resource efficiency, mitigation and adaptation to climate change and resilience to disasters.

India is committed to achieve Sustainable Development Goals. Several of its national priorities are aligned with the SDG targets. "The SDG India Index: Baseline Report 2018" was released by NITI Aayog, Government of India, to understand and map the progress being made by States and Union Territories in moving towards SDG targets. For Goal No. 11, the report gives data on only two SDG targets out of ten. The overall performance of various States and UTs is not very good based on the limited data mapped for the targets.

India as a nation is on its path of fast pace of urbanization posing multiple stresses on the already overburdened infrastructure of the cities such as affordable housing, provision of clean water, waste management, transport-related services, access to affordable health services, lack of open spaces and poor air quality. The country has launched several programmes at the national and sub-national scale to tackle some of these burgeoning issues. One of the ambitious programmes in this direction is "Smart Cities Mission" which was launched in 2015 with the hope that the initiative itself will catalyze the creation of similar smart cities initiatives in various regions and parts of the country. Considering the different context of Indian cities, the Mission rightly defined the "Smartness" in Indian context and different from the one prevalent in other parts of the world like Europe and America.

"In the approach of the Smart Cities Mission, the objective is to promote cities that provide core infrastructure and give a decent quality of life to its citizens, a clean and sustainable environment and application of 'Smart' Solutions. The focus is on sustainable and inclusive development and the idea is to look at compact areas, create a replicable model which will act like a lighthouse to other aspiring cities".²

The core infrastructure covers everything from adequate water supply, electricity supply, sanitation, efficient mobility services, affordable housing, good governance, robust IT connectivity, sustainable environment, public safety and health and education. Adequate Smart Solutions will thereupon enable cities to use technology, information and data to improve infrastructure and services. Hundred cities from various States and Union Territories were selected as part of the Mission with 5151 projects proposed with a total approved budget of 48,000 crore³ and currently under various stages of implementation.

The book address various themes including urban planning, disaster management and resilient cities, sustainable mobility systems, environmental quality, smart construction technologies, renewable energy technologies for smart city applications,

²http://www.smartcities.gov.in/.

³ What is the status of Smart city projects in India?, The Hindu, 17 July 2019.

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sustainable water and waste management systems, Internet of Things, health and safety and community participation. Several of these papers present research ideas and laboratory-scale testing with potential to replicate and upscale to contribute to Smart Cities Mission and SDG of safe, inclusive, resilient and sustainable communities and cities.

Section related to urban planning, disaster management and resilient cities covers several contributions on a range of pertinent issues and possible solutions. Proposals for Smart cities like Jaipur and Tehri have been critically reviewed. Intelligent urbanism as an approach to urban planning and management specifically for bringing in smartness in cities has been explored in the context of Bhopal city. Paper on Low Carbon Smart cities in India emphasizes the need to integrate disaster and climate resilience framework into the development plans of cities. Relevance of Resilience Maturity Model, a five-stage model to incorporate resilience in smart cities and reduce disaster risks, has been discussed. Spatial-temporal analysis to promote mixed-use development and avoid the increase in urban heat island can be used to have more balanced growth. Urban flooding has been addressed in several papers. Use of weighted aggregated sum/product assessment to prioritize challenges and action plans can be very helpful in making proposals and implementation plans for smarter cities. Citing Bengaluru as a case, need for reorienting the material ecologies of cities has been discussed.

Urban mobility is increasingly becoming a huge challenge to deal with especially in the context of large cities and urban agglomerations. Application of Information and Communication Technologies in monitoring, operation and management of mobility services including parking systems and traffic forecasting has been discussed. Application of renewable solar energy with autonomous vehicles and highway gradient effects on hybrid electric vehicles performance dwell on pertinent issues pertaining to the future of mobility systems.

Section on materials and construction technologies is very extensive and caters to several wide-ranging issues. Corrosion of steel is a serious problem in infrastructure systems; experimental investigation of reinforced concrete corrugated beams strengthened with FRP sheets shows promising results. The effect of elevated temperature on the residual compressive strength of normal and high-strength concrete is helpful for developing appropriate solutions against fire effect. Use of waste coarse ceramic aggregates, incinerator ash and waste nanocarbon black in construction material has been explored. A comparative cost analysis of MMFX bars in Indian scenario explores the possibilities of using smarter materials. Soil blended with more than 5% fly ash is more durable and can increase the durability of roads and embankments. Potential benefits accrued from nanomaterials in various fields of applications hold immense hope. Use of smart construction technologies like "3-S" prefab technology for sustainable mass housing can help in meeting the "Housing for All" targets and can also result in cost savings. Performance assessment indexing of buildings through fuzzy-AHP methodology for predicting the survivability and performance of buildings in case of a likely earthquake has been studied. Use of thermal and optical investigation of lime mortar as a tool for retrofitting and conservation of architectural heritage is

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interesting given the large cultural and architectural heritage present in various parts of the country.

Many small and big cities of the country continue to face increasing air quality deterioration and pose serious concerns for the vulnerable population (elderly, children and diseased). The contributions by various authors on the above theme cover aspects like dynamic programming-based decision-making model for selecting optimal air pollution control technologies for an urban setting, spatio-temporal analysis of urban air quality using ARIMA model at a regional scale, role of particulate matter on air quality assessment of Delhi and ANN-based prediction of PM2.5.

Renewable energy technologies are already playing an increasingly important role in meeting the huge energy demands of cities and are likely to grow further. There are several contributions like control techniques to optimize PV system performance for smart energy applications, techno-economic feasibility analysis of hybrid RE system, review of dSPACE 1104 controller and its application in PV, effective grid-connected solar home-based system for Smart cities in India and MPP technique for solar PV module through modified PSO.

Provision of adequate quality and quantity of water to all is a huge challenge in cities, more so in the face of increasing climate change-related extreme events. WSN-based water channelization addresses the challenges of smart water grid and priority-based water supply for a smart water system. In spite of the addition of capacities for treatment of municipal and industrial wastewater, the gap between demand and supply is huge. There is a need to look for scaling up multiple options which are cost-effective and address the various contextual issues of Indian cities. Comparative study of treatment and performance in a membrane bioreactor and sequencing batch reactor for hospital wastewater in smart cities, removal of Pb from Industrial wastewater using CuO/Hg, forward osmosis exploring for waste/ wastewater treatment has been discussed.

Feasibility of aquatic plants for nutrient removal from municipal sewage in Smart cities explores nature mimicking ways to treat municipal wastewater. India is also home to one of the largest informal waste recycling. India's lethal informal e-waste recycling: a case study of Delhi and NCR explores the possibilities of further recovery potential and need for EPR/appropriate policies to be adopted and implemented in cities of all types.

Cities need to be safe and healthy. Internet of Things (IoT) can play an important role in providing smart applications. The immense requirement of bandwidth serving the large data transfer in smart cities can be served by millimetre waves and emerge as a promising candidate for 5G networks. A paper examines the protocols, simulators and initial feasibility analysis of introducing mmwave communication. Another contribution discusses carbon nanotube-based input buffer for high-speed digital transmission. Challenges of IoT implementation and ways to address the same are discussed in another paper. IoT middleware platforms are further explored in a paper to help application developers in choosing a platform according to the application needs. In another paper, IR sensors have been used as test bed in the classroom environment for the analysis, design and implementation of a scalable

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automatic lighting control system. Such smart lighting control systems can be used in several other settings. In another paper, a STRIDE-based approach is proposed to help the system designer in framing security requirement and proposing possible solutions against specific threats related to smart cities and communities.

Community participation is fundamental to the success of smart cities. There are two contributions which specifically look into ways of empowering the community and ensuring their engagement in various ways.

This book thus attempts to look at a variety of issues currently faced by cities with special reference to Indian cities and offers immense possibilities of a whole range of solutions, not necessarily cost-intensive, to make smart cities a reality.

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A Study on Modelled Granular Column of Various Diameters in Soils



Ankush Chaudhary, Rahul Siddarth, A. K. Sahu and S. M. Abbas

Abstract In order to develop a smart city, the role of smart transportation infrastructure system is essential, which will improve the ability to connect and improve the quality of human being by saving time and energy. In the present paper, an attempt has been made to improve the soil for the construction of smart structures. In the present paper, the aim is to study the variation of load carrying capacity and shear parameters of soil after introducing granular columns of varying diameter. Results show that the granular columns derive the strength from the soil confining them. The granular columns also help in easy drainage and reduction in pore pressure. A series of CBR and direct shear test were performed after the installation of granular columns at the centre of the specimen by varying the diameter in the soil where it was found that there was an improvement in load carrying capacity and shear strength parameters of the soil. The study also presents swelling behaviour of soil against time.

Keywords Soil \cdot Granular columns \cdot Stone dust \cdot Direct shear test \cdot BCS \cdot CBR test \cdot OMC \cdot MDD

1 Introduction

Smart cities may be considered as a community that uses the advanced technology and information to improve the infrastructures for the betterment of human being which not only increases the safety but a strong and sustainable infrastructure can be made.

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For any infrastructure, the strong and durable substructure is essential, but in case of problematic soils, some ground improvement techniques are required. In order to construct a smart structure on expansive soil, a study on granular sand column was carried out [1].

Other than the strength criteria, one of the other problems encountered by the soil engineer is the expansive nature of soil found in major parts of the world. The central part of India is covered with such soil. These soils are highly expansive when brought in contact of water and thus offer high uplift capacity to the structures built upon it leading to destruction of integrity of the structure; hence, it becomes very important to study such soils and methods to stabilize them.

Reinforcing the soil for modifying the bearing capacity, shear strength parameters, minimizing settlement as well as swelling and so it has been one of the important goals of studies and researches conducted on soil [2, 3]. These studies have proven to be very useful in every small and large construction projects related to soil where soil serves as foundation material or load bearing strata. The previous studies reveal that the granular column offers resistance to shear stress due to its orientation as well as in axial loading condition due to the confining pressure offered by soil surrounding the column when the column bulges under the vertical loading [4, 5].

The present study aims at studying the effect of granular columns on shear strength parameters and swelling characteristics offered by the soil with and without granular columns of varying diameter. The scope of the study conducted can be applied in the following fields:

- Ground improvement
- Analysis of shear parameters of soil
- Stability analysis of a structure.

Granular columns construction was a cost-effective method developed in order to encounter expansive soils. The expansive soils refer to clay and fine silts which posses high water content and are subjected to low undrained strength [6]. In such kind of soils, granular columns are driven space closely to form a grid of granular columns that imparts higher strength and stiffness to the existing soil [1, 7].

2 Materials Used

The materials used for the study are various types of soils such as sand, black cotton soil, and stone dust [7]. The geotechnical properties of various materials are obtained as per various parts of code IS-2720 (Table 1,2,3).

Table 1 Properties of silty sand and poorly graded sand

Description	Silty sand (SS)	Poorly graded sand
Specific gravity	2.66	2.63
Soil type	SM	SP
Maximum dry density	18.83 KN/m ³	15.50 KN/m ³
Optimum moisture content	11.56%	14.24%
Cohesion (c)	8.05 KN/m ²	0 KN/m ²
Angle of internal friction (Ø)	22°	29.6°

Description	Value
Specific gravity	2.77
Soil type	SP
Maximum dry density	18.88 KN/m ³
Optimum moisture content	12.22%
Cohesion (c)	0.04 KN/m ²
Angle of internal friction (Ø)	77.2°

Table 3 Properties of black cotton soil (BCS)

Description	Value
	1 1111111
Specific gravity	2.73
Soil type	СН
Maximum dry density	17.75 KN/m ³
Optimum moisture content	21.23%
Cohesion (c)	56.57 KN/m ²
Angle of internal friction (Ø)	3.15°
Liquid limit	56.60%
Plastic limit	25.32%
Plasticity index	31.28%
Activity	1.145
UCS value	110.35 KN/m ²

3 Experimental Investigation

This portion covers the study and experiment conducted to observe the effect of granular columns of varying diameter on engineering properties of soil taken for consideration. The motive of the study was to analyse the variation in CBR value, cohesion value, and angle of internal friction and swelling behaviour of soil after the installation of granular columns at the centre of area. As mentioned earlier, soils considered are BCS and silty sand, while the material for column was kept as stone dust and sand.

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The tests conducted were:

- California bearing ratio test
- Direct shear test.

3.1 California Bearing Ratio Test

- CBR test is performed according to IS2720 PART 16.
- According to IRC 37: 2012, the CBR results depend on various factors, and wide variation in values can be expected.
- In the current investigation, the improvement in the given soil has been achieved through installation of granular columns of varying diameter.
- The soil was compacted to MDD at OMC.
- All the CBR tests were performed in soaked condition.

3.2 Direct Shear Test

- Test performed as per IS 2720-part 13-1972
- The soil was compacted to MDD at OMC
- The tests were performed with a single objective to see the variation in cohesion and angle of internal friction in the soil after the installation of columns.

3.3 The Experimental Investigation Shall Be Conducted in the Following Stages

- Study the 'Variation in CBR value for black cotton soil with and without installation of granular column'.
- Study the 'variation in CBR value for silty sand with and without installation of granular column'.
- Study the 'Variation in shear parameter for black cotton soil with and without installation of granular column using DST'.
- Study the 'variation in shear parameter for silty sand with and without installation of granular column using DST'.
- Study the 'variation in the swelling behaviour of black cotton soil with and without installation of granular column (Tables 4 and 5; Fig. 1).

Table 4 Results of CBR test on soils with and without granular column

Description	CBR value (%)
Plain BCS	2.13
BCS + 10 mm stone dust column	2.74
BCS + 15 mm stone dust column	3.23
BCS + 20 mm stone dust column	3.52
BCS + 10 mm sand column	2.56
BCS + 15 mm sand column	2.91
BCS + 20 mm sand column	3.06
SM (silty sand)	3.53
SM Soil + 10 mm sand column	3.70
SM Soil + 15 mm sand column	3.83
SM Soil + 20 mm sand column	4.11
SM Soil + 10 mm stone dust column	3.75
SM Soil + 15 mm stone dust column	4.00
SM Soil + 20 mm stone dust column	4.21

Table 5 Results of direct shear test with and without granular column

Description	Cohesion (c) (KN/m ²)	Angle of internal friction (Ø)
Plain BCS	56.57	3.14°
BCS + 10 mm stone dust column	48.34	5.37°
BCS + 15 mm stone dust column	42.77	9.14°
BCS + 20 mm stone dust column	37.95	13.28°
BCS + 10 mm sand column	50.18	4.91°
BCS + 15 mm sand column	46.76	8.19°
BCS + 20 mm sand column	39.16	12.78°
SM soil + 10 mm sand column	2.03	18.00°
SM soil + 15 mm sand column	1.67	19.13°
SM soil + 20 mm sand column	1.10	33.66°
SM soil + 10 mm stone dust column	6.35	16.43°
SM soil + 15 mm stone dust column	4.34	22.80°
SM soil + 20 mm stone dust column	4.06	31.04°

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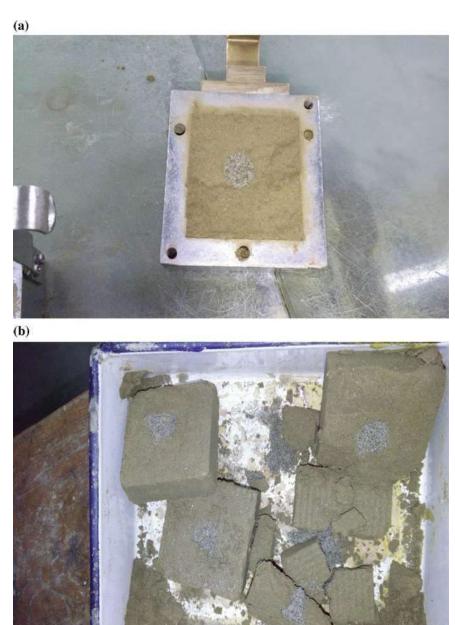


Fig. 1 a DST box with silt soil with granular material columns. b Failed samples

3.4 Swelling Behaviour of BCS

In order to evaluate the effect of granular column on swelling behaviour of BCS, the soil was kept in soaking condition compacted at OMC in CBR mould. The swelling was recorded every 24 h for a duration of four days. This was adopted for both soils in plain and in reinforced condition. The following results were obtained (Tables 6 and 7; Figs. 2 and 3).

Table 6 Swelling for BCS with and without granular column of stone dust

Time (h)	Swelling (Swelling (mm)						
	BCS	10 mm column	15 column	20 column				
24	6.45	6.55	6.65	6.35				
48	11.10	10.75	10.30	9.70				
72	12.65	12.05	11.50	10.90				
96	13.00	12.50	12.10	11.10				

Table 7 Swelling for BCS with and without granular column of sand

Time (h)	Swelling (mm)									
	Plain BCS	Plain BCS 10 mm column 15 column 20 column								
24	6.45	6.25	6.35	6.25						
48	11.10	10.85	10.65	9.50						
72	12.65	12.50	11.30	10.70						
96	13.00	12.75	11.90	11.0						

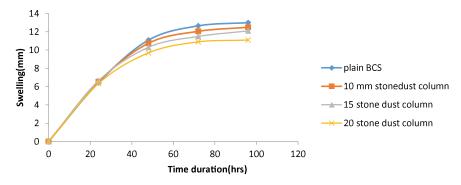


Fig. 2 Swelling behaviour of BCS with and without granular column of stone dust

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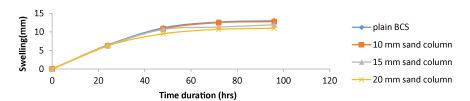


Fig. 3 Swelling for BCS with and without granular column of sand

4 Results and Discussion

The results and discussion with respect to CBR and direct shear tests on black cotton soil (BCS) and silty sand (SS) with and without granular column made up of poorly graded sand and stone dust are presented.

4.1 CBR Test

The results above show that after the installation of granular columns, there has been an increase in the load taking capacity of soils considered, and the possible reason for such behaviour of soil can be deduced from the previous research studies. When the load is applied on the soil in the CBR mould, the load is concentrated on the granular column; under the effect of load, the column tries to fail, but its failure is resisted by the lateral support and resistance provided by the surrounding soil (Table 8).

However, when we compare the BCS to SS soil which is basically comprising of the granular material itself, the granular columns prove more fruitful in BCS; the granular columns in SS soil give low value due to the presence of sand in soil which lowers the cohesion value restricting the lateral support to bulging action of granular column when loaded (Fig. 4; Table 9).

The tabular form of data presented above after conduction of DSTs shows that after the soil was installed with granular columns, there was a decrease in cohesion value of the soil. The decrement of cohesion value increases with the diameter of the column; the reason for happening so is the reduction in the area of plane of failure as the diameter of column is increased.

With the increase in the diameter of column, there is an increase in ϕ value of soil again for the similar reason as stated above; however, the effect of granular column on ϕ value of SS soil is unpredictable which was due to the presence of fine sand particles in the soil.

A better understanding can be developed from the graph plotted Figs. 5 and 6. After studying the diameter variation of reinforcements on soil's shear parameters and the load carrying capacity [8], it also becomes very important to go through the result which we got from the swelling tests that were performed during

BCS Soil with granular SS soil column of Stone dust Sand Stone dust Sand diameter (mm) CBR % CBR % CBR % CBR % (%) increase (%) increase (%) increase (%) increase 00 2.130 0 2.130 0 3.53 0 3.530 0 10 2.746 28.92 2.560 20.18 3.76 6.51 3.700 4.81 15 2.919 3.235 51.8 37.04 4.0 13.31 3.832 8.55

43.8

4.21

19.26

4.110

16.43

3.063

Table 8 Variation of CBR with diameter of granular columns

65.2

3.520

20

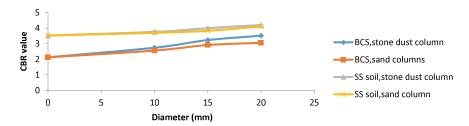


Fig. 4 Variation of CBR for given soil with varying diameter

Table 9 Variation of $c-\varphi$ with diameter of granular columns

Soil with	BCS				SS soil			
granular	Stone dust		Sand		Stone dust		Sand	
column of diameter	c (KN/m ²)	φ						
Plain	56.57	3.14°	56.57	3.14°	8.05	22.00°	8.05	22.00°
10 mm	48.34	5.37°	50.18	4.91°	6.35	16.43°	2.033	18.00°
15 mm	42.77	9.14°	48.76	8.19°	4.34	22.8°	1.67	19.13°
20 mm	37.95	13.27°	39.16	12.78°	4.066	31.04°	1.103	33.66°

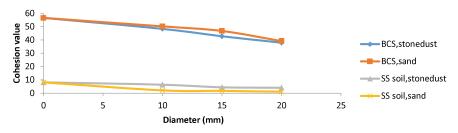


Fig. 5 Variation of cohesion value for given soil with varying diameter

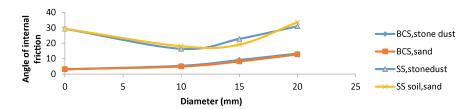


Fig. 6 Variation of φ value for given soil with varying diameter

the investigation program. It was seen that soil like BCS that could swell up to a large extent was cut down short after installation of granular columns. The possible reason for this could be easy drainage facility allowed by the granular columns and minimization of pore pressure caused by them. They also allow expansion in lateral direction. Hence, in this manner, swelling was reduced [9].

However, when it comes to choose between the two granular material, considering the alternations it caused in load bearing capacity, shear strength criteria, and the swelling criteria; it is rational to choose stone dust over sand (Table 10 and 11; Figs. 7, 8 and 9) [10].

Table 10 Variation of CBR with respect to area replacement ratio

Type of cases BCS					SS (silty sand)				
Diameter	$A_{\rm r}$	Stone dust		Sand		Stone dust		Sand	
of granular	(%)	CBR	CBR %		%	CBR	%	CBR	%
column		(%)	increase	(%)	increase	(%)	increase	(%)	increase
0	0	2.130	0	2.13	0	3.53	0	3.53	0
10 mm	0.44	2.746	28.92	2.56	20.18	3.76	6.51	3.70	4.81
15 mm	0.10	3.235	51.8	2.92	37.04	4.0	13.31	3.83	8.55
20 mm	1.77	3.520	65.2	3.06	43.8	4.21	19.26	4.11	16.43

Table 11 Variation of $c - \varphi$ with respect to area replacement ratio

	BCS					SS soil			
Diameter	$A_{\rm r}$	Stone dust		Sand		Stone dust		Sand	
of column (%)		c (KN/m ²)	φ	c (KN/m ²)	φ	c (KN/m ²)	φ	c (KN/m ²)	φ
Plain	0	56.57	3.14°	56.57	3.14°	8.05	29.4°	8.05	29.4°
10 mm	0.21	48.34	5.37°	50.18	4.91°	6.35	16.43°	2.033	18.00°
15 mm	4.90	42.77	9.14°	48.76	8.19°	4.34	22.8°	1.67	19.13°
20 mm	8.72	37.95	13.28°	39.16	12.78°	4.066	31.04°	1.103	33.66°

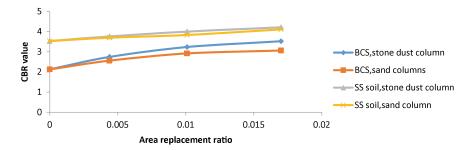


Fig. 7 Variation of CBR with respect to area replacement ratio

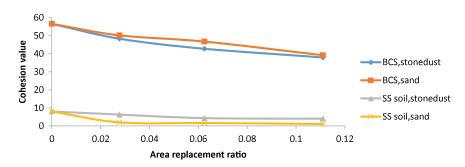


Fig. 8 Variation of c with respect to area replacement ratio

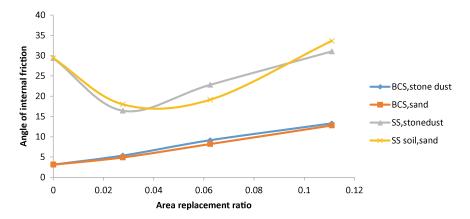


Fig. 9 Variation of φ with respect to area replacement ratio

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Let us also discuss the variation of CBR and $c-\phi$ value variation with area replacement ratio where:

Area replacement ratio

= (area of granular column/area of the mould in which sample is placed).

 $A_r = A_g/A_m$

Diameter of CBR mould = 150 mm.

5 Conclusions

The smart cities can be developed with the smart infrastructures; however, it is difficult to construct such structures on problematic soils. The experimental results of the present study ensure the improvement of problematic soils by intrusion of granular sand columns. Finally, the following conclusion:

- The results of both CBR and DST reveal that the strength of the silty soil and black cotton soil increases due to installation of granular columns.
- The granular column made up of stone dust gives better results as compared to sand columns in both the soils adopted for the study. Therefore, stone dust obtained from the rock crushing industries often discarded as a waste material should be used wisely.
- With increase in % area of fraction of granular material, the strength of overall composite-reinforced soil increases.
- The swelling behaviour of black cotton soil is also reduced after the installation
 of granular column. This is an extra advantage that could be induced in
 expansive soil after the installation of granular columns.

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Column operations for sorption of chromium and lead from aqueous solution using industrial wastes

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Abstract

The rotary kiln waste (dolochar) generated in sponge iron plants has been converted into a low-cost adsorbent by heat activation for the removal of chromium and lead from aqueous solution. The effects of pH, sorbent dosage, adsorbate concentration, temperature, and contact time on the sorption of both the metal ions were studied in batch experiments. Kinetic studies were also conducted to have an idea on the sorption mechanism of the process. The uptake of lead was found to be more than that of chromium. Adsorption on dolochar followed Freundlich isotherm. The kinetics of the Cr (VI) and Pb (II) adsorption on the kiln waste was found to follow a pseudo second-order rate equation. It was observed that the sorption process was spontaneous and adsorbents is suitable for sorption of Pb(II) and Cr(VI). In addition, fixed-bed studies were performed to simulate real-life conditions. The experiments were also performed to regenerate the column by 0.2N HNO₃ for lead-dolochar system and 0.5M NaOH for chromium-dolochar system for reuse.

Key Words: Adsorption; Dolochar; Isotherms; Column study; Breakthrough curve

1. Introduction

Water pollution due to toxic heavy metals such as chromium, lead, manganese, copper, iron, zinc etc has been a major cause of concern for the society. Among these heavy metals, chromium and lead are toxic metals found in several industrial discharges and effluents (Dubey and Gopal 2007). Chromium is harmful heavy metal ion which exists in hexavalent and trivalent forms. The permissible limits of Cr (VI) and Pb (II) in industrial effluents are stipulated 0.5 mg/l and 0.1 mg/l respectively by the environment protection agency in India. But, these metal ions in the mining and industrial effluents are often found to be more than the permissible limits (De Filippis and Pallaghy 1994). Safe disposal of heavy metal contaminated wastewater is a challenging task due to the fact that techno-enviro-cost-effective feasible treatments are scanty (Weng et al., 1994). Although number of methods such as ion exchange, reverse osmosis, precipitation, and adsorption etc. exist to remove these toxic metal ions from industrial effluents, the literature survey suggest that most versatile and widely method is the method of adsorption. Activated carbon has been a standard adsorbent for removal of heavy metals from industrial wastewaters since long (Fornwalt 1966) despite being an expensive material. In last few decades, the researchers have shown lot of interest to develop low-cost adsorbents as a substitute to activated carbon.

2. Material and methods

This study was conducted in the Environmental Engineering Laboratory, Department of Civil Engineering, Veer Surendra Sai University of Technology Odisha in 2015-16. The details of materials and methods of the study are as follows;

2.1. Reagents

Stock solutions of the test sorbates were made by dissolving analytical reagent (AR) grade of potassium dichromate $(K_2Cr_2O_7)$ and lead nitrate $(Pb(NO_3)_2)$ in double-distilled water.

2.2. Equipments

pH measurements were made using a Orion make pH meter. The lead concentrations were measured using Rayleigh WFX-1308 atomic absorption spectrophotometer. A UV-Visible spectrophotometer (Systronics AU-2701) was used for measuring hexavalent chromium by complexing with 1,5-diphenyl carbazide in acid solution at 540 nm. The constituents of dolochar were analyzed by chemical analysis (Vogel 1989). A scanning electron microscope with an electron dispersive X-ray spectrometer (SEM/EDX, JEOL, JSM-6300F) was used to study the surface morphologies and elemental analysis of the dolochar

2.3. Preparation of adsorbent

The waste material (dolochar) was collected from the one of the sponge iron plants operating in the western part of Odisha, India. The impurities present in the dolochar were removed by washing it thoroughly with distilled water followed by drying the dolochar at 200°C. Then the product was cooled at room temperature and activated in a muffle furnace at 600°C for one hour. The condition of actiation was optimized to obtain the best sorption capacity. The product so obtained was sieved to obtain in the range of three-particle sizes viz. 360, 505 and 795 micron. Finally, the materials was kept in a desiccator until used.

2.4. Preparation of adsorbate

The stock solutions of Pb(II) and Cr(VI) (1000 mg/L) were prepared by dissolving the required amounts of anhydrous lead nitrate and potassium dichromate (Analytical grade) respectively in distilled water. Different concentrations of these two solutions were then made from the stock solutions. Dilute H₂SO₄ or NaOH solutions were added to maintain the pH of the solution.

2.5. Adsorption studies

Batch adsorption studies were conducted by taking a series of 50 mL test tubes filled with 10 mL of adsorbate varying initial concentrations from 10 to50 mg/l and adjusted to desired pH and temperature. The dolochar of known quantity was added into each test tube and put in a mechanical shaker at 150 rpm for attaining equilibrium concentration. After one hour, the supernatant solution was filtered and analyzed for aqueous metals. The effect of temperature on sorption was assessed at 30, 40, and 50°C. The effect of pH was studied from 1 to 8.

The adsorption of metal ions on sample was obtained by calculating the difference between the initial and final concentration in solution. The removal capacity q_e (mg/g) of both metal ions was calculated as

$$q_{e} = (C_{0} - C_{t}) V$$

$$W$$
(1)

C (may/I) is the initial master

where C_0 (mg/L) is the initial metal ion concentration, Ct (mg/L) is metal ion concentration at any time t (min), V (litre) is the volume of the solution and W (g) is the weight of adsorbent used.

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2.6. Adsorption isotherms

Two adsorption isotherm models such as Langmuir and Freundlich isotherms were employed to understand the mechanism of the adsorption. The linear form of Langmuir isotherm is

$$q_e = \left(\frac{K_L b C_e}{1 + b C_e}\right) \tag{2}$$

where qe (mg/g) is the amount adsorbed at equilibrium and Ce (mg/L) is the equilibrium concentration. The maximum amount of adsorption capacity (Q₀) and energy of adsorption (b) were determined from the slope and intercept of the linear plot of Ce/qe against Ce. The linear form of Freundlich isotherm is

$$\ln q_e = \ln k + \frac{1}{n} \ln C_e \tag{3}$$

where K_F and 1/n are Freundlich constants related to adsorption capacity and intensity of adsorption and these are determined from the slope and intercept of the plot of ln Ce and ln qe.

2.7. Kinetic measurements

The known concentration of 10 ml metal solutions was taken in a number of glass tubes and placed in a temperature controlled mechanical shaker. Then, required quantity of adsorbent was added into each test tube, once the desired temperature was attained. At given time intervals, the test solutions were filtered and the aqueous metal ions in the supernatant were measured.

The pseudo-first order and second order kinetic models were employed to fit the experimental data obtained at different temperatures to evaluate the adsorption kinetics of metal ions. The linear form of both the equations are as follows;

Ist order Kinetics: Log
$$(q_e-q) = \log q_e - \frac{Kad}{2.303}t$$
 (4)

2nd order kinetics:
$$\frac{t}{q} = \frac{1}{K_2 q_{e^2}} + \frac{1}{q_e} t$$
 (5)

where qe and qt are the metal ion adsorbed per unit weight of adsorbent (mg/g) at equilibrium at any time t, respectively; K1 is the rate constant for 1st order reaction and K₂ is the rate constant for 2nd order reactions. The above two models have been examined by each linear plot of log (qe-q) versus t, and (t/q) versus t, respectively.

2.8. Mass transfer parameter

The particle, film diffusion and mass action-controlled mechanism of exchange are the basis of sorption/ion exchange kinetics (Boyd et al., 1947; Reichenberg 1953). It is necessary to identify the step that governs the overall removal rate of the adsorption process. The linearity behavior of the Boyd plots passing through the origin establish the fact that the rate controlling step in the adsorption process is the internal diffusion, and vice versa.

2.8.1. Boyd model

For the design purposes, it is required to distinguish between film diffusion and particle diffusion applied (Doner et al., 2003). In order to identify the slowest step in the adsorption process, Boyd kinetic equation was employed. The kinetic data was also analyzed by the procedure given by Reichenberg (1953) and Helfferich (1962). The following equations were used as:

$$F = 1 - \frac{6}{\pi r^2} \sum_{n=1}^{\infty} \frac{1}{n^2} \exp\left[\frac{-D_L t \pi^2 n^2}{r^2}\right]$$

(6)

$$F = 1 - \frac{6}{\pi r^2} \sum_{n=1}^{\infty} \frac{1}{n^2} \exp\left[-n^2 Bt\right]$$
 (7)

Where F is the fractional attainment of equilibrium at time t and is obtained by the expression

$$F = \frac{q}{q_m} \tag{8}$$

Where q is the amount of metal ion adsorbed at time t and $q\infty$ is the maximum equilibrium uptake. Bt is a function of F, which can be calculated for each value of F such as:

$$Bt = -0.04977 - \ln(1 - F)$$

$$B = \frac{\pi^2 D_l}{r^2} = \text{time constant}$$
(9)

Where, D_i is the effective diffusion coefficient of ion in the adsorbent phase, r is the radius of the adsorbent particle, assumed to be spherical and is an integer that defines the infinite series of solution. The values of Bt were plotted versus time and the linearity was employed to distinguish between the film diffusion and particle diffusion controlled adsorption. If the plot of Bt versus time is a straight line passing through the origin, then the adsorption rate is governed by particle diffusion mechanism otherwise it is governed by film diffusion.

2.8.2. Film diffusion parameter

The rate of change of metal ion concentration for film diffusion is as follows:

$$\frac{dC}{dt} = k_L A_s (C - C_s) \tag{10}$$

Where C is the bulk liquid phase concentration of metal ion at a time t, C_S is the surface concentration of metal ion, k_L is the external mass transfer coefficient and As is the specific surface area for mass transfer. It is assumed that during the initial stages of adsorption, the intraparticle resistance is negligible and the transport is mainly due to film diffusion mechanism. At t = 0 in the surface concentration of metal ion, CS is negligible and $C = C_0$. With this assumption equation (10) can be simplified as:

$$\left[\frac{d(C/C_0)}{dt}\right] = -k_L A_s \tag{11}$$

Assuming the adsorbent particles to be spherical, A_s is calculated from equation (12).

$$A_{s} = \frac{6S_{s}}{d_{P}\rho_{P}} \tag{12}$$

Where Ss are the sorbent mass concentration in the solution, d_p is the average particle diameter and ρ_p is the density of the sorbent. By plotting C/C_0 against t, the value of k_L may be determined from the slope at t=0.

2.9. Thermodynamic parameters

The adsorption mechanism was also determined through the thermodynamic parameters such as ΔG° , ΔH° and ΔS° . The value of ΔH° and ΔS° was determined from Van't Hoff equation as given below

$$\ln K_C = \frac{\Delta S^0}{R} - \frac{\Delta H^0}{RT} \tag{13}$$

The ΔG° value was calculated by using the equation

$$\Delta G^0 = -RT \ln K_C \tag{14}$$

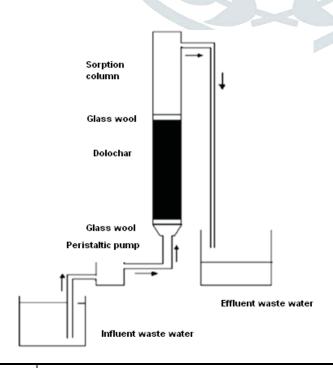
where R is the gas constant, T is the temperature in Kelvin and Kc is equilibrium constant, determined as

$$K_C = \frac{C_A}{C_e} \tag{15}$$

In the above equation, C_A is the adsorbed amount of adsorbate at equilibrium (mg/L) and C_B is the equilibrium concentration in solution (g/L). The plot of log Kc vs. 1/T for both metal ions can be examined to determine ΔH° and ΔS° from the slope and intercept of the plot respectively.

2.10. Column studies

Fig shows the schematic of the experimental setup used in the study. The column was made up of perspex having 4.5 cm in diameter and 55 cm in length. The column was packed with dolochar having layers of glass wool at top and bottom of adsorbent. The column was placed in a vertical position and operated in up-flow mode having flow regulation device at the inlet and outlet of column. The column was then filled with water and the required amount of dolochar was put inside the column. Then the column was allowed to remain in quiescent condition for full settlement of adsorbent. The column was operated up to a point when 90% of the breakthrough capacity was attained. Regeneration of column with suitable chemicals has also been undertaken to restore the sorption efficiency of the column for reuse.



3. Results and discussion

3.1. Characterization of adsorbent material

The chemical analysis of the dolochar as determined were having Moisture content - 3.3, Volatile matter-0.84, Fixed Carbon- 22.79, CaO- 3.6, SiO₂- 48.4, MgO- 1.7, Al₂O₃-15.1, Fe- 4.27 %t by weight. The density, porosity, and ZPC of the material were found to be 3.25 g/cc, 67.5%, and 6.4, respectively. Surface area of the sample as determined by the BET method was 15.36 m²/g. Fig. 2 shows the SEM photograph of dolochar which clearly reveals the porous texture of the product. The EDX spectrum (Fig.3) shows that C, Si, Al, O, Ca, K and Fe are the major elements present in the dolochar.

3.2. Effect of particle size

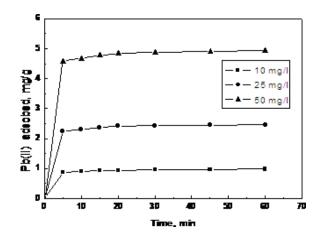
Batch adsorption experiments were conducted at pH 6 ± 0.1 , room temperature at 30°C with an initial concentration of 10 mg/l and a sorbent dose of 10 g/l for different particle size. Fig. 4 shows the the effect of different particle sizes on the metal sorption capacity of Cr (VI) ions. It was observed that by decreasing the particle size from 795 to 505 μ m, the equilibrium concentration was decreased from 1.42 to 0.62 mg/l, the percentage uptake and sorption capacity was increased from 85.8 to 93.8% and 0.858 to 0.938 mg/g respectively.

As the particle size was further decreased from 505 to 360 µm, there was not much effect; however the equilibrium concentration was decreased from 0.62 to 0.56 mg/l, and the percentage uptake and sorption capacity was increased from 93.8 to 94.4 % and 0.938 to 0.944 mg/g respectively. Similar observations were made for Pb (II).

Hence it observed that, the percentage uptake of metal ion were increased with decrease in particle size of dolochar. Decreasing the particle size will increase the surface area per gram of the sorbent, which will provide more number of binding sites and the sorption capacity is increased. Also too small sizes will the cause of high head loss in the column operation. The particle size of 505 micron was selected for detail kinetic study.

3.3. Effect of contact time

The effect of contact time between adsorbent (10g/l) and adsorbate was studied by varying the contact time in the range of 5-60 min at 308 K. Fig. 5 & 6 shows the effect of contact time on uptake capacity of Cr (VI) and Pb(II) by dolochar at different time intervals. It was observed that the rate of adsorption of metal ions is rapid during the initial period. Beyond 30 min, slower rate of sorption indicates conditions of equilibrium.

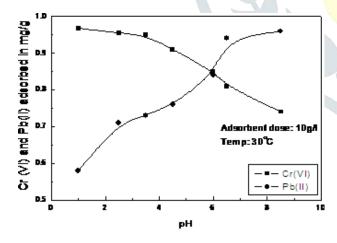


3.4. Effect of adsorbent dosage

The potential of adsorbent dosage to adsorb metal ions for a given initial concentration of the sorbent was studied. Fig. 7 shows the effect of adsorbent dosages on Cr (VI) uptake at 308 K. The initial concentration of chromium was kept at 10mg/l. The percentage uptake of metal ion at equilibrium was improved from 90.0 to 94.6 % by increasing the adsorbent dose from 5 to 15 g/l (Garg et al., 2004; Kannan and Veemaraj 2010; Potgieter et al., 2006). The percentage uptake for 10 and 15 gm/l was almost same. The sorption capacity at equilibrium for the doses of 5, 10 and 15 g/l were obtained as 1.820, 0.938 and 0.630 mg/g respectively. There was a marginal decrease in the sorption capacity for 10 and 15 gm/l. Similar observations were made for Pb (II). Hence, the sorbent dose of 10 g/l of dolochar seems to be optimum and was selected for the detailed kinetic study.

3.5. Effect of pH

In the adsorption process, the adsorbent surface acquires positive or negative charge depending on pH of the solution. Fig. 8 shows the effect of pH varying from 1 to 8 on the uptake capacity of Pb(II) and Cr(VI). It may be observed from the figure that with increase in pH from 1 to 8, the adsorption of Pb(II) increases from 56 to 98.5%, whereas removal of hexavalent chromium by dolochar at different pH values decreases from 97 to 76%. This indicates that the adsorption of chromium is better at acidic pH in comparison to alkaline pH. (Godea et al., 2010; Lalvani et al., 2000; Kobya 2004; Bishnoi et al., 2004). The optimum pH for removal of both ions is found to be at pH 6.



3.6. Effect of temperature

Figs. 9 and 10 show the temperature dependence of Cr(VI) and Pb(II) adsorption by dolochar respectively. The study was conducted at a constant initial metal ion concentration of 10 mg/L for different temperatures (303, 313 and 323 K). From the figures, it may be found that increase in temperature increases the adsorption efficiency indicating chemisorption.

3.7. Adsorption isotherms

The relative parameters of two adsorption isotherm models, Langmuir and Freundlich were determined at three different temperatures and shown in Table 1. Both the isotherm plots showed a linear pattern, The best-fit equilibrium model was determined on the basis of regression correlation coefficient R² and as shown in the Table1. It follows Freundlich model closely.

3.8. Kinetics of adsorption

The pseudo-first order and second order kinetic models were used for evaluating the adsorption kinetics of Pb(II) and Cr(VI). It was observed that the sorption process follows the pseudo second-order kinetic, which agrees with chemisorptions as the rate-limiting mechanism. Figs. 11 and 12 show the pseudo second order plot for chromium and lead respectively. Kinetic parameters and correlation coefficients of different models are given in Table 2. The correlation coefficients of pseudo second-order kinetic model were observed to be highest and almost equal to 1 (Ho and McKay 2000; Cheung et al., 2001; Mohapatra et al., 2009; Namasiyayam and Yamuna 1995) which is the best fitted model in most of the cases as compared to pseudo first order kinetic model or other models (Souundarrajan et al., 2012; Kumar et al., 2013; Li et al., 2012; Jabeen et al., 2011; Ju et al., 2010; Babu and Gupta 2008; Zhu et al., 2012). This is confirmed by the results observed in the present study.

3.9. Mass transfer parameter

3.91. Boyd model

In order to distinguish between film diffusion and particle diffusion, Boyd kinetic equation was employed. The values of Bt were plotted versus time and the linearity was employed to distinguish between the film diffusion and particle diffusion controlled adsorption. As seen from Fig. 13 and 14) for both the metal ions, viz., Cr(VI) and Pb(II) at 10, 25 and 50 mg/l initial concentration, the Bt versus time plots do not pass though the origin indicating the rate-controlling step to be governed by film diffusion. The effective diffusion coefficients Di were calculated from the slope of these plots and are presented in Table 3.

3.9.2. Film diffusion parameter

Figs. 15 and 16 are the plots of C/C_0 versus time which demonstrate the effect of initial metal ion concentration on the external diffusion rate. It may be was seen from the figures that the concentration of metal ion falls rapidly during initial uptake before intraparticle diffusion could start to control the adsorption kinetics for all the cases. The kinetic data were fitted to the equation for the initial uptake phase. Table 4 presents the external mass transfer coefficients determined from the slope at time tends to zero.

3.10. Thermodynamic parameters

Figs. 17 and 18 show linear plot of log Kc vs. 1/T for both metal ions. Table 5 shows the values of ΔH° and ΔS° determined from the slope and intercept of the figures. Both ΔH° and ΔS° values are found to be positive suggesting chemisorption. The irreversible and stability of the adsorption process is confirmed from the positive value of entropy

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(Malkoc andd Nuhoglu 2007; Suksabyea et al., 2009; Erdem et al., 2004; Srivastava et al., 1997). Also, as seen in Table 5, the ΔG° value is found to be negative indicating the adsorption process to be feasible and spontaneous.

3.11. Column operation studies

Adsorption isotherms are normally employed to obtain some preliminary parameters, but in practice the treatment plants use column-type operations. All the column experiments were conducted with distilled water spiked with 10 mg/l metal solutions for dolochar with particle size 505 micron, at bed depths of 10 cm and maintaining a constant flow rate of 10 ml/min ($\sim 2.10 \text{ m}^3/\text{m}^2/\text{h}$) for Cr (VI) and Pb(II). The studies were conducted at the room temperature of $30 \pm 2^{\circ}$ C and the influent of pH were adjusted at 6.0 ± 0.2 . The breakthrough point was considered when the ratio of effluent to influent concentration (C/C_0) reaches at 0.1. The breakthrough plots for ratio of effluent to influent concentration in the column versus time at bed depths 10 cm are shown in Fig. 19 and Fig. 20 for Cr (VI) and Pb(II) respectively. It was observed that the time to achieve breakthrough was increased with the increase of bed depths. The samples were collected at certain time intervals and were analyzed for Cr (VI) and Pb(II) by using the atomic absorption spectrophotometer. The volume of metal effluent treated and the requirement of dolochar upto breakthrough point have been shown in Table 6.

3.12. Column Regeneration and Reuse Studies

The eluting solution must be low in volume and high in concentration for easy handling and recovery of the metals. The column desorption studies were subsequently carried out after complete exhaustion of the adsorption column by using 0.01 N HNO₃ for lead-dolochar and 1M NaOH for chromium-dolochar systems, as it proved much effective to regenerate in batch studies. The metal concentration was measured after different time intervals. As the feed flows upward in the adsorption column, the lower portion of the bed is generally loaded more heavily than the upper portion. Upward regeneration results in the lightly loaded upper portion being exposed to a high concentration of the solute during regeneration and this may result in an unfavorable equilibrium during subsequent loading cycles. Hence, the regenerations were carried in the counter-current mode, i.e. in the down flow mode. The counter-current operation generally reduces regeneration costs and to regenerate the volume, and increases the effluent quality. Desorption was carried out by HNO₃ and NaOH through the bed in the downward direction at a flow rate of 10 ml/min. The concentrations of metal ions were monitored after different time interval as is shown in Fig. 21 and Fig. 22. It was observed that desorption cycle took approximately 1 hr, after which there was hardly any desorption. The total volume of this eluent at 1 hr was 600 ml. The maximum concentration of Cr (VI) and Pb(II) was obtained at a contact time of 7 min and recorded as 300 and 330 mg/l, which is more than 30 times higher than the influent of Cr(VI) and Pb(II) concentration.

4. Conclusions

The preset study reveals that the dolochar generated from the rotary kiln in the sponge iron plants can be efficiently used for the sorption of Pb²⁺ and Cr⁶⁺ in a wide range of concentration. The adsorbent was found to remove the metal ions more than 80% at normal conditions. The study indicated that the adsorption process is influenced by adsorbent dosages, particle size, metal ion concentration, contact time and solution pH etc. Adsorption of Cr (VI) is highly pH-dependent. The kinetics of the Cr (VI) and Pb (II) adsorption on the adsorbents was found to follow a pseudo second-order rate equation. The negative value of free energy and the positive values of entropy indicate the spontaneous process and higher affinity of the material for metal ions respectively. The adsorption process is determined to be endothermic. The adsorption data fitted well to Freundilch isotherm model. The fixed bed studies have also been conducted to obtain a design model for real-life conditions. It has been possible to regenerate the column by 0.2N HNO₃ for lead-dolochar system and 0.5M NaOH for chromium-dolochar system.

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EFFECT AND OPTIMISATION OF MICRO SILICA ON HIGH GRADE STRENGTH OF **CONCRETE**

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ABSTRACT

Concrete is one of the most important engineering material and the addition of some other materials may change the properties of concrete. With increase in trend towards the wider use of concrete for prestressed concrete and high rise buildings there is a growing demand of concrete with higher compressive strength. Mineral additions which are also known as mineral admixtures have been used with cements for many years. There are two types of materials crystalline and non-crystalline. Micro silica or silica fume is very fine non crystalline material. Silica fume is produced in electric arc furnace as a by-product of the production of elemental silicones or alloys containing silicon. It is usually a grey colored powder somewhat similar to Portland or some fly ashes silica fume is generally categorized as a supplementary cementitious material. Silica fume or micro silica was initially vied as cement replacement material and in some area it is usually used as replaced by much smaller quantity of silica fume micro silica may be used as pozzolanic admixtures. Admixture is defined as a material other than cement water and aggregate that is used as ingredient of concrete and is added to the batch immediately before or during mixing. Pozzolanic admixtures are siliceous or aluminous material which is themselves possess little or no cementitious value but will in finely divided form and in the presence of water chemically react with calcium hydroxide liberated on hydration at ordinary temperature to form compounds possessing cementitious properties. In our experiment we are going to use micro silica as an artificial pozzolans. We are going to add 0%, 5%, 10%, 15% by weight of cement in concrete.

Keywords: Cementitious, Concrete, Crystalline, Micro silica, Pozzolanic admixtures, Strength

1. INTRODUCTION

Concrete is a most widely used building material which is a mixture of cement, sand, coarse aggregate and water. It can be used for construction of multistory buildings, dams, road pavement, tanks, offshore structures, canal lining. The process of selecting suitable ingredients of concrete and determining their relative amount with the objective of producing a concrete of the required strength durability and workability as economically as possible is termed the concrete mix design. Nowadays engineers and scientists are trying to increase the strength of concrete by adding the some other cheap and waste material as a partial replacement of cement or as a admixture fly ash, micro silica, steel slag etc. are the few examples of these types of materials. These materials are generally by-products from other industries for example fly ash is a waste product from power plants and silica fume is a by-product resulting from reduction of high purity quartz with coal or coke and wood chips in an electric arc furnace during production of silicon metal or ferrosilicon alloys. Nowadays whole world is facing a major problem of environmental pollution these materials fly ash micro silica, steel slag may become a major pollution material. Micro Silica is one of the materials used to reduce the amount of cement in concrete because of the expenses of cement but since the price of this material has increased in most of the countries it is not economical to apply it as a supersede of cement. Silica is more usual these days as an additional material to obtain special properties of concrete. Micro silica is one of the most active materials among all pozzolanic materials. We can reach to pozzolanic properties sooner in Micro silica than other pozzolanic

materials. According to its shape and size, microsilica can be used as an active fillet material in concrete. Because of high degree of pozzolanic activation, micro silica can convert useless crystallic Hydroxide Calcium to gel. It means that Micro silica combines with calcium hydroxide and converts it to stable calcium Silicate combinations. The concrete mixtures with microsilis have great adhesion, the reason is increasing the contact points of the solid particles and therefore they can be used in pumping. If microsilis is used as an additional material, it does not have harmful effect on the short term strength of concrete meanwhile it has a great effect in increasing the curing of concrete during 3-28 days. The aim of this research is finding the optimized amount of Micro Silica in concrete.

2. LITERATURE REVIEW

2.1 EFFECTS OF SILICA FUME ON PROPERTIES OF HIGH STRENGTH CONCRETE

BY Er Aamir Ahad, Er.Kshipra Kapoor

- **2.1.1 MATERIAL USED:** Cement of ultra tech of 43 grade has been used with normal consistency 33%, specific gravity 9.9, fineness of cement 5% and specific area 3250cm2/gm. Fine aggregate of grading zone 2 has been used with specific gravity 2.67, fineness modulus 3.20 Coarse aggregate of size 10 and 20 mm was used with specific gravity 1.22-1.225, chloride content is nill.
- 2.1.2 CASTING OF SPECIMEN- To determine the compressive strength standard cube of (150*150*150mm), and to determine the split tensile strength, standard cylinders of 300*300mm used. And to determine the flexure strength, standard prism (150*150*700) mm was used.
- 2.1.3 CONCLUSION- The optimum replacement of cement with silica fume 5% to 20 % leads to increase in compressive strength whereas the percentage replacement of 25% leads to decrease in compressive strength. The addition of silica fume reduces workability. However, in some cases it improves the workability. Silica fume having high fineness leads to high normal consistency. The trend in the strength gain due to SF replacement in compressive strength is almost similar to that in split tensile strength for lightweight high strength concrete. Addition of silica fume in proper proportion improves durability attack by acidic waters and improving concrete conditions. Silica fume also decrease the voids in concrete. Addition of silica fume reduces capillary. Addition of silica fume improves bond strength of concrete. Modulus of elasticity of silica fume concrete is similar to that of conventional concrete.

2.2 OPTIMIZE PROPERTIES OF CONCRETE WITH SILICA FUME

BY: Patil Hiteshkumar Santosh, Prof (Dr) A.K. Dwivedi, Prof (Dr) A.M. Chatterjee

- 2.2.1 MATERIAL USED- 53 grad of OPC cement, Zone II sand, 20 mm downgraded aggregate, commercial Silica Fume Grade 920-D (specific surface = 21.4, bulk density = 620 Kg/m3) have been used for various composites. Designed Mix Proportion has been used as (normal concrete) 1: 2.14: 2.65 for M25 grade concrete with the following ingredients: a) Cement = 380.9 Kg/m3, b) Sand = 817.34 Kg/m3 c) Well graded aggregate (20mm size) = 1012.032 Kg/m3 d) Coarse aggregate / Fine aggregate ratio was 1.23 and water cement ratio was 0.43 for all mixes.
- 2.2.2 CONCLUSION- With the experimental studies conducted on concrete with silica fume the following conclusions can be drawn:
- ☐ Compressive strength, split tensile strength & Compressive strength are directly proportional to consider percentage replacement of cement by silica fume. ☐ Percentage change in compressive strength, split tensile strength & present a strength for 15% replacement of cement with silica fume gives optimum results.

☐ Workability is inversely proportional to the % of silica fume.

☐ The use of chemical admixture is necessary for increasing workability of concrete with silica fume.

☐ As the increase in w/c ratio with silica fume strength of concrete decreases.

2.3 INFLUENCE OF SILICA FUME ON THE TENSILE STRENGTH OF CONCRETE

BY: By: S. Bhanja, Sengupta

2.3.1. MATERIAL USED

The constituent materials used in the program were tested to comply with the relevant Indian Standards. To assure uniformity of supply, the materials were subjected to periodical control tests. The cement used was Ordinary Portland Cement, having a 28-day compressive strength of 54 MPa. Silica fume containing 90.9% SiO2 and having a BET specific surface area of about 18,000 m2 /kg was used. Natural river sand having a fineness modulus of 2.5 was used. The specific gravity and water absorption values were obtained as 2.65% and 0.8%, respectively. Crushed, angular, graded coarse aggregates of nominal maximum size 12.5 mm were used in the investigation. The specific gravity and the water absorption of the aggregates were 2.85& and 0.9%, respectively. Potable water and a high dosage of high range water reducing admixtures [superplasticizer (SP)] were employed for the mixing.

2.3.2 CONCLUSION

Extensive experimentation was carried out to determine the isolated effect of silica fume on the tensile strength of concrete at water binder ratios ranging from 0.26 to 0.42 and cement replacements of 0% to 30%. The following conclusions can be derived from the present investigation: 1. The results of the present investigation indicate that, other mix design parameters remaining constant, silica fume incorporation in concrete results in significant improvements in the tensile strengths of concrete, along with the compressive strengths. 2. The optimum silica fume replacement percentages for tensile strengths have been found to be a function of w/cm ratio of the mix. The optimum 28-day split tensile strength has been obtained in the range of 5–10% silica fume replacement level, whereas the value for flexural strength ranged from 15% to 25%. 3. Both the split and flexural tensile strengths at 28 days follow almost the same trend as the 28-day compressive strength does. Increase in split tensile strength beyond 15% silica fume replacement is almost insignificant, whereas sizeable gains in flexural tensile strength have occurred even up to 25% replacements.

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INTELLIGENT TRANSPORTATION SYSTEM IN **INDIA**

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Abstract

Idea of Intelligent transport system comes from problem caused by traffic congestion. Due to rapid vehicular growth with increasing population, rural to urban and economic upsurge has put immense pressure on transportation system in INDIA. Traffic congestion reduces efficiency, increases travel time, causes air pollution and increases fuel consumption. Due to development in transportation network it also leads to increase in number of road accidents all over India. This paper, attempts to understand the application of INTELLIGENT TRANSPORTATION SYSTEM (ITS) as a solution of present traffic congestion problem and how to decrease road accidents by the use of technology.

This paper will also explain various ITS applications and policy measures in India context and a brief about the issuses and challenges of ITS in INDIA.

KEY WORDS: Intelligent transportation system, Traffic congestion, Fuel consumption, To reduce road accidents, Probe and smart vehicles, Sensing technology, Wireless communications, Video vehicle detection, Emergency management system, GIS, safety in public as well as private vehicles.

1. Introduction

Worlds population is increasing at a high rate and simultaneously the world economy is also growing. Hence people are used to have greater mobility and when it comes to transportation, Road movement is considered to be most convient and easy to everyone. There is no doubt in higher the people using the transportation system more will be the road accidents hence there is a requirement of proper transportation system which can handel a larger mass of people on wheels safely and it is make sure it should be envoirment friendly as well. World wide various organizations are working on this problem and it is first setup in 1991 by US Department of Transportation. Vehicle to vehicle communication, vehicle to infrastructure communication, electronic toll collection are some of the very popular projects undergoing worldwide. When it comes to the developing countries like India, Intelligent Transportation System is very helpul. Each nation whether developed or developing, when implement the intelligent technologies the surface transportation system will be safest, economical and last but not the least Environment friendly.

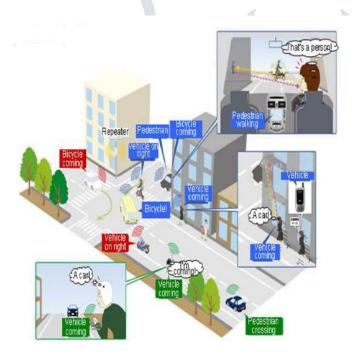
2. Overview

Intelligent transport system is one of the best method to simply or minimize traffic problems. The main aim of ITS is to achieving traffic efficiency, reducing traffic congestion, to control environmental degradation, energy conservation, reducing travel time, safety of passenger, increase travel comfort with the help of information and communication technologies. Its covers all modes of transport and considers all elements of the transportation systems like vehicle, infrastructure, and the driver or user, interacting together dynamically. The overall application of ITS is to collect data, analysis of that data and use that analysis data into operational, control and research concept for traffic management.

ITS relies on wide range of technologies and functions such as Communications (Microwave, internet, Bluetooth), Geographical Locations, Geographical Information System, Data acquisition and exchange, Camera system and Artificial vision, Detection and classification, In-vehicle systems and Digital Mapping.

3. Basic Requirement of ITS for India is-

- Intelligent Transport Systems (ITS) intend to add information and communications technology to transport infrastructure and vehicles in an effort to improve:
- 1.Safety
- 2.Reliability
- 3.Efficiency
- 4. Quality of means of transport.
- 4. WHAT ARE THE THOUGHTS WHICH COMES IN THE MIND OF A PERSON DRIVING ON ROADS SPECIALLY IN INDIA.



All these problems will easily be handled by technology if we will implement ITS all over India

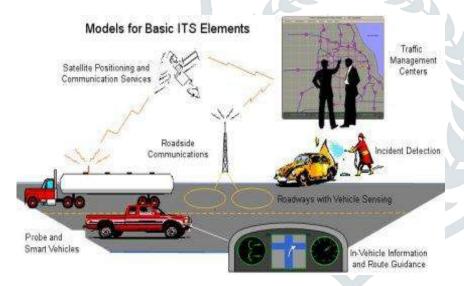
5. BASIC PROBLEMS IN INDIAN TRASPORTATION SYSTEM.

5.1 Conditions of roads are pathetic which leads to the probability to accident

- 5.2 Lack of traffic management system-Traffic management system is meant to handle large mass of traffic efficiently, but due to presence of large crowd of vehicles the complexity of management system increases and these systems somehow fails to handle the crowd., which results in decrease in mobility, reduced fuel consumption, higher travel time and pollution.
- 5.3 Traffic police system in India is also not upto the mark, the proper security and surveillance on the traffic system and vehicles can also help to reduce the problem of traffic congestion and will also lead in decrease of road accidents.
- 5.4 Vehicle to Vehicle Co-ordination and implementation of new technologies .This is the most important from the point of implementation of ITS, vehicle to vehicle coordination refers to the onboard information regarding the nearby vehicle this would facilitates in collision control, coordinating them on the basis of the trips planned by the driver.

6. SOLUTIONS FOR THE ABOVE PROBLEMS

6.1 By Implementation of properly programmed traffic management system, that means by implementing the GPS,GIS & Remote sensing, the congestion in particular route can be easily known and hence the route can be diverted and problem for traffic congestion can be reduced and this should be marked as standard in Indian vehicles like now airbags and braking system is.



6.2 Electronic toll collection (ETC) makes it possible for vehicles to drive through toll gates—at traffic speed, reducing congestion at toll plazas and automating toll collection.



6.3 Emergency vehicle notification systems - The in-vehicle e-cell is an emergency call generated either manually by the vehicle occupants or automatically via activation of in-vehicle sensors after an accident.

- 6.4 Automatic road enforcement -A traffic enforcement camera system, consisting of a camera and a vehicle monitoring device, is used to detect and identify vehicles disobeying a speed limit or some other road legal requirement.
- 6.5 Advanced Driver Assistance System -This would increase the safety of vehicle mobility, driver would be assisted on demand irrespective to time for any situation and hence the emergency time can be tackled easily.

7. CONCLUSION

Implementing intelligent transport system in India will definitely going to affect our ride in positive way. It will reduce the possibility of road accidents, it will reduce average journey time by reducing travel time, it will also reduce fuel consumption and hence also contributes to environment. ITS holds a good point in making our journey comfortable and safe.

APPLYING ITS IN INDIA SEEMS PROMOSING SOLUTION FOR ADVANCE TRAFFIC CONTROL AND MANAGEMENT

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Physico-Chemical Analysis of Groundwater in Iglas and Beswan, Aligarh District, Uttar Pradesh, India

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Abstract. Iglas and Beswan are the towns in Aligarh district in of Uttar Pradesh, India. These are located along Aligarh- Mathura high way at 24 km from Aligarh. These are located at 27°43′ N 77°56′ E. It has an average elevation of 178 m. The town area extends from Karban River (towards Mathura) to old Canal (towards Aligarh). In the present study Groundwater samples were collected from Iglas and Beswan town. The samples were collected without any air bubbles. These bottles were rinsed before collection of water samples which are sealed labelled and transported for Laboratory analysis. The dissolved oxygen was measured in situ.

Results showed that pH level in the study area was 7.10 in Iglas and 7.79 in Beswan. The total alkalinity 476 mg/L in Iglas and 350 mg/L in Beswan. Similarly total hardness was 570 mg/L in Iglas, and 210 mg/L in Beswan. The concentration of calcium was 82.50 mg/L in Iglas, and 120 mg/L in Beswan, Magnesium concentration was 145.50 mg/L in Iglas and 90 mg/L in Beswan. Conversely turbidity 0.31 mg/L in Iglas and 0.84 mg/L in Beswan. The concentration of chloride was 52 mg/L in Iglas and 368 mg/L in Beswan are respectively. Overall, the results showed that groundwater sources in Iglas and Beswan are suitable for drinking, except for high Cl in Iglas. Although, no health based guideline value is suggested for Cl in drinking water. Cl concentrations above 250 mg/L can give rise to detectable taste in water. This study has shown that Groundwater is comparatively suitable for drinking. However, broader studies evaluating Groundwater over wider spatial and temporal scales are recommended, since this analysis was based on few parameters and limited spatial scale.

Keywords: Physico-chemical parameters \cdot Water quality \cdot Human consumption

1 Introduction

The clean water is one of the essential requirements for living. The availability of the clean water is decreasing day by day due to increase in anthropogenic activities that are harmful to Groundwater aquifers. These include urbanization, agriculture and industrialization. Therefore, water analyses are very essential for public health studies (Rafiullah et al. 2012; Bakraji et al. 1999; Kot et al. 2000; Bheshdadia et al. 2012). This study has been carried out to assess the water quality by studying its physico-chemical characteristics. This aquifer receives recharge from in filtering rainfall, which may dissolve and transport effluents which may pollute the groundwater aquifers.

In India, most of the population is dependent on damp water as the major source of drinking water supply. The groundwater is believed to be comparatively much cleaner and free from pollution than surface water. But prolonged discharge of industrial effluents, domestic sewage and solid waste dump in the landfills are the causes the groundwater pollution, which results into health problems. The rapid growth of urban areas has further affected groundwater quality due to over exploitation of resources and improper waste disposal practices. Hence, there is a need for and concern over the protection and management of surface water and groundwater quality. Heavy metals are priority toxic pollutants. In some places the water is more turbid and hard at levels above the permissible limits. Some physicochemical parameters are very much responsible for the water borne diseases, which led to a life crippled in many villages of India and so as Uttar Pradesh. At some places, the water cannot be used for domestic and industrial purposes.

The Government of India has emphasized the objective of safe drinking water supply to the population and so desired by Aligarh district. State Government is responsible for undertaking. Water quality assessment of all the groundwater sources used for public water supply schemes. Drinking water sources have excessive fluoride, chloride, nitrate and salinity, (Groundwater report, Aligarh, 2011). The State government had taken the cognizance of the problem and an immediate action was taken for the corrective measures through water quality assessment of all the ground and surface water sources for improved drinking water supply in the Aligarh district. The physic-chemical parameters and trace metal contents of water samples from town of Iglas and Beswan were assessed. The consequence of urbanization and industrialization leads to pollution the water sources in these areas.

For agricultural purposes Groundwater is explored in rural areas especially in those areas where other sources of water like dam and river or the canal is not available. During the last decade, it was observed that the surface water gets polluted drastically because of increased human activities. Aligarh District which is situated in the heart of India has become an important village because of the natural resources found around it. There are various existing industries and industrial estates.

These industries use huge quantity of water for processing and release most of the water in the form of effluent. The wastewater being generated is discharged into the nearby water channels. Similarly, the geochemical and morphological structure changes and for other subsequent uses. Considering the above aspects of surface water contamination, the present study was undertaken to investigate the impact of the

Groundwater of Iglas and Iglas Aligarh district. Thus, in this research work an attempt has been made to assess the physical and chemical parameters of Groundwater parameters including pH, total dissolved solids (TDS), total alkalinity (TA), chloride (Cl), was determined. The analyzed data were compared with standard values recommended by WHO 2011.

1.1 Study Area

Iglas and Beswan are the towns in Aligarh district of Uttar Pradesh, India. These towns are located along Aligarh- Mathura high way at a distance of 24 km from Aligarh shown in Fig. 1.

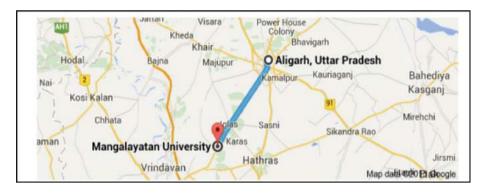


Fig. 1. Location map of Iglas to Beswan Town.

It is located at 27°43′ N 77° 56′ E. It has an average elevation of 178 m. The town area extends from Karban River (towards Mathura) to old Canal (towards Aligarh) are shown in Fig. 2.



Fig. 2. Map showing Drainage and Rivers in Aligarh District. (Source: Based on national Informatics Centre Maps-2011).

In the present study Groundwater samples were collected. The samples were collected in clean bottles without any air bubbles. These bottles were rinsed before tightly sealed after collection and labelled in the field. The dissolved oxygen of the samples was measured in the field itself at the time of sample collection.

2 Geological Setting

Aligarh district falls in Central Ganga Plain which lies in the interfluvial tract of Ganga and Yamuna. The Ganga Basin is the biggest groundwater repositories of the world. It is situated between the northern fringe of Indian Peninsula and Himalayas. It extends from Delhi Haridwar ridge in the west to Monghyr-Saharsa ridge in the east. In the study area the bed rock is encountered at a depth of 340 m below ground level. Hydrogeological data indicates that the area is underlain by moderately thick pile of quaternary sediments, which comprises of sands of various grades clays and kankar shown in Table 1.

Group	Age	Formation	Lithology			
Quaternary	Recent to Upper Pleistocene	Newer/Younger alluvium	Fine sand silt clay admixed with gravels			
Upper Pleistocene Older alluvius		Older alluvium	Clay with kankar and sand of different grades			
Unconformity						
Paleozonic	Cambrian	Upper Vindhyans (Bhawder Series)	Red sandstone & Shale			

Table 1. Geological succession of Aligarh District, Uttar Pradesh, India.

Alluvial sediments overlies Vindhyan group of rocks in an unconformable manner. The thickness of deposits varies from 287 to 380 m. Older Khan and Khurshid/alluvium occupy the upland of the district while the newer alluvium occupies low land area along the courses of Ganga Yamuna and their tributaries and paleo channels of the Ganga and Kali rivers.

2.1 Hydrogeological Setup of the Study Area

In the study area three to four tier aquifer systems is found. Aquifer seems to merge with each other and developing a single bodied aquifer.

2.1.1 First Aquifer Group

This is the most potential aquifer group generally occurring between the depth ranges of 0–122 m below ground level (mbgl) and covering almost the entire area below soil capping. The lithology comprised fine to medium grained sand is found and Kankar is associated with clay formation. At some places it occurs below the surface soil. Groundwater is mainly found under water table in semi-confined conditions. The quality of formation water of this aquifer group is generally fresh. This aquifer group is the main source of water supply to open wells, hand pumps and shallow tube-wells, Government tube-wells that have been installed in this aquifer zone.

2.1.2 Second Aquifer Group

This aquifer group is separated with the overlying shallow aquifer group by thick clay and it occur at the depth range of 100 to 150 m below ground level. The aquifer material consists of medium grained sand but at some places blend of fine to coarse grained sand is found. Groundwater is brackish to saline in nature in this aquifer group which is also confirmed by the packer test in this aquifer group. Total clay content of this aquifer group ranges from 30–40%.

2.1.3 Third Aquifer Group

The disposition of this aquifer group ranges between 130 to 300 mbgl. This aquifer group is regionally extensive and in confined state. It has the great quantitative potential but the quality of formation water is brackish to saline. Cumulative thickness of granular zone in this aquifer group varies from 50–100 m.

3 Material and Method

The Groundwater samples were collected from Iglas and Beswan town. The physical parameters such as Turbidity, pH, Total alkalinity, and Total solids, Total Hardness were determined. Similarly, chemical parameters including Calcium, Magnesium and Chloride were estimated. The water samples from the hand pumps were collected in plastic bottles. After the collection of samples, these bottles were labelled and transported to the Laboratory for Analysis. The samples were analysed for various water quality parameters such as Turbidity (Nephlometer), pH (pH meter), Total alkalinity (Indicator method), Total hardness, Ca and Mg hardness, Total dissolved solids (Filtration method) and Chloride (silver nitrate method) following the standard procedures described in W.H.O. 2011, Table 2 manual and Indian standard. The water quality parameters values are in mg/L except pH and EC in µs/cm.

S. no.	Parameters	W.H.O.	Iglas	Beswan
		Standard (2011)	(Minimum-	(Maximum-
			value)	value)
1	pН	7.0–8.0	7.79	7.10
2	Turbidity (N.T.U.)	5.0	0.84	0.31
3	Total Alakalinity (mg/L)	100	350	476
4	Total Hardness (mg/L)	100	210	368
5	Calcium (mg/L)	100	120	82
6	Magnesium (mg/L)	30	90	145.5
7	Chloride (mg/L)	200	52	368
8	Florides (PPM)	1.0	0.8	1.48
9	Nitrates	10	Nil	6.71
10	Dissolved Oxygen (mg/L)	5.0	7.9	4.3
11	Biological Oxygen Demand (mg/L)	6.0	7.2	12.8

Table 2. Table showing a comparative data collecting for qualitative study.

4 Result and Discussion

4.1 Physicochemical Parameters

Analysis was carried out to investigate water quality over various parameters, Table 3.

Location	pН	Turbidity	Total alkalinity	Total hardness	Electrical conductivity	Total dissolved solid	
In front of	7.79	0.84	350	210	1253.66	840	
Manglayaan Manglayatan University	7.8	1	528	232	835.67	880	
Mohakampur	7.6	0	580	296	1074.66	560	
Mathura-Aligarh H.way	7.9	0	488	252	1522	420	
Beswan Chauraha	7.7	1	760	288	1880.23	660	
Iglas	7.1	0.31	476	570	716.6	1420	
Taau Bagh	7.6	0.62	760	440	668.23	1050	
Iglas Market	7.4	0	520	510	334.56	950	
Shiv dan school	7.9	0	488	633	733.67	668	
Karas	7.2	1	610	588	660.66	970	

Table 3. Physical parameters

4.1.1 pH

High pH value induces the formation of trihalomethanes, which are toxic, while pH below 6.5 starts corrosion in pipe thereby releasing toxic metals such as zinc, lead, cadmium and copper (Shrivastava and Patil 2002). It was noticed that the pH value of the water appears to be dependent upon the relative quantities of calcium, carbonates and bicarbonates. The water tends to be more alkaline when it possesses carbonates (Zafar 1966; Suryanarayana 1995). It can be seen all the sampling sites had pH level falling with the recommended range of 6.5–8.5 (W.H.O 2011). The average pH value of the samples in the study areas varied from 7.10 in Iglas and 7.79 in Infront of Mangalayatan, Beswan respectively indicating slightly alkaline condition, Fig. 3.

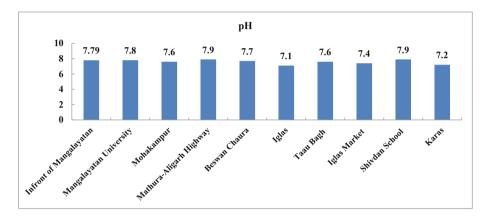


Fig. 3. Variability of pH in the study area.

4.1.2 Turbidity

Turbidity is an important parameter for characterizing Groundwater. Turbidity in water may be due to wide variety of suspended materials, which range in size from colloidal to coarse dispersions, depending upon the degree of turbulence. The turbidity in the study areas varied from 0.31 N.T.U in Iglas and 1.0 N.T.U in Beswan Chauraha respectively, Fig. 4.

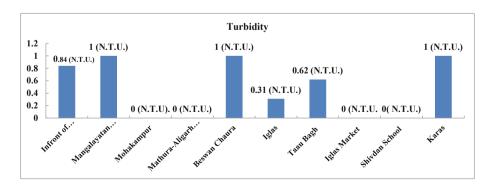


Fig. 4. Variability of turbidity in the study area.

4.1.3 Total Alkalinity

The excess of alkalinity could be due to the minerals, which dissolved in water from mineral rich soil. The various ionic species that contribute mainly to alkalinity includes bicarbonates, carbonates, hydroxides, phosphates, borates, silicates and organic acids. In some cases, ammonia or hydroxides are also accountable to the alkalinity (Sawyer et al. 2000). It is value is above standard value hence causing Digestion, Malfunctions, Metabolic abnormalities. The alkalinity in the study area ranged between 476 mg/L in Iglas and 350 mg/L in Infront of Mangalayatan, respectively as CaCO₃ indicated high alkaline nature of water in the area, Fig. 5.

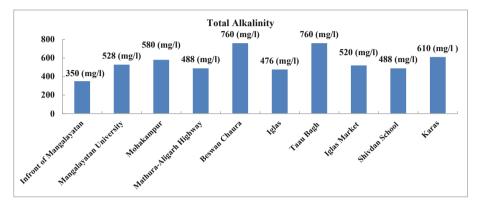


Fig. 5. Variability of alkalinity in the study area.

4.1.4 Total Hardness

Total hardness varies between Iglas (570 mg/L) and (210 mg/L) in front of Mangalayatan, Beswan. Groundwater sources in Beswan are harder compared to Iglas. Hardness in water is caused by certain salts held in solution. The most common are the hardness may be advantageous in certain conditions; it prevents the corrosion in the pipes by forming a thin layer of scale, and reduces the entry of heavy metals from the pipe to the water (Shrivastava et al. 2002). Water can be classified in terms of degree of hardness as shown in Table 4.

Total Hardness in mg/L	No. of samples	% of samples	Classification
0–75	Nil	Nil	Required for drinking
75–150	Nil	Nil	Required for drinking
150-300	6	60	Required for drinking
300-3000	4	40	Acceptable for drinking
>3000	Nil	Nil	Unhealthy for drinking and irrigation
Total	10	100	

Table 4. Table showing degree of Hardness.

About 60% Groundwater sources in study area have TDS levels less than 500 mg/L. This is particularly required for drinking. About 40% of groundwater in study area is acceptable for drinking base on TDS concentration, Fig. 6.

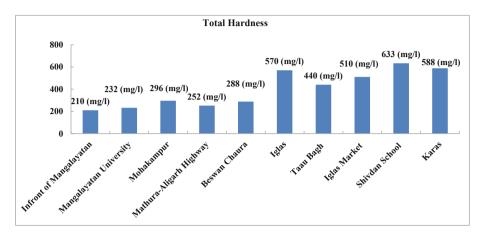


Fig. 6. Variability of hardness in the study area.

4.1.5 Electrical Conductivity

Electrical Conductivity is the measure of capacity of a substance or solution to conduct electrical current through the water. EC values were in the range of 334.56 μ mhos/cm in Iglas Market to 1880.23 μ mhos/cm in Beswan Chaurah. High EC values indicating the presence of high amount of dissolved inorganic substances in ionized form, Fig. 7.

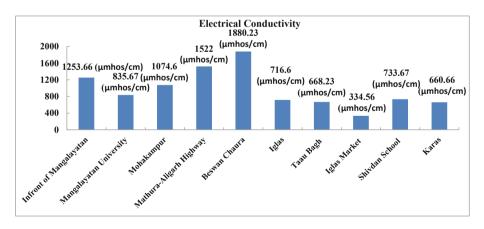


Fig. 7. Variability of Electrical Conductivity in the study area.

Chemical Parameters: Chemical parameters are shown in Table 5 and discuss below:

Location	Calcium	Magnesium	Chloride	Fluoride	Nitrates	DO	BOD
In front of Manglayaan	120	90	52	0.8	0.6	7.9	7.2
Manglayatan University	140	91	89	0.7	0.8	12.6	7.7
Mohakampur	112	185	169	0.9	0.12	14.7	8.4
Mathura-Aligarh H.way	108	144	149	0.67	0.19	11.8	7.7
Beswan Chauraha	80	78	176	0.97	0.7	10.8	9.6
Iglas	82	145.5	368	1.48	6.71	4.3	12.8
Taau Bagh	81	96	333	0.57	6.11	3.37	11.8
Iglas Market	110	188	390	0.5	7.1	8.4	14.7
Shiv dan school	116	136	410	0.9	8.9	11.6	12.8
Karas	210	74	116	0.67	5.9	9.6	7.8

Table 5. Chemical parameter

4.1.6 Calcium

Calcium is one of the most abundant elements found in natural waters. It is mainly derived from rock minerals. Higher Level of calcium is not desirable in washing, bathing and laundering while small concentration of calcium is beneficial in reducing the corrosion in pipes. Calcium concentration was 82 mg/L in Iglas and 120 mg/L in Infront of Mangalayatan, Bewan. The observed variability in Ca levels between the two settlements perhaps is derived from the variability of the geologic materials. The study area is basically of granitic terrain. Experts have opined that the difference in relative mobility of calcium, magnesium, sodium and potassium is more distinct in the groundwater from granitic terrain and the higher concentrations of calcium, magnesium, chlorides and bicarbonates in several cases are probably due to their low rate of removal by soil (Somashekar *et al.* 2000). High Ca level may be associated with increased risk of Kidney stone, colorectal cancer, Hypertension, Stroke and Obesity. Calcium in the study area Iglas and Beswan varied widely from 82 mg/L and 120 mg/L CaCO₃, Fig. 8.

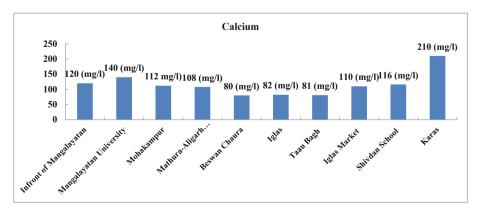


Fig. 8. Variability of calcium in the study area.

4.1.7 Magnesium

Magnesium concentration in the study was 145.50 mg/L in Iglas and 90 mg/L in Infront of Mangalayatan Beswan Fig. 9. Adaptable change in Bowel habits leading to Diarrhoea.

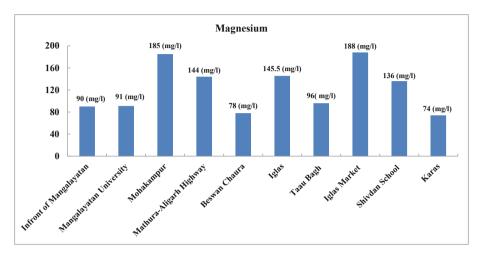


Fig. 9. Variability of Magnesium in the study area.

4.1.8 Chloride

Naturally chloride occurs in all types of waters. The contribution of chloride in the groundwater is due to minerals like apatite, mica, and hornblende and also from the liquid inclusions of igneous rocks (Das and Malik 1988). The main diseases are Vomiting and Nausea. The chlorides in the study area are varied widely from 368 mg/L in Iglas and 52 mg/L in Infront of Mangalayatan, Beswan, Fig. 10.

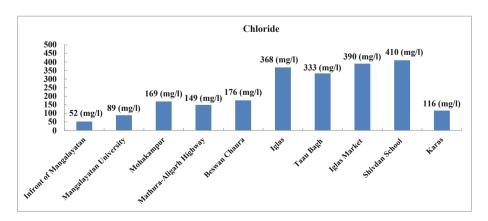


Fig. 10. Variability of chloride in the study area.

4.1.9 Fluorides

The fluoride values in the study area ranges from 1.48 mg/L in Iglas and 0.9 mg/L respectively. Fluoride is beneficial for human beings as a trace element, this protects tooth decay and enhances bone development, but excessive exposure to fluoride in drinking-water, or in combination with exposure to fluoride from other sources, can give rise to a number of adverse effect, Fig. 11.

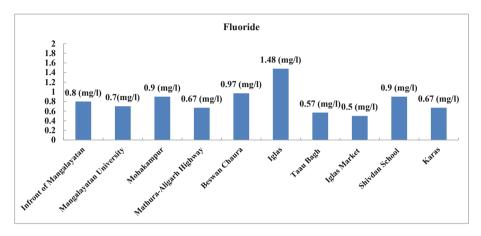


Fig. 11. Variability of fluoride in the study area.

4.1.10 Nitrates

Natural levels of nitrate are usually less than 1 mg/L. Concentrations over 10 mg/L will have an effect on the freshwater aquatic environment. Nitrate concentration of 10 mg/L is also the maximum concentration allowed drinking water. For a sensitive fish such as salmon the recommended concentration is 0.06 mg/L. The Nitrates in the study area are varied widely 6.71 mg/L in Iglas and 0.6 in Infront of Mangalayatan, Beswan respectively Fig. 12.

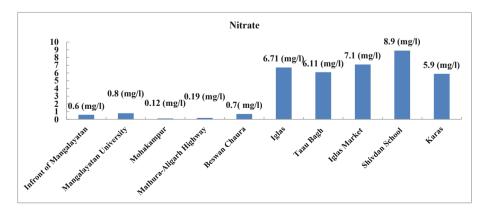


Fig. 12. Variability of Nitrate in the study area.

4.1.11 Dissolved Oxygen

Dissolve Oxygen is an important physico-parameter in water quality assessment and biological process prevailing in the water. The DO value indicates the degree of pollution in the water bodies. The presence of DO enhance the quality of water and also acceptability. This shows the high degree of pollution due to presence of bacteria and minerals in water. DO under the area determined in the present study ranged between 4.3 mg/L in Iglas and 7.9 mg/L in Infront of Mangalayatan, Beswan, Fig. 13.

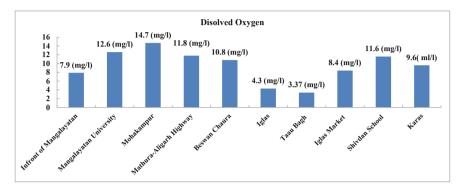


Fig. 13. Variability of dissolved oxygen in the study area.

4.1.12 Biochemical Oxygen Demand

The BOD values indicating the degree of pollutants in the water bodies not good for the existence of aquatic organism that play an important ecological role. Biochemical oxygen demands in study area are 12.8 mg/L in Beswan and 7.2 mg/L in Iglas, Fig. 14.

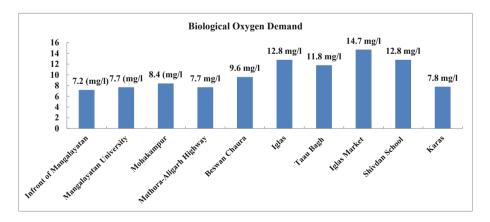


Fig. 14. Variability of biological oxygen demand in the study area.

5 Result and Discussion

Many of the parameters are going beyond the acceptable limit of good quality water. As we have seen Diarrhoea and fever are the major diseases cause by imbalance nature. Talking on the basis of data provided by Annual Health Survey (A.H.S.) conducted by Government of Uttar Pradesh. In Aligarh District children suffering from Diarrhoea (%) is about 7.5% and from Fever (%) is about 24.3%. Graphical representation of water quality in this area also clearly indicates that the water quality at Iglas and Beswan is very poor.

Parameters Such as pH, Turbidity, DO, Fluoride and Nitrate are found within the standard ranges of W.H.O.-2011, but most of the parameters like Total Alkalinity, Total Hardness, Calcium, Magnesium, Chloride, Dissolved Oxygen and Biological Oxygen Demand are not fall in the standard.

6 Conclusion

The Rapid growth of population in the area increases its residences dependence more on groundwater but the groundwater quality is not found up to mark. People must become more aware about the utilisation of Groundwater and how their activities may lead to contamination of groundwater sources. This study was carried out to assess the quality of Groundwater in Iglas and Beswan, using some physicochemical parameters. Results have shown that Groundwater varied markedly between the town locations. Despite the observed variability, Groundwater sources in the study area are suitable for drinking. Further this study employed limited number of parameters to evaluate the groundwater chemistry and assess it overall suitability for drinking. Therefore, broader studies analyzing Groundwater over wider spatial and temporal scales are recommended.

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Review paper-Effect of crumb rubber tyre in conventional concrete

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Abstract

Disposal of waste tyre rubber has become a major environmental issue in all parts of the world representing a very serious threat to the ecology. One of the possible solutions for the use of scrap tyre rubber is to incorporate it into concrete, to replace some of the natural aggregate. The paper evaluates the influence of the rubber powder on material characteristics and durability of CRC. CRCs with various contents of fine and coarse crumb powder were compared. The tested parameters were slump, air content, permeability, resistance of concrete to water with deicing chemicals, compressive and splitting tensile strength. The tests showed that workability, compressive strength and permeability decreased as the amount of rubber increased, but the air content increased as the rubber content increased. Photos of air voids in cement matrix from electron microscope were captured (SEM is a type of electron microscope that produces images of a sample by scanning the surface with a focused beam of electrons. The electrons interact with atoms in the sample, producing various signals that contain information about the surface topography and composition of the sample.) The results of laboratory tests showed that admixture of rubber powder in concrete could have a positive impact on durability of concrete and concurrently contribute to sustainable development. Considering the lower compressive strength, CRC is recommended for use in applications where the high strength of concrete is not required.

Keywords: Aggregates, Compressive strength, Crumb tyre, Flexural strength, Tensile strength, Weight loss.

1.Introduction

The vehicle tyres which are disposed to landfills constitute one important part of solid waste. Stockpiled tyres also present many types of, health, environmental and economic risks through air, water and soil pollution. The tyres store water for a long period because of its particular shape and impermeable nature providing a breeding habitat for mosquitoes and various pests [1–3]. Tyre burning, which was the easiest and cheapest method of disposal, causes serious fire hazards [4]. In addition, the residue powder left after burning pollutes the soil.

An estimated 1000 million tyres reach the end of their useful lives every year [1]. At present enormous quantities of tyres are already stockpiled (whole tyre) or landfilled (shredded tyre), 3000 millions inside EU and 1000 millions in the US [2]. By the year 2030 the number of tyres from motor vehicles is expect to reach 1200 million representing almost 5000 millions tyres to be discarded in a regular basis. Tyre landfilling is responsible for a serious ecological threat. Mainly waste tyres disposal areas contribute to the reduction of biodiversity also the tyres hold toxic and soluble components [3]. Secondly although waste tyres are difficult to ignite this risk is always present. Once tyres start to burn down due to accidental cause's high temperature take place and toxic fumes are generated [4] besides the high temperature causes tyres to melt, thus producing oil that will contaminate soil and water.



Crumb rubber of different sizes

2. Mechanical Properties

2.1. Compressive strength

The variations in compressive strength obtained at 7, 28 and 90 days with respect to the percentage of crumb rubber [6]. Gradual decrease in compressive strength was noticed as the percentage of crumb rubber increased. The reduction in compressive strength of the mix with 20% crumb rubber was more than 50% than the value of the control mix. At 7 days, the maximum compressive strength (65.5 MPa) was obtained for the control mix with 0% crumb rubber and the minimum value (27 MPa) for the mix with 20% crumb rubber. Same trend was observed for the compressive strength at 28 and 90 days. At 28 days, a strength above 60 MPa was obtained for all the mixes in which the amount of rubber was from 0% to 10% and at 90 days, all the mixes in which the crumb rubber was substituted from 0% to 12.5% crossed the 60 MPa threshold. The control specimens exhibited brittle failure while the rubberized concrete did not show brittle failure under compression loading. Horizontal cracks were observed for the specimens with rubber and inclined cracks were observed in the control specimens. The loss in mechanical properties of rubberized concrete was supported by the results obtained by various researchers [5]. The reasons for the decrease in compressive and flexural strength of the rubberized concrete [8]. (a) The aggregate would be surrounded by the cement paste containing rubber particles. This cement paste would be much softer than that without rubber. This results in rapid development of cracks around the rubber particles while loading and this leads to quick failure of specimens. (b) There would be lack of proper bonding between rubber particles and cement paste, as compared to cement paste and natural aggregate. This can lead to cracks due to non-uniform distribution of applied stresses. (c) The compressive strength depends on the physical and mechanical properties of the constituent materials. If part of the materials is replaced by rubber, reduction in strength will occur. (d) Due to low specific gravity of rubber and lack of bonding of rubber with other concrete ingredients, there is a tendency for rubber to move upwards during vibration leading to higher rubber concentration at the top layer. Such a non-homogeneous concrete sample leads to reduced strengths.

2.2. Flexural strength

The variations in flexural tensile strength obtained at 7, 28 and 90 days with respect to the percentage of crumb rubber shown in [7]. At 7, 28 and 90 days, gradual reduction in the flexural strength was noticed as the percentage of crumb rubber increased. At 7 days, the maximum value (6.2 MPa) was observed for the mixes with 0% and 2.5% crumb rubber and minimum value (4.6 MPa) observed for the mixes with 17.5% and 20% crumb rubber. At 28 days, the maximum value (7.3 MPa) was obtained in the mix with 2.5% crumb rubber and minimum value (5.5 MPa) was obtained for the mix with 20% crumb rubber. Same trend as 28 days has been observed at 90 days, where the maximum and minimum values were 7.9 MPa and 5.7 MPa respectively.

When the 90 days strength was considered, there was 28% reduction in the flexural tensile strength of the rubberized specimen (20%) crumb rubber) when compared to the control mix specimen. Also it was observed that the control specimens exhibited brittle failure and was broken to two pieces under loading while the Compressive strength of varying crumb rubber (%). Compressive strength a curing period of 7 days. Compressive strength a curing period of 28 days. Effect of waste tyre rubber on mechanical and durability properties of concrete – A review. Ain Shams Eng rubberized concrete did not show brittle failure under flexural tensile loading[1]. The specimens containing tyre rubber (in the form of fibres) up to 20% exhibited higher flexural strength than the control specimens The flexural strength decreases when the amount of rubber was increased from 20 to 30%. The control specimens exhibited brittle failure and split into two pieces immediately after cracking, while the specimens containing rubber fibres showed deformation without complete disintegration. Su et al. [10] observed a reduction of 12.8% in the flexural strength when 20% fine aggregate was substituted with rubber aggregate. Less loss in strength was obtained when the size of rubber particles were smaller. This would be due to the filler effect of small rubber particles that increase the compactness of concrete, reduce the stress singularity at internal voids and hence reduce the likelihood of fracture. The addition of silica fume and reduction in watercement ratio has enhanced the flexural strength of rubberized concrete As the effect of silica fume enhanced the interfacial transition zone bonding, the reduction in strength of high strength rubberized concrete [11] was lower than that of the normal strength concrete. The highest strength (3.18 MPa) was obtained for the control mix specimens and lowest value (2.15 MPa) was observed for the specimens with 20% crumb rubber. Gradual decrease in the pull-off strength was observed as the percentage of crumb rubber substitution was increased. It was clear from the results that the variation in pull-off strength closely follows the trends of the corresponding compressive strength results of the mixes as reported by [9]. The results of flexural strength tests are shown in Replacement of rubber reduces flexural strength as expected. The reduction in flexural strength occurred in both mixtures and only the rate was different. A reduction of 37% with respect to the control sample was observed in the first mixture. This value reached to 29% for the second mixture. As a result the most important factor in reducing flexural strength, as well as the compressive strength is lack of good bonding between rubber particles and cement paste. This conclusion was reached because after breaking the concrete samples for flexural strength test, it was observed that chipped rubber could be easily removed from concrete.

2.3. Tensile strength

The results of tensile strength test are given in Tensile strength of concrete was reduced with replacement of rubber in both mixtures. The percentage reduction of tensile strength in the first mixture was about twice that of the second mixture for lower percentage of replacements. The reduction in tensile strength with 7.5% replacement was 44% for the first mixture and 24% for the second mixture as compared to the control mixture. Tyre rubber as a soft material can act as a barrier against crack growth in concrete. Therefore, tensile strength in concrete containing rubber should be higher than the control mixture. However, the results showed the opposite of this hypothesis. The reason for this behaviour may be due to the following variables: The interface zone between rubber and cement may act as a micro-crack due to weak bonding between the two materials; the weak interface zone accelerates concrete breakdown. Inspections of the broken concrete samples proved that the chipped rubbers were observed after breaking the concrete specimens in the first mixture The reason for this behaviour is that during crack expansion and when it comes into contact with rubber particle, the Flexural tensile strength for varying curing period 7 days, 28 days and 90 days. Compressive strength of concrete with aggregate replaced by rubber. Mixture Compressive strength (N/mm2).

3. Conclusions

The compressive and flexural values were gradually decreasing with increase in the amount of crumb rubber in concrete. In the compressive strength test, all the concrete mixes with 0-12.5% crumb rubber, crossed the limit of 60 MPa. The rubberized concrete exhibited better resistance to abrasion than the control mix. The water penetration of rubberized concrete was higher than control mix concrete and all the mixes with up to 12.5% crumb rubber had exhibited lesser or similar water absorption value when compared with the control mix. It is possible to design high strength concrete in which waste tyre rubber may be utilized as a partial substitute for fine aggregate up to 12.5% by weight. It can be applicable in structures where there are chances of brittle failure.

The high strength concrete with crumb rubber shows better resistance to abrasion than the control mix. So it can be applied in pavements, floors and concrete highways, hydraulic structures such as tunnels and dam spillways, or for other surfaces upon which the abrasive forces are applied by moving objects during service. The highest reduction was related to 7.5% and 10% replacement for both grades of rubber used. The reduction in compressive strength at 28 days of age was about 10-23% for aggregates and 20-40% for cement replacement. Modulus of elasticity of concrete was reduced with the replacement of rubber for aggregate or cement. Reduction in modulus of elasticity was 17–25% in the case of 5–10% aggregate replacement by chipped rubber and the corresponding reduction for powdered rubber was 18-36%. Tensile strength of concrete was reduced with increased percentage of rubber replacement in concrete. Tensile strength of concrete containing chipped rubber (replacement for aggregates) is lower than that of concrete containing powdered rubber (for cement replacement). Replacement of rubber for aggregate or cement in concrete caused a reduction in its flexural strength for both grades, but the rate of reduction was different. The depth of chloride penetration of the mixes with crumb rubber up to 7.5% was lower than that of the control mix in case of w/c 0.4. In the water absorption test of acid attacked specimens, gradual increase in the percentage of water absorption was observed as the percentage of crumb rubber was increased.

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ROLE OF CIVIL ENGINEERS IN GREEN **BUILDING**

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Abstract:- There are three Green Building Rating system operational in India. Although it is considered that design and development of Green Buildings are Architects, Mechanical and Electrical Engineers job. It is the Civil Engineers create need and chose site for Building. They are involved all the phases of building from planning, execution ,maintenance,addition alteration and disposal of building. Apart of aesthetics and comfort creation by electro-mechanical means it is the civil engineering profession who recognizes the reality of limited natural resources and directly responsible for strength and durability of buildings. This paper discusses a framework of green building rating systems and civil engineering role in it. By providing a better understanding of Green Buildings, civil engineers can provide proactive solution to competitive global infrastructures.

KEYWORDS: Sustainable construction, civil engineering, green buildings, Sustainable development.

Introduction

Globally, the construction industry is one of the main contributors to the depletion of natural resources and a major cause of unwanted side effects such as air and water pollution, solid waste, deforestation, health hazards, global warming, and other negative consequences.

In order to stay competitive and to meet upcoming stricter environmental regulations and customer requirements, designers have a key role in designing civil infrastructure so that it is environmentally sustainable. These and other factors have compelled the engineer to design with greater care and in more detail. The changing roles of engineers will be highlighted, in order to react to changes in climate.

Conventionally the prime focus of a civil engineer is building strength and lifespan, but with present changing scenario, awareness and responsibility toward environment the characterization of civil engineer has changed from "The one who directs nature great power source to convenience and use of man" to "the guardians of built and natural environment" (Ochsendorf, 2005).

A sustainable building, or green building is an outcome of a design which focuses on increasing the efficiency of resource use — energy, water, and materials — while reducing building impacts on human health and the environment during the building's lifecycle, through better sitting, design, construction, operation, maintenance, and removal. Green buildings are designed to reduce the overall impact of the built environment on human health and the natural environment by:

- Efficiently using energy, water, and other resources
- Protecting occupant health and improving employee productivity
- Reducing waste, pollution and environmental degradation

The 'Green Building' concept is gaining importance in various countries, including India. In India there are two Systems of Green **Building Certification**

- I. CII- LEED INDIA (Indian green Building Council).
- II. GRIHA system developed by The Energy and Resource Institute (TERI).

Both the above system has almost identical rating system and aim. The criteria's are categorized as follows:

IGBC Green Homes Rating System	GRIHA Rating System
 Site Selection and Planning 	❖ Site Selection and Site planning
 Local Regulations Required 	 Conservation and efficient utilization of
 Soil Erosion Required Required 	resources
 Water Efficiency 	Health and well being
Rainwater Harvesting, 50% Requi	red Building planning and construction stage
 Water Efficient Fixtures Required 	Water
Energy Efficiency	❖ Energy: end use
CFC Free Equipment Required	 Energy: embodied and construction
Materials	Energy: renewable
 Separation of Waste Required 	 Recycle, recharge, and reuse of water
 Indoor Environmental Quality 	❖ Waste management
 Tobacco Smoke Control Required 	 Building operation and maintenance
Daylighting: 50% Required	
 Fresh Air Ventilation Required 	
Innovation and Design Process	

Civil engineers are involved all the phases of building construction i.e. planning, execution, operation and demolition ,they have role in making a building green.

Role of Civil Engineers at Planning Stage

The Major role of engineer is resource conservation. This starts with site selection. The site should be near to public transport and the day to day amenities shall be available in around 500m from the site. The site should have good bearing capacity to hold multistory building which reduces load on land. It is preferable to promote brown field project in place of green field project. Plan proper drainage with rainwater harvesting on site with effective sedimentation control measure. At this stage a plan of material procurement from local sources, storage on site and with labour camp shall be prepared.

Role of Civil Engineers at Execution Stage

The engineer on site shall ensure that Green plan shall be implemented. At this stage labour welfare shall be ensured. Monitoring hygiene at site is the primary role of engineer at this stage. Maintaining high level of shifty at site is requirement of green building movement. Material shall be used to reduce wastage and it can either be used on site or off site.

Role of Civil Engineers at Operational Stage

Constructing a building is easy but maintainit is a challenge. Role engineer at this stage to use recycle water to its maximum potential. Dispose of solid recyclable waste to recycler and organic waste can be composted. Proper shifty shall be maintained in and around the building. Effective Tobacco Smoke Control shall be ensured. A effective check shall be put on place to ensure that users use only CFC Free Equipment and low VOC material in their part of Building.

Role of Civil Engineers at Demolition and Dispersion Stage

Demolition and disposing of building material is a great challenge. Here Civil Engineer shall identify recyclable material and potential user. At the time of demolition proper safety of man at work and recyclable material shall be ensured.

Conclusion

With global warming increasing, ice cap melting and climate changing, its needless to say green construction is the demand of current scenario. Civil engineer must opt for more environment friendly materials, should bring recyclable material for use and must come up with creative solution to support sustainable design practice.

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- IGBC Green Homes Rating System Manual
- **GRIHA Rating System Manual**

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Study of control the pollution by Road side purifiers by water storage and through raw material concept

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Abstract:-Now days we used the motor vehicle to travel one place to another place which is necessary to all for to make the journey smooth and comfortable and we used daily consumption lots of fuel which cause of main reason of pollution so can use the construct of purifier(Hepa filter and Electrostatic Precipitators made of borosilicate glass fibers or plastic or fiber) with air filter on road side which sucked the whole gases and dust particle through fan mounted on the top of filter where the some specific raw material converts the gases and dust particle collect into bottom of the tank mounted bottom of filter which direct connect to main pipe of fan mounted on top, water tank dissolved all dust particle into water and another water purifier bond to water tank purifies remain water here can use waste water reuse by filtration process for harvesting and drinking purpose.

Keywords:-HEPA filter, electrostatic precipitators, settling water tank, Activated corbon

INTRODUCTION:-Air purifiers evolved in response to people's reaction to allergens like pollen, animal ,dander ,dust ,and mold spores .Reactions like sneezing, runny nose and more severe consequences such as asthma attacks are the result of antigens found in the home. These antigens are major triggers of asthma, and there are more than 18 million asthmatics in the united states alone. Air purifiers remove a portion of these particles, thus reducing allergic type responses.

Due to their extremely small size, allergens are able to pass through a standard vacuum cleaner bag and redistribute into the air where they stay for days. Even a single microgram of cat allergens is enough to invoke an allergic response in most of the six to 10 million Americans who are allergic to cats. Other airborne particles such as bacteria and viruses can cause illness and some of which are fatal. There are many reasons allergies, asthma, fatal. There are many reasons allergies, asthma, fatal, illnesses that millions of air purifiers are sold in the united states every year.

There are two types of air purifiers that can remove some or all of the disease and allergy causing particles in the air and the most effective are classified as high efficiency particulate air filter HEPA filter and electrostatic precipitators.

Raw material:-

HEPA filters are made out of very fine glass threads with a diameter of less than 1 micron (micron is 0.00004 in 0.001mm). By comparison , a human hair has a diameter of about 75 microns (0.003 in 0.07mm). The fine glass threads are tangled together and compressed to form a filter mat. Because the individual threads are so microscopic, most of the mat consist of air. The openings in the mat are very small, generally less than 0.5 micron (0.00002 in,0.0005mm). HEPA filter will collect particles down to 0.3 microns(0.00001in,0.0003mm) in diameter.

Electrostatic precipitator rely on electrostatic forces to remove particles from the air. They work by creating a cloud of free electron through which dust particles forced to pass. Electrostatic precipitators can collect particles down to a diameter of 0.01 microns (0.00001mm). A water tank planted bottom surface of the earth

to collect the dust particles into water tank bed whose pipe line directed connect to the main pipe line of the fan where dust particles come into the channel by suction of fan and settle down on the water tank ,two filters are use in the water tank to reuse the waste water for harvesting and drinking purpose.

HEPA filter nor electrostatic precipitators can remove volatile organic compound from the air, therefore do nothing to reduce odors. for this reason most of air purifiers are equipped with a pre or post filter composed of activated carbon. Activated carbon produced by heating a carbon sources like old tires and by bones etc at very high temperature in the absence of oxygen. The pure carbon from the other materials contained in the raw material. The pure carbon is then exposed to steam at 800 c. The high temperature steam activates the carbon. The activation process provides the carbon with an enormous surface area per weight about 6.5 acres/oz. The millions of cracks provide locations where organic compounds can be adsorbed. In addition the surface of the carbon carries a residual electric charge that attracts non polar chemicals.

Electrostatic precipitators:-

- 1. The electrostatics precipitators collection system in manufactured by enclosing steel plates into a plastic casing, often by hand assembly. The plates are arranged parallel to each other in the case.
- 2. Wires are then connected to alternate plates through which the high voltage positive direct currents will be applied to the plates.
- 3. A voltage transformer which is used to convert 115 volt household alternating current into high voltage direct current is fixed to the precipitators case. This voltage is run to both the positively charged collector plates and the ionizing wires.

Carbon filter:-

- 1. The activated carbon filter usually consists of carbon impregnated cloth or fan. This is manufactured by infusing the raw material with powdered activated carbon.
- 2. The carbon filter is then wrapped around the inside of the HEPA filter or stretched in a frame at either the inlet or outlet of the electrostatic precipitators.

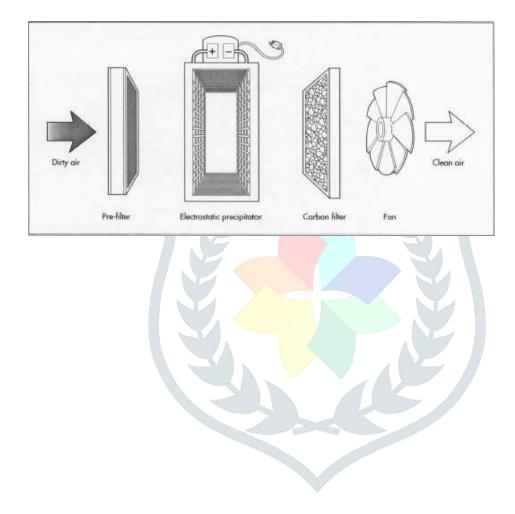
Settling water tank:-

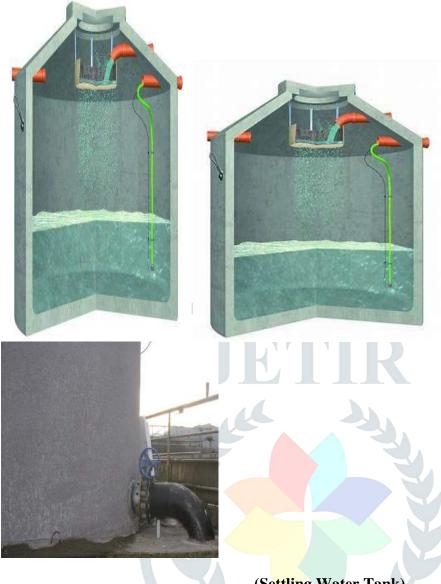
- 1. The dust particle settle down to the bottom of tank which directly comes from the air into line of tank.
- 2. Water tank fulfilled by water to collect the impure particle of air.
- 3. It is huge tank to used the store the water and after the purification can reuse for many purposes like harvesting, cleaning etc.
- 4. Made of tough steel or cemented.
- 5. All the pipeline of purifier directed connected to the main pile line of tank.
- 6. Two filter are also connected to the tank for filteration of water for reuse purpose.

DESIGN:-

HEPA filter are designed based on the size of particles to be removed and the required air flow rate. The finer the pores in the HEPA material ,the finer the particles removed from the air. However, collecting finer particles means the filter material will clog sooner and need replacing on a more frequent basis. The designer will specify the diameter of the glass fibers and the mat density of the filter fabric that fixes the filter pore size. HEPA filter can contain binders that provide additional strength but this also produces a filter that clogs sooner.

Design of an electrostatic precipitators is considerably is considerably more complex .Home electrostatic precipitators usually are designed to have two components an ionizing component and a collecting component .The collecting component consists of a series of parallel steel plates half are grounded and half carry a positive direct current voltage thus alternate plates are either positively or negative charged .The ionizing unit consists of thin wires strung between a separate set of grounded steel ionizing plates parallel to but set in front of the collector plates. The thin wires carry a very high positive voltage direct current upto 25000 volts in home air purifiers . The positive charges in the wire induce a flow of electron between the wires and the adjacent ionizing plates. Because there is a very high voltage on the wire, electron are pushed toward it by an acceleration of around 1,000 time the acceleration of gravity which accelerates the electrons to very high velocities .





(Settling Water Tank)

The Future:-

As scientist learn more about environmental pollutants and their impact on human health, the need to provide cleaner air in homes and offices will only grow. The current generation of HEPA filters can only remove particles down to 0.3 microns (0.00001 in,0.0003mm) in diameter while it is believed that particles down to 0.01microns (0.0001mm) in diameter can cause mechanical damage to lung tissue. Viruses can be as small as 0.02 microns (0.00002mm)in diameter. Clearly, there is still progress that can be made in controlling indoor air pollution. The current direction of technology is towards ever finer filter materials.

SUSTAINABLE APPROACH TO SOLID WASTE

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ABSTRACT

Sustainable development is not a product but it is a process, one of the most obvious impacts of rapidly increasing urbanization and economic development can be witnessed in the form of heaps of solid waste. Solid-waste management has become an important issue in the Asia-Pacific region, and it needs to be resolved through an integrated community, private sector and policy based approach. An attempt has been made to establish that how these three factors —Sustainable development, Solid Waste management and Environment plays a significant role in the construction of agro-based nation and also look at the relationship how solid waste dumped in open space or landfill site can contribute to the generation of landfill gas and contribute to climate as well as environment conservation in developing countries.

This study endeavors to understand the role of solid waste for the development of individual, society and nation. It focuses on producing lasting impacts on the management of solid waste in developing countries.

Keywords: Solid waste Management, Environmental Conservation, Sustainable development, Landfill.

1. INTRODUCTION

Solid waste management is an important facet of sustainable development for any nation and prioritizing solid waste management is greatly supported by global initiatives. Solid waste generation is a continually growing problem at global, regional and local levels. Improper disposal of solid wastes pollutes all the vital components of the living environment (i.e., air, land and water) at local and global levels. Urban society rejects and generates solid material regularly due to rapid increase in production and consumption. The problem is more acute in developing nations than in developed nations, as their economic growth as well as urbanization is more rapid. This necessitates management of solid waste at generation, storage, collection, transfer and transport, processing, and disposal stages in an environmentally sound manner accordance with the best principles public economics, engineering, conservation, aesthetics and environmental considerations. Thus, solid waste management includes all administrative, financial, legal, planning, and functions (Ramachandra, 2006; Ramachandra and Varghese, 2003).

According to a United Nations Development Programme survey of 151 mayors of cities from around the world, the second most serious problem that city dwellers face (after unemployment) is insufficient solid waste disposal (UNDP 1997). Typically one- to two-thirds of the solid waste that is generated is.not collected. The uncollected waste is dumped indiscriminately in the streets and in drains, contributing to flooding, breeding of insect and rodent vectors, and spreading of diseases. Even waste that is collected is often disposed of in uncontrolled dumpsites or burned, polluting water resources and the air. Studies have shown that a high percentage of workers who handle refuse and of individuals who live near or on disposal sites are infected with gastrointestinal parasites, worms, and related organisms. Solid Waste Management (SWM) includes all activities that seek to minimize health, environmental, and aesthetic impacts of solid waste.

Given the current developments, the generation of solid waste in India in the year 2047 has been projected to exceed 260 million tons-a number more than five times the present levels. While the quantity of solid waste generated by society is increasing, the composition of solid waste is becoming more and more diversified. Thirty years ago, the composition of solid waste generated by the Indian farmer was characterised by one-fifth non-biodegradable waste and four-fifths biodegradable waste. At present, this ratio is about to reverse; today, a mere 40 percent is biodegradable while 60 percent is non-biodegradable. At the same time, many households do not

recycle their waste, but, instead, tend to dispose it outside their homes or on the streets.

principle of the *waste* hierarchy consists following general steps, in order environmental priority: minimizing maximizing environmentally (1) waste, (2) sound waste and recycling, promoting environmentally-sound disposal and reuse (3) waste treatment. and (4) extending waste service coverage.

However, although it is the duty of the Urban Local Bodies (ULBs) to address the issue of SWM, tight budgets, inefficient organisation, etc., has rendered a situation that has little hope for alleviation in the near future. Instead, garbage is burnt or dumped; either producing hazardous smoke or leeching into the soil and contaminating both soil and water.

1.1 The Solid Waste Management System

Solid waste can be defined as nonliquid material that no longer has any value to the person who is responsible for it. In urban areas, solid waste is generated by domestic households, commercial and industrial enterprises, and healthcare and institutional activities, as well as on the streets.

The term *solid waste* refers to solid waste from houses, streets and public places, shops, offices, and hospitals. Management of these types of waste is most often the responsibility of governmental authorities. A typical waste management system in a low- or middle-income country includes the following elements:

- Waste generation and storage.
- Segregation, reuse and recycling at the household level.
- Primary waste collection and transport to a transfer station or community bin.
- Street sweeping and cleaning of public places.
- Management of community bin.
- Secondary collection and transport to the waste disposal site.
- Waste disposal in landfills.
- Collection, transport, and treatment of recyclables at all points on the solid waste pathway (collection, storage, transport, and disposal).

In the past, these important elements of waste management were often regarded only from an engineering and technical viewpoint.

Physical handling of solid waste and recyclables is just one SWM activity; it alone cannot fulfill the requirement for sustainable and integrated solutions. Other activities are equally important:

- Making policy, as well as setting and enforcing standards and regulations.
- Evaluating data on waste generation and characterization for the purposes of planning and adapting system elements.
- Carrying out public information and awareness and education programs.
- Identifying and implementing financial mechanisms, economic instruments, and cost-recovery systems.
- Incorporating formal and informal elements of the private sector as well as community-based activities and non-governmental organizations (NGOs).

1.1.1 Service Coverage for Waste Collection

SW collection schemes of cities in the developing world generally serve only a limited part of the urban population. Lack of financial resources and planning capacity to cope with increasing urban population growth affects the availability or sustainability of a waste collection service. inappropriate technologies, deficient management capacity inefficiencies, or of the involved also give rise to inadequate service levels. With regard to the technical system, often the conventional collection approach-developed and used in industrial countries-is applied.

More and more, involving private companies in SWM is seen as an easy way out. However, an

important factor in the success of private sector participation is the ability of the client-usually administration-to write and enforce an effective contract. As an large (often international) companies that can provide most or all of the solid waste services in a community-based organizations (CBOs) city, microenterprises, small enterprises, or services at the community level.

1.1.2 Recycling

Recycling of inorganic materials from SW is often well developed through the activities of the informal sector, although municipal authorities seldom recognize such activities. Some key factors that affect the potential for resource recovery are the cost of separating recyclable material the separated material, its purity, its quantity, and its location. The costs of storage and transport are major factors that determine the economic potential for resource recovery.

1.1.3 Disposal

Most of the SW in developing countries is dumped on land in a more or less uncontrolled manner. Those dumps make very uneconomical use of the available space and often produce unpleasant and hazardous smoke from slow-burning fires. The present disposal situation is expected to deteriorate even more as with rapid urbanization, settlements and housing estates encircle existing dumps and the environmental degradation associated with the dumps directly affects the population. Waste disposal sites are, therefore, also subjected to growing opposition, and it is becoming increasingly difficult to find new sites that meet public approval and are located at a reasonable distance from collection area. Landfills at very far distance from the central collection areas implies higher transportation costs, as well as an additional investments in road infrastructure, hence intensifying the financial problems of the responsible authorities

The safe alternative is a sanitary landfill, where solid wastes are disposed of at a carefully selected location that is constructed and maintained using engineering techniques such as liner's that minimize pollution of air, water and soil and other risks to people and animals.

1.1.4 Healthcare Waste and Hazardous Waste

Health care waste is generated as a result of activities related to the practice of medicine, sale of pharmaceuticals from hospitals and institutions is similar to domestic solid waste and may be called general healthcare waste. The remaining types of waste pose serious health hazards because of their physical, chemical, or biological nature. Such waste is known as *hazardous waste*.

strategies for treatment of hazardous waste rely solely on the use of or similar technologies. Such strategies have several weaknesses, because often the hospitals and healthcare facilities cannot afford to pay the operating costs of the treatment plant. The key to improving healthcare waste management is to provide better storage methods and to train the staff segregate hazardous general healthcare adopt safer working practices and waste from waste. The management of hazardous chemicals is not only a technological and legislative issue but also a matter of enforcement, funding, and financial instruments. Changing to processes that use less hazardous substitutes and minimizing hazardous waste quantities that are discarded can be seen as the preferred options in dealing with any difficult waste. Composition of the waste provides a description of the constituents of the waste; this varies widely from place to place as is evident from Table 1.

Table 1: Relative composition of household waste in low, medium and high-income countries

Contents	Parameter	Low income countries	Medium income countries	High income countries
Physical and chemical properties	Organic %	40-85	20-65	20-30
	Paper %	1-10	15-30	15-40
	Plastics %	1-5	2-6	2-10
	Metal %	1-5	1-5	3-13
	Glass %	1-10	1-10	4-10
	Rubber, leather, etc. %	1-5	1-5	2-10

Source: INTOSAI working group on environmental auditing (2002).

1.2 Potential Environmental Impacts

The typical solid waste stream (SWS) will contain general wastes (organics and recyclables), special wastes (household hazardous, medical, and industrial waste), and construction and demolition debris. Most adverse environmental impacts of solid waste management are rooted in inadequate or incomplete collection, or in inappropriate siting, design, operation, or maintenance of landfills. Improper waste management activities can:

1.2.1 Increase Disease Transmission or Otherwise Threaten Public Health

Purefying organic materials pose great public health risks. They can become breeding grounds for disease vectors such as rats and flies. Waste-handlers and waste-pickers risk contracting and transmitting diseases, especially if human or animal excreta or medical waste is in the waste stream. Populations are also at an increased risk for poisoning, cancer, birth defects, and other ailments.

1.2.2 Contaminate Ground and Surface Water

Solid waste streams can bleed toxic materials and pathogenic organisms into the leachate of dumps and landfills. If the landfill is unlined, depending on the drainage system and the composition of the underlying soils, this runoff can contaminate ground or surface water. When leachate from sanitary landfills is discharged into surface water it will similarly contaminate these bodies. Many toxic materials can only be treated or removed with expensive advanced technologies.

1.2.3 Create Greenhouse Gas Emissions and other Air Pollutants

When organic wastes are disposed of in deep dumps or landfills they undergo anaerobic degradation and become significant sources of methane, which is inflammable & greenhouse gas. Garbage is often burned in residential areas and in landfills to reduce volume and uncover metals. Burning creates thick smoke that contains carbon monoxide, soot, and nitrogen oxide, all of which are hazardous to human health and degrade urban air quality. Combustion of polyvinyl chlorides (PVCs) generates highly carcinogenic dioxins.

1.2.4 Damage Ecosystems

When solid waste is dumped into rivers or streams it can alter the aquatic habitat and harm native plants and animals. High nutrient contents can deplete dissolved oxygen in the body of water, and solids can cause sedimentation and change the stream's flow and bottom habitat. Landfills in sensitive ecosystems may significantly damage these valuable resources and the services they provide.

1.2.5 Cause Flooding

The accumulation of waste along streets can clog drains and cause localized flooding. Even these accumulation can decrease the catchment area of any river.

1.2.6 Injure People and Property

In locations where shantytowns have been built near open dumps or badly designed or operated landfills, landslides can destroy homes and injure or kill residents.



Table 2: Health and Environmental Effects of Some Pollutants caused by burning of Solid waste

Pollutant	Health Effects	Environmental Effects
Carbon Monoxides	Cause dizziness, headaches and slowed reflexes.	Oxidized to carbon dioxide in the atmosphere.
Chlorofluorocarbons (CFCs)	Causes dizziness, headaches and slowed reflexes.	The primary contributor to stratospheric ozone level depletion and are involved in the global warming effect.
Heavy Metals (such as Mercury)	Highly toxic: heavy metals collect in the human system until a lethal dosage is reached. Non-lethal effects can include chronic respiratory or intestinal distress, poisoning of the central nervous system, disruption of effects of the body's hormone system, inhibition of growth and development of children.	Increase toxic loading on environment: leads to contaminated water/land, affects animal health.
Ozone (03)	Exposure to ozone can injuri biological tissues and cells. Reduce lung function, including tightness of the chest, coughing pain and breathing difficulty.	Ground –level ozone damages vegetation and ecosystem, effects animal health.
Nitrogen Oxides	Causes respiratory illness, fluid collection in the lungs and fibrotic changes.	Contribution to acid rain and ozone formation.
Particulate Matter (PM)	Irritation of respiratory tract, aggravated asthma, contributes to chronic obstructive pulmonary diseases.	Increased toxic loading on the environment: leads to contaminated water/ land and affects animal health.
Polynuclear Aromatic Hydrocarbon (PAH's)	Cancer causing agent in most animal species including mammals, fish & birds.	Increased toxic loading on environment: leads to contaminated water / land affects animals health.
Volatile Organic Compounds' (VOCs)	Directly toxic including problems ranging from cancer risks to nervous disorders. Causes respiratory irritation/illness, chronic lung disease.	Contributes to low level ozone (smog), causes vegetative damage, leads to contaminated water/land, affect animals health.
Sulphur Oxides (S02)	Increase in hear/lung disease, acute/ chronic respiratory diseases. Health people experience shortness of breath, sore throats, breathing difficulties.	Causes vegetative damage: corrodes many materials; contributes to acid rain (forests, aquatic and urban environments i.e structures).

1.3 Recommendations

1.3.1 Technical Aspects

The technical aspects for a sustainable SWM would have to take into account the following points for planning and implementation of strategies:

- Provision of facilities for primary collection of waste from curbside/community bins and adequate storage facilities in the urban areas based on the population density.
- Transportation of waste from the community storage facilities at regular intervals and improvement in the waste collection fleet.
- Transfer stations (at optimal distances from residential areas) should be constructed wherever necessary with provision for weighbridges.

• There must be a separate SWM system for hospitals, healthcare establishments and industries to prevent the infectious and hazardous wastes from entering the municipal waste stream.

1.3.2 Management Aspects

Sustainable SWM would call for the strengthening of the management sector which has to go hand in hand with technical planning. The effectiveness can only be achieved by a strong management that takes into consideration the following aspects:

- An executable master plan and implementation plans for SWM at the provincial level or the state level in accordance with the strategy for national environmental quality would help the management;
- Application of the 3R concepts, product stewardship, cleaner production and specification in the selection of packaging materials to the manufacturers.
- Continuous monitoring and record keeping of MSW aspects with the development of a systematic information system that can be comparable, utilizable and updated; and
- Providing of organizational support for encouraging the involvement of private sector operators, NGOs and CBOs.

1.3.3 Financial Aspects

- There should be provisions for subsidies (grant, soft loan, etc.) from government to local authorities, including the private sector, NGOs and CBOs;
- There should be transparency and coordination amongst the staff regarding the operation and maintenance costs at each level of waste handling so that the expenses are rational;
- Tax exemption for importing recycling technology and reduced tax benefits from those industries using waste and scraps as raw materials; and
- A fund or trust for promoting 3R needs to be developed instead of a micro credit program in the informal sector.

1.3.4 Legislative Aspects

Legislation and its effective enforcement is a key to sustainability for which the framework requires to be established. The related aspects are given hereunder:

- Set up of appropriate pollution discharge standards for solid waste disposal. facilities such as effluent and emission standards either based on World Health Organization norms or related to the national standards for pollution control;
- Develop regulations and related laws to set up mechanisms for implementing 3R concepts Reduce, Reuse and Recycle;
- Declare a no-development buffer zone within 500 meters from the boundary of all processing and disposal sites; and
- The joint involvement of the Ministry of Finance, city planning offices and the Ministry of Environment to develop infrastructure plans on promotion of 3R is needed.

1.3.5 Supportive Aspects

Municipal bodies could have the required technology, financial resources, management structure and a framework of legislation for effective SWM. However, its implementation cannot be effectual unless the supportive aspects are mobilized to work hand-in-hand with the system. This can be achieved if the system can:

- Promote public education program, trainings and workshops, revise school curriculum by introducing the 3R concepts in general and SWM in particular, and reinforce social values for all children and citizens in the society; and
- Encourage waste separation and recycling program sources-households, commercial at centers. institutions and factories by employing segregation would the strategy that fit appropriate

waste collection and disposal practices.

The effective implementation of these strategies will help to solve the environmental pollution problems to a large extent.

2. SUMMARY

Waste generation, both domestic and industrial, continues to increase worldwide in tandem with growth in consumption. increased developed countries, per capita waste generation nearly fold over the last two decades, reaching a level five to six times higher than that in developing countries. With increases in populations and living standards, waste generation in developing countries is also increasing rapidly, and may double in volume in the current decade. If current trends continue! the world may see a five-fold increase in waste generation by the year 2025. A high proportion of the waste could be recycled by the urban poor generating income for themselves and protecting the environment. There is a need to develop an integrated approach where the public, solutions promoting sustainable private and community sectors work together to develop local solid waste management.

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Thermal Analysis of Submarine Power Cable Considering Natural Convection

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Abstract: Conventional Energy production techniques consume fossil fuels and thus contributes to anthropogenic climate change. Migration from conventional and centralized energy production centers to green energy have generated the demand to look for alternate sources i.e. tidal and wind and location (ocean) for energy production. Ocean energy with vast potential and varying methods of generation has emerged as an alternate to fulfil the energy demand. However, transportation of this generated energy and distribution of energy across the marine environment require a new incite to the existing methods of calculation for sea floor temperature rise due to buried power cables. These methods neglect the effect of natural convection which is a significant factor for high permeable North and Baltic Sea surface composition. These seafloor are largely composed of Gravel and coarse sand. This study encompasses two scenarios of heating of ocean floor 1) Energy production (Wind Power Station) 2) energy transmission across the seas connecting neighboring landmasses. The simulation results show that neglecting natural convection underestimate the seafloor temperature rise which could be disastrous to the flora and fauna in cable vicinity and can cause permanent change to the sea bed.

Keywords: Submarine power cable, Natural convection, FEM, Heat transfer, Power transmission.

1. Introduction

The first submarine cable to carry electricity was laid across the Isar river in Bavaria, Germany during 1811. The importance and development in technology and design of submarine power cables in terms of capacity and length has increased since then and in the past two decades, with advent of offshore renewable energy such as wind, marine and tidal installation, a network of cables are laid near and far from the shore line. The generated energy from these decentralized power production centers, which are far from industrial/consumption centers has generated the demand to reassess the power transmission systems. Submarine power cables are used to transmit the power across or from a water body. The installation and maintained of this system is cheap and a huge requirement is at horizon due to increasing demand of green energy. However, the generated energy is causing minimum environmental damage but the transportation of this energy emitting heat into the surrounding seabed can cause serious damage to the flora and fauna.[12]

Submarine power cables are of two type based on the current (i) High Voltage Alternating Current (HVAC) and (ii) High Voltage Direct Current (HVDC). AC cables are either 3 phase bundled in core or three separate cable, while HVDC may be monopolar (bundled together) or bipolar (separately lay).

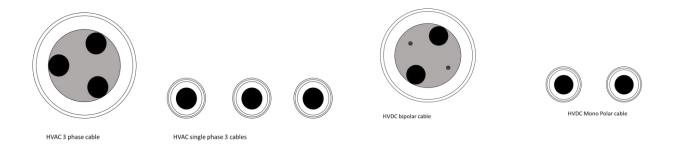


Figure 1: Showing two different kind of submarine power cable system and arrangement.

Both of these power cables dissipate heat into the surrounding due to Joule losses (I²R). Typically, HVAC cables are used for transmission distance of 150-180 km., above this distance, the transmission losses become high and HVDC is more cost effective. Cables laid on the seafloor dissipate heat in their surrounding water and is washed away. These installation are not permitted as they can alter the marine inhabitants & the cables can strangle with ship anchors in near shore scenarios. Therefore, cables are buried between the depths of 1.5 m-2.5 m under the seabed depending upon the scouring currents.

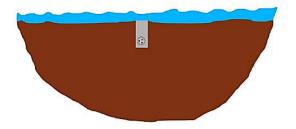
To cope with the situation of damage to the marine environment German environmental authority (Nationalparkverwaltung Niedersächsiches Wattenmeer) & German environmental authority (Bundesamt für Naturschutz) has recommended a 2K rise limit above the cable axis at 0.3 m below the seafloor, 0.2 m in Exclusive Economic Zone.

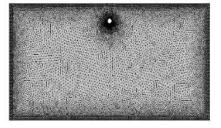
A calculation method based on Line Source Model (LSM) is applied in general given by IEC for the temperature field distribution around these cables. This method is not suitable to compute the complex seabed scenario. The controversy over application of this method is discussed in detail. [3,4,5,6] A Finite Element based approach is applied by Brakelmann[7] Stammen [8], In their study they consider heat transfer from cable due to conduction and convection. Convective heat transfer is imposed using and average convective heat transfer coefficient term based upon the low and high tide. These calculations are done only considering sediments with very low hydraulic permeability. However, near-shore marine and estuarine sediments tends to show variations horizontally and vertically over short distances, with a corresponding variation in thermal properties. Furthermore, the hydraulic regime in such an area is one of high activity, and as such, contributes to potential scour problems. Therefore, conventional land approaches are not directly applicable to the ocean environment.

In most cases, near shore backfill is in saturated condition. Most of the seabed in North and Baltic Sea are consisting of (1) clean granular sediment, poorly graded quartzite sands (2) fragmented glacial deposits. Clean quartzite sands with high thermal conductivity and permeability is ideal for heat dissipation and moisture replenishment. However, near the shore sandy-silt and sludge is also found. [9] Experiments has suggested that placing the offshore cables in sand and gravels with high permeability avoids the formation of 'Hot spots' around the cable thus preventing failure in insulation. [10] Placements of these power cables is gravel and highly permeable sand generates density driven flow adding to the mechanism of heat transfer.

Heat and mass transfer in a porous media is a complex phenomenon. Calculation of heat transfer neglecting natural convection for the grain size more than 6mm result in under estimation of temperature field [11]. Coupling temperature driven buoyancy and heat transfer in porous media also explain the maximum temperature directly above the cable and not on either sides of the cable as reported by Brakelmann & Stammen[12].

Figure 2: Schematic diagram showing submarine cable is trench. a) Uniform bed b) Finite element model of the





system. Red box in figure 1a showing the control volume.

To our knowledge based on Literature survey no such study in performed to observe the natural convection due to submarine power cable embedded in porous seabed (coarse sand and gravel). Therefore, a mathematical model

is setup to observe the near shore and off shore heat transfer around the cable under varying cable temperature and seabed soil conditions with native and modified backfilling of the trench.

In this study, a 2D numerical model is established to simulate the effect of natural convection around the buried submarine power cable. An investigation is performed to see the effects of change in permeability of the seafloor. The finite element package COMSOL Multiphysics is used to couple the heat transfer and convective fluid flow among the pores using flow equations.

2. Finite Elements coupled Heat and Mass transfer model

A detailed theoretical and experimental study related to convective flow of fluid in bounded and unbounded porous media is available. Theoretical work by Lapwood[13] which was confirmed by Katto & Masuoka [14] neglected the viscous effect, thus significant error arises near the solid boundaries in absence of boundary layer effect. Numerical solutions for the natural convection in enclosed porous media using Darcy's law is presented by many authors Chen [15] Farouk & Shayer [16] and Himasekhar& Bau[17] work on a heated cylinder in semiinfinite and bounded porous media is a noteworthy contribution.

To model the problem unsteady laminar natural convection flow has been considered to model the flow due to internal heat generation in a water saturated porous sand. The free convection problem is model by introducing Boussinesq buoyancy term to the Brinkman's momentum equation, and then coupling the resulting velocities to the heat transfer in porous media equation.

$$\frac{\rho}{\epsilon_p} \frac{\partial \mathbf{u}}{\partial t} = \nabla \cdot \left[-p\mathbf{l} + \frac{\mu}{\epsilon_p} (\nabla \mathbf{u} + (\nabla \mathbf{u})^T) - \frac{2\mu}{3\epsilon_p} (\nabla \cdot \mathbf{u}) \right] - \left(\frac{\mu}{\kappa} + \beta_F |\mathbf{u}| + \frac{Q_{br}}{\epsilon_p} \right) \mathbf{u} + \mathbf{F}$$

$$\rho \nabla \cdot \mathbf{u} = Q_{br}$$

The Boussinesq buoyancy term in equation (1) accounts for the lifting force due to thermal expansion. The boundary conditions for the Brinkman equations are all no-slip conditions.

Transient porous heat transfer equation

$$d_{z}(\rho C_{p})_{eff} \frac{\partial T}{\partial t} + d_{z}\rho C_{p} \mathbf{u} \nabla T = \nabla \cdot (d_{z} k_{eff} \nabla T) + d_{z} Q + Q_{vd} + Q_{p} + Q_{oop}$$

The heat diffusion equation for 3D is used to model the heat transfer in porous media. The width parameter d_z is fixed to 1m for 2D analysis. Effective values of heat transfer and thermal conductivity parameter are calculated as below.

$$(\rho C_p)_{eff} = \theta_p \rho_p C_{p,p} + (1 - \theta_p) \rho C_p$$
$$k_{eff} = \theta_p k_p + (1 - \theta_p) k$$

2.1 Initial Condition for Boussinesq Equation

Eq. 1 & Eq. 3 are strong nonlinear problem and represents convergence task for the most nonlinear solvers. Even without Boussinesq term, the Brinkman equations are nonlinear alone. Therefore, the coefficient of volumetric thermal expansion β is increase stepwise and use solution of previous step as initial condition. This iterative approach solve the problem of convergence.

In most of natural convection solution with various methods, the isothermal boundary conditions are assigned on the external boundaries of the submerged ground and the effects of seabed temperature change over the year is ignored. In this model we have considered the fluctuation of seabed temperature and assigned the measured value obtained from direct measurement in the Baltic Sea.

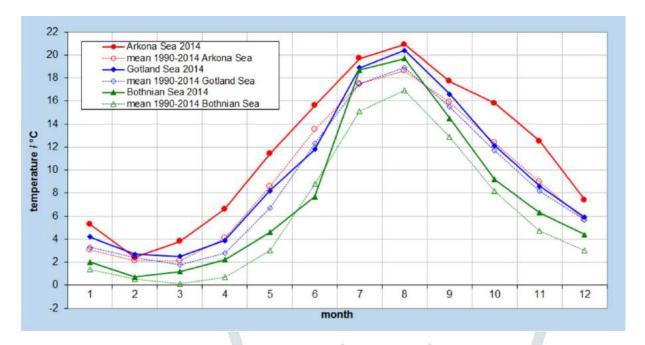


Figure 3: Fluctuation of seabed temperature change over a year in Baltic Sea.

3. Results & Discussion

Numerical simulation is performed to calculate the effect of natural convection due to submarine power cable in semi-infinite porous media. First the calculations are done to observe the buoyancy effect and the velocities are calculated. These velocities then used in calculation of temperature field considering the effect of natural convection. The cross flow velocity profile is not considered in these calculations. In case of strong cross flow the thermal plume will be shifted along the flow thus causing a different zone of heating. Sea bed temperature of 10°C is assumed to match seabed temperature for Wind Power Station (WPS) case. This is a short term simulation running for 5days and a large variation in temperature is not expected. A maximum of 60°C cable temperature is assigned for Wind Power Station (WPS) and 90°C for power transmission along the seabed. A temperature of more than 90°C in avoided in these XLPE cables to avoid melting of surrounding insulation for the conductor.

Temperature and flow boundary conditions are shown in figure 4 and the values are tabulated in Table 1. The system is modeled as close system only allowing energy transfer to the surrounding.

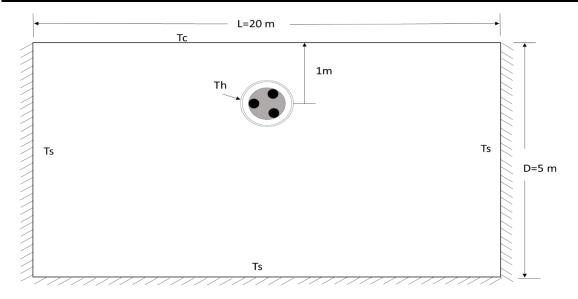


Figure 4: showing temperature and flow boundary condition. No flow is allowed from system to the surrounding.

As most of the submarine cables are laid with a calculated tensile stress, these cables are always in tension. Differential rise in temperature due to local soil condition cause the cable to expand at these location. Improper surrounding soil temperature calculation can cause insulator failure around the conductor, seabed temperature rise and worst case breaking of the cable due to "hot spot" generation.

Burying the cable deep into the seabed helps in avoiding the environmental criteria (2K criteria), but increases the budget of the project. Also it is difficult to retrieve the cable after the service life. On the other hand, shallow buried cable don't meet with the environmental criteria.

The following results indicate the heat transfer calculation only considering conduction equation are not sufficient in gravels and coarse sand with high permeability.

Table 1

Parameters (Sea water)	Values
Density	1029[kg/m³]
Dynamic viscosity	0.00188[Pa*s]
Volumetric thermal expansion	170e-6[1/K]
Thermal conductivity	0.563[W/(m*K)]
Ratio of specific heat	1.004
Heat capacity at constant pressure	3985[J/(kg*K)]
Hydrostatic pressure	1.5[atm]

Parameters (Soil Matrix)	Values
Thermal Conductivity	2.0[W/(m*K)]
Heat capacity at constant pressure	1440[J/(kg*K)]
Density	2100[kg/m³]

Calculation are performed for 5 days for Wind Power Station (WPS) and 1 year assuming a constant operating voltage, generating a constant temperature around the cable. A significant temperature rise due to natural convection is observed for gravel and coarse sand. These results indicate that natural convection must be considered in calculation when gravel and coarse sand with high permeability is encountered at the seafloor bed.

The limiting factor in cable efficiency is the ability of these cables to dissipate heat in the surrounding. Therefore, a high thermal backfill material is placed near these cables to dissipate the heat faster and avoid the hot spot formation. Simulations are performed to model this scenario for both short and long term effect. The results suggest as shown in figure xx that the existing model without considering the effect of convection underestimate the temperature rise in a gravel seabed.

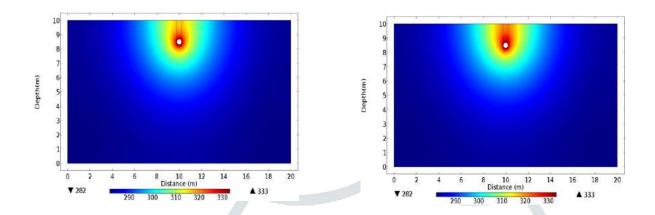


Figure 5: Evolution of temperature field after 365 days around the cable. a) Only conduction b) with natural convection $K=10^{-9}m^2$ c) with natural convection $K=10^{-9}m^2$ d) with natural convection $K=10^{-7}m^2$

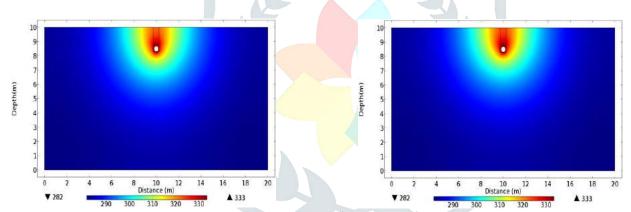
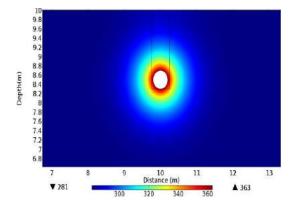


Figure 6: Temperature rise above the cable at 0.2 m depth from the surface considering low thermal conductivity of 2.0 W/m.K (native material) after 5 days a) without natural convection b) with natural convection.



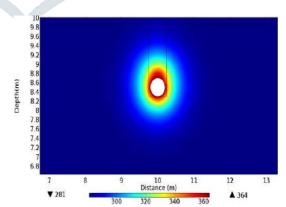
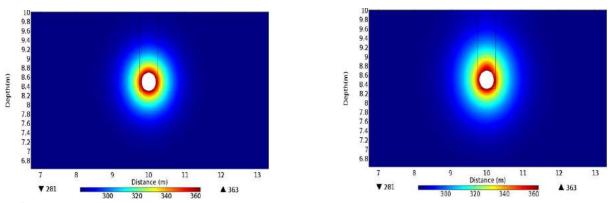


Figure 7: Temperature rise above the cable at 0.2 m depth from the surface considering high thermal conductivity of 3.5



W/m.K (trench backfill material) after 5 days a) without natural convection b) with natural convection.

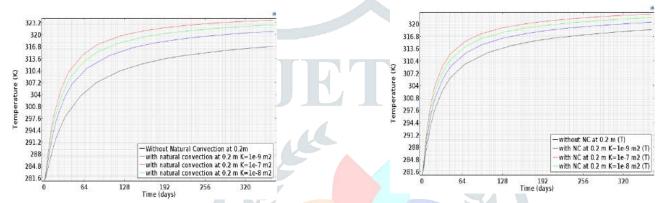


Figure 8: Temperature rise above the cable at 0.2m depth after 365 days a) in native soil b) with modified trench backfill.

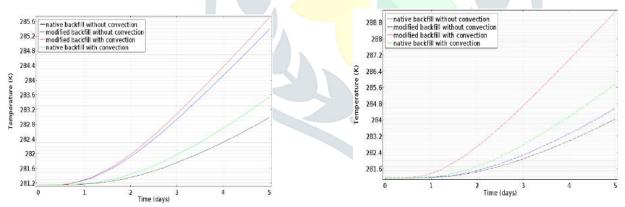


Figure 9: Temperature rise above the cable at 0.2m depth after 5 days a) in native soil b) with modified trench backfill.

Conclusions

Comparison of heat transfer characteristic with fine grain soils such as clayey and silty bed to that of coarse grain beds such as gravel and coarse sand suggest that, although coarse grain soils has the effect of natural convection which violates the 2K criteria it has the advantage of preventing hotspot formation around the cable thus damaging the insulation.

Concluding, it is emphasized that an optimum design brings not only an detail understanding of technical aspects related to electrical transmission by buried cables, but on the concept of multidisciplinary processing of the marine world.

To reduce the temperature to meet the 2K environmental criteria, cable trenches are filled with high thermal backfill material. These materials are less permeable as they are made up of more than 70% fine grain content. These modified backfill materials suppress the formation of convection cell formation due to low permeability. However, the technique work to reduce the heat accumulation near the cable, the method is costly and brings environmental constrains for implementation.

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Literature Review of Various Nature-Inspired Optimization Algorithms Used for Digital Watermarking



Preeti Garg and R. Rama Kishore

Abstract Today, a tremendous amount of data is transferred online, so there is a need to secure this data. Digital watermarking is a process of embedding some presumed content image or data in any cover data so that the quality of the content should not degrade and it should not be visible to human eyes. This paper describes various characteristics required by any watermarking algorithm and explains some of the optimization algorithms. DWT, DCT and SVD alone are not sufficient for achieving the required robustness, imperceptibility and security of the digital content; some of the optimization algorithms are required to achieve these, so this paper reviews various nature-inspired optimization algorithms used for optimizing the process of digital watermarking and shows a comparative study of these techniques in tabular form.

Keywords Digital watermarking · Optimization · Genetic algorithm · Firefly algorithm · Particle swarm optimization · SVD · Artificial bee colony algorithm

1 Introduction

Today's world is a digital world because every information or data is available in digital form on the Internet. This availability of data on Internet allows users to share and access all the data and information in digital form which infringes the law of copyright ownership of particular data. As everything is available in digital form, one can use other's data easily and can modify it which gives birth to the digital watermarking. One of the applications of digital watermarking is to provide copyright

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Chapter 12 Data Mining—A Tool for Handling Huge Voluminous Data



Seema Maitrey and Yogesh Kumar Gupta

1 Introduction

Tremendous and exceedingly huge data is being accumulated recently almost in every field and growing continuously. The precious information is concealed in large databases. It is becoming very difficult and inefficient for researchers to analyze and retrieve knowledge from such huge tomb of data. Data is voluminous, so human intervention is not required, thus results in a rapid and economical way of exploring and analyzing data. Algorithms of data mining are comprised of techniques which existed few years back, i.e., at least 10 years [1]. Now, they are refined with matured, reliable and user-friendly tools in such a manner that they have consistently outperformed the previous methods. Data mining produced information and knowledge that got used in several areas, such as education, health care, finance, science, market analysis, intelligence agencies, internal revenue service, sports, Web education, credit scoring, engineering design and many more [2]. The significant use of data mining in these special areas affects our life in one way or other. It is improved due to the rise in information technology [3]. These fields are making the use of databases technology, parallel computing, distributed computing.

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Chapter 8

Improvement and Reduction of Clustering Overhead in

Mobile Ad Hoc Network

With Optimum Stable Bunching Algorithm

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ABSTRACT

In MANET, every hub isfitfor sending message (information) progressively without prerequisite of any fixed framework. Portable hubs oftentimes move in/out from the system powerfully, making arrange topology unsteady in portable specially appointed system (MANET). Therefore, it turns into an incredibly moving errand to keep up stable system. In this chapter, the authors have proposed an upgraded stable bunching calculation that will give greater soundness to the system by limiting the group head changes furthermore, diminishing grouping overhead. In proposed optimum stable bunching calculation (OSBC), another hub is presented which goes about as a reinforcement hub in the bunch. Such reinforcement hub goes about as group head, when real bunch head moves out (or passed on) from the bunch. Last mentioned, the group head reelect another reinforcement hub. This training keeps

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PERFORMANCE COMPARISON OF VARIOUS FILTERS ON DESPECKLING OF MEDICAL ULTRASOUND IMAGING

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ABSTRACT

Ultrasound Imaging plays vital role in diagnoses a disease. US image suffers from speckle noise. Despeckling is an important task for accurate diagnosis. In this paper experiment has been performed to measure the effectiveness of various filters available for despeckling. Results are compared qualitatively and quantitatively the Peak Signal to Noise Ratio and SSIM parameters are used to quantify the results. On basis of these parameters the performance of various filters are shown.

Keywords: Median Filter, Mean Filter, PSNR, SSIM, Speckle Noise.

I. INTRODUCTION

Medical imaging is very much useful to investigate the human body to diagnose diseases. Currently in medical imaging technologies, ultrasound imaging is widely used modality, practically safe to human body, non surgical, portable, and lesser cost. US images are accessed by processing the echo signals reverted by body tissues, obtain distinct acoustic impedances. Due to this it can also show the movement of body's internal organ movement as well as the blood flowing through the blood vessels. These features enable ultrasound imaging the most adaptable diagnostic tool around the world in almost all hospitals.

Ultrasound imaging has been considered the finest technique for organ and soft tissue imaging from the last many years. Unfortunately ultrasound imaging gives low quality images that leads it difficult to interpret as they strongly depends on the operator's skill. This constraint is due to presence of speckle noise [1].

Due to US imaging principle it suffers from strong speckle noise. Speckle is image variance or a granular noise, exists inherently and degrades the quality of the medical ultrasound images. Speckle noise is mainly due to the interference of the returning wave at the transducer aperture. Speckle noise consequences from these patterns of constructive and destructive interference shows as bright and dark dots in the image. Speckle noise blurs the image details and decrease the contrast of ultrasound image, thus diminish the trustworthiness of the image that leads to the wrong diagnosis of the diseases. As a result, speckle noise reduction is the foremost requirement, whenever ultrasound imaging is used for tissue characterization.

Our objective is to improve the quality of the images by reducing the effect of speckle noise from the US imaging. For this many algorithm are evolved that are describe in next section. There are several parameters that are

An Enhanced Cellular Automata Based Filter for Despeckling of Ultrasound Images

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Ankur Bhardwaj; Sanmukh Kaur; Anand Prakash Shukla; Manoj Kumar Shukla All Authors

1 Paper Citation 53 Full Text Views











Abstract

Document Sections

- I. Introduction
- II. Cellular Automata
- III Related Work
- IV. Proposed Work
- V. Experiments and Results

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Authors

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Citations Keywords

Metrics

Abstract

Speckle noise is a multiplicative noise which degrades the quality of ultrasound images and videos which causes the difficulties in evaluation and diagnoses of diseases by experts. Despeckle filtering is the emerging area of research necessary for US imaging. Cellular automaton is a novel and innovative technology which can be applied in image processing applications. The cellular automation techniques resolve a particular problem by considering it in terms of specific patterns. In this paper a new algorithm on cellular automata based approach for despeckling filter has been proposed. Experiment has been performed to compare the effectiveness of proposed filter. The proposed filter is compared with the existing filters both quantitatively on the basis of PSNR and SSIM it is found better. Future enhancement on the proposed filter is also discussed.

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I. Introduction

Ultrasound imaging is non-invasive technique widely used to diagnose any disease. It generates the real time images of different organs of human being like liver, kidney, heart, uterus, stomach and many more. Despite of its cost effective and usefulness it is badly effective by speckle noise, quescian poice and environmental noise. The prior one not only reduces the quality of Sign in to Continue Reading rained in diagnosis of disease. It is upto the expert who used their skills to identify the outcome of the US imaging. Speckle noise is a multiplicative noise and is present everywhere in the image.

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HealthStack—A Decentralized Medical Record Storage Application



Abstract

The aim of this study is to design and develop a blockchain-based web app called Health Stack to maintain accurate and complete medical records of patients, to help doctors to fetch previous medical history of the patients, to assist user to find out the disease he or she is suffering from and much more. For medical services, secure data storage is one of major concern for people. This problem can be resolved by developing an app using a blockchain technology having the features of decentralization and verifiability. Development of this app doesn't involve any kind



Analysis of Two Phase Query Optimization Algorithm for Generating Optimal Query Plan using Randomized Algorithm

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Abstract: The environment in which large numbers of distributed sites are connected with each other, without sharing their physical memory is called distributed database system. The database systems that execute on each distributed sites are independent of each other. Replication and fragmentation are the two important techniques used in the development of distributed database. The replicas of the data are stored in different distributed sites for promoting the availability of data at all the distributed sites. Thus with the help of replication each distributed site can request for the replica of the data and can store the entire copy of the same. The concept of fragmentation is commonly used for flooding the data to various distributed sites. In this paper an attempts have been made to compare the results of Iterative Improvement (II), Simulated Annealing (SA) and 2 Phase Optimization (2PO) algorithms. The 2PO algorithm is also known as hybrid approach since it is a combination of II and SA. It is called 2 PO because it executes in two phase, in the first phase the II algorithm is applied, then in the second phase the SA algorithm is applied. The results of the experiments obtained after implementing II, SA and 2PO algorithms are compared. Based on the experimental result obtained it is oblivious that 2PO performs better than II and SA.

Key-words: Distributed database; Two Phase Optimization; Query Optimization.

1. Introduction

Replication and fragmentation plays a vital role in the establishment of distributed sites. Replication, replicates the data at distributed sites where as fragmentations on the other hand divide the relation into different fragments i.e. horizontal, vertical and mixed fragmentation [11]. The entire relation is divided into several small fragments and thus these small fragments are stored at various distributed sites for availability of data. Each site may access same data from the distributed locations. Therefore fragmentation is a better technique for storing the data at different distributed site as it takes lesser amount of memory space and time too [13]. Also in fragmentation, only the required data is stored as compared to replication.

Randomized algorithms generates best optimal query plan [6]. It is called 2PO since it uses II in the first phase and applies the SA

in the second phase. The fundamental concept of the randomized algorithm is that it first selects some random plan and then it compares the cost of randomly selected plan with the neighbor plan [13]. The process of selecting random plan continues till it obtains a plan with lower cost as compared to the final randomly selected plan[2]. Since the randomized algorithm adopts the advantage of both the II and SA algorithm thus it produces the optimal query plan with the lowest cost [16].

The generation of optimal query plan depends on the two factors, i.e. the search strategies and the number of distributed site participating [1]. There are various search

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Exploration of Deep Learning Techniques in Big Data Analytics

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Poonam Rana; Vineet Sharma; Pradeep Kumar Gupta All Authors

45 Full Text Views











Abstract

Document Sections

- I. Introduction
- II. Big Data Classification
- III. Deep Learning Techniques:
- IV. Applications of deep learning in big data analytics.

Authors

Figures

References

Keywords

Metrics

Abstract:

Due to the advancements in modern technologies, big data plays a significant role in every field. Now to extract information and meaningful data from the various sources of data is a tedious task. In this paper we present various techniques of deep learning used in Big data processing and present various applications of Deep Learning in Big Data Analytics. Data comes from various sources like facebook, youtube videos, twitter data, Linkedin, Millions of devices connected over the Internet, (IOT).

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I. Introduction

As we know that in today's World data is increasing day by day. Data comes from various sources such as twitter, face but Sign in to Continue Reading actions, IOT(millions of

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Key Attributes for a Quality Mobile Application

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Abstract— The innovative advancement of cell phones. the significance of the Internet in the present society and the blasting market of the mobile devices have upset the mobile software programming altogether known as the product quality of portable intuitive gadgets. The mobile software programming gets increasingly competent and complex, which enables designers to apply entrenched quality strategies and models, from the work area of software programming advancement to mobile programming. But still, mobile software programming moreover still has its portable explicit qualities, comparing models and techniques that must be balanced for its use in the larger domain. In the following research, some of the key attributes that must be incorporated and taken care for developing a portable quality mobile applications are identified. The key attributes determined by investigating before developed quality models which allows enhancing knowledge that can be drifted in the near future.

Keywords— Mobile Application, Software Quality, Software Quality Models

I. INTRODUCTION

In such a booming industry of software programming, similar to the market of mobile devices today, software quality is a major issue nowadays [1] [2]. New stages and levels for the applications are pushed into the market to advertise, which lead time to showcase systems not once in a while, but the software programming quality is missed out in many cases. But still, particularly for today when the equipment segments of distinctive cell phones get increasingly assorted, programming turns into the particular product for end-clients and designers. To oversee portable explicit of software programming quality necessities, firstly the developed standard quality models get explored. After exploring the previously used models, it has been noticed that such a nonexclusive and widespread quality model covers much more than just software programming in the portable zone where it takes a parcel of time to separate the parts that fit the necessities of creating portable applications and levels of quality for them [3].

In the present research work, the aim is to identify the key attributes so that, a quality model can be proposed for portable mobile applications. The model must incorporate the essential factors for developing a mobile application. The model may be utilized for the progression of several applications that has the advantage, even in its essential rendition, which as of now centres around some of the major characteristics of quality. It has been noticed that if the process of designing these applications focus on the key attributes of the mobile applications, then the end

product will be a quality product. The process of development is important for any kind of product [6].

Since the focal thought depends on setting up a software programming quality model for mobile applications which is going to be similar to the model suggested by Bohem, McCall and ISO 9126, it isn't limited to the given quality possession, but can be adjusted for the exceptional needs of explicit programming ventures and other applications [4] [5]. The present research work is organized as: Section II defines an overview of the related work. The identified key attributes for quality mobile applications are explored in Section III and the conclusion at the end in Section IV, and at last references.

II. RELATED WORK

Since various software programming quality models already exist and have substantiated themselves for numerous years. Two of the most adaptable models across the board models include model propounded by the Jim McCall et al. in 1976-1977 and B. W. Boehm et al. in 1978 [14] [15] [17]. Both of these quality models characterize fundamental client prerequisites, quality elements and qualities without constraining or centring themselves to a particular software programming boundary. Another model propounded by the International Organization for Standardization ISO 9126 in 1993, which was a model depends on the quality models suggested by McCall and Boehm. It distinguishes outer and inside quality attributes of programmable software products.

Other realized models were FURPS in 1987, ISO/IEC 9126 model in 1991, Dromey's model in 1995, ISO/IEC 25010 in 2011, and Bansiya's QMOOD model in 2002 [16] [25] [26]. All these, in general, are to the point, which means these are inconceivable to spread the unique needs of explicit software programming frameworks, as for mobile applications. Every one of them is pretty much appropriate for software programming mobile applications, yet none takes the particular conditions under record that becomes an integral factor with such intelligent inserted gadgets.

Various authors have also presented different types of frameworks for the assessment of the quality of the mobile applications. Franke and Weise propounded a framework for assuring the quality of the mobile applications. The framework was developed based on the previous quality models presented for assessment of the quality [27]. The model gets validated on the case study using statistical methods. In 2012, Wang et al. propounded another model for testing android mobile





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Redundant Iaas Cloud Selection With Consideration Of Multi Criteria Decision Analysis

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Abstract

Due to the rapid growth of dependency over Mobile cloud system, the demand of high computational system increases rapidly. Cloud computing gives the flexibility to users to use high computation system at nominal cost and scalability in dynamic and on demand fashion. The term offloading has attracted the researcher to obtain the highly capable cloud system with certain limitations such as minimum processing and communication time, make span, minimum operational cost. Offloading of data and application have definite positive keynotes such as it can extend the battery life of IOT devices also it is suitable for critical events (events those require minimum response time). In today, numerous cloud services providers are offering customized services, they are dedicated to fulfill the demands of user with negotiable service level agreement. But due to the inherent uncertainty involved in human judgment and lack of learning capacity, a dynamic cloud selection and decision model is required to evaluate the user preferences. That can recommend an optimal and redundant cloud system from the available pool of cloud service providers. Resolving of uncertainties and ambiguity in human's decision are solved through fuzzy set theory. In this paper, an optimal and redundant cloud selection model has been presented on the basis of multi criteria decision analysis under consideration. Weighted Sum Model, Fuzzy Analytic Hierarchy Process and Fuzzy Revised Analytic Hierarchy Process are evaluated on 10 different criterions. Overall the outranking result for the considered datasets is similar, while the computation power of AHP method is ideally superior with comparison to revised AHP method.

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Keywords: Cloud service selection; Application Offloading; MCDM; WSM; AHP; RAHP

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IAIHC-025

Reinforcement Learning Instructions and Algorithm: A Survey and Classification

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Reinforcement Learning (RL) is the toughest approach to artificial intelligence (AI), it is an area of machine learning, concerned with robotics and the mapping of software with the environment. In this study paper we attempt to do a quick survey of different RL algorithms, to give outlook on how the pathway moves in the research scenery RL. We are also trying to classify and give an overview of the 3-D (dimensional) problem, and how each of these dimensions' travel in different directions progressing. We quickly review the basic classifications of some popular and old, methods in RL. This paper discusses the latest trends; and sum up the entire topography visible from an Ariel view. We offer our frame of reference on saying that reinforcement learning ends with a 3D problem and challenges it is in front of us. We aspire this article provides a summary is a great place for students, researchers and scholars.

Keywords: Game Theory; Artificial Intelligence; Machine Learning; Reinforcement Learning; Deep learning; Deep Reinforcement Learning

Research and Analysis of Technologies used in Big Data

Manish Bhardwaj¹, Anil Ahlawat² ¹²KIET Group of Institutions, Ghaziabad

Abstract- "Enormous Data" could be a term together with the employment of strategies to catch, process, break down and envision conceivably vast datasets during a wise time span not available to straightforward IT innovations. By augmentation, the stage, instruments and programming used for this reason for existing are by and enormous referred to as "Huge knowledge advancements". In this manuscript, we give the importance, attributes, models, advances, life cycle and diverse totally different components of Big data.

Keyword: Cloud Computing, Big Data, Distributing Computing, AEP.

I. INTRODUCTION

We have entered an amount of massive information. Through higher investigation of the large volumes of data that are becoming to be accessible, there's the potential for creating faster propels in varied logical teaches and up the productivity and accomplishment of various endeavors (1).

Huge data is creating exceptional open doors for organizations to accomplish more, faster bits of information that may fortify basic leadership, improve the consumer experience, and quicken the pace of advancement. In any case, today, most immense data yields neither importance nor esteem (2). Organizations are thus swamped by the total and assortment of data falling into and thru their activities that they battle simply to store the information—considerably less examine, decipher, what's additional, gift it in necessary ways that.

The expression "enormous information" incorporates over organized and exchange based mostly data. It in addition incorporates recordings, RFID logs, person to person communication discussions, sensing element systems, search records, natural conditions, restorative sweeps, "information exhaust" — the path of navigates the net delivered by internet surfers—and the sky is that the limit from there.

Huge data systems supplement business insight (BI) instruments to open associate degree incentive from business sector information. While BI typically performs organized examination and offers a back read replicate into business execution, huge data examination provides a progressive perspective, empowering associations to visualize and execute on possibilities of what's to return (3).

Huge data could be a relative term portrayal a circumstance wherever the volume, speed associate degreed assortment of data surpass an association's warehousing or register limit with regards to express and convenient basic leadership. Enormous data, similar nowadays with trade insight, trade investigation, and knowledge pulling out, has affected trade knowledge which revealing with selection facilitate to expectation and another one basic leadership.

Governments anticipate that huge facts ought to upgrade their capability to dole out their natives and deal with real general difficulties including the financial system, medicative services, work creation, normal fiascos, and psychological oppression (4). Organizations utilize immense data to hunt once edges, governments use it to advance the open nice.

Huge information presents ideas, strategies, innovations, IT structures and instruments accessible to the large volume expanding of varied in sequence in higher usage of resonance and opportune administration selections furthermore, consequently improve the imagination and aggressiveness of endeavors.

The utilization of big data may offer adequate advantage to a little to medium calculable organization to the degree that the business would submit assets to actualize immense data innovation in-house (5).

To benefit the maximum amount as doable from huge data, undertakings should advance their IT foundations for modify the huge frequency of sound, highvelocity, highassortment wellsprings of statistics and coordinate it with the previous venture statistics to be examined.

Multifaceted troubles are often understood rapidly utilizing immense data what's additional, refined examination in associate degree confiscated, in-memory and comparable condition.

The pattern on the way to illustration based mostly statistics speech act apparatuses is merit investigation by any production that tries to infer additional esteem from immense statistics (6).

This manuscript is sorted out as pursues. Section 1 pair of introduces the foundation subtleties. Second area shows the

Pre-processing Highly Sparse and Frequently Evolving Standardized Electronic Health Records for Mining

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Abstract

EHRs aid in maintaining longitudinal (life-long) health records constituting a multitude of representations in order to make health related information accessible. However, storing EHRs data is non-trivial due to the issues of semantic interoperability, sparseness and frequent evolution. Standard based EHRs are recommended to attain semantic interoperability. However, standard based EHRs possess challenges (in terms of sparseness and frequent evolution) that need to be handled through a suitable data model. The traditional RDBMS is not well-suited for standardized EHRs (due to sparseness and frequent evolution). Thus, modifications to the existing relational model is required. One such widely adopted data model for EHRs is Entity Attribute Value (EAV) model. However, EAV representation is not compatible with mining tools available in the market. To style the representation of EAV as per the requirement (i.e., relational table) of mining tools, pivoting is required. The chapter explains the architecture to organize EAV for the purpose of preparing the dataset for use by existing mining tools.

Introduction

Electronic Health Records (EHRs) provide a digital support to the healthcare industry. A database of EHRs assembles health data of a patient from various departments of a healthcare organization including administration, pharmacy, clinical, radiology, laboratory and nursing. Contents within EHRs can be structured, semi-structured, unstructured, or a hybridization of these. For example, the contents of EHRs can be in the form of plain text, basic types (such as state variable and Boolean), time, date, date-time (including partial date/time), paragraphs, coded text, encapsulated data (such as parsable and multimedia content), measured quantities (providing units with values), uniform resource identifiers (URI) and container types (such as set and list) (Sachdeva S. & Bhalla S., 2012). EHRs aid in exchanging patients' health information electronically from one hospital to another. This electronic exchange of EHRs diminishes the burden of patients to carry reports printed on papers and other health related documents. However, exchange of EHRs needs to be semantic interoperable i.e. communicating parties must depict the same meaning of the exchanged EHRs data without any ambiguity.

Semantic Interoperability

To attain semantic interoperability, distinguished standard organizations, such as ISO (ISO 13606-1. 2008. Health informatics -- Electronic health record communication -- Part 1: Reference Model,.; ISO/DIS 13606-2 - Health informatics -- Electronic health record



Chapter

Research on IoT Governance, Security, and Privacy Issues of Internet of Things

By Manish Bhardwaj

Book <u>Privacy Vulnerabilities and Data Security</u> <u>Challenges in the IoT</u>

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ABSTRACT

The Internet of Things (IoT) is one of the most important advancements of this century. In its varied uses, for example in infrastructure, security, design, and privacy, it can be expected to play an imperative role in shaping the destiny of the digital world. IoT devices are connected through sensors that influence the information and its security. During this investigation, we used 5 stratified arrangements of the Internet of Things to handle the safety and privacy issues with IoT-engaged organizations and applications. Moreover, we wish to draw your attention towards how the IoT is trying to revolutionize the globe. This chapter focuses on the various topics and issues related to the Internet of Things, like governance, security, and privacy. These are the main issues for IoT and its growth in today's technologically advancing environment.

A Robust Copy Move Forgery Classification Using End to End Convolution Neural Network

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Abstract- in this digital world it is not surprising to do manipulation with digital images. With advantage of such technologies it has become very easy to misguide the observer about the reality appearing in the images. The objective behind such manipulation for fun and entertainment is acceptable but when such things are applied on sensitive information such as evidences used in judiciary system, to prove certain claim, using such manipulated images on social media becomes dangerous. Although many types of forgeries that could be performed with images such as copying certain part of image then pasting it in same image somewhere else in document with such precision that it appears normal to observer called copy move forgery. Other forgeries include splicing of images, image morphing, retouching etc. Two different categories of approaches are being used till recently for this problem of copy-move forgery detection. These are block based and approach wherein block based is Keypoint based computationally intensive and suffers from many disadvantages and other is based interest points or high textured areas whose features vectors are formed for comparison to find the duplicated regions. In this paper, a deep neural network based approach has been proposed with promising results that can classify images based whether any copy move forgery has been there in the images. The proposed work aims to classify all the images having copy move forgery with presence of scaling, rotation, different compression level. A new CNN model has been researched for this problem to obtain the accuracy of around 93-95 percent for different datasets alone as well on the combination of two or more

Keywords— Forgery detection, Tempering, CMFD, Blockbased, Keypoint based, Convolutional neural network.

I. INTRODUCTION

In the era of computation technologies and digital world it is has become very easy to manipulate images. Even on the smart phones high level of editing can be done easily. Various techniques of digital image processing led to image manipulation in number of ways. All available approaches motivates for different tempering in images for illegal use such as evidence, blackmailing, misguiding the observer etc. Different types of forgeries are possible in images such as tempering with authentication of images such changing source, splicing of images where two or more images are combined to have different interpretation and meaning from the scene. Other kind of forgeries includes copy move forgery where one part of single image is copied then pasted into same image in different location to certain part of image or to have replication effect. If an image is taken as input usually we can apply two approaches as existing Litrature named as block based approaches [1] and Keypoint based method. Furthermore in block based approach the whole image is devided in small chunks of image of fixed size and then certain feature vectors are extracted through transformation like DCT [1], DWT [1] etc. These feature vectors are then compared for similarity to detect the forging in image. Block based approaches are usually not flexible to image rotation or scaling. Other Approach is Keypoint based where main focus is given on high textured areas in image. Interest points are detected using certain algorithm like harries corner detector, SIFT [2] or SURF [3]. All different techniques have some advantages and disadvantages but none of them alone flexible enough for different challenges of forgery detection.

A. Types of Forgereis

Usually types of forgeries possible are splicing, copy move, morphing as show in figure-1.

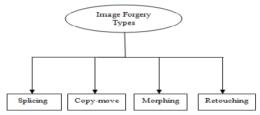


Fig. 1. Classification of Image forgeries

 Copy Move forgery: In Copy-move forgery detection as clear from example figure-2 that some part of the image is taken and pasted in other area of same image giving a different interpretation of image.



Fig. 2. (a) Image of pigeon in original (b) Forged image after copying pigeon image in other part of image [4]

2) Splicing: In case of splicing two or more images [5] are used to have tempering effect. If spliced image is shown

A Framework for Optimization of Software Test Cases Generation using Cuckoo Search Algorithm

Publisher: IEEE

Cite This

🖟 PDF

Sanjiv Sharma; S. A. M. Rizvi; Vineet Sharma All Authors













Abstract

Document Sections

- I. INTRODUCTION
- II. CUCKOO SEARCH ALGORITHM
- III. RELATED WORK
- IV. PROPOSED FRAMEWORK
- V. CONCLUSION AND FUTURE WORK

Authors

Figures

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Keywords

Metrics

Abstract:

Software testing is the most important phase of the software development lifecycle in the software industr It is done to make sure that developed software is defect free; behavior of the software is same as expected and includes the generation of test data that satisfies some adequacy criteria like statement coverage, branch coverage, path coverage etc. This task is costly and time-consuming so there is an urge for automation of this process. In recent years various meta-heuristic based nature-inspired algorithms are applied in various fields of software engineering. This article proposes a framework for the generation of a optimal set of test cases using a meta-heuristic based optimization algorithm called Cuckoo Search Algorithm as well as an overall algorithm for the same.

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I. INTRODUCTION

▶ ISBN Information:

Software testing is the most important phase of the software development lifecycle in the software industry. It is the process through which we ensure software is reliable and trustworthy. Software testing consumes approximately 50 percent of the total efforts needed for development of software by a software development organization. These efforts include cost, time and manpower. In software testing, one generates test data/test cases, which further works as input to the concerned software, now behavior of the software on those inputs are examined to check whether it satisfies the requirement stipulated in the document called Software Requirement Specification (SRS) or not. Software testing can be done manual or automatic. Through automatic software testing, we can minimize manual labor and improve the overall testing efficiency by reducing the testing execution time as well as increasing the fault exposure and coverage ratio.

Testing may be of two types, s also known as white box testing the internal structure of the program. Structural testing can be performed at the unit level, integration level or system level. There are various testing adequacy criteria available in this category like statement coverage, branch coverage, condition coverage, path coverage etc. Functional testing is also called black box testing. In this type of testing, test cases are generated using the functionality of the software under test. In this internal structure of the software is not concerned for the testing purpose. Functional testing is used to test the functionality of the system against functional requirement or

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A Survey on Multi-objective based clustering techniques for solving real I problems

Publisher: IEEE

Cite This

🚨 PDF









Abstract

Document Sections

- I. Introduction
- II. Litrature Review
- III. Basic Evolutionary
 Based Approaches
- IV. Comparative Study Of Existing Moo Based Clustering Techniques
- V. Conclusion And Future
 Work

Abstract:

Clustering is a popular data mining technique which can be applied to a given data set to identify objects that belong to a single class, such that data objects in different clusters are distinct while exists for data objects belonging to the same cluster. Usually, clustering techniques are based on optimizing single objective function criteria, which may not be capable of performing well in many scenarios. Motivated by this many multi-objective based optimization techniques are discussed in paper. Multi-objective based optimization techniques are capable of optimizing several conflicting functions simultaneously. Under this context, evolutionary based approach and simulated anneali techniques are adopted in various MOO techniques and proven well in case of noise, non-spheric high dimensional feature space. The paper further discusses various validity measures to evalual goodness of clustering techniques.

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Authors

Figures

References

Keywords

Metrics

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I. Introduction

Machine learning has been emerged as the major area of research for dealing with many real life problems such as, medical diagnosis, collaborative filtering, and recommendation system, classifying the gene expression data, speech recognition, text mining and many more. The learning technique identifies and learns different models which can be used for various decision making purposition to Continue Reading and supervised based machine learning techniques:

Sign in to Continue Reading and supervised based abjects. However, in several scenarios, semi-supervised learning technique is used due to the scarcity of labeled data. In real scenarios, training examples or external labeled data are often unavailable, so unsupervised learning techniques is professed to the scarcity of labeled data.

Authors

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An Enhanced Cellular Automata Based Filter for Despeckling of Ultrasound Images

Publisher: IEEE

Cite This



Ankur Bhardwaj; Sanmukh Kaur; Anand Prakash Shukla; Manoj Kumar Shukla All Authors

1 Paper Citation 53 Full Text Views











Abstract

Document Sections

- I. Introduction
- II. Cellular Automata
- III Related Work
- IV. Proposed Work
- V. Experiments and Results

Show Full Outline ▼

Authors

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Citations Keywords

Metrics

Abstract

Speckle noise is a multiplicative noise which degrades the quality of ultrasound images and videos which causes the difficulties in evaluation and diagnoses of diseases by experts. Despeckle filtering is the emerging area of research necessary for US imaging. Cellular automaton is a novel and innovative technology which can be applied in image processing applications. The cellular automation techniques resolve a particular problem by considering it in terms of specific patterns. In this paper a new algorithm on cellular automata based approach for despeckling filter has been proposed. Experiment has been performed to compare the effectiveness of proposed filter. The proposed filter is compared with the existing filters both quantitatively on the basis of PSNR and SSIM it is found better. Future enhancement on the proposed filter is also discussed.

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Conference Location: Noida, India

I. Introduction

Ultrasound imaging is non-invasive technique widely used to diagnose any disease. It generates the real time images of different organs of human being like liver, kidney, heart, uterus, stomach and many more. Despite of its cost effective and usefulness it is badly effective by speckle noise, quescian poice and environmental noise. The prior one not only reduces the quality of Sign in to Continue Reading rained in diagnosis of disease. It is upto the expert who used their skills to identify the outcome of the US imaging. Speckle noise is a multiplicative noise and is present everywhere in the image.

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Big Data and Cloud Computing: An Emerging Perspective and Future Trends

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Cite This



Pramod Kumar Yadav; Sanjiv Sharma; Amar Singh All Authors











Abstract

Document Sections

- I. Introduction
- II. Big data
- III. Hadoop
- IV. Map reduce
- V. Cloud database

Show Full Outline ▼

Authors

Figures

References

Keywords

Metrics

Abstract:

Big Data is a collection of large amount of data which is growing very rapidly with the popularity of social networking sites. The size of the Big data has been extended from terabytes to petabytes. Big data are characterized by four important attributes: volume, velocity, variety and veracity. The volume attributes describe the data at rest in the range from terabytes to Exabyte's, the velocity deals with data in motion, i.e streaming the data to respond within milliseconds rather than in seconds, the variety discuss the data in many different forms such as structured, unstructured, text and multimedia data, whereas the veracity deals with the data in doubt, i.e. uncertainty in data due to data inconsistency. These attributes of big data make it a challenge for organizations to have control over, and use such data. In today's era we are overloaded with the information, however we are lacking the insight. The 90% of the data in the world today has been created in the last two years by various social networking sites. As big data grows it challenges the capabilities of traditional data warehouses that collect and store large amounts of internal and external data. Data drawn from these repositories are used to improve decision making, increase organizational efficiencies, and improve organizational effectiveness. In this paper an attempt has been made to explore the real life application of Big Data, cloud database, Hadoop, Map Reduce and Cloud Computing, in various domains.

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Conference Location: Ghaziabad, India

I. Introduction

KIET, Ghaziabad

Due to the rapid growth in the modern technologies and popularity of social sites, there is a high growth in the amount of data generated every day. The big data plays a significant role in several applications. In today's era we are overloaded with information however we are lacking insight. Big data security and privacy is the one of important challenges where the researchers are focusing to get the optimal solution for it. Hadoop and Map Reduce are the important tool Sign in to Continue Reading ept of Cloud database also plays a key role in the development or nandling large data. With the fast growing technology, the cloud database has emerged as one of the important aspects of handling large data. Since for storing large amount of data on cloud is very helpful as the

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Comparative Study of Big Data Frameworks

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Abstract: We are really living in ever growing volume of data production. The huge amount of data in terabyte and petabytes are generating in real word and it is a challenging task to access, storage, analysis of all structured, unstructured and semi structured heterogeneous and complex data, also traditional tools is not suitable towards distributed and real-time processing. We need an efficient framework for processing such heterogeneous data and transform it into optimized meaningful information. There are many frameworks for distributed computing has been developed to perform huge amount of data processing. Hadoop Map Reduce is the extensively used framework because of its scalability, security, latency and efficiency, and reliability. The intension of this paper is to relative study of common framework such as Hadoop, Spark, Flink, Samza and Storm.

Keywords: Big Data, Map Reduce, HDFS, Hadoop, Spark, YARN,, Scala, Samza HBase, HIVE, Flink, Storm, Oozie.

I. Introduction

According to IBM Big Data Analytics 2019 about 294 billion emails sent every day, over 1 billion google search every day with 40 thousand search every second, trillion of sensors monitor, track and communicate with each other's, more than 30 petabytes of user generated data stored, accessed and analyzed, more than 230 million tweets each day with 7000+ tweets per second are generated. By 2020 at least third of all data will passes through cloud [1]. Before the year 2000 data was relatively smaller that the disk however data computation was complex, all the data computation depends on the processing power of the computer, later when data has grow the solution is large memory and fast processor. In order to store and process huge amount of data there are many frameworks available for data analytics. The fast evolution of big data technologies and the ready acceptance of the concept by public and private sectors left little time for the discourse to develop and mature in the academic domain [2]. The challenges of Big Data include capture, curation, storage, search, sharing, transfer, analysis and visualization [3]. Big Data Technology is very much adequate for the accurate analysis of our big data which yields strong conclusion and prediction. Big Data also categorized in two-part Operation Big Data and Analytical Big data. Using different Bigdata Framework we can analyze different Big Data issues/Problems.90% of data has got generated in last few vears back.

II. BIG DATA FRAMEWORK

2.1 Apache Hadoop

Hadoop is an Apache project founded in 2008 by Doug Cutting at Yahoo and Mike Cafarella at the University of Michigan [4]. Hadoop is a giant system that's provides two services (store and process) and consumes big Data. The data storage is responsibility of HDFS(Hadoop Distributed File System) and The Data Processing is responsibility of Map Reduce .Master in HDFS is called as Name Node and Slave is called as Data node similarly Master in Map Reduce is called Job Tracker and slave is called as task tracker. This particular setup with two services had a very serious limitation that we can write program only in MapReduce or any other framework that runs on Map Reduce we can't use Spark. Hadoop would allow to use the services with condition to write program in Map reduce only such Hadoop called as Hadoop 1.x, To do something better without such Conditional limitation YARN(Yet Another Resource Negotiator) comes into the picture in place of Map Reduce in Hadoop setup. YARN provides resources to anybody such as MapReduce, spark etc. without dependency of programming of Map reduce. In Hadoop 2.x Map reduce is one of the way to write program but in Hadoop 1.x, MapReduce is the only one way to write program.

2.1.1 Map Reduce

Map Reduce is one of the very important and major component of in Hadoop ecosystem use to solve problem for a big computational problem with large data set. In Map reduce huge data set is divided into small blocks and processing will be done in parallel. if you apply a particular algorithm parallel over the data for solving efficiently then Map Reduce solves in better form. The fundamental principle of Map Reduce is single instruction with multiple class of data problem can be effectively solve using Map Reduce using a very simple abstraction called Map and Reduce which works on divide and conquer approach. Some people has done hard work and proven that this simple abstraction is splitting a huge input file and doing some transformation, grouping the data and then aggregating this data, all these things can be done parallel. Generally, we treated data in form of list of record. The Map Reduce programming framework helps to iterate the list one by one and it will call a function called Map and as a programmer we need to write a logic to a map function to group the data together and for grouping we need a key which is associated with data.

E-assessments and Feedback Mechanisms in Moocs

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Abstract- Assessment can be defined as the interpretation of a student's work performed. It can be the guiding as well as decision making point for various stakeholders. It checks the learner on three pillars as to how student represent knowledge, how to develop competence and how to draw influence from the topic. Assessment is the best way to identify what the student wants as in support to increase his/her knowledge base. It encourages the desire in the learner to excel in various fields and progress further. Assessment is sometimes mistaken as evaluation but they are different in many perspective such as: Assessment is to evaluate the effectiveness of the teaching done, the process of appraising something, to check the level of performance whereas evaluation is judging the learner based on the standards, to determine to which degree the goals are satisfied. From the reference of all the assessment, we can propose m-assessment in which the practice tests and enhancement of the topic related questions can be uploaded and be assessed frequently and immediately.

Keywords—e-assessment; interactivity; online higher education: feedback: skill enhancement

I. INTRODUCTION

The three pillars of student's education process is Teaching, Learning and assessment. Like teaching and learning, assessment is the core of learning background: how learners are assessed decides their understanding of the curriculum and checks their ability to progress in the particular area [1]. Assessment is not only for the marks as it is a formative term which enhances the overall personality of the learner whereas evaluation is a summative term ,only provides the marks and ranks without considering the feedback of the student [2].

Initially the education is based on the classroom pattern, where the importance of teacher was more and evaluation was done on face to face basis and eventually online resources were available. With the evolution of internet eassessments are often denoted because the end-to-end electronic assessment method wherever Information and Communication Technology (ICT) is employed for the management of the educational assessment. From the perspective of various stakeholders such as learners, tutors, educational institutions, companies, regulators of administration and parents [3,5]. In other words, eassessment involves the use of any web platform which is accessible by the internet and can be accessed at any place or time (conditions as per the instructors). The role of student and teacher in the learning process is significant where students' active participation and engagement with the resources is needed along with a continuous formative assessment, which is carried out during the learning process at short intervals such as after every unit or module with the help of the teacher only [9, 10] and not just at the end of the learning process, as is usual in traditional face-to-face examinations which only increases the anxiety of the student

and sometimes student underperform due to the phobia [11]. The assessment is useful but its validity is questionable because the exams conducted at the end semester may not include the real time situations or recent activity. It is even less valid for the real world as we have the example of many universities who still have C and C++ in their curriculum and it is not even used in the companies' project now, in this case the e-learning can play an important role in this by giving knowledge base and improved learning. Students are made to learn them and are graded on that basis which is not the sole purpose of the formative assessment.

Assessment is categorized on various basis and it is further subdivided which is shown by table 1.

Table 1: Describing various types of assessment

S. No	Types	Sub-types	Work	Techniques
1.	Assessm ent for learning [4]	Formative (Criterion referenced)	Occurs regularly throughout the instruction process Measures a student's performanc e against a specific goal	Student observation Homework Reflection journals Sketchbooks Socratic discussions Student /teacher conference Peer reviews Portfolios Project Think/pair/share Critiques
2.	Assessm ent of learning [10]	Summativ e (Interim/B enchmark)	Predict the student's performanc e at the end of the year or semester.	Essays Tests Multiple choice questions Capstone projects Rubrics Performances Checklist
3.	Assessm ent as learning [12]	Diagnostic (Norm Reference d)	It compares the performanc e at the national norms or fixed values.	Pre and post tests elf assessment Discussion based report Entry/exit tikcets Interviews Observation polling

The combination of formative and summative assessment can utterly measure the abstract data, procedural and sensible skills needed in any subject. It may also cut back the teacher's work in checking the paper with the assistance

Fuzzy Ant Colony Optimization Based Energy Efficient Routing For Mixed Wireless Sensor Network

Publisher: IEEE

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Pravin Kumar; Rajesh Dwivedi; Varun Tyagi All Authors

2 Paper Citations **52** Full Text Views











Abstract

Document Sections

- I. Introduction
- II. Related Works
- III. Proposed Work
- IV. Simulation And Results
- V. Conclusion

Authors

Figures

References

Citations

Keywords

Metrics

Abstract:

Wireless sensor networks contains small sensor node and processor which have several issues and challenges with regards to Limited Computational Capacity, Energy Efficiency, Path Planning Overhead and many more. Entire lifetime of network depends on efficient energy consumption in sensor network so it is a challenging task to design an Energy Efficient Routing Protocol for wireless sensor networks. Wireless sensor nodes dynamically self-organize themselves without utilizing preexisting infrastructure. Problem becomes more complex if some sensor node having mobility for some particular instance. In this paper we proposed an energy efficient routing protocol for WSN motivated by swarm intelligence of rummage behavior of ant and also covered mobility behavior of node. Furthermore we have combined the fuzzy logic with behavior of ant to take a better decision to find optimal path with less energy consumption. Our proposed algorithm utilize the principle of Fuzzy logic in addition of Ant Colony Optimization to develop energy efficient routing. The performance of our proposed work is evaluated on QualNet 7.4 Network Simulator. The simulation result shows that the proposed technique optimize the energy consumption, decrease RREQ packet and increase the lifetime of network as compare to existing routing protocol.

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Conference Location: Ghaziabad, India

I. Introduction

Wireless sensor network is one of the fastest growing technology in 21st century and become widely used technology in different fields. The infrastructure of wireless sensor node is composed by sensor nodes working independently with sensing, computing and enables the end user to measure and capture various act in different environment. In wireless sensor network the sensor nodes have small and compact in size, limited computational capacity with limited energy resources which is scattered over the area with vast diverse parameters like store and forward the data to Base station(BS) for further processing of sensed data. All sensor of WSN try to collect the data from the environment and send sensing data to base station. Sometimes it is possible that source and destination may not be in ave multi-hop distance Sign in to Continue Reading which leads to more energy co rgy consume can be find out by the energy consume by each nodes for sending or receiving data to or from other nodes in the network. Since energy sources are irreplaceable and have direct effect to lifetime of network [2], WSN nodes have the capability to operate in different kind of vast

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Handling Structured Data Using Data Mining Clustering Techniques

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Abstract - In the new era, every organization has the capability to store the extremely large amount of data. The continuous rise in the capturing of data is turning it into a huge tomb of data. Such huge data is becoming difficult to get analysed. This constantly growing large data set is making the challenge to the researchers in discovering knowledge from it. Valuable information is buried under the huge collection of data which can be extracted by making the use of Data Mining technique, as it possess the ability to dig out the embedded precious information from the large datasets. Various application areas required this technique, thus, resulted into an evolution of many data mining methods. Though several data mining methods get evolved not all of them were capable to deal with high voluminous data. Numerous computation and data- intensive scientific data analyses are established to compete with the ongoing time. As today's data has got converted to Big data, it now require large-scale data mining analyses to fulfil its scalability and performance requirements. To serve such data, several efficient parallel and concurrent algorithms got applied. The parallel algorithms used different parallelization techniques to manage the huge voluminous data and brought them into real action. Formerly, these techniques were : threads, MPI etc. which produce different performance and usability characteristics. The MPI model was efficient in computing rigorous problems but difficult to bring them into the practical use. Over coming years, Data mining is continuously spreading its root in business and in learning organizations. The new integrated clustering algorithm called CURE became more vigorous to outliers and recognizes those clusters that were having irregular shapes and are of variant size. CURE is formed with the combined features of random sampling and partitioning which assured that the quality of output clusters produced by it is much improved with respect to those clusters that are resulted from the prior algorithms. This paper put focus on CURE clustering technique which found suitable for working with large

Key Words - Data Mining, Clustering, Sampling, DBSCAN, BIRCH and CURE.

I. INTRODUCTION

In the present situation, large amount of data is getting accumulated by the organizations and it is growing exponentially which tends to get examined inefficiently. It has become a challenge for researchers in data mining to discover knowledge from these continuously growing large data sets. Fundamentally, data mining processes data and identify patterns and trends hidden in that information which helps to make the decision [1][2]. Though the data mining principles

have been existing for many years, it has become more popular and acceptable when the data collection resulted in a huge tomb of data or Big Data. This huge collection of data consists of a varied and extensive size that resulted in the sudden increase in the use of more widespread data mining techniques[3]. Due to the collection of the enormous set of data, the approval of simple and straightforward statistics is no longer adequate. Thus, this required more complex data mining techniques. The precious information which found embedded in a vast group of data is extracted by data mining[5]. It has become has become one of the remarkable areas of data mining to reveal such hidden information under voluminous datasets [2] [5]. There are several techniques found in data mining to deal with this huge data. They are clustering, classification, prediction, association, deviation and outlier analysis. Among these techniques, clustering is taken into consideration in this paper which would help in mining large databases [6]. i.e. to be used in data exploration. Clustering is the unsupervised categorization of patterns(data) into groups or clusters where each cluster forms higher intracluster similarity and higher inter-cluster dissimilarity. Number of clustering techniques is available based on different parameters like distance, density, hierarchy and partition. The researchers had addressed the problems in grouping the data items in many contexts and disciplines. Based on the understanding or utility, cluster analysis has long been used in a wide variety of fields: psychology and other social sciences, biology, statistics, pattern recognition, information retrieval, machine learning, and data mining. The scope of this paper is modest: to provide an introduction to clustering algorithm in the field of data mining, where we define data mining to be the discovery of useful, but nonobvious, information or patterns in large collections of data. Lot of clustering methods that have recently been developed are described here, with a goal of providing useful recommendation and references to fundamental concepts accessible to the broad community of clustering practitioners[7][8].

The paper is organized in following sections: Section 1 gives the introduction of paper, section 2 will discuss the overview of data mining, section 3 will focus on cluster analysis, section 4 gives glimpse of all clustering techniques and finally concludes to the best strategy to deal with large structured data

Hiding Text In Color Image Using YCbCr Color Model: An Image Steganography approach

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Abstract— for the security related issues over internet two main techniques are used first is Cryptography and second is Steganography. Both are basically used for data security. Cryptography transforms the data from one form to another form while steganography hide data in an image such that its presence cannot be detected by human visual system. This paper present an approach for image steganography using YCbCr color model based on least significant bit. Proposed method transform the image from RGB to YCbCr color space then secret data is hidden inside YCbCr color space using least significant bit and transform it back to RGB color space after hiding the data. The said technique is evaluated by objective analysis. Different techniques of cryptography are compared using mean square error (M.S.E.) and peak signal to noise ratio (P.S.N.R.). It is observed that the proposed method have high P.S.N.R. and low M.S.E. which shows the proposed approach is very efficient to hide data in an image.

Keywords—Image steganography. YCbCr color model, L.S.B., Objective analysis, M.S.E., P.S.N.R. Introduction

I. INTRODCTION

Steganography is the process of hiding data into another data that cannot be detected easily through the human visual system.

Image Steganography is the part of Steganography in which images are used for hiding the secret data. The Word came

from Greek words "stegos" which means "cover" & "grafia" which means "writing" so "Covered Writing" is the meaning

of Steganography. Steganography term is similar to Cryptography but there are some differences between them-

- Cryptography always concern about keeping the content message secret but Steganography is concern about keeping the existence of message secret
- The terms which are important in Image Steganography are image quality after embedding the secret data and ability of the image to keep maximum confidential data as possible ease of use.

II Related work:

Different approaches were implemented previously for secure steganography.

Adaptive image steganography using pixel intensity differences:

Here the entire color image scans row by row and cover image is converted into binary format and stored in buffer then max intensity pixel is searched. Secret text is also converted into binary format. If there is intensity difference then two MSB's of secret text is replaced by LSB and LSB-1 bits of lower intensity pixel of cover image and contiguous high intensity pixel embeds data only at LSB bit. Further if there is intensity difference then we repeats this process until secret text not completely embedded.

Limitation: The algorithm is not too secure. We can implement more security by changing the encryption technique.

b) A novel image steganography approach for hiding text in color images using HSI color Model:

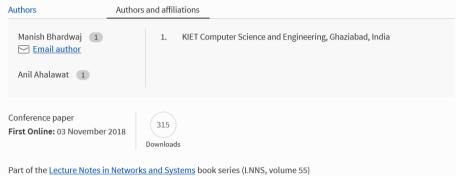
This method transform the image from RGB color space to HSI(Hue saturation intensity) color space and then embeds secret data inside the intensity plane(I plane) and transform it back to RGB color model after embedding.





International Conference on Innovative Computing and Communications pp 123-133 | Cite as

Improvement of Lifespan of Ad hoc Network with Congestion Control and Magnetic Resonance Concept



Abstract

In versatile specially appointed systems, congestion happens with restricted assets. The standard TCP blockage control instructions cannot deal with the unique properties of a common remote channel. TCP blockage control works extremely well on the Internet. As it turned out, the incomprehensibly contrasting condition in a versatile specially appointed system is exceedingly hazardous for standard TCP. Many methodologies have been proposed to conquer these troubles. Versatile operator-based blockage control technique is proposed to maintain a strategic distance from blockage in specially appointed system. When portable operator goes into the system, the choice of it is that nodes which are less-stacked and for the same it refreshes the directing table as congestion status. With the help of above Power Efficient Congestion Control Algorithm (PECCA) save the power of the network and with another, wireless power transfer technique which recharge the portable nodes of the network so that lifespan of the network can't exhausted early. This manuscript shows the simulation result between AODV and proposed algorithm PECCA with different parameter metrics.

Keywords

MANET Ad hoc network TCP Congestion AODV

Prioritizing Factors Used in Designing of Test Cases: An ISM-MICMAC Based Analysis

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Abstract— This research attempts to prioritize the factors that are important for the designing of test cases. There are many researches done on making testing complexities easier such as by applying various algorithms, approaches and processes to make testing automated. There are techniques that have been applied to prioritize the test cases so that testing time can be reduced. Therefore, in this research we have considered some factors by taking advice of experts and by the help of literature in this field that are taken care of for designing of test case. We have applied a new methodology that is ISM (Interpretive Structural Modelling) with MICMAC analysis technique. This theory has been applied in various field like management, science etc. but in the field of software engineering we have tried to implement it for the first time. By the help of this we have prioritized the factors. The rank has been associated with all the factors as per the partitioning theory applied in ISM. A diagraph has been formed and an ISM model is developed that clearly differentiate the factors on the basis of ranks. Then a MICMAC analysis is performed on the ISM model, in which factors are differentiated on the basis of their dependence power and driver power. A graphical representation of MICMAC is done. And the factors have been prioritized.

Keywords— Factors of test case, ISM, MICMAC Analysis, Test case Prioritization, Diagraph.

I. INTRODUCTION

Testing a software is an important part of Software Development Lifecycle (SDLC). Testing is a technique where the computer program is processed under several conditions so that a quality product is delivered to the end users that contain the proper information as per requirement specifications. The inputs of test data have the high potential to detect the error at an early stage. While designing of the test suite the tester should keep in mind the valid and invalid data. One can test the data either manually or through automation to provide validation and verification of the program. During testing of software, requirements of system and components of system are exercised and manually evaluated or with the use of automation tools in order to find that the system is fulfilling specified need or not [1]. When software is tested it has to go through under various phases such as test planning, analysis, test case design, execution of test, bug logging, test closure. According to the requirement the tester defines which type of testing to be applied such as mutation, regression, load, black box, security, and white box testing and many more.

There are two central motivation behind testing: checking obtainment details and overseeing hazard (approval). In the first place, testing is tied in with checking that what was determined is what was conveyed: it confirms that the item

(framework) meets the useful, execution, structure, and usage prerequisites distinguished in the obtainment details. Second, testing is tied in with overseeing hazard for the procuring organization and the framework's seller/designer/integrator to give the approval to the product. The testing project is utilized to distinguish when the work has been "finished" so the agreement can be closed, the seller paid, and the framework moved by the organization into the guarantee and support period of the undertaking [2].

The testing comprises of broadly two ways for testing of any software i.e. Manual Testing or Automated Testing. The testing of software that is done without any support of tools is defined as manual testing. The testing that needs the support of tools to get complete is defined as the automated testing. Testing can be done manually or through automation but to perform testing efficiently, test cases should be appropriately defined. That is, they should satisfy the requirement specifications. Therefore, to enhance the capability of testing, test case prioritization is the best approach. Ample number of researchers defined the concept of test case prioritization using different techniques but none of the researchers concentrate on the factors that are being actually cared when the testers developing or designing the test cases.

The research paper propounds a model that allows to prioritize the factors that help in designing of test cases so that the testers can focus on the determined critical factors for achieving good results with the motive of quality testing of the software product. The model proposed using an Interpretive Structural Modelling Technique (ISM) which helps in identifying the relationships among the critical factors and helps in enhancing the quality of the software product. Also, for analysis another approach named MICMAC analysis has been utilized so that the model can be verified and applied for prioritizing the factors in a right way.

II. RELATED WORK

Number of different techniques already exist for prioritization of test cases. Various researchers have already been working on it from past many years. The test case prioritization can be classified in number of ways either depending upon the requirements of the customer, coverage based prioritization, time based prioritization, cost based prioritization, and prioritization based on historical information. Number of techniques have been proposed depending upon these classifications by various renowned researchers.



Research on Modes and Defiance of Big Data and Cloud Computing

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Abstract-Huge data is presently one among the foremost basic rising advances, vast information area unit used as an inspiration that alludes to the failure of customary data structures to proficiently upset the new informational indexes. The 4V's of huge statistics - volume, speed, assortment & truthfulness define the executives & investigation attempting for the standard information distribution centers. It's imperative to contemplate bigdata and examination along. The coordinative vast data with distributed computing advances, organizations and instruction foundations will have a superior course to what is to come back. In any case, there's an enormous concern with reference to protection and security problems once moving to the cloud that is that the elementary driver concerning why organizations and instructive foundations will not budge to the cloud. This manuscript presents attributes, patterns and difficulties of huge statistics. In this case, it researches the remuneration and it also provides the dangers that will ascend absent of the coordination among vast statistics and distributed computing.

Keywords—map reduce; Iaas; Paas; SaaS; cloud computing

I. INTRODUCTION

Enormous information is associate degree info examination system authorised by another age of innovations and style that bolster high-speed info catch, reposition, and investigation. info sources stretch out past the customary company info to include email, telephone yield, sensor-produced info, and web-based social networking yield [1]. info square measure nevermore restricted to organized info records but incorporate unstructured info – info having no customary composition [2].

Huge information needs prodigious measures of additional area, whereas the price of capability unbroken on declining, the assets expected to use vast info will even currently gift cash connected challenges for small to medium measured organizations, an everyday huge info reposition and examination framework are based on clustered prepare joined capability (NAS), clustered NAS framework needs setup of a couple of NAS "cases" with each na "case" contained a couple of reposition gizmos related to a NAS gadget. The arrangement of NAS gadgets square measure then unified to permit mammoth allocation and looking out of statistics[3].

Distributed computing is associate degree improbably effective worldview of administration placed registering, and has upset the way within which process framework is

disconnected and used. 3 most thought cloud standards include: Infrastructure as a Service (IaaS), Platform as a Service (PaaS), and package as a Service (SaaS). the concept anyway will likewise be reached bent info as a Service or Storage as a Service. skillfulness, pay-examine, low forthright speculation, low time to plug, associate degreed move of dangers square measure some of the most important empowering highlights that create distributed computing an all inclusive worldview for conveyance novel applications which weren't financially potential in an exceedingly customary endeavor framework settings.

The paper is sorted out as pursues: in area 2, Introduction about the topic is given. Area 3 demonstrates the general Overview of the Big data. Section 4 of this manuscript describes the overview of management of dynamic information in CLOUD. In segment five, we tend to gift the "Map Reduce" and "Hadoop" a free indoctrination composition underpins the handling of huge provision of statistics in an exceedingly distributed registering condition. The paper at long last finished up in space 6.

II. RELATED WORK

Huge knowledge and Cloud process square measure an interesting patterns that square measure quickly was developing and new difficulties and arrangements square measure being distributed on a daily basis. In 2014, a production was created to characterize the most effective techniques to send large information examination details to the cloud[4]. Some arrangement of stepladder square measure characterized in half-dozen stages: the most stage, we tend to build up the commerce use crate by concentrating on however the profound trade esteems are going to be accomplished by shifting to the cloud & acknowledge the processing tools to accomplish. Following this is often adjusting the partner's stipulations to the crate therefore on accomplish their facilitate. At long last the case should be plausible by recognizing the key favorable circumstances that out weight totally different arrangements accessible; the following stage, is to induce to you application outstanding burden. Contingent upon the sensible necessities put and trade crate, the cloud administration have to be compelled to have to be compelled to the capability to assist the remaining task at hand with the capability to quickly enhance because the new outstanding tasks at hand return on the web[5]; The third organize, is to make up a specialised thanks to traumatize the massive info

Voltage Control by Optimized Participation of Reactive Power Compensation Using Fixed Capacitor and STATCOM



Nitin Kumar Saxena

Abstract FACTS devices play a significant role in providing voltage control through adequate reactive power compensation under the conditions of load and input changes. In isolated wind diesel based hybrid electrical system, choosing adequate participation of reactive power compensation device becomes more important because of the following aspects; (i) unlike to grid connected system, additional sources are required for supplying reactive power, (ii) normally self excited induction generators are used for power generation through wind and these generators require reactive power for building up the voltage, (iii) wind generators power output is much affected by changes in input wind speed and these changes require additional reactive power to control the voltage, (iv) similar to input change, load changes also require additional reactive power to maintain the voltage level, (v) compensating device should respond fast for nullifying the voltage deviation in minimum time, (vi) the procedure adopted for reactive power compensation should be economically acceptable even for the last end user in the society. Therefore, the reactive power compensating devices for voltage control in isolated hybrid electric system should be participated optimally by considering these technical and economical aspects simultaneously. In this chapter, MATLAB (programming along with simulink model) based approach is demonstrated for voltage control through optimized participation of reactive power compensation using fixed capacitor as static and STATCOM as dynamic compensator.

Keywords Static Compensator · Dynamic Compensator · Reactive power compensators · Compensation cost · Ancillary services

Modelling for Composite Load Model Including Participation of Static and Dynamic Load



1

Nitin Kumar Saxena and Ashwani Kumar

Abstract It is well recognized that voltage problems in power system is much affected through the connected loads. Different types of load can be modeled on their characteristics basis for computation of power system problems effectively. For different power system studies especially in the area of power system optimization problems that includes voltage control with reactive power compensation, transfer function $\Delta Q/\Delta V$ of composite load is required. This chapter gives a detailed mathematical modelling to compute the reactive power response with small voltage perturbation for composite load. Composite load is defined as a combination of static and dynamic load model. To develop this composite load model, the exponential load is used as a static load model and induction motors are used as a dynamic load model in this chapter. To analyze the dynamics of induction motor load, fifth, third and first order model of induction motor are formulated and compared using differential equations solver in MATLAB coding. Since the decentralized areas have many small consumers which may consist large numbers of induction motors of small rating, it is not realistic to model either a single large rating unit or all small rating induction motors together that are placed in the system. In place of using single large rating induction motor a group of motors are being considered and then aggregate model of induction motor is developed using law of energy conservation and this aggregate model is used as a dynamic load model. Transfer function of composite load is derived in this chapter by successive derivation for exponential model of static load and for fifth and third order induction motor dynamic load model using state space model.

Keywords Static load · Dynamic load · Composite load · Aggregate load · *ZIP* load model · Exponential load model · Induction motor load

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Economic Benefits for Reactive Power Compensation as Ancillary Service through Multi Units Based Electrical System

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Abstract— In available studies of multi units based hybrid electrical system, technical and operational issues are well taken by several researchers to describe their benefits over single unit based hybrid electrical system. However, economic issues are almost not attempted in available literature for the same. To be precise, economic investigations about the payment towards hybrid compensation cost as one of the important ancillary service to control the terminal voltage are not focused yet and so, the same are being investigated in this work. For this work, reactive power and compensation cost are being evaluated using hybrid compensation of static and dynamic compensators in wind diesel based hybrid electrical system developed for multi units as well as single unit system. The main contributions of this paper are; (i) optimization of reactive power quantity through fixed capacitor and STATCOM in presence of composite load, (ii) compensation cost estimation for changes in load and input, and (iii) comparison of economic benefits for reactive power compensation as ancillary service through multi units and single units based system of same capacity.

Keywords—Multi units electrical system, dynamic compensators, static compensators, composite load model, voltage control, compensation cost as ancillary service, STATCOM

I. INTRODUCTION

In India, 139445 MW peak demand and 135184 MW peak met was reported as on 31.01.2015 [1]. Development of suburbs because of high population density in inner-cities is the most rapidly increasing urban residential model in India and therefore demands more electricity from the power system. According to Central Electricity Authority (CEA) annual report published at the end of financial year 2018, installed generating capacity in India has reached up to 344002.39 MW [2]. These statistics represent the improving life style and prosperity in India. In contrast of this situation, there are still some such regions in India that cannot be electrified efficiently through central power grid due to their geological conditions. Almost 50% population living in rural areas of India which is more than 40 Crores (400 million) in numbers still had no reliable, continuous and secure access to electricity. Government is putting all possible efforts to provide electricity for such far located consumers. Also T&D Losses, exponential increase in rural consumers demand and congestion in distribution lines has already motivated to private investors for using renewable based decentralized power plants to enhance the electricity generation with the support of several central and state government policies [3]. To provide continuous and reliable power in such remote areas, renewable energy based generators along with conventional fuel based generators are used without grid connection. Such systems are called isolated hybrid electrical

system (IHES). Researchers have presented models in which induction generator (IG) and synchronous generator (SG) are used for fetching power through wind and diesel respectively [4-9]. These IHES are designed by using single unit of SG and single unit of IG. Typically the most efficient diesel based SGs are allowed to run at their rated output. But, single unit generator may have to work for a wide range of system load demand during its operation. Evidently, a very rapid cycling, on and off, of such large diesels would not be efficient or sensible [10]. Though the continuous on-off operations cause serious issues in system but still it is preferable to avoid an inconvenient unloading of the diesel engine. So, the power generation using diesel system must be reduced during light-load periods or good wind conditions. This can be achieved by replacing a single unit power generation with multi units power generation. It is also reported that multi diesel systems allow a variety of possible operation and control strategies. Therefore, multi diesel systems of small rating can give satisfactorily result compare with single large rating unit.

It is also reported that multi wind systems can attenuate the effect of power fluctuations produced due to wind intermittent nature [11]. Need for short-term storage can also be eliminated in IHESs with power generation capacity is made up with multi wind and multi diesel machines [12]. Therefore, it can be concluded that configuration and components rating in wind diesel based IHESs may be decided depending upon the load type, pattern and resource available at site. Available papers explain the operational issues in installing the high rating wind and diesel systems. The operation of high rating systems are not benefitted due to several issues such as high maintenance, complex control strategies and low flexibility to change in generation with load change [13]. The use of multi generating units can provide scale benefits to improve operation performances.

The above explained discussions clearly depict the advantages of using multi units of wind and diesel system in electrical system on the basis of their operational and technical benefits. Still, there is a wide scope of analyzing the economic issues of multi units' electrical system as most of such hybrid electrical systems are commissioned for remote areas where consumers are not financially strong. Ref. [15] suggests that a logical pricing of an ancillary service can lead to market liquidity which in turn results in approaching the optimal condition. Voltage control has prime importance in the system along with other ancillary services like system control, regulation, load following, energy imbalance. In isolated hybrid electrical system, voltage can be supported and controlled by the compensators with the help of

synchronous generators, static and dynamic compensator. It has been suggested that ISO provides a platform for mutual concern between the independent generators and customers so that they can own their resources for reactive support. This procurement of reactive power services should be done taking into account the perceived demand conditions, mix of the load and availability of reactive power resources [16]. Private investors, promoted through Government, can develop decentralized units for continuous power supply and adjustments in required reactive power for voltage control to these far located areas if they are getting healthy business. At such remote areas, power supply continuity is a prime concern however its quality degradation may be allowed up to some extent depending upon the paying capacity of consumers [14].

Therefore, authors are estimating the cost of compensation and voltage profile in multi units' hybrid electrical system in this paper. The results show the economic benefits of using multi units over single unit hybrid electrical system. Finally, Test systems of 5.0 MW for both multi as well as single unit have been developed, compared and analyzed in this paper.

This paper is organized as follows; in section 1, detailed introduction is presented that summarize the need and importance of hybrid electrical system. Technical and operational benefits of using multi units' hybrid electrical systems are explained. The importance of reactive power as ancillary service along with Government promotional schemes is explained. And finally, the main work which is being done in this paper is briefed. In section 2, a generalized block model is presented for which reactive power compensation and cost issues are being discussed in this paper. In section 3, mathematical details for developing MATLAB simulink model for multi unit and single unit based hybrid electrical system are presented. In section 4, mechanism for estimating optimum value of reactive power compensation subjected to given equalities and inequalities are elaborated. In section 5, results are demonstrated, compared and analyzed for both the test systems. Finally, in Section 6, the objectives of the paper are concluded. Results are obtained through the MATLAB programs written in MATLAB 8.4 (The Math Works, Natick, Massachusetts, USA). At the end of paper, Appendices are given. Appendix A provides the pu ratings of induction generator, synchronous generator, fixed capacitor and STATCOM. Appendix B provides the constants details required for assembling MATLAB simulink model.

II. REACTIVE POWER COMPENSATION AND COST ISSUES IN IHES

Multi units IHES, as represented in Fig. 1, is designed by using multi units of wind operated self excited induction generator (SEIG) and diesel operated synchronous generator (SG) together. A composite load model is represented by CLM while reactive power can be supplied for this system through fixed capacitor and STATCOM as represented by FC and ST respectively. Ref. [17, 18] suggests the merits of SEIG over DFIG and PMIG in hybrid electrical system and so, same is used in this paper. However, the major limitations with SEIG are the requirement of reactive power for its excitation and change in input power because of intermittent wind conditions. Moreover, load also demands

reactive power from the system for both steady state and dynamic conditions. This deficiency of reactive power may cause large voltage disturbances if adequate reactive power is not supplied to system. Therefore, fast acting compensators are used so that they can respond fast for changes in system and can recover the system voltage by supplying additional reactive power in the system. SVC and STATCOM (ST) have been presented by many authors with advance control techniques for fast voltage control of IHES. Since IHES is more prominent for remotely located consumers who can compromise with power quality but cost of electricity should remain low. In such scenario, economic issues become more important with some flexibility in power quality to the end consumers. In ref. [15], authors have elaborated four cases to show how the cost of compensation can be reduced with the hybrid participations of FC and ST together. In Ref. [19], an optimization approach to find best possible participation of FC and ST has been discussed only for single units based IHES.

The optimization approach for the selection of reactive power compensation and cost analysis for multi units based IHES are presented first time in this paper.

To present multi units system, two units of both SEIGs and SGs are modelled with MATLAB Simulink in this work. Composite load is a proper choice for modelling an accurate load and therefore same is used in this paper as in ref. [20] with 4:1 participation ratio of static and dynamic load as in Ref. [21, 22].

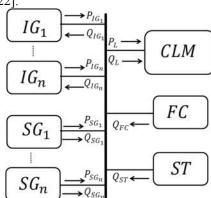


Fig. 1 Multi units IHES representation

III. DEVELOPMENT FOR IHES MODEL

Fig. 1 represents a generalized block diagram that can be reduced to either single or multi units IHES. A generalized mathematical expressions are described below for implementing it either for single or for multi units IHES. In steady state, requirement of reactive power for load and IGs are supplied by SGs, FC and ST. Mathematically, reactive power equation for steady state condition and reactive power surplus for dynamic conditions as in ref. [23],

$$\sum \Delta Q_{IG} + \Delta Q_L = \sum \Delta Q_{SG} + \Delta Q_{FC} + \Delta Q_{ST}$$
 (1)

$$\Delta Q = \sum \Delta Q_{SG} + \Delta Q_{FC} + \Delta Q_{ST} - \sum \Delta Q_{IG} - \Delta Q_{L}$$
 (2)

Ref. [15] suggests that ΔQ can be obtained by estimating induction generator's electro-magnetic energy absorption and load characteristics.

Therefore,

$$\Delta Q(s) = \left\{ s \frac{v}{\omega} \sum_{\omega} \left(\frac{1}{x_m} \right) + (D_v)_{CLM} \right\} \Delta V(s)$$
Comparing Eq. (2) and (3),

$$\sum \Delta Q_{SG} + \Delta Q_{FC} + \Delta Q_{ST} - \sum \Delta Q_{IG} - \Delta Q_L = \left\{ s \frac{v}{\omega} \sum \left(\frac{1}{x_m} \right) + (D_v)_{CLM} \right\} \Delta V(s)$$
(4)

Eq. (4) is a general transfer function showing reactive power balance in IHES for any number of generating units. Following two test systems of same capacities are considered in this paper;

- (i) 5.0 MW test system using single unit of 3.0 MW IG and single unit of 2.0 MW SG,
- (ii) 5.0 MW test system using two units of 1.5 MW IGs and two units of 1.0 MW SGs.

To simulate accurate load model, composite load model (CLM) is used in place of static load model (SLM) and this CLM has characteristics of both static load and dynamic load [24]. In ref. [25, 26] author has illustrated a complete procedure for developing $(D_v)_{CLM}$ as required in Eq. (4). The main technical issue in this IHES model study is the voltage control using adequate reactive power compensation. The role of dynamic compensator is to adjust the reactive power generation depending upon its firing angle and reference system voltage. Reactive power injection by the STATCOM as in ref. [27]

$$Q_{STATCOM} = (kV_{dc})^2 B - kV_{dc} VBCos\alpha$$
 (5)

k is a ST constant which depends on 12 pulse converter with unity modulation index of STATCOM. Eq. (5) shows that reactive power depends on two controlled variables α and V. On solving, the transfer function for ST can be expressed as [28],

$$\Delta Q_{STATCOM}(s) = kV_{dc}VBSin\alpha\Delta\alpha(s) - kV_{dc}BCos\alpha\Delta V(s)$$
 (6)

Eq. (6) is a reactive power change of ST which can be adjusted with either voltage or firing angle. So, for maintaining the terminal voltage firing angle can be tuned with reactive power and a systematic block diagram for the same is brought from ref. [29]. As in ref. [29], the three sub blocks for this STATCOM simulink model are phase sequence delay, thyristor firing delay and PI controller. Conventional PI controller has two gain constants K_P and K_I . K_P and K_I can be evaluated using either method conventional and advanced methods. In conventional method, K_P and K_I are tuned by using ISE criterion as elaborated in ref. [23]. The limitations of conventional method can be taken care by tuning the gain constants of PI controller using genetic algorithms (GA) as suggested by the author in ref. [15] and same is used here.

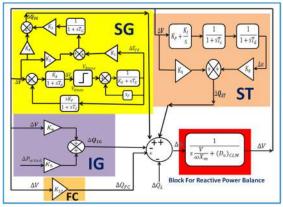


Fig.2 Simulink model for single units IHES

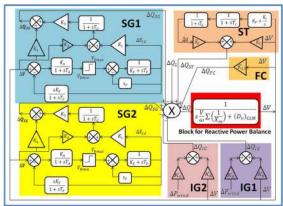


Fig.3 Simulink model for multi units IHES

A 10% step disturbance is produced to study the load reactive power demand and wind input real power disturbances. The system is much affected by the uncertainties produced by the load reactive power demand and wind input real power at the time of its operation. To analyse the effect of uncertainties, a 1% probabilistic pattern is also introduced with these step disturbances. As, reactive power balance equation represented in Eq. (4) requires reactive power voltage relations for all the system components. Linear models for incremental change in reactive power of SG, IG, ST and FC are brought from available previous papers [4-9]. The simulink model for test system of single units IHES and multi units IHES are shown in Fig. 2 and in Fig. 3 respectively.

IV. COST ANALYSES FOR HYBRID COMPENSATING METHOD

For attending disturbances, ST alone can give better technical solution for system voltage control but at a high cost. The cost of FC is very low compare to ST but FC alone cannot be used for satisfying reactive power requirements. Fig. 4 represents how the voltage will collapse if the operator is planning to satisfy demand of reactive power through FC only.

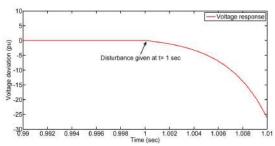


Fig 4 Voltage collapse in presence of FC (static compensator) only

This clearly depicts that use of ST (dynamic compensator) is necessary to mitigate the voltage control problem while the hybrid FC and ST participation can provide an economic solution of reactive power compensation. Therefore, FC and ST together suggest a solution for compensation with low cost but this technique forced to on compromise with voltage response. And selection between FC and ST can be done in such a way so that voltage should remain within the permissible level. The two important parameters of this optimization problem are;

- (i) Compensation cost reduction through FC along with ST, and
- (ii) Threshold value of reactive power from FC to keep voltage in pre-defined acceptable level.

Mathematically, total reactive power generated in MVAR

$$Q_{com} = \{Q_{FC}^{ss} + Q_{ST}^{ss}\} + Q_{ST}^{ts}$$

$$\tag{7}$$

Compensation cost functions for FC and ST are brought from ref. [19]. The assumptions and considerations are same as in the referred paper [30, 31, 32].

$$C1(Q_{FC}) = 0.132 * Q_{FC} in \$/Hr$$
 (8)

$$C2(Q_{ST}) = \frac{1000*Q_{ST}}{8760*15} (0.0002466Q_{ST}^2 - 0.2243Q_{ST} + 150.527) in \$/Hr$$
(9)

Using Eq. (7) and Eq. (8), total compensation cost can be evaluated using Eq. (6).

$$C(Q_{total}) = \{C1(Q_{FC}^{ss}) + C2(Q_{ST}^{ss})\} + C2(Q_{ST}^{ts})\}$$
(10)

To minimize the compensation cost as in Eq. (10), an objective function J subjected to several equality and inequality constraints are presented in Eq. (11). Dynamic condition reactive power cannot be generated with static compensator i.e. FC so Q_{ST}^{ts} is not required to include in in Eq. (11).

Objective function;

$$J = C1(Q_{FC}^{ss}) + C2(Q_{ST}^{ss})$$
 (11)

Equality constraints;

Reactive power generation should match with consumption in the system. Load and induction generator are the consuming components while synchronous generator, fixed capacitor and STATCOM are the generating components in the system.

$$Q_{SG} = Q_{SG}(mandatory)$$

$$\sum Q_{IG} = \sum Q_{IG}(full load)$$
(12)

$$Q_{demand} = Q_{release} \tag{14}$$

$$Q_{demand} = Q_{release}$$

$$Q_{demand} = \sum_{IG} Q_{IG} + Q_{L} - Q_{SG}$$

$$(15)$$

$$Q_{release} = Q_{FC}^{ss} + Q_{ST}^{ss} \tag{16}$$

Inequality constraints;

$$\begin{array}{l} 0 \leq Q_{ST}^{ss} \leq Q_{demand} \\ 0 \leq Q_{FC}^{ss} \leq Q_{demand} \end{array} \tag{17}$$

$$0 \le Q_{FC}^{ss} \le Q_{demand}$$

$$V_{min} \le \Delta V \le V_{max}$$

$$(18)$$

$$\begin{array}{ll}
\text{settling time} \leq \text{settling time}_{acceptable} & (17) \\
\text{settling time} \leq \text{settling time}_{acceptable} & (20)
\end{array}$$

A step wise procedure for solving this optimization problem is in Fig. 5.

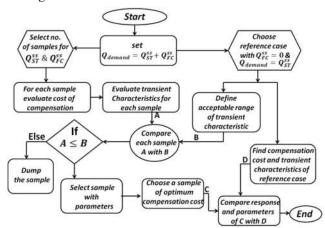


Fig. 5 Step wise procedure for solving optimizing problems

V. RESULTS AND DISCUSSIONS

Introduction of this paper depicts that the available papers do not focus of economic provisions for suitable ancillary service especially reactive power compensation cost studies for remote area based isolated and hybrid multi units electrical systems. The reactive power compensation cost studies are available in very few papers but only for single unit system as summarized in section 2 and with the help of this multi units' model has been developed as shown in Fig.

1. This paper demonstrates first time the economic benefits of using multi units system over single units system especially with hybrid reactive power compensation. Section 3 represents the methodology to develop simulink model for single and multi units IHES. Section 4 gives a complete procedure to find best optimum solution of hybrid participation between FC and ST in system. It has been observed that use of hybrid compensation i.e. FC with ST can give economically suitable solution as the ancillary service cost reduction directly depends on the compromise with power quality. In this paper, two test systems of same capacities are compared to investigate the economic effects of using multi units IHES in place of single units IHES. Both the test system ratings are given in Table 1. Load model, dynamic disturbances and tuning method for gain constants of STATCOM controller are being considered same for both test systems as discussed before in the paper with the help of reference papers.

Table 1 Test system data used in simulation							
System	5.0 <i>MW</i>						
CLM		5.0 <i>MW</i>					
	SLM	Exponential type load	2.0 MW				
	DLM Fifth order induction motor		0.5 <i>MW</i>				
		load					
Base power	5.0 <i>MVA</i>						
Base voltage	400 V						
Type of system		Single					
Induction gen.		$1.5 MW \times 2$					
Synchronous		$1.0 \ MW \times 2$					

For both the test systems, the optimization problem is solved with the help of MATLAB codes and simulink library together. The total simulation time observed is set equal to 1.1 sec through which simulations starts at t = 0 sec, disturbances are produced at 1.0 sec and responses are observed till 1.1 sec.

Two test systems as in Table 1 are studied as two cases;

- Case I (Dynamic compensation): ST alone is used for reactive power compensation in the system.
- Case II (Hybrid compensation): Participation of both FC and ST is used for reactive power compensation in the system.

Case I is taken as reference case. Voltage response from this case is used to define the reference values for case II. Allowable limit of settling time, voltage dip and voltage rise for case II may be assumed with respect to case I as;

- The voltage after disturbance must be conversed. Mathematically, steady state error for voltage deviation must he zero
- Absolute value of voltage rise and dip should not be exceeding more than 0.05 pu of case I voltage rise and dip values.
- Settling time should not be beyond 0.01 sec of settling time of case I voltage response.

In case II, total reactive power demand is divided among FC and ST. Satisfying the Eq. (16), 1000 samples are taken for step changes in the value of FC and ST reactive power. For these 1000 samples, voltage response is generated with the interfacing of MATLAB program and simulink models. Only the samples, satisfying the pre-defined acceptable voltage

responses are sorted. Reactive power compensation cost for each sorted sample is evaluated and a sample with least compensation cost is selected finally. This sample gives optimum value of compensation and cost.

Table 2	Com	narative	study	for	5 () N	ſW	single	and	multi	units	IHES

tote 2 comparative stady for 5:0 for wording to the matter and state					
	Single units IHES	Multi units IHES			
Q _{ST} (pu)	0.1068	0.1024			
Q _{ST} (pu)	0.2070	0.2051			
Qss (pu)	0.1647	0.1690			
Q _{total} (pu)	0.4785	0.4765			
$C_{FC}(Q_{FC}^{ss})$ (\$ per hour)	0.1087	0.1116			
$C_{ST}(Q_{ST}^{ss})$ (\$ per hour)	0.6117	0.5867			
$C_{ST}(Q_{ST}^{ts})$ (\$ per hour)	1.1853	1.1738			
C(Q _{total}) (\$ per hour)	1.9057	1.8721			

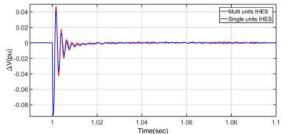


Fig. 6 Voltage pattern in 5.0 MW test systems with hybrid compensation

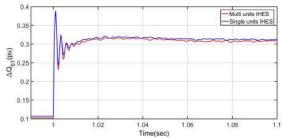


Fig. 7 ST reactive power pattern for 5.0 MW test systems with hybrid compensation

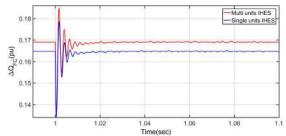


Fig. 8 FC reactive power pattern for 5.0 MW test systems with hybrid

To identify the economic effects of hybrid reactive power compensation over multi units system, the results are obtained for same rating single and multi units based system as in Table 1. The results showed in Table 2 gives cost comparison for the same. Following are the observations from the Table 2;

- In multi units IHES, reactive power demands from STATCOM for both steady state and dynamic state are decreasing.
- In multi units IHES, reactive power demands from fixed capacitor for steady state is decreasing.
- In multi units IHES, overall reactive power demand is decreasing.

Since reactive power demand is decreasing, cost of compensation will decrease from the use of multi units IHES as depicted in Table.

since the reactive power compensation cost through fixed capacitor is comparatively low, the results become more favorable because more reactive power is generated by fixed capacitor in multi unit IHES.

Therefore, it can be concluded that overall reactive power compensation cost in multi units IHES is decreasing more comparing to single units IHES when hybrid participation, proposed in this paper, is applied. The acceptability of this proposed method is again verified on the basis of voltage variation given in Fig. 6, reactive power variations for FC and ST in Fig. 7 and Fig. 8 respectively.

VI. CONCLUSIONS

In this paper, economic aspects for reactive power compensation cost as an ancillary service are studied for multi units IHES. It has been found that compensation cost can be reduced more in multi units IHES with hybrid reactive power compensation approach without compromising much with voltage response. A comparative study between single units and multi units IHES is carried out for same load and disturbance conditions. It has been observed that multi units system requires less reactive power for system voltage control through hybrid compensation technique. If compensation is provided by using STATCOM only, the system compensation cost will be much higher in multi unit system too. But, use of hybrid participations of fixed capacitor and STATCOM together reduces compensation cost. Technical and operational benefits of multi units system over single units IHES are demonstrated in many papers. However, this study suggests the economic benefits for the use of multi units IHES over single units IHES if hybrid compensation approach will be used as proposed in this paper. This approach may be useful for private investors to reduce the cost of reactive power compensation as ancillary service so that consumers can be benefited more without more burdens on suppliers. The same work can further be carried out with grid connected hybrid electrical system for estimating and analyzing the cost of hybrid compensation.

Appendix A

Induction Generator: IG power factor = 0.9 lagging slip = -4%, efficiency = 90%, voltage = 400 V, **Synchronous Generator:**

SG power factor = 0.9 lagging, voltage = 400 VFixed capacitor: voltage = 400 V, frequency = 50 Hz**STATCOM:** voltage = 400, Switching freq. = 10 kHz

Appendix B

Constants used in simulink model

$$K_{1} = \frac{X'_{d}}{X_{d}}; K_{2} = (X_{d} - X'_{d}) \frac{\cos \delta}{X_{d}}; K_{3} = \frac{V \cdot \cos \delta}{X'_{d}}; K_{4} = \frac{E'_{d} \cdot \cos \delta - 2V}{X'_{d}}; K_{5} = \frac{X_{eq}}{R_{P} - \{((R_{P} - R_{eq})^{2} + X_{eq}^{2})/2(R_{P} - R_{eq})\}}$$

$$K_{6} = \frac{2V}{(R_{P} - R_{eq})^{2} + X_{eq}^{2}} \left[X_{eq} - \frac{R_{P} X_{eq}}{R_{P} - \{((R_{P} - R_{eq})^{2} + X_{eq}^{2})/2(R_{P} - R_{eq})\}} \right]$$

$$K_{7} = \frac{2V}{X_{C}}; K_{8} = kV_{dc}VBSin\alpha; K_{9} = -kV_{dc}BCos\alpha$$

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Performance Evaluation of a 4 kW Isolated Solar Powered Lab with IoT Energy Management System

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Abstract— A stand-alone solar powered system is an economic & effective alternative to provide electric power at places in remote and difficult terrains. These setups consist of an array of solar panels, dc-dc charge controllers, dc-ac inverters & an energy storing element. This work presents performance evaluation of an isolated photovoltaic (PV) power plant roof-top installation located at Electrical Department block, Krishna Institute of Engineering & Technology, Muradnagar, U.P., India. The aim of this work is to promote the utilization of mini isolated solar power plants to provide electricity to schools & households in rural locations & places with difficult terrains. The scope of this paper is to acquire data from the installed setup & evaluate performance of the system. In this work, we establish an economic energy logging system for data logging & monitoring. This energy management system uses a Wi-Fi module for Internet of Things (IoT), which provides easy access to the data anywhere around the world. After its successful installation, the performance of the stand-alone PV system is evaluated. The experimental data was recorded from 1st August to 30th October, 2018 through the IoT system. The assessed parameters of the PV installation include performance ratio, Capacity utilization factor, inverter efficiency and system losses.

Keywords- Renewable Energy; Solar energy; Internet of Things; Performance Evaluation; EMS.

I. INTRODUCTION

Electrical power plays an important role in this modern civilization. In order to have proper and sustainable development of a nation, it depends on the availability of energy for industries and human civilization. Along these lines, it can be seen that energy is a fundamental component for the financial improvement of a nation. It is a significant part of our life and it is impossible to imagine our daily routines without electricity. "Yet, over 1 billion people in the world do not have access to electricity. Of this, over 95% live in developing countries and over 84% reside in rural areas" [1]. Meanwhile, the world has

the problem of emptying reserves & sky-rocketing cost of fossil fuels. "Additionally, there is special focus on the major problem of Global Warming and pollution. These issues prompt us to reduce our dependence on fossil fuels as the primary source of energy" [1]. Hence, it is high time that the world focus on other sources of energy, and develop and promote renewable sources like solar, wind, geothermal, and others.

Amongst the current renewable energy options, solar power presents the highest potential. "The approximate emission power from the sun is 1.8 x 1011 MW" [1, 2]. Because the nation of India is situated in the sunny belt, it gets 300 days of sunlight. As per NIWE estimates, "India has a solar energy potential of 750 GW" [3]. Under normal conditions, India gets 4-7kWh solar radiation per m² [4]. Under the National Solar Mission, "India plans to build large grid connected solar power plants, with a cumulative installed capacity of 20,000 MW by 2020" [5].

Photovoltaic (PV) modules or panels are made from semiconductor materials which have the ability to directly convert sunlight into electricity. Such modules offer us a secure, reliable, low-maintenance and environmentally sustainable source of electricity for a very long time. In order to properly implement a solar PV powered system, prior data, knowledge & understanding of their operation and running performance under varying climatic condition is required [6].

In this work, performance analysis of a 4000W SPV system which was setup on the roof-top of Electrical Department block, Krishna Institute of Engineering & Technology, Muradnagar, U.P., India. on July, 2018 is presented. The setup supplies power to a laboratory in Electrical Department. "The performance of this Photovoltaics (PV) system is assessed on daily basis. Data logging & monitoring is done by Wi-Fi based IoT system that can be accessed from anywhere. In this paper, the development and performance of this PV system is presented for three months from August to October 2018" [1].

The aim of this work is to encourage the utilization of isolated SPV systems in in rural locations & places with difficult terrains. This project has a wide scope for the long-term benefits as well. Once a large data-set is logged, this information can be utilized by creating smart methods to analyze and predict

upcoming outputs based on "Fuzzy logic and Adaptive neurofuzzy inference system (ANFIS)" [7-10].

INSTALLATION OF THE SPV PLANT

The primary components of a SPV plant can be mainly described as:

- An array of Solar Panels 1.
- 2. Charge Controller
- Battery Bank
- 4. Inverter

Additionally, in to perform various analysis on the SPV, there is a need for a data acquisition system that can not only measure the data accurately but also store it for further utilization. This prompted us to develop our own energy management system for accurate measurement and logging of various current & voltage parameters. Flow Chart for the Energy management system (EMS) is shown in Figure 2. This energy management system is based on IoT and uploads the data on cloud. Hence, the data can be accessed anywhere. This furthers the application of the project as it can be utilized in remote locations.

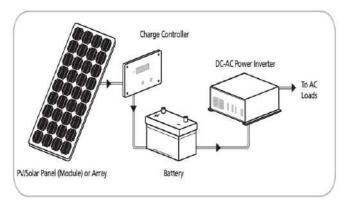


Figure 1. An isolated solar PV system

III. PARAMETERS FOR PERFORMANCE ANALYSIS

The system performance indices are defined by International Standard IEC-61724 for analyzing the "performance of solar PV grid-connected, stand-alone and hybrid systems" [13]. Numerous performance parameters are utilized in order to define the performance of a PV system with respect to the "net energy production, generation by the solar array and net effect of system losses" [14-18]. The performance parameters used in this study are the Performance Ratio (P.R.), efficiency, array & final yield and losses.

1. Array Yield (Y_a)

Array Yield, as defined in (1), provides to the total hours for which the photovoltaic powered system needs to be in operation

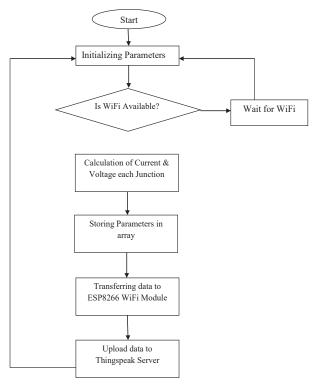


Figure 2. Flow Chart for the Energy management system

Our work in the design & installation of the entire system has been explained in much more detail in "Smart Solar Energy Management to Power Computer Lab in Rural Areas", "3rd International Innovative Applications of Computational Intelligence on Power, Energy and Controls with their Impact on Humanity (CIPECH), 2018" [1].

at rated solar array power PPV to produce array's DC energy Ea as defined in (2) [14, 18]. Its unit is kWh/kWp/d.

$$Y_a = \frac{E_{DC}}{P_{PV}, rated} \tag{1}$$

PV Panel's energy output per day Ea:

$$E_a = I_{DC} * V_{DC} * t \text{ (kWh)}$$

$$I_{DC} = DC \text{ current (Amp)}$$
(2)

 V_{DC} = DC voltage (Volts)

 P_{PV} = Rated Power at ideal test conditions (1 kW/m² and 25°C).

2. Reference Yield (Y_r)

The reference yield, as defined in (3), is "the total in-plane irradiance H_t divided by the PV's reference irradiance G" [16]. It serves as a measure of the net attainable energy. "If G equals 1 kW/m², then Y_r is the number of peak sun hours or the solar radiation in units of kW h/m². The Y_r defines the solar radiation resource for the PV system" [16]. It depends on various factors, mainly depending upon the geographical location, altitude & Solar Panel's placement and annual weather conditions. Its unit is h/d. [13, 18]. Its unit is h/d.

$$Y_r = \frac{H_t \left(kWh/m^2 \right)}{G_0} \tag{3}$$

where

 H_t = Net Horizontal irradiance on PV panels (kWh/m²), G_0 = Global irradiance for standard test conditions (1 kW/m²).

3. Final Yield (Y_F)

Final yield, as defined in (4), is the "net AC energy output of the system divided by the nameplate or peak power of the installed PV array at STC (1 kW/m² solar irradiance and 25°C)" [18]. It is calculated on a daily, monthly or annual basis. It implies the number of hours per day the PV system must run at its rated capacity in order to produce the same amount of energy as was recorded [13, 17]. Its units are kWh/kW_P/d. It is given as

$$Y_{F,d} = \frac{E_{AC}}{P_{PV,rated}} \tag{4}$$

4. Performance ratio (P.R.)

The P.R., as defined in (5), is the "ratio of Final Yield (Y_F) and the Reference Yield (Y_R) " [15]. Performance ratio can be described as a measure of plant output compared to the output that the plant could have achieved by considering the solar irradiance, PV panel temperature, sun-hours, rated power output, temperature correction values [16]. The performance ratio is considered as a quality factor. The P.R. value is usually expected to vary between 0.6 to 0.8 [14].

$$P.R. = \frac{Y_F}{Y_R} \tag{5}$$

5. Inverter Efficiency

The inverter efficiency, as defined in (6), is the ratio of AC power generated by the inverter to the DC power generated by the PV array system and provides a measure of how effectively the inverter converts DC power into AC power. [16, 17].

$$\eta_{Inv} = \frac{P_{AC}}{P_{DC}} \tag{6}$$

6. Capacity utilization factor (CUF)

C.U.F., as defined in (7), is the ratio between the real energy generation of the SPV to the theoretically max energy generation from the SPV [16].

$$C.U.F. = \text{Actual Energy generated (kWh)} / (\text{days}*24*\text{total capacity of the SPV})$$
 (7)

7. Inverter Efficiency

The inverter efficiency, as defined in (8), is the ratio of AC power generated by the inverter to the DC power generated by the PV array system and provides a measure of how effectively the inverter converts DC power into AC power. [16, 17].

$$\eta_{Inv} = \frac{P_{AC}}{P_{DC}} \tag{8}$$

8. System losses (L_s)

The "system losses are mainly present due to losses in converting the DC Power output from PV to AC power by the inverter" [19] and losses in dc cables (drop in voltage).

$$L_{\rm S} = Y_{\rm A} - Y_{\rm F} \tag{9}$$

IV. PERFORMANCE EVALUATION

The results of the calculations of the parameters defined previously are shown in Table I. The highest value of P.R. is seen to be 67.3% in the stretch of October and the minimum estimation of P.R. was 60.9% in the duration of August. Capacity factor (CUF) for the SPV setup fluctuated from 12.71% to 14.01% in the duration of the observed three-month activity. The fluctuations observed in the C.U.F. for the most part emerge from the varying irradiance and atmosphere conditions and from misfortunes because of changing temperature. It is generally observed that higher the C.U.F., lesser will be the cost of energy. The highest inverter efficiency is 89.61% in the month of September with 61.9% performance ratio.

TABLE I. PERFORMANCE EVALUATION FOR THREE MONTHS

S. No.	Performance Evaluation								
	Month	P. R.	CUF	Inverter Efficiency	Losses (kWh)				
1	August	60.9%	12.95%	84.356%	17.53				
2	September	61.9%	12.71%	89.61%	10.72				
3	October	67.3%	14.01%	85.538%	17.29				

The month to month mean(average) value of solar PV plant's daily array yield, reference yield and final yield over three

months are shown in Table 5.2. The month to month mean daily array yield varied between 1.2 kWh/kWp/d to 5.4 kWh/kWp/d and final yield varied between 1.4 kWh/kWp/d to 4.3 kWh/kWp/d for the month of August.

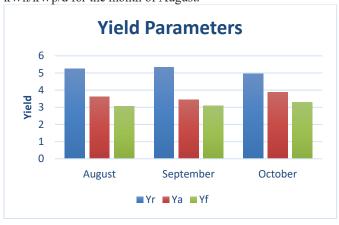


Figure 3: The variation of the monthly average daily yield

For September, mean day to day array yield fluctuated from 0.93 kWh/kWp/d and 5.4 kWh/kWp/d and final yield fluctuated from 0.90 kWh/kWp/d and 4.2 kWh/kWp/d. The mean day to day array yield fluctuated from 2.8 kWh/kWp/d and 4.9 kWh/kWp/d and final yield fluctuated from 2.7 kWh/kWp/d and 3.9 kWh/kWp/d in October. The overall variation is shown in Figure 3.

The array and final yield values observed for the duration of August and September are lower than expected on some days because of the low irradiance due to rainy season. The overcast weather also reduces the availability of sun in these months which further reduces the yield.

The results of the calculated yields for every day are shown in Figures 4, 5 & 6.

The month to month net average energy generation output per day by the PV system over the monitored period of three months is shown in Figure 7. The energy output fluctuated from 5.2kWh to 18.3kWh.

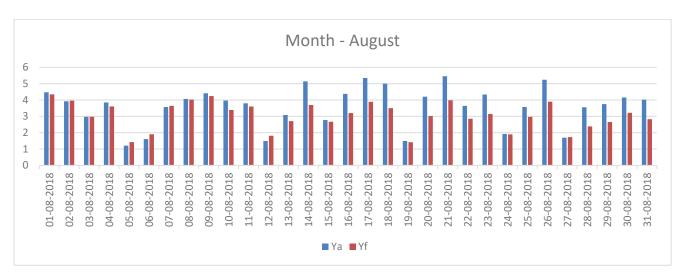
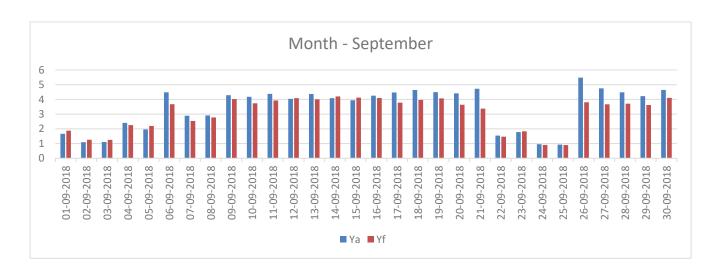


Figure 4: Array and Final Yield for August, 2018



0-10-2018 03-10-2018 04-10-2018 04-10-2018 06-10-2018 06-10-2018 09-10-2018 09-10-2018 11-10-2018 11-10-2018 12-10-2018 13-10-2018 14-10-2018 14-10-2018 14-10-2018 15-10-2018 16-10-2018 17-10-2018 18-10-2018 19-10-2018 22-10-2018 23-10-2018 24-10-2018

Figure 5: Array and Final Yield for September, 2018

Figure 6: Array and Final Yield for October, 2018

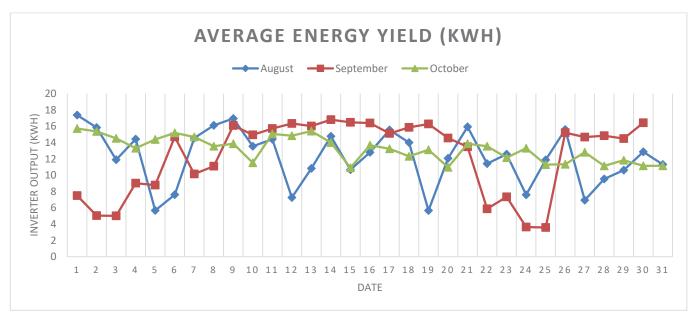


Figure 7: The variation of the Daily Average Energy output

V. CONCLUSION

The design & installation of the 4 kW SPV system has been successful. The entire project is up & running successfully and powers a Laboratory in the EN Department building. The data logging system has also operated as expected and is measuring & logging the data accurately. The performance of the setup has been evaluated for month of August, September and October 2018. As we move from summer season to winters, ambient temperature falls and as a result, performance of an SPV plant is expected to improve which can be seen from the rise in

Performance ratio (P.R.) value. Hence, the results of the performance evaluation are satisfactory.

Also, the data-set logged via IoT system is saved in the cloud, and offers various options to assess long-term running advantages & depreciation of the setup based on numerous energy parameters. Meanwhile, when a large data-set is logged, this information can be utilized by training an Artificial Neural Network (ANN) to forecast the energy output of an upcoming day.

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A Nature-Inspired Metaheuristic Swarm Based Optimization Technique BFOA Based Optimal Controller for Damping of SSR



AQ1

AQ2

Rajeev Kumar, Rajveer Singh and Haroon Ashfaq

- Abstract In the proposed paper, an innovative method for damping of subsynchronous resonance in a series capacitor compensated line has been investigated. A nature-inspired metaheuristic swarm based optimization technique BFOA is applied over the optimal control theory for damping and mitigation of subsynchronous oscillations, with a FACT controller (SVS) connected at the midpoint of a series capacitor compensated network. The analysis has been carried out using IEEE first benchmark model and the entire test system has been simulated using MATLAB software, the simulation results include the eigenvalue analysis which explicitly shows that the application of BFOA on the optimal control theory, the problem of SSR is effectively minimized. Further the time domain analysis for the response curve of rotor angle (Mech-Delta 5) also shows the effectiveness of the 11 proposed BFOA based optimal controller. All the time domain parameters viz., rise time, settling time, overshoot, and peak time is improved by the application of optimal controller which is further improved by the application of BFOA over optimal controller. 15
- Keywords BFOA · Eigen value · Optimal control theory · Static var system · Sub-synchronous resonance · Torsional oscillations · Time domain analysis
- 1 Introduction

The use of series capacitors in transmission line definitely helps in the improvement of power transfer capability as well as transient and steady state stability limits of power systems and it is also economical compared to the addition of new lines.

However, the Series compensated lines having capacitance C have a tendency to produce series resonance at frequencies below the fundamental power frequency. This is called sub-synchronous resonance [1–4]. SSR problem results due to the interaction

R. Kumar (\boxtimes) · R. Singh · H. Ashfaq Department of Electrical Engineering, Jamia Millia Islamia, New Delhi 110025, India e-mail: rajeev.kumar@kiet.edu

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Capacitance Requirement for Rated Current and Rated Voltage Operation of SEIG Using Whale Optimization Algorithm

International Conference on Computational Intelligence and Data Science (ICCIDS 2019)

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Abstract

In today's world non-conventional energy resources are being considered as powerful resources in the field of power generation. To optimize the resources required to generate the power is always be a challenging task. Many metaheuristic algorithms have been applied for solving the complex optimization problems. Resource optimization is also a n-p hard problem. Whale optimization (WO) is newly developed meta-heuristic performed efficiently for solving complex engineering problems. In this paper WO is used as an optimization algorithm in order to optimize the value of excitation capacitance for rated voltage and rated current operation of self-excited induction generator. The simulation has been carried out on a 5.5 kw rating induction generator and the same has been used for the experimental validation. The results as obtained shows that WO outperformed as compared to other meta-heuristic

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Peer-review under responsibility of the scientific committee of the International Conference on Computational Intelligence and Data Science (ICCIDS 2019).

Keywords: Self-excited induction generator (SEIG), Whale optimization algorithm (WO), Genetic algorithm (GA), Wind energy, balanced operation. Introduction

1. Introduction:

In order to analyze the steady state performance of self-excited induction generators, per-phase equivalent circuit of self-excited induction generator has been adopted which is analyzed using the loop impedance method whereas another approach based on nodal admittance may also be used for the performance analysis of SEIG [1]. The roll

and requirement of excitation capacitance in isolated mode of SEIG was discussed for its successful operation [2] Bansal et. al. presented a study on the limits on the performance of three-phase SEIG[3]. In order to reduce the computational efforts, proposed an iterative technique which makes the analysis of such machines quite easy[4]. Instead of conventional circuit of SEIG, a new model was proposed for the performance analysis of self-excited induction generator which when analyzed results in to a second order quadratic expression in slip with other parameters related to machine[5]. The second order quadratic expression as presented was easy to compute the generated frequency and magnetizing reactance.

A new iterative model to analyze the steady state operation of SEIG under different operating conditions was proposed by Sandhu, which contain a power source on the rotor side giving the basic concept of generator [6]. A critical analysis was presented [8] for SEIG and also proposed input/output impedance method to compute steady state reactive power needed to self-excited induction generators.

The research work for performance analysis of SEIG leads to lengthy and highly non-linear mathematical expressions which are quite difficult to solve[7]. Currently soft computing techniques are being adopted by the researchers to solve these non-linear equations. In the area of soft computing, genetic algorithm was considered for the solution of the non-linear equations as formed in the process of performance investigation of SEIG [8],[9]. An approach based on DIRECT algorithm was used [10] to minimize the admittance of induction generator which includes the real as well as the imaginary parts.

Further, various optimization techniques were adopted in balanced operation of SEIG and on behalf of their comparison it was suggested that genetic algorithm and particle swarm optimization leads to accurate analysis [11], [12]. For the first time, genetic algorithm as an optimization technique was implemented [13],[14]in unbalanced operations of self-excited induction generator where large numbers of variables have been targeted using GA.

Main contribution of the Paper:

 An attempt has been made to obtain the capacitance required across stator terminals of the induction machine for its rated current and rated voltage operation using whale optimization algorithm.

The organization of paper is as follows. In Section 2, machine is modeled and then by application of nodal admittance method, objective function has been made which consists of generated frequency, magnetizing reactance and excitation capacitance as the unknown variables. In Section 3, a brief overview of whale optimization algorithm is discussed. Performance equations associated with SEIG are presented in Section 4. In Section 5, simulated results have been obtained using whale optimization algorithm with experiments conducted to evaluate the performance of SEIG. Finally, the conclusion and future work has been discussed in Section 6.

2. Modeling of machine

In order to analyze the steady state performance of induction machine, we need to have an appropriate electrical equivalent circuit to that machine. Per phase electrical equivalent representation of an three phase induction machine is represented in Fig.1.Proposed work: Hybrid Artificial Chemical Reaction Optimization Algorithm for Clustering Problems.

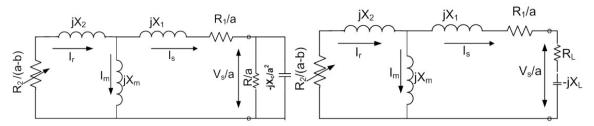


Fig. 1. Equivalent circuit of single-phase induction generator.

Fig. 2. Equivalent circuit of fig.1

From the equivalent of load resistance R& excitation capacitance X_c , R_L and X_L may be written as:

$$R_L = \frac{(R/a)}{1 + \left(\frac{aR}{X_C}\right)^2} \tag{1}$$

$$X_L = \frac{X_C}{a^2 + \left(\frac{X_C}{R}\right)^2} \tag{2}$$

Application of nodal admittance in Fig. 1will results into the following equation:

$$\frac{\frac{R_2}{(a-b)}^{-j}X^2}{\left(\frac{R_2}{a-b}\right)^2 + X_2^2} + \frac{J}{X_m} - \left[\frac{\left(\frac{R_1}{a} + R_L\right)^{-j}(X_1 - X_L)}{\left(\frac{R_1}{a} + R_L\right)^2 + (X_1 - X_L)^2}\right] = 0$$
(3)

In terms of objective function, equation (3) may be written as:

$$f_1 \left\{ \frac{\frac{R_2}{(a-b)} - jX2}{\left(\frac{R_2}{a-b}\right)^2 + X_2^2} + \frac{J}{X_m} - \left[\frac{\left(\frac{R_1}{a} + R_L\right) - J(X_1 - X_L)}{\left(\frac{R_1}{a} + R_L\right)^2 + (X_1 - X_L)^2} \right] \right\} = 0$$
(4)

Stator current in the machine may be written as:

$$I_S = \frac{E}{\sqrt{\left(\frac{R_1}{a} + R_L\right)^2 + (X_1 - X_L)^2}} \tag{5}$$

For rated current operation, the stator current in the machine would be 1.0 p.u, hence stator current may be written as:

$$I_{S} = \frac{E}{\sqrt{\left(\frac{R_{1}}{a} + R_{L}\right)^{2} + (X_{1} - X_{L})^{2}}} = 1 \tag{6}$$

In terms of objective function, equation (6) may be written as:

$$f_2\left\{E - \left(\frac{R_1}{a} + R_L\right) - J(X_1 - X_L)\right\} = 0\tag{7}$$

Now from the equivalent circuit, Voltage across the stator terminals may be written as:

$$V_{\rm s} = aI_{\rm s}\sqrt{(R_L)^2 + (X_L)^2} \tag{8}$$

For rated voltage operation, the voltage across stator terminals in the machine would be 1.0 p.u, hence stator voltage may be written as:

$$V_{\rm s} = aI_{\rm s}\sqrt{(R_L)^2 + (X_L)^2} = 1 \tag{9}$$

In terms of objective function, equation (9) may be written as:

$$f_3 \left\{ aE(R_L - JX_L) - \left(\frac{R_1}{a} + R_L\right) - J(X_1 - X_L) \right\} = 0 \tag{10}$$

Here, a and b are the generated frequency and speed of the machine in per unit where as R_1 , R_2 , X_1 , X_2 are machine parameters. Solution of equations (4), (7) and (10) for variables generated frequency, magnetizing reactance and excitation capacitance for any induction machine operating at particular speed may be obtain using whale optimization by simultaneously minimizing the objective functions defined as:

$$Min|f_1(a, X_m, X_c)| = Min\sqrt{\{Re(f_1)\}^2 + \{Im(f_1)\}^2}$$
(11)

$$Min|f_2(a, X_m, X_c)| = Min\sqrt{\{Re(f_2)\}^2 + \{Im(f_2)\}^2}$$
(12)

$$Min|f_3(a, X_m, X_c)| = Min\sqrt{\{Re(f_3)\}^2 + \{Im(f_3)\}^2}$$
(13)

3. Overview of the optimization Techniques

3.1 Whale Optimization (WO)

WO was proposed by Mirjalili and Lewis in 2016[16]. WO is a population-based algorithm that exploit hunting method of humpback whales known as bubble net feeding technique. Whales create a spiral shaped bubble path. Exploitation of the search space is performed using bubble net method which constitute of two mechanism: shrinking encircling mechanism and spiral updating position. Whales move around prey in a spiral shaped thereby shrinking circular path simultaneously for perfect attack. In WO, a probability of 50% is assigned to both paths for every position update. WO consists of minimum number of heuristics and internal parameter and is computationally a simple algorithm.

Position Update:

$$X(t+1) = \begin{cases} X^*(t) - A.D & \text{if } p < 0.5\\ D'. e^{bl}. \cos(2\pi l) + X^*(t) & \text{if } p \ge 0.5 \end{cases}$$
where: D = |C. X*(t) - X(t)|; A = 2a.r - a; C = 2r

SEIG Using Whale Optimization Algorithm

Step 1: Generate initial population for the variables of SEIG

Step 2: Initialize WO parameters: a, A, C, l and p

Step 3: $a = 2 - t * \frac{2}{max_iter}$ where t is iteration number

A = 2 * a * r - a where r is random number between [0,1]

$$C = 2 * r$$

and 1 is random number between [-1,1]; p is probability

Step 4: Calculate fitness values using equations (11-13).

Step 5: if p < 0.5

- if (
$$|A| < 1$$
)
$$D = |C.X^*(t) - X(t)|$$

$$X(t+1) = X^*(t) - A.D$$

$$X^* \text{ is the best solution so far and } X \text{ is the position vector}$$
 -else if ($|A| < 1$) select a random agent Xrand
$$D = |C.X_{rand}(t) - X(t)|$$

$$X(t+1) = X_{rand}(t) - A.D$$
 -end if

else if $p \ge 0.5$

 $\begin{aligned} D' &= |X^*(t) - X(t)| \\ X(t+1) &= D^{'}.e^b.cos(2\pi l) + X^*(t)ifp \geq 0.5 \end{aligned}$

Step 7: end if

Step 6:

Step 8: Get optimized of value of variables of SEIG

Step 9: End

4. Performance Equation

After getting solution of generated frequency, magnetizing reactance and excitation capacitance, the performance of any machine may be obtained by the following performance equations:

Rotor Current of machine:

$$I_{\rm r} = \sqrt{\left(\frac{E}{X_m}\right)^2 + (I_s)^2} \tag{15}$$

Load current of machine:

$$I_L = \frac{V_S}{R} \tag{16}$$

Power output of machine:

$$P_{out} = 3I_L^2 R (17)$$

Power losses in machine:

$$P_{loss} = 3(I_s^2 R_s + I_r^2 R_r) ag{18}$$

Efficiency of machine:

$$\%\eta = \frac{P_{out}}{P_{out} + P_{loss}} * 100 \tag{19}$$

5. Results and Discussions

Simulation using whale optimization has been carried out on a 5.5kw, 415V, 11A, 50 Hz delta connected squirrel cage induction machine whose Per phase parameters are $R_1 = 0.05248$ p.u, $R_2 = 0.05417$ p.u, $X_1 = X_2 = 0.0899$ p.u while the saturation curve of machine in p.u is:

$$\mathbf{E} = \mathbf{0.221} + \mathbf{1.254X_m} - \mathbf{0.437X_m^2} \tag{20}$$

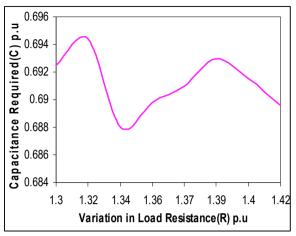
Performance of machine has been evaluated in terms of generated frequency, magnetizing reactance, excitation capacitance, rated machine voltage, rated machine current, power output and efficiency of machine with the variation in the load resistance while speed of the machine has been marked constant at 1.02p.u throughout the operation.

5.1 Performance Under Variation in Load Resistance

Table: 1 (Experimental verification of machine voltage & machine current using whale optimization)

Load Resistance R (p.u)	Machine Current (p.u) (I- WO)	Machine Current (p.u) (I-exp)	Machine Voltage (p.u) (V-WO)	Machine Voltage (p.u) (V-Exp)
1.3	1.0	1.0005	0.99	0.991
1.32	1.005	1.006	0.992	0.994
1.34	0.998	1.0	0.99	0.993
1.36	0.999	1.0	0.998	1.0
1.37	0.999	1.0	1.0	1.0
1.39	1.0	1.0005	1.0	1.0005
1.40	0.997	0.998	1.0	1.0006

Table 1 shows the Experimental verification of machine voltage & machine current using whale optimization. Further The variation in generated frequency, magnetizing reactance, excitation capacitance, rated machine voltage, rated machine current, power output and efficiency of the machine under the variation in the balanced load resistance is shown in the Fig. 3 to Fig. 10.



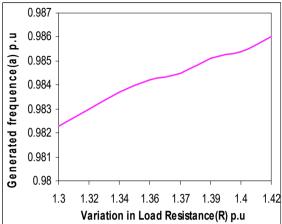
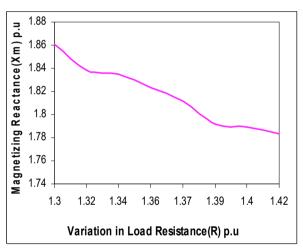


Fig. 3. Variation in capacitance required with load resistance.

Fig. 4. Variation in generated frequency with load resistance



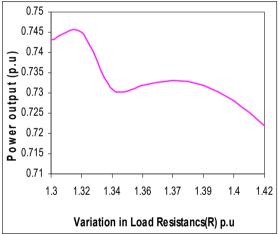
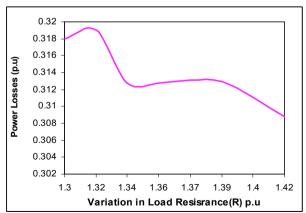
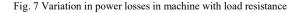


Fig. 5 Variation in magnetizing reactance with load resistance.

Fig. 6 Variation in power output required with load resistance





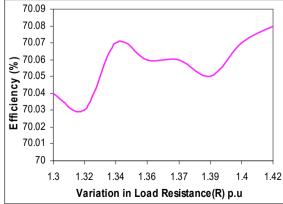
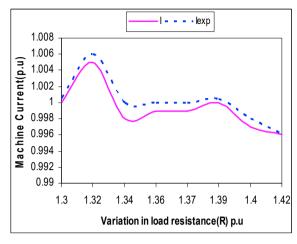


Fig. 8 Variation in efficiency of machine with load resistance



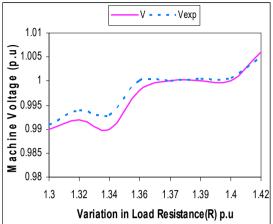


Fig. 9 Variation in machine Current with load resistance

Fig. 10 Variation in machine voltage with load resistance

The observations as made from the simulated results show that increase in the load resistance will result into increase in the generated frequency, but the magnetizing reactance of the machine reduces with this change in load resistance. This change in the magnetizing reactance is responsible for set up voltage across the magnetizing branch. However the need of excitation requirement for rated voltage and rated current operation of SEIG changes in accordance to change in the load resistance. Further power output of the machine seems to reduce as we increase the load resistance. With same variation in load resistance, it is observed that for rated voltage and rated current operation of SEIG the load resistances at which capacitance requirement is maximum & minimum, the efficiency of same machine at these load points is minimum & maximum accordingly.

6. Conclusion and Future Scope

In this paper, the per phase equivalent circuit of self-excited induction generator has been modeled mathematically which results in to an objective function related to rated current and rated voltage under balanced load. The objective functions consists three variables generated frequency, magnetizing reactance and excitation capacitance which have been solved using whale optimization algorithm in order to find capacitance required for rated voltage and rated current operation of SEIG under different loaded conditions. The results as obtained using whale optimization have been verified experimentally on a 5.5 kw induction machine (table -1) which proves the effectiveness of optimization technique for balanced load operation of SEIG. In future, the study may be carried out under unbalanced load operation of self-excited induction generator whale optimization algorithm.

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Abstract



Document Sections

I. Introduction

II. Modeling of machine

III. Overview of optimization techniques

IV. Performance equations

V. Results and discussions

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Abstract:

In current scenario wind energy is counted as important factor for power generation in order to minimize the gap between generation of power and load demand across the world. Due to several features, Self-excited induction generators (SEIG) are being actively used for power generation through wind. This paper is targeted on the steady state operation SEIG under balanced operation feeding a resistive load. Three optimization techniques namely APSO, PSO and GA have been considered for the performance investigation of SEIG. The results obtained from APSO, PSO and GA are compared with experimental results on a 5.5 KW rating induction machine. Comparison among optimization techniques APSO, PSO & GA has been made which shows the

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References

effectiveness of optimization techniques as presented for finding of known variables associated with the induction generator.

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E Contents

I. Introduction

In present scenario energy is the main requirement for the growth and progress of any society. The conventional energy sources like coal, gas etc. used for power generation are pollutant and hazardous which are destroying the nature and our society as well. Continuous reduction in the conventional energy sources used for power generation and its harmful effect on environment are encouraging the researchers to work in the direction of non-cosignitiota Continuous like admits solar, geothermal, tidal, biogas etc. Energy generation via renewable energy resources is growing continuously and among them share of energy generation through wind is dominating the others. Currently, wind energy is being used by around one hundred countries in the world on a commercial basis. Among them, the top five countries which are working with energy from wind are China, USA, Germany, India and Spain.

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SELF-EXCITED INDUCTION GENERATOR: AN INSIGHT

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Abstract- With the ever increasing demand of power for the sustaining of humans civilization and the threat of depletion of conventional energy sources, focus has been centered to the possibilities in renewable energy during the recent past to accomplish the energy requirement. The Self Excited Induction Generator has been identified as an ideal alternative to the well known synchronous generator for meeting the growing demand of electrical energy. As a matter of fact, various researches and experiments have been done to optimize the performance and characteristics of Self Excited Induction Generator. The objective of this paper is to get an insight of the literature of research on Self Excited Induction Generator in the last three decades.

Keywords- Self excited induction generator, Voltage built up, Steady state and transient analysis.

1. Introduction:

To maintain the balance between the supply and demand of electrical power for the much electrified modern world, renewable energy sources like wind energy, solar energy, bio gas etc. have been marked as promising alternatives to replenish the requirement of power [1-6]. The Self Excited Induction Generator, abbreviated as SEIG, being used for the conversion of wind energy into electrical energy, has become a popular alternative source of energy. This is because of some of the outstanding features exhibited by SEIG like its simplicity, robustness, ease of maintenance, lesser unit cost etc. The SEIG is actually an induction machine being operated in the generating mode. A three phase capacitor bank, when connected across the induction machine, provides the excitation, thereby inducing an emf in the winding of the machine. Accordingly, the SEIG, with a three phase capacitor bank as an auxiliary, is called a self excited SEIG. With the three phase capacitor bank being connected, the SEIG becomes the source of power supply in isolated mode. Like any other machine, there are various structural and operational characteristics of SEIG. With the advent of power electronic convertors, the SEIG has been embellished with the precise control over its operating characteristics. The SEIG has some outstanding advantages such as reduced maintenance cost, ruggedness, brushless construction in squirrel cage type, absence of external dc excitation etc.



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Although the potential of SEIG as an isolated source of power supply has been accredited widely for a number of years, it too suffers from some serious drawbacks. Firstly, the SEIG exhibits a poor voltage regulation. The reason is that the SEIG is not able to generate reactive power, rather consumes it. Besides, being operated in saturation region, the efficiency of SEIG may be very low.

2. Classification:

The classification of SEIG may be done on the basis of two different aspects. Depending upon the construction of rotor, the SEIG may be two types:

- (i) Wound rotor induction generator
- (ii) Squirrel cage induction generator

Depending on the type of prime movers, which may be constant speed or variable speed and their location with respect to the power networks, the generating system may be classified as under [7-8]:

- (i) Constant speed constant frequency
- (ii) Variable speed constant frequency
- (iii) Variable speed variable frequency

We now briefly describe these classifications as follows:

(i) Constant speed constant frequency:

According to T.S. Jayadev [7], by the continuous adjustment of blade pitch in conjugation with the generator characteristics, a constant speed characteristic is obtained from the prime mover. The operating speed range of an induction generator on an infinite busbar in terms of slip is 1% to 5% above the synchronous speed.

(ii) Variable speed constant frequency:

The variable speed operation of wind energy generating system yields higher output at low as well as high wind speeds as explain by Dezza et al [9]. This property is exhibited by both horizontal and vertical axis wind turbines. The constant frequency output from a variable speed turbine may be achieved by two prominent methods.

- (a) AC-DC-AC link and
- (b) Double output induction generator (DOIG)

A brief explanation of these methods is given below:

- (a) AC-DC-AC link: In this scheme, with the help of high power rated thyristor, the AC output of the alternator is rectified and subsequently inverted to AC with the help of inverters. The frequency, being fixed by the power line, remains constant [9].
- (b) Double output induction generator (DOIG): The DOIG is in fact a three phase wound rotor machine which is mechanically coupled to a wind or hydro turbine. Its stator terminals are connected to the utility grid having constant voltage and constant frequency [10-11]. The output having variable frequency is fed into the AC supply through and AC-DC-AC link converter. Here, it may be noted that in generation by DOIG, the output power may exceed the rating of the machine. However the DOIG exhibit some operational disadvantages, which a bottleneck to its widespread use. Besides, being exposed to the atmosphere, it has low power factor and its maintenance is somewhat difficult. Further, as it needs grid supply to maintain excitation, it is not suitable for isolated power generation.
- (iii) Variable speed variable frequency:



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As the applications of resistive heating are independent of frequency, the SEIG in this mode of operation is suitable for this job [12].

3. Voltage built up process and methods of self excitation:

For the voltage to develop across the SEIG, excitation needs to be provided externally. The machine needs the excitation in the form of reactive power. There are two methods for supplying this reactive power.

- (a) Grid connected mode
- (b) Isolated mode

In the grid connected mode the induction generator can draw reactive power from the grid. In the isolated mode, a suitable capacitor bank connected across the generator terminals provides the excitation. This phenomenon is known as "capacitor self excitation" and the induction generator exhibits a new name "SEIG".

In a way much similar to that observed in DC generator, it is essential to have a suitable value of residual magnetism in the rotor of the SEIG, failing which there will be no voltage built up. When the SEIG starts running a small voltage is induced in the rotor circuit because of the residual magnetic field. This induced voltage causes a capacitive current to flow. This capacitive current provides an increment in the voltage. This is a cumulative process and it goes on until the voltage is completely built up. Graphically, the no load terminal voltage is given by intersection point of the magnetization curve of the generator and capacitive load line [13]. An adequate amount of the magnetizing current by the capacitor makes it possible to achieve a required voltage.

4. Modelling:

Different authors have suggested different models of SEIG for its analysis in steady state as well as its behaviour in transient state. An optimum model of SEIG is accomplished by considering the main flux path saturation while the saturation in leakage flux path, the iron an rotational losses being neglected. Malik and Haque [14] have demonstrated that in addition to voltage and frequency, steady state analysis can be used to estimate the minimum value of excitation capacitance required for excitation as well as for maintaining the terminal voltage of the induction machine, a constant.

An essential requirement for the modelling of SEIG is to transform the time varying parameters into mutually decoupled direct and quadrature axis. This model is known as d-q model. In this context, Stanley [15] has presented an analysis based on direct three phase model using phase variables being presented in shifted reference axis. The time varying parameters of an induction machine may be eliminated by referring the stator and rotor variables to an arbitrarily rotating reference frame, as suggested by Krauss & Thomas [16]. For an optimum analysis of SEIG, the d-q model has emerged as the best with current being taken as state variables and using the d-q model, it is possible to make the analysis in any reference frame, be it stationary or rotating. Rijwan khan et al [17] have analysed the model of a single phase two winding SEIG derived from double field revolving theory. This model has successfully explained the steady state behaviour of SIEG subject to the prior information about frequency and magnetizing reactance. The phenomena of self excitation in SEIG has been physically interpreted by Elder et al [18]. The core loss component, being neglected earlier, has been considered by Malik & Haque



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[14] for analysing the performance of SEIG. The upper and lower limits of the capacitance and speed of SEIG necessary to maintain the self excitation are determined in [19-20]. The study of SEIG, driven by regulated and unregulated prime movers has been done in [21-22]. Uctug & Demirekler [23] have presented a linear model of SEIG describing a wide variation in the speed. They have also suggested a strategy to maintain the voltage and frequency constant.

In the modelling and analysis of SEIG, the assumption of a linear circuit for SEIG failed to explain some transient condition like the switching transients. The inclusion of saturation in dynamic model has emerged as a solution for this problem. With the inclusion of saturation, extensive work has been done in this area as presented in [24-26].

5. Control of voltage and frequency:

Despite of being a simple and efficient machine for conversion wind energy into electrical energy, there are two major drawbacks of SEIG. The first is the poor voltage regulation and the second is the need for reactive power support. The loads in power system, being mostly inductive in nature, require the supply of reactive power, in the absence of which voltage variations may occur. According to Malik et al [20], the requirement of capacitance in a SEIG is proportional to the square of the speed and the maximum value of saturated magnetizing reactance. Sridhar et al [27] have suggested a method to determine an optimum value of the capacitance for a short shunt SEIG. Here, it may be noted that if a simple shunt configuration is replaced with short or long shunt design, we may have better voltage regulation, although some problems likes sub synchronous resonance are also associated with this design. A synchronous machine, in over excited mode can also provide reactive power compensation. However this is not a one sided agreement, as it costs the active power generation. The reactive power requirement of SEIG at different speeds and loading conditions can not be met by fixed capacitors. A combination of fixed and switched capacitor as suggested by [28] can provide sufficient reactive power needed by a SEIG over a wide range of operating speeds. However, The methods mentioned above for the reactive power control have some short comings also and they are not the perfect alternatives. With the advent of power electronic devices in recent time, Static VAR Compensator (SVC) has been conveniently used for the continuous and rapid control of reactive power in an isolated wind-diesel hybrid system [29] where the induction generator is used for wind system and the synchronous generator is used for a diesel generator set.

As the frequency of an isolated generating unit varies considerably with the varying load conditions, a governor control system has been emerged as a solution to this problem. The governor control system adjusts the turbine flow in accordance with load demand. Owing to the high cost of governor and complexity in operation, the load controller may be used to regulate the generator frequency as suggested by Woodward [30]. A variety of different load controller schemes for both the induction generator and synchronous generator are suggested in [31-32]. Load controller consisting of a thyristor bridge with pulse control and a chopper with pulse width control for the separate regulation of real and reactive power for the SEIG has been suggested by Bonert & Raja karuna [31] and Bonert & Hoops [33]. For the frequency control of wind diesel system, a combination of



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diode bridge and pulse width modulation (PWM) chopper has been suggested by Stein et al [34].

6. Steady state and transient analysis:

According to the mathematical analysis presented by Murthy et al [35], equivalent loop impedance has been represented in the form of polynomials and further, the polynomials are separated in real and imaginary parts. They are solved using Newton-Raphson method and hence the frequency and the magnetizing reactance are obtained. Subsequently different authors have suggested different techniques for the determination of frequency and magnetizing reactance. The approach of Quazene et al [8] was to use a nodal admittance technique to obtain a nodal equation. According to Jain et al [36] an algebraic equation is solved for the initial value of the frequency and then the exact solution is obtained by Secant method. According to Raja karuna [22], using an iterative technique based on approximate equivalent circuit and mathematical model for B-H curve, a non-linear equation in frequency can be obtained. Singh et al [37] have suggested an optimization technique in which frequency and magnetizing reactance are considered as independent variables. By allowing the variations in the value of these variables, practically acceptable values are obtained. Observation made in [38-40] suggest that by changing the number of poles of a SEIG, more wind energy can be harnessed under the condition of varying wind speed. The conclusion is that at lower speed of prime mover, the machine is to be run with six poles and at a higher speed of prime mover a smaller number i.e. four poles is optimum. A comparably simple approach to steady state analysis of the SEIG has been suggested by Sandhu et al [41] in which a quadratic equation in slip is solved for the analysis. The maximum and minimum value of the excitation capacitance has been determine by Wang et al [42] in which eigen value based approache is adopted. A general analysis of a three phase SEIG with an asymmetrically connected load and excitation capacitance has been presented in [43] using the method of symmetrical components. An optimization based approach for the analysis of the SEIG has been presented by Alolah et al [44]. Various dynamic models have been suggested to study the transient behaviour of induction machine.

The parameter concerned to most of the transient studies are voltage built up due to self-excitation and load perturbation. The performance of short shunt SEIG in transient mode is presented in [25]. Major success has been achieved in predicting the transient behaviour of an induction machine by d-q model in stationary reference frame using current as state variables. The transient analysis of the SEIG by considering the main flux saturation has been suggested by Granthm et al [45]. The importance of cross saturation has been depicted by Hallenious et al [46]. The dynamic performance of the SEIGs operating in parallel has been presented by Wang and Lee [47]. They have also calculated the minimum value of shunt excitation capacitance. Jain et al [48] have investigated the behaviour of SEIG with due consideration to the effects of main and cross flux saturation for various modes of unbalancing like line to line short circuit. More works are being carried to investigate the response of the SEIG to these fault.

7. Conclusion:



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This article has revealed a comprehensive literature review of some of the critical feature of the SEIG such has modelling, voltage and frequency control etc. It is observed that the SEIG is an economic and efficient alternative source of electrical power for the localities isolated from utility grid. This exhaustive literature survey leads to the fact that the SEIG is superior to a synchronous generator in many aspects. Apart from being suitable for wind and mini hydro plant, it also works well with prime movers driven by other sources such as diesel, biogas, natural gas etc. A lot of more work and research can be carried out to enhance the capabilities of SEIG for optimum harnessing of some non-conventional energy sources.

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Scientific Study on Effect of Polarization in Calculation of Rain Attenuation Using ITU-R Model

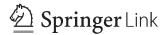
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Abstract

This paper addresses the current need to work on higher frequency levels for radio wave communication because of need for higher speed requirement in communication system and also because the current frequency spectrum is congested. While establishing radio communication links of higher frequencies it is important to study various problems associated with them. Rain induced attenuation at higher frequency is a major problem. Therefore, a study has been done on rain attenuation and effect of polarization is calculated for six different regions of the world. The simulation results are tested on ITU-R model and various findings throughout the simulation work have been concluded.



Optimal Controller Design for Altitude Control of Modern Airship

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Abstract

This paper describes modeling and full-state feedback controller design of airship for stabilization of altitude. The state feedback controller based on linear quadratic (LQ) optimization technique is realized, and performance is compared with pole-placement-based controller. The weighing and regulating matrices are designed and analyzed for the performance of designed controllers for the modern airship. The performance analysis is also presented in this chapter.

Keywords

Full-state feedback controller Linear quadratic regulator Airship This is a preview of subscription content, <u>log in</u> to check access.

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Comparison of Haar and Daubechies wavelet based denoising for speed control of DC motor

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Abhas Kanungo; Monika Mittal; Lillie Dewan All Authors

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Abstract

Abstract:

Document Sections

- I. Introduction
- II. Modelling of DC motor
- III. EFFECT OF NOISE
- IV. WAVELET BASED DENOISING
- V. RESULTS AND DISCUSSION
- Show Full Outline ▼

This paper presents the comparison between Haar and Daubechies wavelet based denoising for the application of speed control of DC motor in the presence of noise. The multiresolution property of wavelet is utilized to compensate for the effect of noise in the system. In addition, the performance of associated controller is improved in the presence of uncertainty. It has been observed that similarity of the wavelet's wave shape to the signal being denoised has a direct bearing on its denoising performance. Simulation

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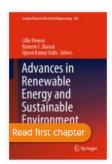
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results are obtained with the help of MATLAB@2015a.

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GA and PSO Based Optimization for Benchmark Thermal System Using Wavelet-Based MRPID Controller



Authors: Abhas Kanungo, Monika Mittal, Lillie Dewan

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Abstract

A high performance thermal control system that can handle temperature uncertainties is significant for various applications. The characteristics of such systems can be improved by tuning the control parameters of multi-resolution proportional, integral, and derivative (MRPID) controller, which is still a challenge. Therefore, this paper presents the two optimization techniques for optimizing the















Voltage Control by Optimized Participation of Reactive Power Compensation Using Fixed Capacitor and STATCOM



Nitin Kumar Saxena

Abstract FACTS devices play a significant role in providing voltage control through adequate reactive power compensation under the conditions of load and input changes. In isolated wind diesel based hybrid electrical system, choosing adequate participation of reactive power compensation device becomes more important because of the following aspects; (i) unlike to grid connected system, additional sources are required for supplying reactive power, (ii) normally self excited induction generators are used for power generation through wind and these generators require reactive power for building up the voltage, (iii) wind generators power output is much affected by changes in input wind speed and these changes require additional reactive power to control the voltage, (iv) similar to input change, load changes also require additional reactive power to maintain the voltage level, (v) compensating device should respond fast for nullifying the voltage deviation in minimum time, (vi) the procedure adopted for reactive power compensation should be economically acceptable even for the last end user in the society. Therefore, the reactive power compensating devices for voltage control in isolated hybrid electric system should be participated optimally by considering these technical and economical aspects simultaneously. In this chapter, MATLAB (programming along with simulink model) based approach is demonstrated for voltage control through optimized participation of reactive power compensation using fixed capacitor as static and STATCOM as dynamic compensator.

Keywords Static Compensator · Dynamic Compensator · Reactive power compensators · Compensation cost · Ancillary services

Modelling for Composite Load Model Including Participation of Static and Dynamic Load



1

Nitin Kumar Saxena and Ashwani Kumar

Abstract It is well recognized that voltage problems in power system is much affected through the connected loads. Different types of load can be modeled on their characteristics basis for computation of power system problems effectively. For different power system studies especially in the area of power system optimization problems that includes voltage control with reactive power compensation, transfer function $\Delta Q/\Delta V$ of composite load is required. This chapter gives a detailed mathematical modelling to compute the reactive power response with small voltage perturbation for composite load. Composite load is defined as a combination of static and dynamic load model. To develop this composite load model, the exponential load is used as a static load model and induction motors are used as a dynamic load model in this chapter. To analyze the dynamics of induction motor load, fifth, third and first order model of induction motor are formulated and compared using differential equations solver in MATLAB coding. Since the decentralized areas have many small consumers which may consist large numbers of induction motors of small rating, it is not realistic to model either a single large rating unit or all small rating induction motors together that are placed in the system. In place of using single large rating induction motor a group of motors are being considered and then aggregate model of induction motor is developed using law of energy conservation and this aggregate model is used as a dynamic load model. Transfer function of composite load is derived in this chapter by successive derivation for exponential model of static load and for fifth and third order induction motor dynamic load model using state space model.

Keywords Static load · Dynamic load · Composite load · Aggregate load · *ZIP* load model · Exponential load model · Induction motor load

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Economic Benefits for Reactive Power Compensation as Ancillary Service through Multi Units Based Electrical System

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Abstract— In available studies of multi units based hybrid electrical system, technical and operational issues are well taken by several researchers to describe their benefits over single unit based hybrid electrical system. However, economic issues are almost not attempted in available literature for the same. To be precise, economic investigations about the payment towards hybrid compensation cost as one of the important ancillary service to control the terminal voltage are not focused yet and so, the same are being investigated in this work. For this work, reactive power and compensation cost are being evaluated using hybrid compensation of static and dynamic compensators in wind diesel based hybrid electrical system developed for multi units as well as single unit system. The main contributions of this paper are; (i) optimization of reactive power quantity through fixed capacitor and STATCOM in presence of composite load, (ii) compensation cost estimation for changes in load and input, and (iii) comparison of economic benefits for reactive power compensation as ancillary service through multi units and single units based system of same capacity.

Keywords—Multi units electrical system, dynamic compensators, static compensators, composite load model, voltage control, compensation cost as ancillary service, STATCOM

I. INTRODUCTION

In India, 139445 MW peak demand and 135184 MW peak met was reported as on 31.01.2015 [1]. Development of suburbs because of high population density in inner-cities is the most rapidly increasing urban residential model in India and therefore demands more electricity from the power system. According to Central Electricity Authority (CEA) annual report published at the end of financial year 2018, installed generating capacity in India has reached up to 344002.39 MW [2]. These statistics represent the improving life style and prosperity in India. In contrast of this situation, there are still some such regions in India that cannot be electrified efficiently through central power grid due to their geological conditions. Almost 50% population living in rural areas of India which is more than 40 Crores (400 million) in numbers still had no reliable, continuous and secure access to electricity. Government is putting all possible efforts to provide electricity for such far located consumers. Also T&D Losses, exponential increase in rural consumers demand and congestion in distribution lines has already motivated to private investors for using renewable based decentralized power plants to enhance the electricity generation with the support of several central and state government policies [3]. To provide continuous and reliable power in such remote areas, renewable energy based generators along with conventional fuel based generators are used without grid connection. Such systems are called isolated hybrid electrical

system (IHES). Researchers have presented models in which induction generator (IG) and synchronous generator (SG) are used for fetching power through wind and diesel respectively [4-9]. These IHES are designed by using single unit of SG and single unit of IG. Typically the most efficient diesel based SGs are allowed to run at their rated output. But, single unit generator may have to work for a wide range of system load demand during its operation. Evidently, a very rapid cycling, on and off, of such large diesels would not be efficient or sensible [10]. Though the continuous on-off operations cause serious issues in system but still it is preferable to avoid an inconvenient unloading of the diesel engine. So, the power generation using diesel system must be reduced during light-load periods or good wind conditions. This can be achieved by replacing a single unit power generation with multi units power generation. It is also reported that multi diesel systems allow a variety of possible operation and control strategies. Therefore, multi diesel systems of small rating can give satisfactorily result compare with single large rating unit.

It is also reported that multi wind systems can attenuate the effect of power fluctuations produced due to wind intermittent nature [11]. Need for short-term storage can also be eliminated in IHESs with power generation capacity is made up with multi wind and multi diesel machines [12]. Therefore, it can be concluded that configuration and components rating in wind diesel based IHESs may be decided depending upon the load type, pattern and resource available at site. Available papers explain the operational issues in installing the high rating wind and diesel systems. The operation of high rating systems are not benefitted due to several issues such as high maintenance, complex control strategies and low flexibility to change in generation with load change [13]. The use of multi generating units can provide scale benefits to improve operation performances.

The above explained discussions clearly depict the advantages of using multi units of wind and diesel system in electrical system on the basis of their operational and technical benefits. Still, there is a wide scope of analyzing the economic issues of multi units' electrical system as most of such hybrid electrical systems are commissioned for remote areas where consumers are not financially strong. Ref. [15] suggests that a logical pricing of an ancillary service can lead to market liquidity which in turn results in approaching the optimal condition. Voltage control has prime importance in the system along with other ancillary services like system control, regulation, load following, energy imbalance. In isolated hybrid electrical system, voltage can be supported and controlled by the compensators with the help of

synchronous generators, static and dynamic compensator. It has been suggested that ISO provides a platform for mutual concern between the independent generators and customers so that they can own their resources for reactive support. This procurement of reactive power services should be done taking into account the perceived demand conditions, mix of the load and availability of reactive power resources [16]. Private investors, promoted through Government, can develop decentralized units for continuous power supply and adjustments in required reactive power for voltage control to these far located areas if they are getting healthy business. At such remote areas, power supply continuity is a prime concern however its quality degradation may be allowed up to some extent depending upon the paying capacity of consumers [14].

Therefore, authors are estimating the cost of compensation and voltage profile in multi units' hybrid electrical system in this paper. The results show the economic benefits of using multi units over single unit hybrid electrical system. Finally, Test systems of 5.0 MW for both multi as well as single unit have been developed, compared and analyzed in this paper.

This paper is organized as follows; in section 1, detailed introduction is presented that summarize the need and importance of hybrid electrical system. Technical and operational benefits of using multi units' hybrid electrical systems are explained. The importance of reactive power as ancillary service along with Government promotional schemes is explained. And finally, the main work which is being done in this paper is briefed. In section 2, a generalized block model is presented for which reactive power compensation and cost issues are being discussed in this paper. In section 3, mathematical details for developing MATLAB simulink model for multi unit and single unit based hybrid electrical system are presented. In section 4, mechanism for estimating optimum value of reactive power compensation subjected to given equalities and inequalities are elaborated. In section 5, results are demonstrated, compared and analyzed for both the test systems. Finally, in Section 6, the objectives of the paper are concluded. Results are obtained through the MATLAB programs written in MATLAB 8.4 (The Math Works, Natick, Massachusetts, USA). At the end of paper, Appendices are given. Appendix A provides the pu ratings of induction generator, synchronous generator, fixed capacitor and STATCOM. Appendix B provides the constants details required for assembling MATLAB simulink model.

II. REACTIVE POWER COMPENSATION AND COST ISSUES IN IHES

Multi units IHES, as represented in Fig. 1, is designed by using multi units of wind operated self excited induction generator (SEIG) and diesel operated synchronous generator (SG) together. A composite load model is represented by CLM while reactive power can be supplied for this system through fixed capacitor and STATCOM as represented by FC and ST respectively. Ref. [17, 18] suggests the merits of SEIG over DFIG and PMIG in hybrid electrical system and so, same is used in this paper. However, the major limitations with SEIG are the requirement of reactive power for its excitation and change in input power because of intermittent wind conditions. Moreover, load also demands

reactive power from the system for both steady state and dynamic conditions. This deficiency of reactive power may cause large voltage disturbances if adequate reactive power is not supplied to system. Therefore, fast acting compensators are used so that they can respond fast for changes in system and can recover the system voltage by supplying additional reactive power in the system. SVC and STATCOM (ST) have been presented by many authors with advance control techniques for fast voltage control of IHES. Since IHES is more prominent for remotely located consumers who can compromise with power quality but cost of electricity should remain low. In such scenario, economic issues become more important with some flexibility in power quality to the end consumers. In ref. [15], authors have elaborated four cases to show how the cost of compensation can be reduced with the hybrid participations of FC and ST together. In Ref. [19], an optimization approach to find best possible participation of FC and ST has been discussed only for single units based IHES.

The optimization approach for the selection of reactive power compensation and cost analysis for multi units based IHES are presented first time in this paper.

To present multi units system, two units of both SEIGs and SGs are modelled with MATLAB Simulink in this work. Composite load is a proper choice for modelling an accurate load and therefore same is used in this paper as in ref. [20] with 4:1 participation ratio of static and dynamic load as in Ref. [21, 22].

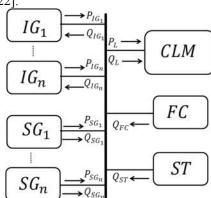


Fig. 1 Multi units IHES representation

III. DEVELOPMENT FOR IHES MODEL

Fig. 1 represents a generalized block diagram that can be reduced to either single or multi units IHES. A generalized mathematical expressions are described below for implementing it either for single or for multi units IHES. In steady state, requirement of reactive power for load and IGs are supplied by SGs, FC and ST. Mathematically, reactive power equation for steady state condition and reactive power surplus for dynamic conditions as in ref. [23],

$$\sum \Delta Q_{IG} + \Delta Q_L = \sum \Delta Q_{SG} + \Delta Q_{FC} + \Delta Q_{ST}$$
 (1)

$$\Delta Q = \sum \Delta Q_{SG} + \Delta Q_{FC} + \Delta Q_{ST} - \sum \Delta Q_{IG} - \Delta Q_{L}$$
 (2)

Ref. [15] suggests that ΔQ can be obtained by estimating induction generator's electro-magnetic energy absorption and load characteristics.

Therefore,

$$\Delta Q(s) = \left\{ s \frac{v}{\omega} \sum_{\omega} \left(\frac{1}{x_m} \right) + (D_v)_{CLM} \right\} \Delta V(s)$$
Comparing Eq. (2) and (3),

$$\sum \Delta Q_{SG} + \Delta Q_{FC} + \Delta Q_{ST} - \sum \Delta Q_{IG} - \Delta Q_L = \left\{ s \frac{v}{\omega} \sum \left(\frac{1}{\chi_m} \right) + (D_v)_{CLM} \right\} \Delta V(s)$$
(4)

Eq. (4) is a general transfer function showing reactive power balance in IHES for any number of generating units. Following two test systems of same capacities are considered in this paper;

- (i) 5.0 MW test system using single unit of 3.0 MW IG and single unit of 2.0 MW SG,
- (ii) 5.0 MW test system using two units of 1.5 MW IGs and two units of 1.0 MW SGs.

To simulate accurate load model, composite load model (CLM) is used in place of static load model (SLM) and this CLM has characteristics of both static load and dynamic load [24]. In ref. [25, 26] author has illustrated a complete procedure for developing $(D_{\nu})_{CLM}$ as required in Eq. (4). The main technical issue in this IHES model study is the voltage control using adequate reactive power compensation. The role of dynamic compensator is to adjust the reactive power generation depending upon its firing angle and reference system voltage. Reactive power injection by the STATCOM as in ref. [27]

$$Q_{STATCOM} = (kV_{dc})^2 B - kV_{dc} VBCos\alpha$$
 (5)

k is a ST constant which depends on 12 pulse converter with unity modulation index of STATCOM. Eq. (5) shows that reactive power depends on two controlled variables α and V. On solving, the transfer function for ST can be expressed as [28],

$$\Delta Q_{STATCOM}(s) = kV_{dc}VBSin\alpha\Delta\alpha(s) - kV_{dc}BCos\alpha\Delta V(s)$$
 (6)

Eq. (6) is a reactive power change of ST which can be adjusted with either voltage or firing angle. So, for maintaining the terminal voltage firing angle can be tuned with reactive power and a systematic block diagram for the same is brought from ref. [29]. As in ref. [29], the three sub blocks for this STATCOM simulink model are phase sequence delay, thyristor firing delay and PI controller. Conventional PI controller has two gain constants K_P and K_I . K_P and K_I can be evaluated using either method conventional and advanced methods. In conventional method, K_P and K_I are tuned by using ISE criterion as elaborated in ref. [23]. The limitations of conventional method can be taken care by tuning the gain constants of PI controller using genetic algorithms (GA) as suggested by the author in ref. [15] and same is used here.

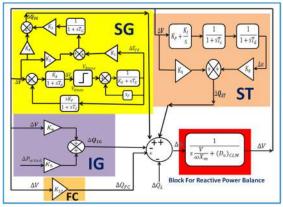


Fig.2 Simulink model for single units IHES

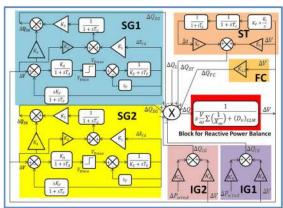
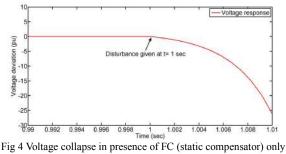


Fig.3 Simulink model for multi units IHES

A 10% step disturbance is produced to study the load reactive power demand and wind input real power disturbances. The system is much affected by the uncertainties produced by the load reactive power demand and wind input real power at the time of its operation. To analyse the effect of uncertainties, a 1% probabilistic pattern is also introduced with these step disturbances. As, reactive power balance equation represented in Eq. (4) requires reactive power voltage relations for all the system components. Linear models for incremental change in reactive power of SG, IG, ST and FC are brought from available previous papers [4-9]. The simulink model for test system of single units IHES and multi units IHES are shown in Fig. 2 and in Fig. 3 respectively.

IV. COST ANALYSES FOR HYBRID COMPENSATING METHOD

For attending disturbances, ST alone can give better technical solution for system voltage control but at a high cost. The cost of FC is very low compare to ST but FC alone cannot be used for satisfying reactive power requirements. Fig. 4 represents how the voltage will collapse if the operator is planning to satisfy demand of reactive power through FC only.



This clearly depicts that use of ST (dynamic compensator) is necessary to mitigate the voltage control problem while the hybrid FC and ST participation can provide an economic solution of reactive power compensation. Therefore, FC and ST together suggest a solution for compensation with low cost but this technique forced to on compromise with voltage response. And selection between FC and ST can be done in such a way so that voltage should remain within the permissible level. The two important parameters of this

(i) Compensation cost reduction through FC along with ST, and

optimization problem are:

(ii) Threshold value of reactive power from FC to keep voltage in pre-defined acceptable level.

Mathematically, total reactive power generated in MVAR

$$Q_{com} = \{Q_{FC}^{ss} + Q_{ST}^{ss}\} + Q_{ST}^{ts}$$
 (7)

Compensation cost functions for FC and ST are brought from ref. [19]. The assumptions and considerations are same as in the referred paper [30, 31, 32].

$$C1(Q_{FC}) = 0.132 * Q_{FC} in \$/Hr$$
 (8)

$$C2(Q_{ST}) = \frac{1000*Q_{ST}}{8760*15} (0.0002466Q_{ST}^2 - 0.2243Q_{ST} + 150.527) in \$/Hr$$
(9)

Using Eq. (7) and Eq. (8), total compensation cost can be evaluated using Eq. (6).

$$C(Q_{total}) = \{C1(Q_{FC}^{ss}) + C2(Q_{ST}^{ss})\} + C2(Q_{ST}^{ts})\}$$
(10)

To minimize the compensation cost as in Eq. (10), an objective function J subjected to several equality and inequality constraints are presented in Eq. (11). Dynamic condition reactive power cannot be generated with static compensator i.e. FC so Q_{ST}^{ts} is not required to include in in Eq. (11).

Objective function;

$$J = C1(Q_{FC}^{ss}) + C2(Q_{ST}^{ss})$$
 (11)

Equality constraints;

Reactive power generation should match with consumption in the system. Load and induction generator are the consuming components while synchronous generator, fixed capacitor and STATCOM are the generating components in the system.

$$Q_{SG} = Q_{SG}(mandatory)$$

$$\sum Q_{IG} = \sum Q_{IG}(full load)$$
(12)

$$Q_{demand} = Q_{release} \tag{14}$$

$$Q_{demand} = Q_{release}$$

$$Q_{demand} = \sum_{IG} Q_{IG} + Q_{L} - Q_{SG}$$

$$(15)$$

$$Q_{release} = Q_{FC}^{ss} + Q_{ST}^{ss} \tag{16}$$

Inequality constraints;

$$\begin{array}{l} 0 \leq Q_{ST}^{ss} \leq Q_{demand} \\ 0 \leq Q_{FC}^{ss} \leq Q_{demand} \end{array} \tag{17}$$

$$0 \le Q_{FC}^{ss} \le Q_{demand}$$

$$V_{min} \le \Delta V \le V_{max}$$

$$(18)$$

$$\begin{array}{ll}
\text{settling time} \leq \text{settling time}_{acceptable} & (17) \\
\text{settling time} \leq \text{settling time}_{acceptable} & (20)
\end{array}$$

A step wise procedure for solving this optimization problem is in Fig. 5.

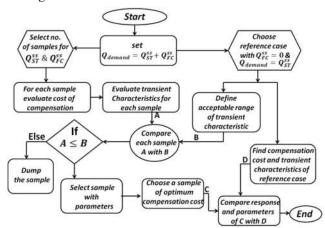


Fig. 5 Step wise procedure for solving optimizing problems

V. RESULTS AND DISCUSSIONS

Introduction of this paper depicts that the available papers do not focus of economic provisions for suitable ancillary service especially reactive power compensation cost studies for remote area based isolated and hybrid multi units electrical systems. The reactive power compensation cost studies are available in very few papers but only for single unit system as summarized in section 2 and with the help of this multi units' model has been developed as shown in Fig.

1. This paper demonstrates first time the economic benefits of using multi units system over single units system especially with hybrid reactive power compensation. Section 3 represents the methodology to develop simulink model for single and multi units IHES. Section 4 gives a complete procedure to find best optimum solution of hybrid participation between FC and ST in system. It has been observed that use of hybrid compensation i.e. FC with ST can give economically suitable solution as the ancillary service cost reduction directly depends on the compromise with power quality. In this paper, two test systems of same capacities are compared to investigate the economic effects of using multi units IHES in place of single units IHES. Both the test system ratings are given in Table 1. Load model, dynamic disturbances and tuning method for gain constants of STATCOM controller are being considered same for both test systems as discussed before in the paper with the help of reference papers.

Table 1 Test system data used in simulation					
System	5.0 <i>MW</i>				
CLM		5.0 <i>MW</i>			
	SLM	Exponential type load	2.0 MW		
	DLM	Fifth order induction motor	0.5 <i>MW</i>		
		load			
Base power		5.0 <i>MVA</i>			
Base voltage	400 V				
Type of system		Single			
Induction gen.	$1.5 MW \times 2 \qquad \qquad 3.0 MV$				
Synchronous		2.0 MW			

For both the test systems, the optimization problem is solved with the help of MATLAB codes and simulink library together. The total simulation time observed is set equal to 1.1 sec through which simulations starts at t = 0 sec, disturbances are produced at 1.0 sec and responses are observed till 1.1 sec.

Two test systems as in Table 1 are studied as two cases;

- Case I (Dynamic compensation): ST alone is used for reactive power compensation in the system.
- Case II (Hybrid compensation): Participation of both FC and ST is used for reactive power compensation in the system.

Case I is taken as reference case. Voltage response from this case is used to define the reference values for case II. Allowable limit of settling time, voltage dip and voltage rise for case II may be assumed with respect to case I as;

- The voltage after disturbance must be conversed. Mathematically, steady state error for voltage deviation must he zero
- Absolute value of voltage rise and dip should not be exceeding more than 0.05 pu of case I voltage rise and dip values.
- Settling time should not be beyond 0.01 sec of settling time of case I voltage response.

In case II, total reactive power demand is divided among FC and ST. Satisfying the Eq. (16), 1000 samples are taken for step changes in the value of FC and ST reactive power. For these 1000 samples, voltage response is generated with the interfacing of MATLAB program and simulink models. Only the samples, satisfying the pre-defined acceptable voltage

responses are sorted. Reactive power compensation cost for each sorted sample is evaluated and a sample with least compensation cost is selected finally. This sample gives optimum value of compensation and cost.

Table 2	Com	narative	study	for	5 () M	V sin	gle a	and	multi	units	IHES

Tuble 2 Comparative State	ij tor c.o mrn bingie	and main anno milo
	Single units IHES	Multi units IHES
Q _{ST} (pu)	0.1068	0.1024
Q _{ST} (pu)	0.2070	0.2051
Qss (pu)	0.1647	0.1690
Q _{total} (pu)	0.4785	0.4765
$C_{FC}(Q_{FC}^{ss})$ (\$ per hour)	0.1087	0.1116
$C_{ST}(Q_{ST}^{ss})$ (\$ per hour)	0.6117	0.5867
$C_{ST}(Q_{ST}^{ts})$ (\$ per hour)	1.1853	1.1738
C(Q _{total}) (\$ per hour)	1.9057	1.8721

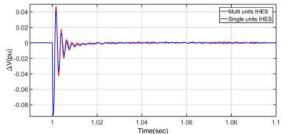


Fig. 6 Voltage pattern in 5.0 MW test systems with hybrid compensation

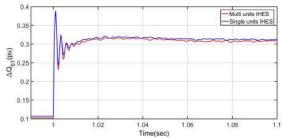


Fig. 7 ST reactive power pattern for 5.0 MW test systems with hybrid compensation

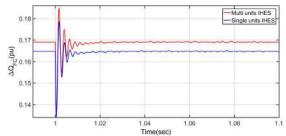


Fig. 8 FC reactive power pattern for 5.0 MW test systems with hybrid

To identify the economic effects of hybrid reactive power compensation over multi units system, the results are obtained for same rating single and multi units based system as in Table 1. The results showed in Table 2 gives cost comparison for the same. Following are the observations from the Table 2;

- In multi units IHES, reactive power demands from STATCOM for both steady state and dynamic state are decreasing.
- In multi units IHES, reactive power demands from fixed capacitor for steady state is decreasing.
- In multi units IHES, overall reactive power demand is decreasing.

Since reactive power demand is decreasing, cost of compensation will decrease from the use of multi units IHES as depicted in Table.

since the reactive power compensation cost through fixed capacitor is comparatively low, the results become more favorable because more reactive power is generated by fixed capacitor in multi unit IHES.

Therefore, it can be concluded that overall reactive power compensation cost in multi units IHES is decreasing more comparing to single units IHES when hybrid participation, proposed in this paper, is applied. The acceptability of this proposed method is again verified on the basis of voltage variation given in Fig. 6, reactive power variations for FC and ST in Fig. 7 and Fig. 8 respectively.

VI. CONCLUSIONS

In this paper, economic aspects for reactive power compensation cost as an ancillary service are studied for multi units IHES. It has been found that compensation cost can be reduced more in multi units IHES with hybrid reactive power compensation approach without compromising much with voltage response. A comparative study between single units and multi units IHES is carried out for same load and disturbance conditions. It has been observed that multi units system requires less reactive power for system voltage control through hybrid compensation technique. If compensation is provided by using STATCOM only, the system compensation cost will be much higher in multi unit system too. But, use of hybrid participations of fixed capacitor and STATCOM together reduces compensation cost. Technical and operational benefits of multi units system over single units IHES are demonstrated in many papers. However, this study suggests the economic benefits for the use of multi units IHES over single units IHES if hybrid compensation approach will be used as proposed in this paper. This approach may be useful for private investors to reduce the cost of reactive power compensation as ancillary service so that consumers can be benefited more without more burdens on suppliers. The same work can further be carried out with grid connected hybrid electrical system for estimating and analyzing the cost of hybrid compensation.

Appendix A

Induction Generator: IG power factor = 0.9 lagging slip = -4%, efficiency = 90%, voltage = 400 V, **Synchronous Generator:**

SG power factor = 0.9 lagging, voltage = 400 VFixed capacitor: voltage = 400 V, frequency = 50 Hz**STATCOM:** voltage = 400, Switching freq. = 10 kHz

Appendix B

Constants used in simulink model

$$K_{1} = \frac{X'_{d}}{X_{d}}; K_{2} = (X_{d} - X'_{d}) \frac{\cos \delta}{X_{d}}; K_{3} = \frac{V \cdot \cos \delta}{X'_{d}}; K_{4} = \frac{E'_{d} \cdot \cos \delta - 2V}{X'_{d}}; K_{5} = \frac{X_{eq}}{R_{P} - \{((R_{P} - R_{eq})^{2} + X_{eq}^{2})/2(R_{P} - R_{eq})\}}$$

$$K_{6} = \frac{2V}{(R_{P} - R_{eq})^{2} + X_{eq}^{2}} \left[X_{eq} - \frac{R_{P} X_{eq}}{R_{P} - \{((R_{P} - R_{eq})^{2} + X_{eq}^{2})/2(R_{P} - R_{eq})\}} \right]$$

$$K_{7} = \frac{2V}{X_{C}}; K_{8} = kV_{dc}VBSin\alpha; K_{9} = -kV_{dc}BCos\alpha$$

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Performance Evaluation of a 4 kW Isolated Solar Powered Lab with IoT Energy Management System

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Abstract— A stand-alone solar powered system is an economic & effective alternative to provide electric power at places in remote and difficult terrains. These setups consist of an array of solar panels, dc-dc charge controllers, dc-ac inverters & an energy storing element. This work presents performance evaluation of an isolated photovoltaic (PV) power plant roof-top installation located at Electrical Department block, Krishna Institute of Engineering & Technology, Muradnagar, U.P., India. The aim of this work is to promote the utilization of mini isolated solar power plants to provide electricity to schools & households in rural locations & places with difficult terrains. The scope of this paper is to acquire data from the installed setup & evaluate performance of the system. In this work, we establish an economic energy logging system for data logging & monitoring. This energy management system uses a Wi-Fi module for Internet of Things (IoT), which provides easy access to the data anywhere around the world. After its successful installation, the performance of the stand-alone PV system is evaluated. The experimental data was recorded from 1st August to 30th October, 2018 through the IoT system. The assessed parameters of the PV installation include performance ratio, Capacity utilization factor, inverter efficiency and system losses.

Keywords- Renewable Energy; Solar energy; Internet of Things; Performance Evaluation; EMS.

I. INTRODUCTION

Electrical power plays an important role in this modern civilization. In order to have proper and sustainable development of a nation, it depends on the availability of energy for industries and human civilization. Along these lines, it can be seen that energy is a fundamental component for the financial improvement of a nation. It is a significant part of our life and it is impossible to imagine our daily routines without electricity. "Yet, over 1 billion people in the world do not have access to electricity. Of this, over 95% live in developing countries and over 84% reside in rural areas" [1]. Meanwhile, the world has

the problem of emptying reserves & sky-rocketing cost of fossil fuels. "Additionally, there is special focus on the major problem of Global Warming and pollution. These issues prompt us to reduce our dependence on fossil fuels as the primary source of energy" [1]. Hence, it is high time that the world focus on other sources of energy, and develop and promote renewable sources like solar, wind, geothermal, and others.

Amongst the current renewable energy options, solar power presents the highest potential. "The approximate emission power from the sun is 1.8 x 1011 MW" [1, 2]. Because the nation of India is situated in the sunny belt, it gets 300 days of sunlight. As per NIWE estimates, "India has a solar energy potential of 750 GW" [3]. Under normal conditions, India gets 4-7kWh solar radiation per m² [4]. Under the National Solar Mission, "India plans to build large grid connected solar power plants, with a cumulative installed capacity of 20,000 MW by 2020" [5].

Photovoltaic (PV) modules or panels are made from semiconductor materials which have the ability to directly convert sunlight into electricity. Such modules offer us a secure, reliable, low-maintenance and environmentally sustainable source of electricity for a very long time. In order to properly implement a solar PV powered system, prior data, knowledge & understanding of their operation and running performance under varying climatic condition is required [6].

In this work, performance analysis of a 4000W SPV system which was setup on the roof-top of Electrical Department block, Krishna Institute of Engineering & Technology, Muradnagar, U.P., India. on July, 2018 is presented. The setup supplies power to a laboratory in Electrical Department. "The performance of this Photovoltaics (PV) system is assessed on daily basis. Data logging & monitoring is done by Wi-Fi based IoT system that can be accessed from anywhere. In this paper, the development and performance of this PV system is presented for three months from August to October 2018" [1].

The aim of this work is to encourage the utilization of isolated SPV systems in in rural locations & places with difficult terrains. This project has a wide scope for the long-term benefits as well. Once a large data-set is logged, this information can be utilized by creating smart methods to analyze and predict

upcoming outputs based on "Fuzzy logic and Adaptive neurofuzzy inference system (ANFIS)" [7-10].

INSTALLATION OF THE SPV PLANT

The primary components of a SPV plant can be mainly described as:

- An array of Solar Panels 1.
- 2. Charge Controller
- Battery Bank
- 4. Inverter

Additionally, in to perform various analysis on the SPV, there is a need for a data acquisition system that can not only measure the data accurately but also store it for further utilization. This prompted us to develop our own energy management system for accurate measurement and logging of various current & voltage parameters. Flow Chart for the Energy management system (EMS) is shown in Figure 2. This energy management system is based on IoT and uploads the data on cloud. Hence, the data can be accessed anywhere. This furthers the application of the project as it can be utilized in remote locations.

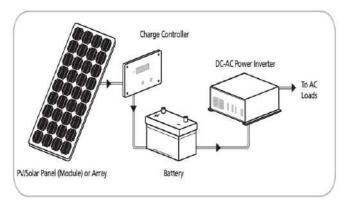


Figure 1. An isolated solar PV system

III. PARAMETERS FOR PERFORMANCE ANALYSIS

The system performance indices are defined by International Standard IEC-61724 for analyzing the "performance of solar PV grid-connected, stand-alone and hybrid systems" [13]. Numerous performance parameters are utilized in order to define the performance of a PV system with respect to the "net energy production, generation by the solar array and net effect of system losses" [14-18]. The performance parameters used in this study are the Performance Ratio (P.R.), efficiency, array & final yield and losses.

1. Array Yield (Y_a)

Array Yield, as defined in (1), provides to the total hours for which the photovoltaic powered system needs to be in operation

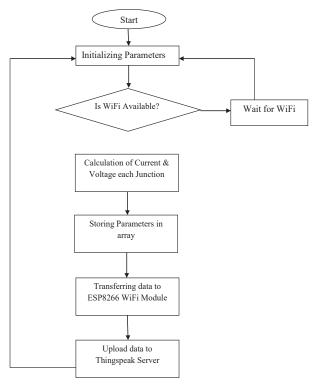


Figure 2. Flow Chart for the Energy management system

Our work in the design & installation of the entire system has been explained in much more detail in "Smart Solar Energy Management to Power Computer Lab in Rural Areas", "3rd International Innovative Applications of Computational Intelligence on Power, Energy and Controls with their Impact on Humanity (CIPECH), 2018" [1].

at rated solar array power PPV to produce array's DC energy Ea as defined in (2) [14, 18]. Its unit is kWh/kWp/d.

$$Y_a = \frac{E_{DC}}{P_{PV}, rated} \tag{1}$$

PV Panel's energy output per day Ea:

$$E_a = I_{DC} * V_{DC} * t \text{ (kWh)}$$

$$I_{DC} = DC \text{ current (Amp)}$$
(2)

 V_{DC} = DC voltage (Volts)

 P_{PV} = Rated Power at ideal test conditions (1 kW/m² and 25°C).

2. Reference Yield (Y_r)

The reference yield, as defined in (3), is "the total in-plane irradiance H_t divided by the PV's reference irradiance G" [16]. It serves as a measure of the net attainable energy. "If G equals 1 kW/m², then Y_r is the number of peak sun hours or the solar radiation in units of kW h/m². The Y_r defines the solar radiation resource for the PV system" [16]. It depends on various factors, mainly depending upon the geographical location, altitude & Solar Panel's placement and annual weather conditions. Its unit is h/d. [13, 18]. Its unit is h/d.

$$Y_r = \frac{H_t \left(kWh/m^2 \right)}{G_0} \tag{3}$$

where

 H_t = Net Horizontal irradiance on PV panels (kWh/m²), G_0 = Global irradiance for standard test conditions (1 kW/m²).

3. Final Yield (Y_F)

Final yield, as defined in (4), is the "net AC energy output of the system divided by the nameplate or peak power of the installed PV array at STC (1 kW/m² solar irradiance and 25°C)" [18]. It is calculated on a daily, monthly or annual basis. It implies the number of hours per day the PV system must run at its rated capacity in order to produce the same amount of energy as was recorded [13, 17]. Its units are kWh/kW_P/d. It is given as

$$Y_{F,d} = \frac{E_{AC}}{P_{PV,rated}} \tag{4}$$

4. Performance ratio (P.R.)

The P.R., as defined in (5), is the "ratio of Final Yield (Y_F) and the Reference Yield (Y_R) " [15]. Performance ratio can be described as a measure of plant output compared to the output that the plant could have achieved by considering the solar irradiance, PV panel temperature, sun-hours, rated power output, temperature correction values [16]. The performance ratio is considered as a quality factor. The P.R. value is usually expected to vary between 0.6 to 0.8 [14].

$$P.R. = \frac{Y_F}{Y_R} \tag{5}$$

5. Inverter Efficiency

The inverter efficiency, as defined in (6), is the ratio of AC power generated by the inverter to the DC power generated by the PV array system and provides a measure of how effectively the inverter converts DC power into AC power. [16, 17].

$$\eta_{Inv} = \frac{P_{AC}}{P_{DC}} \tag{6}$$

6. Capacity utilization factor (CUF)

C.U.F., as defined in (7), is the ratio between the real energy generation of the SPV to the theoretically max energy generation from the SPV [16].

$$C.U.F. = \text{Actual Energy generated (kWh)} / (\text{days}*24*\text{total capacity of the SPV})$$
 (7)

7. Inverter Efficiency

The inverter efficiency, as defined in (8), is the ratio of AC power generated by the inverter to the DC power generated by the PV array system and provides a measure of how effectively the inverter converts DC power into AC power. [16, 17].

$$\eta_{Inv} = \frac{P_{AC}}{P_{DC}} \tag{8}$$

8. System losses (L_s)

The "system losses are mainly present due to losses in converting the DC Power output from PV to AC power by the inverter" [19] and losses in dc cables (drop in voltage).

$$L_{\rm S} = Y_{\rm A} - Y_{\rm F} \tag{9}$$

IV. PERFORMANCE EVALUATION

The results of the calculations of the parameters defined previously are shown in Table I. The highest value of P.R. is seen to be 67.3% in the stretch of October and the minimum estimation of P.R. was 60.9% in the duration of August. Capacity factor (CUF) for the SPV setup fluctuated from 12.71% to 14.01% in the duration of the observed three-month activity. The fluctuations observed in the C.U.F. for the most part emerge from the varying irradiance and atmosphere conditions and from misfortunes because of changing temperature. It is generally observed that higher the C.U.F., lesser will be the cost of energy. The highest inverter efficiency is 89.61% in the month of September with 61.9% performance ratio.

TABLE I. PERFORMANCE EVALUATION FOR THREE MONTHS

	Performance Evaluation					
S. No.	Month	P. R.	CUF	Inverter Efficiency	Losses (kWh)	
1	August	60.9%	12.95%	84.356%	17.53	
2	September	61.9%	12.71%	89.61%	10.72	
3	October	67.3%	14.01%	85.538%	17.29	

The month to month mean(average) value of solar PV plant's daily array yield, reference yield and final yield over three

months are shown in Table 5.2. The month to month mean daily array yield varied between 1.2 kWh/kWp/d to 5.4 kWh/kWp/d and final yield varied between 1.4 kWh/kWp/d to 4.3 kWh/kWp/d for the month of August.

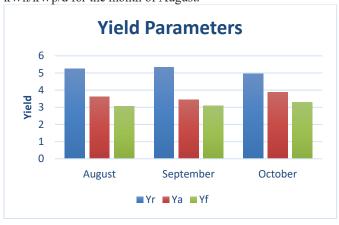


Figure 3: The variation of the monthly average daily yield

For September, mean day to day array yield fluctuated from 0.93 kWh/kWp/d and 5.4 kWh/kWp/d and final yield fluctuated from 0.90 kWh/kWp/d and 4.2 kWh/kWp/d. The mean day to day array yield fluctuated from 2.8 kWh/kWp/d and 4.9 kWh/kWp/d and final yield fluctuated from 2.7 kWh/kWp/d and 3.9 kWh/kWp/d in October. The overall variation is shown in Figure 3.

The array and final yield values observed for the duration of August and September are lower than expected on some days because of the low irradiance due to rainy season. The overcast weather also reduces the availability of sun in these months which further reduces the yield.

The results of the calculated yields for every day are shown in Figures 4, 5 & 6.

The month to month net average energy generation output per day by the PV system over the monitored period of three months is shown in Figure 7. The energy output fluctuated from 5.2kWh to 18.3kWh.

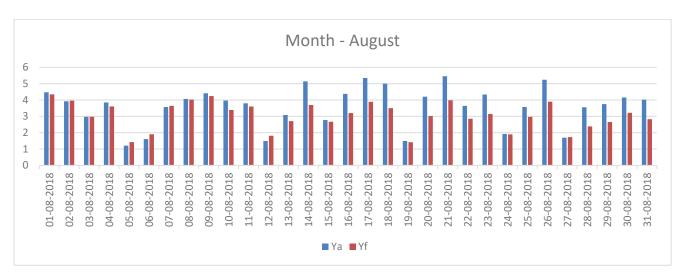
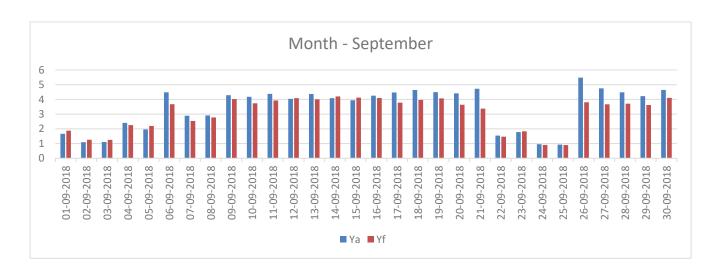


Figure 4: Array and Final Yield for August, 2018



0-10-2018 03-10-2018 04-10-2018 04-10-2018 06-10-2018 06-10-2018 09-10-2018 09-10-2018 11-10-2018 11-10-2018 12-10-2018 13-10-2018 14-10-2018 14-10-2018 14-10-2018 15-10-2018 16-10-2018 17-10-2018 18-10-2018 19-10-2018 22-10-2018 23-10-2018 24-10-2018

Figure 5: Array and Final Yield for September, 2018

Figure 6: Array and Final Yield for October, 2018

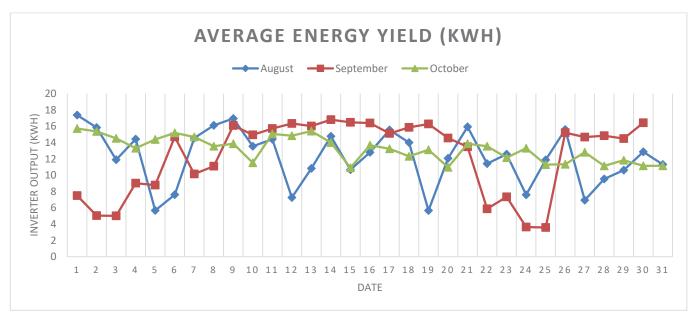


Figure 7: The variation of the Daily Average Energy output

V. CONCLUSION

The design & installation of the 4 kW SPV system has been successful. The entire project is up & running successfully and powers a Laboratory in the EN Department building. The data logging system has also operated as expected and is measuring & logging the data accurately. The performance of the setup has been evaluated for month of August, September and October 2018. As we move from summer season to winters, ambient temperature falls and as a result, performance of an SPV plant is expected to improve which can be seen from the rise in

Performance ratio (P.R.) value. Hence, the results of the performance evaluation are satisfactory.

Also, the data-set logged via IoT system is saved in the cloud, and offers various options to assess long-term running advantages & depreciation of the setup based on numerous energy parameters. Meanwhile, when a large data-set is logged, this information can be utilized by training an Artificial Neural Network (ANN) to forecast the energy output of an upcoming day.

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A Nature-Inspired Metaheuristic Swarm Based Optimization Technique BFOA Based Optimal Controller for Damping of SSR



AQ1

AQ2

AQ3

AQ4

Rajeev Kumar, Rajveer Singh and Haroon Ashfaq

- Abstract In the proposed paper, an innovative method for damping of subsynchronous resonance in a series capacitor compensated line has been investigated. A nature-inspired metaheuristic swarm based optimization technique BFOA
 is applied over the optimal control theory for damping and mitigation of subsynchronous oscillations, with a FACT controller (SVS) connected at the midpoint
 of a series capacitor compensated network. The analysis has been carried out using
 IEEE first benchmark model and the entire test system has been simulated using
 MATLAB software, the simulation results include the eigenvalue analysis which
 explicitly shows that the application of BFOA on the optimal control theory, the
 problem of SSR is effectively minimized. Further the time domain analysis for the
 response curve of rotor angle (Mech-Delta 5) also shows the effectiveness of the
 proposed BFOA based optimal controller. All the time domain parameters viz., rise
 time, settling time, overshoot, and peak time is improved by the application of optimal controller which is further improved by the application of BFOA over optimal
- Keywords BFOA · Eigen value · Optimal control theory · Static var system · Sub-synchronous resonance · Torsional oscillations · Time domain analysis

1 Introduction

controller.

15

The use of series capacitors in transmission line definitely helps in the improvement of power transfer capability as well as transient and steady state stability limits of power systems and it is also economical compared to the addition of new lines. However, the Series compensated lines having capacitance C have a tendency to produce series resonance at frequencies below the fundamental power frequency. This is called sub-synchronous resonance [1–4]. SSR problem results due to the interaction

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Capacitance Requirement for Rated Current and Rated Voltage Operation of SEIG Using Whale Optimization Algorithm

International Conference on Computational Intelligence and Data Science (ICCIDS 2019)

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Abstract

In today's world non-conventional energy resources are being considered as powerful resources in the field of power generation. To optimize the resources required to generate the power is always be a challenging task. Many metaheuristic algorithms have been applied for solving the complex optimization problems. Resource optimization is also a n-p hard problem. Whale optimization (WO) is newly developed meta-heuristic performed efficiently for solving complex engineering problems. In this paper WO is used as an optimization algorithm in order to optimize the value of excitation capacitance for rated voltage and rated current operation of self-excited induction generator. The simulation has been carried out on a 5.5 kw rating induction generator and the same has been used for the experimental validation. The results as obtained shows that WO outperformed as compared to other meta-heuristic

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Peer-review under responsibility of the scientific committee of the International Conference on Computational Intelligence and Data Science (ICCIDS 2019).

Keywords: Self-excited induction generator (SEIG), Whale optimization algorithm (WO), Genetic algorithm (GA), Wind energy, balanced operation. Introduction

1. Introduction:

In order to analyze the steady state performance of self-excited induction generators, per-phase equivalent circuit of self-excited induction generator has been adopted which is analyzed using the loop impedance method whereas another approach based on nodal admittance may also be used for the performance analysis of SEIG [1]. The roll

and requirement of excitation capacitance in isolated mode of SEIG was discussed for its successful operation [2] Bansal et. al. presented a study on the limits on the performance of three-phase SEIG[3]. In order to reduce the computational efforts, proposed an iterative technique which makes the analysis of such machines quite easy[4]. Instead of conventional circuit of SEIG, a new model was proposed for the performance analysis of self-excited induction generator which when analyzed results in to a second order quadratic expression in slip with other parameters related to machine[5]. The second order quadratic expression as presented was easy to compute the generated frequency and magnetizing reactance.

A new iterative model to analyze the steady state operation of SEIG under different operating conditions was proposed by Sandhu, which contain a power source on the rotor side giving the basic concept of generator [6]. A critical analysis was presented [8] for SEIG and also proposed input/output impedance method to compute steady state reactive power needed to self-excited induction generators.

The research work for performance analysis of SEIG leads to lengthy and highly non-linear mathematical expressions which are quite difficult to solve[7]. Currently soft computing techniques are being adopted by the researchers to solve these non-linear equations. In the area of soft computing, genetic algorithm was considered for the solution of the non-linear equations as formed in the process of performance investigation of SEIG [8],[9]. An approach based on DIRECT algorithm was used [10] to minimize the admittance of induction generator which includes the real as well as the imaginary parts.

Further, various optimization techniques were adopted in balanced operation of SEIG and on behalf of their comparison it was suggested that genetic algorithm and particle swarm optimization leads to accurate analysis [11], [12]. For the first time, genetic algorithm as an optimization technique was implemented [13],[14]in unbalanced operations of self-excited induction generator where large numbers of variables have been targeted using GA.

Main contribution of the Paper:

 An attempt has been made to obtain the capacitance required across stator terminals of the induction machine for its rated current and rated voltage operation using whale optimization algorithm.

The organization of paper is as follows. In Section 2, machine is modeled and then by application of nodal admittance method, objective function has been made which consists of generated frequency, magnetizing reactance and excitation capacitance as the unknown variables. In Section 3, a brief overview of whale optimization algorithm is discussed. Performance equations associated with SEIG are presented in Section 4. In Section 5, simulated results have been obtained using whale optimization algorithm with experiments conducted to evaluate the performance of SEIG. Finally, the conclusion and future work has been discussed in Section 6.

2. Modeling of machine

In order to analyze the steady state performance of induction machine, we need to have an appropriate electrical equivalent circuit to that machine. Per phase electrical equivalent representation of an three phase induction machine is represented in Fig.1.Proposed work: Hybrid Artificial Chemical Reaction Optimization Algorithm for Clustering Problems.

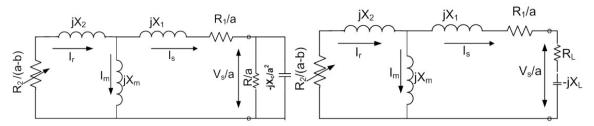


Fig. 1. Equivalent circuit of single-phase induction generator.

Fig. 2. Equivalent circuit of fig.1

From the equivalent of load resistance R& excitation capacitance X_c , R_L and X_L may be written as:

$$R_L = \frac{(R/a)}{1 + \left(\frac{aR}{X_C}\right)^2} \tag{1}$$

$$X_L = \frac{X_C}{a^2 + \left(\frac{X_C}{R}\right)^2} \tag{2}$$

Application of nodal admittance in Fig. 1will results into the following equation:

$$\frac{\frac{R_2}{(a-b)}^{-j}X^2}{\left(\frac{R_2}{a-b}\right)^2 + X_2^2} + \frac{J}{X_m} - \left[\frac{\left(\frac{R_1}{a} + R_L\right)^{-j}(X_1 - X_L)}{\left(\frac{R_1}{a} + R_L\right)^2 + (X_1 - X_L)^2}\right] = 0$$
(3)

In terms of objective function, equation (3) may be written as:

$$f_1 \left\{ \frac{\frac{R_2}{(a-b)} - jX2}{\left(\frac{R_2}{a-b}\right)^2 + X_2^2} + \frac{J}{X_m} - \left[\frac{\left(\frac{R_1}{a} + R_L\right) - J(X_1 - X_L)}{\left(\frac{R_1}{a} + R_L\right)^2 + (X_1 - X_L)^2} \right] \right\} = 0$$
(4)

Stator current in the machine may be written as:

$$I_S = \frac{E}{\sqrt{\left(\frac{R_1}{a} + R_L\right)^2 + (X_1 - X_L)^2}}$$
 (5)

For rated current operation, the stator current in the machine would be 1.0 p.u, hence stator current may be written as:

$$I_{S} = \frac{E}{\sqrt{\left(\frac{R_{1}}{a} + R_{L}\right)^{2} + (X_{1} - X_{L})^{2}}} = 1 \tag{6}$$

In terms of objective function, equation (6) may be written as:

$$f_2\left\{E - \left(\frac{R_1}{a} + R_L\right) - J(X_1 - X_L)\right\} = 0\tag{7}$$

Now from the equivalent circuit, Voltage across the stator terminals may be written as:

$$V_{\rm s} = aI_{\rm s}\sqrt{(R_L)^2 + (X_L)^2} \tag{8}$$

For rated voltage operation, the voltage across stator terminals in the machine would be 1.0 p.u, hence stator voltage may be written as:

$$V_{\rm s} = aI_{\rm s}\sqrt{(R_L)^2 + (X_L)^2} = 1 \tag{9}$$

In terms of objective function, equation (9) may be written as:

$$f_3 \left\{ aE(R_L - JX_L) - \left(\frac{R_1}{a} + R_L\right) - J(X_1 - X_L) \right\} = 0$$
 (10)

Here, a and b are the generated frequency and speed of the machine in per unit where as R_1 , R_2 , X_1 , X_2 are machine parameters. Solution of equations (4), (7) and (10) for variables generated frequency, magnetizing reactance and excitation capacitance for any induction machine operating at particular speed may be obtain using whale optimization by simultaneously minimizing the objective functions defined as:

$$Min|f_1(a, X_m, X_c)| = Min\sqrt{\{Re(f_1)\}^2 + \{Im(f_1)\}^2}$$
(11)

$$Min|f_2(a, X_m, X_c)| = Min\sqrt{\{Re(f_2)\}^2 + \{Im(f_2)\}^2}$$
(12)

$$Min|f_3(a, X_m, X_c)| = Min\sqrt{\{Re(f_3)\}^2 + \{Im(f_3)\}^2}$$
(13)

3. Overview of the optimization Techniques

3.1 Whale Optimization (WO)

WO was proposed by Mirjalili and Lewis in 2016[16]. WO is a population-based algorithm that exploit hunting method of humpback whales known as bubble net feeding technique. Whales create a spiral shaped bubble path. Exploitation of the search space is performed using bubble net method which constitute of two mechanism: shrinking encircling mechanism and spiral updating position. Whales move around prey in a spiral shaped thereby shrinking circular path simultaneously for perfect attack. In WO, a probability of 50% is assigned to both paths for every position update. WO consists of minimum number of heuristics and internal parameter and is computationally a simple algorithm.

Position Update:

$$X(t+1) = \begin{cases} X^*(t) - A.D & \text{if } p < 0.5\\ D'. e^{bl}. \cos(2\pi l) + X^*(t) & \text{if } p \ge 0.5 \end{cases}$$
where: D = |C. X*(t) - X(t)|; A = 2a.r - a; C = 2r

SEIG Using Whale Optimization Algorithm

Step 1: Generate initial population for the variables of SEIG

Step 2: Initialize WO parameters: a, A, C, l and p

Step 3: $a = 2 - t * \frac{2}{max_iter}$ where t is iteration number

A = 2 * a * r - a where r is random number between [0,1]

$$C = 2 * r$$

and 1 is random number between [-1,1]; p is probability

Step 4: Calculate fitness values using equations (11-13).

Step 5: if p < 0.5

- if (
$$|A| < 1$$
)
$$D = |C.X^*(t) - X(t)|$$

$$X(t+1) = X^*(t) - A.D$$

$$X^* \text{ is the best solution so far and } X \text{ is the position vector}$$
 -else if ($|A| < 1$) select a random agent Xrand
$$D = |C.X_{rand}(t) - X(t)|$$

$$X(t+1) = X_{rand}(t) - A.D$$
 -end if

else if $p \ge 0.5$

 $\begin{aligned} D' &= |X^*(t) - X(t)| \\ X(t+1) &= D^{'}.e^b.cos(2\pi l) + X^*(t)ifp \geq 0.5 \end{aligned}$

Step 7: end if

Step 6:

Step 8: Get optimized of value of variables of SEIG

Step 9: End

4. Performance Equation

After getting solution of generated frequency, magnetizing reactance and excitation capacitance, the performance of any machine may be obtained by the following performance equations:

Rotor Current of machine:

$$I_{\rm r} = \sqrt{\left(\frac{E}{X_m}\right)^2 + (I_s)^2} \tag{15}$$

Load current of machine:

$$I_L = \frac{V_S}{R} \tag{16}$$

Power output of machine:

$$P_{out} = 3I_L^2 R (17)$$

Power losses in machine:

$$P_{loss} = 3(I_s^2 R_s + I_r^2 R_r) ag{18}$$

Efficiency of machine:

$$\%\eta = \frac{P_{out}}{P_{out} + P_{loss}} * 100 \tag{19}$$

5. Results and Discussions

Simulation using whale optimization has been carried out on a 5.5kw, 415V, 11A, 50 Hz delta connected squirrel cage induction machine whose Per phase parameters are $R_1 = 0.05248$ p.u, $R_2 = 0.05417$ p.u, $X_1 = X_2 = 0.0899$ p.u while the saturation curve of machine in p.u is:

$$\mathbf{E} = \mathbf{0.221} + \mathbf{1.254X_m} - \mathbf{0.437X_m^2} \tag{20}$$

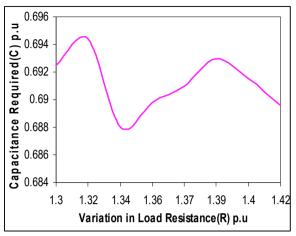
Performance of machine has been evaluated in terms of generated frequency, magnetizing reactance, excitation capacitance, rated machine voltage, rated machine current, power output and efficiency of machine with the variation in the load resistance while speed of the machine has been marked constant at 1.02p.u throughout the operation.

5.1 Performance Under Variation in Load Resistance

Table: 1 (Experimental verification of machine voltage & machine current using whale optimization)

Load Resistance R (p.u)	Machine Current (p.u) (I- WO)	Machine Current (p.u) (I-exp)	Machine Voltage (p.u) (V-WO)	Machine Voltage (p.u) (V-Exp)
1.3	1.0	1.0005	0.99	0.991
1.32	1.005	1.006	0.992	0.994
1.34	0.998	1.0	0.99	0.993
1.36	0.999	1.0	0.998	1.0
1.37	0.999	1.0	1.0	1.0
1.39	1.0	1.0005	1.0	1.0005
1.40	0.997	0.998	1.0	1.0006

Table 1 shows the Experimental verification of machine voltage & machine current using whale optimization. Further The variation in generated frequency, magnetizing reactance, excitation capacitance, rated machine voltage, rated machine current, power output and efficiency of the machine under the variation in the balanced load resistance is shown in the Fig. 3 to Fig. 10.



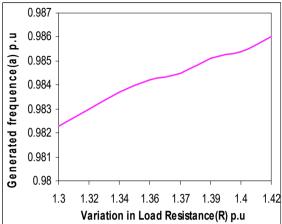
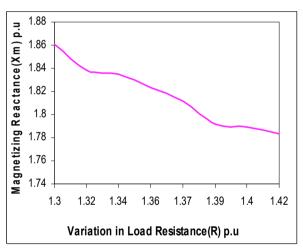


Fig. 3. Variation in capacitance required with load resistance.

Fig. 4. Variation in generated frequency with load resistance



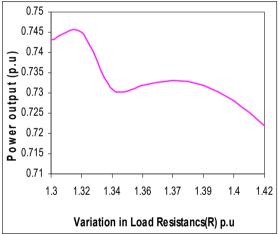
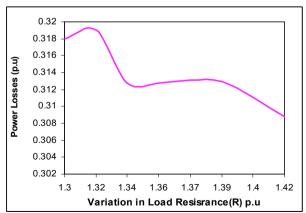
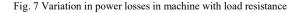


Fig. 5 Variation in magnetizing reactance with load resistance.

Fig. 6 Variation in power output required with load resistance





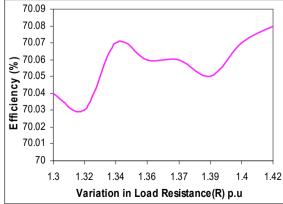
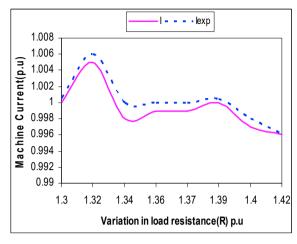


Fig. 8 Variation in efficiency of machine with load resistance



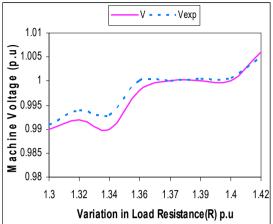


Fig. 9 Variation in machine Current with load resistance

Fig. 10 Variation in machine voltage with load resistance

The observations as made from the simulated results show that increase in the load resistance will result into increase in the generated frequency, but the magnetizing reactance of the machine reduces with this change in load resistance. This change in the magnetizing reactance is responsible for set up voltage across the magnetizing branch. However the need of excitation requirement for rated voltage and rated current operation of SEIG changes in accordance to change in the load resistance. Further power output of the machine seems to reduce as we increase the load resistance. With same variation in load resistance, it is observed that for rated voltage and rated current operation of SEIG the load resistances at which capacitance requirement is maximum & minimum, the efficiency of same machine at these load points is minimum & maximum accordingly.

6. Conclusion and Future Scope

In this paper, the per phase equivalent circuit of self-excited induction generator has been modeled mathematically which results in to an objective function related to rated current and rated voltage under balanced load. The objective functions consists three variables generated frequency, magnetizing reactance and excitation capacitance which have been solved using whale optimization algorithm in order to find capacitance required for rated voltage and rated current operation of SEIG under different loaded conditions. The results as obtained using whale optimization have been verified experimentally on a 5.5 kw induction machine (table -1) which proves the effectiveness of optimization technique for balanced load operation of SEIG. In future, the study may be carried out under unbalanced load operation of self-excited induction generator whale optimization algorithm.

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Abstract:

In current scenario wind energy is counted as important factor for power generation in order to minimize the gap between generation of power and load demand across the world. Due to several features, Self-excited induction generators (SEIG) are being actively used for power generation through wind. This paper is targeted on the steady state operation SEIG under balanced operation feeding a resistive load. Three optimization techniques namely APSO, PSO and GA have been considered for the performance investigation of SEIG. The results obtained from APSO, PSO and GA are compared with experimental results on a 5.5 KW rating induction machine. Comparison among optimization techniques APSO, PSO & GA has been made which shows the

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effectiveness of optimization techniques as presented for finding of known variables associated with the induction generator.

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E Contents

I. Introduction

In present scenario energy is the main requirement for the growth and progress of any society. The conventional energy sources like coal, gas etc. used for power generation are pollutant and hazardous which are destroying the nature and our society as well. Continuous reduction in the conventional energy sources used for power generation and its harmful effect on environment are encouraging the researchers to work in the direction of non-cosignitiota continuously solar, geothermal, tidal, biogas etc. Energy generation via renewable energy resources is growing continuously and among them share of energy generation through wind is dominating the others. Currently, wind energy is being used by around one hundred countries in the world on a commercial basis. Among them, the top five countries which are working with energy from wind are China, USA, Germany, India and Spain.

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SELF-EXCITED INDUCTION GENERATOR: AN INSIGHT

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Abstract- With the ever increasing demand of power for the sustaining of humans civilization and the threat of depletion of conventional energy sources, focus has been centered to the possibilities in renewable energy during the recent past to accomplish the energy requirement. The Self Excited Induction Generator has been identified as an ideal alternative to the well known synchronous generator for meeting the growing demand of electrical energy. As a matter of fact, various researches and experiments have been done to optimize the performance and characteristics of Self Excited Induction Generator. The objective of this paper is to get an insight of the literature of research on Self Excited Induction Generator in the last three decades.

Keywords- Self excited induction generator, Voltage built up, Steady state and transient analysis.

1. Introduction:

To maintain the balance between the supply and demand of electrical power for the much electrified modern world, renewable energy sources like wind energy, solar energy, bio gas etc. have been marked as promising alternatives to replenish the requirement of power [1-6]. The Self Excited Induction Generator, abbreviated as SEIG, being used for the conversion of wind energy into electrical energy, has become a popular alternative source of energy. This is because of some of the outstanding features exhibited by SEIG like its simplicity, robustness, ease of maintenance, lesser unit cost etc. The SEIG is actually an induction machine being operated in the generating mode. A three phase capacitor bank, when connected across the induction machine, provides the excitation, thereby inducing an emf in the winding of the machine. Accordingly, the SEIG, with a three phase capacitor bank as an auxiliary, is called a self excited SEIG. With the three phase capacitor bank being connected, the SEIG becomes the source of power supply in isolated mode. Like any other machine, there are various structural and operational characteristics of SEIG. With the advent of power electronic convertors, the SEIG has been embellished with the precise control over its operating characteristics. The SEIG has some outstanding advantages such as reduced maintenance cost, ruggedness, brushless construction in squirrel cage type, absence of external dc excitation etc.



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Although the potential of SEIG as an isolated source of power supply has been accredited widely for a number of years, it too suffers from some serious drawbacks. Firstly, the SEIG exhibits a poor voltage regulation. The reason is that the SEIG is not able to generate reactive power, rather consumes it. Besides, being operated in saturation region, the efficiency of SEIG may be very low.

2. Classification:

The classification of SEIG may be done on the basis of two different aspects. Depending upon the construction of rotor, the SEIG may be two types:

- (i) Wound rotor induction generator
- (ii) Squirrel cage induction generator

Depending on the type of prime movers, which may be constant speed or variable speed and their location with respect to the power networks, the generating system may be classified as under [7-8]:

- (i) Constant speed constant frequency
- (ii) Variable speed constant frequency
- (iii) Variable speed variable frequency

We now briefly describe these classifications as follows:

(i) Constant speed constant frequency:

According to T.S. Jayadev [7], by the continuous adjustment of blade pitch in conjugation with the generator characteristics, a constant speed characteristic is obtained from the prime mover. The operating speed range of an induction generator on an infinite busbar in terms of slip is 1% to 5% above the synchronous speed.

(ii) Variable speed constant frequency:

The variable speed operation of wind energy generating system yields higher output at low as well as high wind speeds as explain by Dezza et al [9]. This property is exhibited by both horizontal and vertical axis wind turbines. The constant frequency output from a variable speed turbine may be achieved by two prominent methods.

- (a) AC-DC-AC link and
- (b) Double output induction generator (DOIG)

A brief explanation of these methods is given below:

- (a) AC-DC-AC link: In this scheme, with the help of high power rated thyristor, the AC output of the alternator is rectified and subsequently inverted to AC with the help of inverters. The frequency, being fixed by the power line, remains constant [9].
- (b) Double output induction generator (DOIG): The DOIG is in fact a three phase wound rotor machine which is mechanically coupled to a wind or hydro turbine. Its stator terminals are connected to the utility grid having constant voltage and constant frequency [10-11]. The output having variable frequency is fed into the AC supply through and AC-DC-AC link converter. Here, it may be noted that in generation by DOIG, the output power may exceed the rating of the machine. However the DOIG exhibit some operational disadvantages, which a bottleneck to its widespread use. Besides, being exposed to the atmosphere, it has low power factor and its maintenance is somewhat difficult. Further, as it needs grid supply to maintain excitation, it is not suitable for isolated power generation.
- (iii) Variable speed variable frequency:



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As the applications of resistive heating are independent of frequency, the SEIG in this mode of operation is suitable for this job [12].

3. Voltage built up process and methods of self excitation:

For the voltage to develop across the SEIG, excitation needs to be provided externally. The machine needs the excitation in the form of reactive power. There are two methods for supplying this reactive power.

- (a) Grid connected mode
- (b) Isolated mode

In the grid connected mode the induction generator can draw reactive power from the grid. In the isolated mode, a suitable capacitor bank connected across the generator terminals provides the excitation. This phenomenon is known as "capacitor self excitation" and the induction generator exhibits a new name "SEIG".

In a way much similar to that observed in DC generator, it is essential to have a suitable value of residual magnetism in the rotor of the SEIG, failing which there will be no voltage built up. When the SEIG starts running a small voltage is induced in the rotor circuit because of the residual magnetic field. This induced voltage causes a capacitive current to flow. This capacitive current provides an increment in the voltage. This is a cumulative process and it goes on until the voltage is completely built up. Graphically, the no load terminal voltage is given by intersection point of the magnetization curve of the generator and capacitive load line [13]. An adequate amount of the magnetizing current by the capacitor makes it possible to achieve a required voltage.

4. Modelling:

Different authors have suggested different models of SEIG for its analysis in steady state as well as its behaviour in transient state. An optimum model of SEIG is accomplished by considering the main flux path saturation while the saturation in leakage flux path, the iron an rotational losses being neglected. Malik and Haque [14] have demonstrated that in addition to voltage and frequency, steady state analysis can be used to estimate the minimum value of excitation capacitance required for excitation as well as for maintaining the terminal voltage of the induction machine, a constant.

An essential requirement for the modelling of SEIG is to transform the time varying parameters into mutually decoupled direct and quadrature axis. This model is known as d-q model. In this context, Stanley [15] has presented an analysis based on direct three phase model using phase variables being presented in shifted reference axis. The time varying parameters of an induction machine may be eliminated by referring the stator and rotor variables to an arbitrarily rotating reference frame, as suggested by Krauss & Thomas [16]. For an optimum analysis of SEIG, the d-q model has emerged as the best with current being taken as state variables and using the d-q model, it is possible to make the analysis in any reference frame, be it stationary or rotating. Rijwan khan et al [17] have analysed the model of a single phase two winding SEIG derived from double field revolving theory. This model has successfully explained the steady state behaviour of SIEG subject to the prior information about frequency and magnetizing reactance. The phenomena of self excitation in SEIG has been physically interpreted by Elder et al [18]. The core loss component, being neglected earlier, has been considered by Malik & Haque



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[14] for analysing the performance of SEIG. The upper and lower limits of the capacitance and speed of SEIG necessary to maintain the self excitation are determined in [19-20]. The study of SEIG, driven by regulated and unregulated prime movers has been done in [21-22]. Uctug & Demirekler [23] have presented a linear model of SEIG describing a wide variation in the speed. They have also suggested a strategy to maintain the voltage and frequency constant.

In the modelling and analysis of SEIG, the assumption of a linear circuit for SEIG failed to explain some transient condition like the switching transients. The inclusion of saturation in dynamic model has emerged as a solution for this problem. With the inclusion of saturation, extensive work has been done in this area as presented in [24-26].

5. Control of voltage and frequency:

Despite of being a simple and efficient machine for conversion wind energy into electrical energy, there are two major drawbacks of SEIG. The first is the poor voltage regulation and the second is the need for reactive power support. The loads in power system, being mostly inductive in nature, require the supply of reactive power, in the absence of which voltage variations may occur. According to Malik et al [20], the requirement of capacitance in a SEIG is proportional to the square of the speed and the maximum value of saturated magnetizing reactance. Sridhar et al [27] have suggested a method to determine an optimum value of the capacitance for a short shunt SEIG. Here, it may be noted that if a simple shunt configuration is replaced with short or long shunt design, we may have better voltage regulation, although some problems likes sub synchronous resonance are also associated with this design. A synchronous machine, in over excited mode can also provide reactive power compensation. However this is not a one sided agreement, as it costs the active power generation. The reactive power requirement of SEIG at different speeds and loading conditions can not be met by fixed capacitors. A combination of fixed and switched capacitor as suggested by [28] can provide sufficient reactive power needed by a SEIG over a wide range of operating speeds. However, The methods mentioned above for the reactive power control have some short comings also and they are not the perfect alternatives. With the advent of power electronic devices in recent time, Static VAR Compensator (SVC) has been conveniently used for the continuous and rapid control of reactive power in an isolated wind-diesel hybrid system [29] where the induction generator is used for wind system and the synchronous generator is used for a diesel generator set.

As the frequency of an isolated generating unit varies considerably with the varying load conditions, a governor control system has been emerged as a solution to this problem. The governor control system adjusts the turbine flow in accordance with load demand. Owing to the high cost of governor and complexity in operation, the load controller may be used to regulate the generator frequency as suggested by Woodward [30]. A variety of different load controller schemes for both the induction generator and synchronous generator are suggested in [31-32]. Load controller consisting of a thyristor bridge with pulse control and a chopper with pulse width control for the separate regulation of real and reactive power for the SEIG has been suggested by Bonert & Raja karuna [31] and Bonert & Hoops [33]. For the frequency control of wind diesel system, a combination of



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diode bridge and pulse width modulation (PWM) chopper has been suggested by Stein et al [34].

6. Steady state and transient analysis:

According to the mathematical analysis presented by Murthy et al [35], equivalent loop impedance has been represented in the form of polynomials and further, the polynomials are separated in real and imaginary parts. They are solved using Newton-Raphson method and hence the frequency and the magnetizing reactance are obtained. Subsequently different authors have suggested different techniques for the determination of frequency and magnetizing reactance. The approach of Quazene et al [8] was to use a nodal admittance technique to obtain a nodal equation. According to Jain et al [36] an algebraic equation is solved for the initial value of the frequency and then the exact solution is obtained by Secant method. According to Raja karuna [22], using an iterative technique based on approximate equivalent circuit and mathematical model for B-H curve, a non-linear equation in frequency can be obtained. Singh et al [37] have suggested an optimization technique in which frequency and magnetizing reactance are considered as independent variables. By allowing the variations in the value of these variables, practically acceptable values are obtained. Observation made in [38-40] suggest that by changing the number of poles of a SEIG, more wind energy can be harnessed under the condition of varying wind speed. The conclusion is that at lower speed of prime mover, the machine is to be run with six poles and at a higher speed of prime mover a smaller number i.e. four poles is optimum. A comparably simple approach to steady state analysis of the SEIG has been suggested by Sandhu et al [41] in which a quadratic equation in slip is solved for the analysis. The maximum and minimum value of the excitation capacitance has been determine by Wang et al [42] in which eigen value based approache is adopted. A general analysis of a three phase SEIG with an asymmetrically connected load and excitation capacitance has been presented in [43] using the method of symmetrical components. An optimization based approach for the analysis of the SEIG has been presented by Alolah et al [44]. Various dynamic models have been suggested to study the transient behaviour of induction machine.

The parameter concerned to most of the transient studies are voltage built up due to self-excitation and load perturbation. The performance of short shunt SEIG in transient mode is presented in [25]. Major success has been achieved in predicting the transient behaviour of an induction machine by d-q model in stationary reference frame using current as state variables. The transient analysis of the SEIG by considering the main flux saturation has been suggested by Granthm et al [45]. The importance of cross saturation has been depicted by Hallenious et al [46]. The dynamic performance of the SEIGs operating in parallel has been presented by Wang and Lee [47]. They have also calculated the minimum value of shunt excitation capacitance. Jain et al [48] have investigated the behaviour of SEIG with due consideration to the effects of main and cross flux saturation for various modes of unbalancing like line to line short circuit. More works are being carried to investigate the response of the SEIG to these fault.

7. Conclusion:



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This article has revealed a comprehensive literature review of some of the critical feature of the SEIG such has modelling, voltage and frequency control etc. It is observed that the SEIG is an economic and efficient alternative source of electrical power for the localities isolated from utility grid. This exhaustive literature survey leads to the fact that the SEIG is superior to a synchronous generator in many aspects. Apart from being suitable for wind and mini hydro plant, it also works well with prime movers driven by other sources such as diesel, biogas, natural gas etc. A lot of more work and research can be carried out to enhance the capabilities of SEIG for optimum harnessing of some non-conventional energy sources.

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Original Paper | Chapter

Scientific Study on Effect of Polarization in Calculation of Rain Attenuation Using ITU-R Model

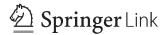
Authors: Arun Kumar, Natwar Singh Rathore, Alok Kumar Pandey

Publisher: Springer Singapore

Published in: Renewable Power for Sustainable Growth

Abstract

This paper addresses the current need to work on higher frequency levels for radio wave communication because of need for higher speed requirement in communication system and also because the current frequency spectrum is congested. While establishing radio communication links of higher frequencies it is important to study various problems associated with them. Rain induced attenuation at higher frequency is a major problem. Therefore, a study has been done on rain attenuation and effect of polarization is calculated for six different regions of the world. The simulation results are tested on ITU-R model and various findings throughout the simulation work have been concluded.



Optimal Controller Design for Altitude Control of Modern Airship

Recent Advances in Mechanical Engineering pp 205-211 | Cite as

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Abstract

This paper describes modeling and full-state feedback controller design of airship for stabilization of altitude. The state feedback controller based on linear quadratic (LQ) optimization technique is realized, and performance is compared with pole-placement-based controller. The weighing and regulating matrices are designed and analyzed for the performance of designed controllers for the modern airship. The performance analysis is also presented in this chapter.

Keywords

Full-state feedback controller Linear quadratic regulator Airship This is a preview of subscription content, <u>log in</u> to check access.

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and data analytics, blockchain enrolled with IIoT, applications in public domain, etc.

Keywords

Internet of Things Industrial Internet of Things Smart contracts Security Privacy Blockchain Industry 4.0

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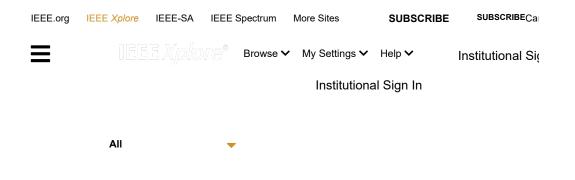
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Abstract

Abstract:The following topics are dealt with: Internet of Things; learning (artificial intelligence); data privacy; computer network security; mobile computing; pattern classifica... **View more**

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- I. Introduction
- II. Architecture of 5G-IOT
- III. Challenges & Vision of 5G-IOT
- IV. Cyber Security and Privacy In
- IOT Environment

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The following topics are dealt with: Internet of Things; learning (artificial intelligence); data privacy; computer network security; mobile computing; pattern classification; feature extraction; cryptography; cloud computing; Internet.

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In this day and age, mobile communications with swift web availability and higher data rates possess a notable request from humankind and is the principal constituents in productive expansion and digitalization of civilization and the business. As the debate of establishing 5G developed over years, the test was to discover the differentiating features. Unmistakably, the race for extraordinary data rates would forge ahead, requiring an increment in data rate often times at regular intervals. Wireless technologies available in current scenario such as 3G and 4G is unable to encounter the challenge of 5G technology essentials and what's more, it can't be employed for the Advanced Low Power Wide Area (LPWA) networking technology also extensive range conversation. Nevertheless, it ought to be comprehended that 5G is not exactly fabricating the currently available 4G technology, essentially through improving the possible data rate. [1] As a particular distinction from the past when the technology evolved from 2G to 3G to 4G, the progress towards 5G will unlock new application areas, particularly for the Internet of Things. These outcomes in a large number of modernistic research problems for building networks, just respect to working up the equipment or programming design to proficiently strengthen and support the widespread intrigue in its usage. [2]

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Analysis of Black-Hole Attack with its Mitigation Techniques in Ad-hoc Network

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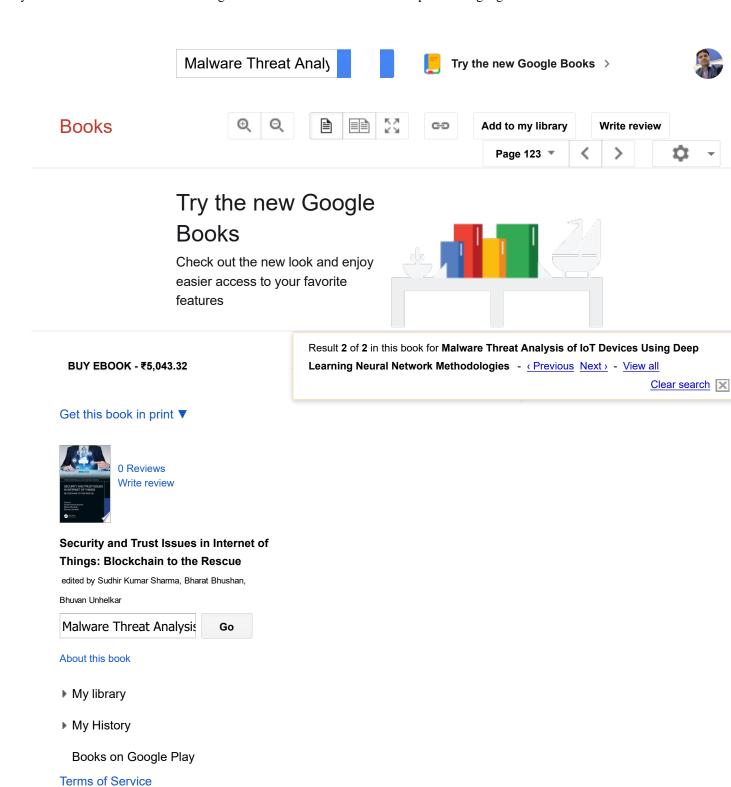
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Abstract: In wired and wireless communication, providing security is extremely important and challenging. But the flying evolution in communication technology and characteristics of wireless network make this issue even more challenging. In Adhoc network, there is a huddle of autonomous mobile nodes; which dynamically form a temporary multi-hopped, peer-to-peer radio network, without any use of predefined infrastructure. Lack of fixed infrastructure, use of wireless link and mobility of nodes make Ad-hoc networks extremely receptive to rival's hostile attacks, blackhole attack being one among them. This paper includes a brief description of black hole attack and presented a comprehensive survey of its prevention techniques as given by some researchers. The main aim is to find how, when, and why an Ad-hoc network was compromised or involved in commitment with blackhole attack. At last we used ACO (Ant Colony Optimization) technique to prevent the network from blackhole attack by using AOMDV protocol with fitness value (FV-AOMDV). The fitness value is used to find the optimal and secure path from source node to destination node. Conclude the result on the basis of some performance metrics i.e. Packet delivery ratio, Delay, Generated packets and Received packets by using NS-2 simulator. The observed results prove that there is a substantial.

Keywords: Wireless Network, Blackhole Attack, ACO, AOMDV, Intrusion Detection using Anomaly based Detection

1. INTRODUCTION TO WIRELESS NETWORKS

A wireless network is a network which create by computer i.e. nodes by using wireless data connection between them. Wireless communication is a method by which cost of wire is reduces [1] Wireless medium is playing a vital role to provide communication to real world by allowing user to take information and service electronically or digitally, spite their topographical site. Wireless connection/communication provide by two types: Infrastructure based (contains Access point) and Infrastructure less (without access point). MANET is infrastructure less network [2]. The wireless links used for interconnection may be terrestrial microwave, communication Satellites, radio and



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APHONIC'S VOICE: A HAND GESTURE BASED APPROACH TO CONVERT SIGN LANGUAGE TO SPEECH

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Abstract -- As everyone knows that language has always been a barrier in the path of communication for the people speaking different languages. A person going to some other country can learn a new language or carry a dictionary to communicate but, specially-abled people such as deaf or profoundly deaf person can only use sign language for communication. In a world where people barely understand this language it does not helps a lot in curbing the issue. So, the purpose of this proposed system is to develop a translation tool which can reduce the communication gap by converting the real-time gesture-based signs to text and finally to speech. This paper will first at discuss the design to recognize the hand gesture as it is one of the 1. fastest way to communicate. And further the discussion will be about 2 recognizing the digit and perform operations in addition to recognizing the English alphabets to form words. The paper reviewed the current study status of application aiming to recognize the hand 1. gestures, symbols and movements to convert it into numbers and alphabets, and further into words and then sentences. According to 2. the research the application will work as a medium in between an³. aphonic person and a normal person or vice versa. This paper shows⁴. the status of the application, customized hand gestures, the methods,5. analyzing the strength and week points and lists all the challenging problems in current research of hand gestures used for aphonic people school etc.

Keywords: Hand Gesture, Study Status, Application, Aphonic people school

I. INTRODUCTION

A gesture can be described as the movements of hands or faces that express an inspiration or a feeling such as arms crossed over the chest, nail-biting or stroking chin, etc. Apart from body language, hand gestures can be of great help, especially for the deaf, mute or profoundly deafpeople.

The deaf, mute or profoundly deaf person use sign language to communicate with other peoples. However, it is only those people can understand the language who has undergone some special training to learn the sign language. Sign language makes the use of hand gesture along with other non-verbal cues to convey their thoughts. It makes the use of hand shapes, alignment, movements of hands, arms and facials

expressions to convey the speaker's thoughts. The notion behind this proposed system is to develop a hand-gestures to speech conversion desktop-based application. The system provides the user i.e., deaf, mute and profoundly deaf person the ability to perform calculations based on hand gesture and recognize alphabets to form words. Further, it conveys the result to the normal people by converting the text result tospeech. Following administrative activities should be automated as follows: -

Gesture Calci

Instructions
Start Operation
Input through camera
Gesture to digitsconversion
N-Digitsformation
Arithmeticoperations
Text digits to speechconversion

c. Exit

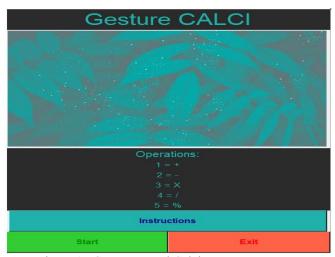


Figure 1: Gesture Based Calci

3. Say Out Loud

- I. Instructions
- II. StartOperation
 - 1. Input throughcamera
 - 2. Gesture to letterconversion
 - 3. Wordformation
 - 4. digits to speechconversion

III. Exit

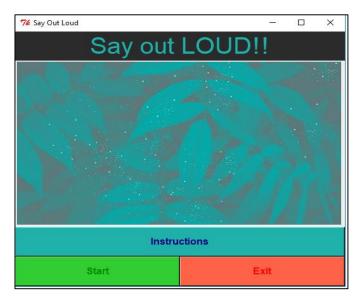


Fig 2: Gesture Based Calci (Say out LOUD)

Gesture recognitions is the technology with the objective of decoding human gesture using mathematical algorithm.

II. GESTURE RECOGNITION USING OPENCY

OpenCV is an acronym of Open supply pc Vision Library. This is the library of a programming function, in the main geared toward period pc visions, developed by the Intel and currently supported by "Willow Garage and Itseez". This is open and free to be used underneath the open BSD licenses.

The library is cross-platform which mainly focuses on real-time image processing. Gesture recognition is also a technology with a goal of deciphering human gesture using mathematical algorithm. All the gesture will be generated from any movement or motion of the body. Currently, in the system, we are focusing on gestures using a hand. Users will use easy pre-defined hand gestures to manage the device while not physically touching the device. recognitions are the topics Gesture computer science and language technologies with the goals of interpreting human gestures via a mathematical algorithm. Gestures can originates from any bodily motions or state but commonly originate from the face or hand. Current focused in the field of include emotion recognition from faces and hands gestures recognitions. Users can use simple gesture to control or interact with devices without physically touching them.

III. METHODOLOGY

The deaf, mute or profoundly deaf person uses sign languages to communicate with other persons. However, it is only those people can understand the language who has undergone some special training to learn the sign language. Sign language makes the use of hand gesture along with other non-verbal cues to convey their thoughts. It makes the use of hand shapes, alignment, movements of hands and arm and facial expression to convey the speaker's thoughts.

With constantly advancing technology various software are available for these the deaf, mute or profoundly deaf people. The method used to create this type of technology is as follows: The system will be divided into two parts:

- 1. Gesture based calculator
- 2. Say Out Loud

The gesture-based calculator will be used for performing arithmetic operations using gesture and some predefined operations. 'Say out loud' will be used to convert the gestures into words and then into speech.

IV. IMPLEMENTATION

The idea can be implemented in the series of the following steps:-

1. Read real time images from the camera

- 2. Extract individual frames so that it can be further processed
- 3. Find the region of interest in each frame i.e., hand.
- 4. Background Extraction using absolute difference between the first frame and the current frame.
- 5. Image processing
- I. Convert the RGB to grey
- II. Blur the image
- III. Thresholding
 - 6. Find contour and further find the contour with the maximum area which will actually be the hand.
 - 7. Find convex hull and convexity defects.
 - 8. Remove the convexity defects around the hand that are not in between the fingers using the cosine rule i.e.,

```
angle =math.acos((b**2 + c**2 -a**2)/(2*b*c))*57
# ignore angles >90 and highlight rest with red dots if angle<=90
and d>35:
count_defects+= 1
cv2.circle(crop_image, far, 1,[0,0,255],-1)
```

- Using the convexity defects, orientation of the image, ratio of the hull to counters as well as the area of the hull and the contours we can recognize the various symbols
- 10. If four or five consecutive frames are same then the symbol is confirmed and is used for further processing.
- 11. Recognize digits and perform operations

dist = cv2.pointPolygonTest (cnt,far,True)

- 12. Recognize letters and combine them to form words and further form sentences
- 13. At any moment of time the system can be reset or stopped.

Gesture calci

The purpose of below pictures is to give a basic flow of how the gestures have been used in creating digits and operations and further convert them into text. The user defined symbols will be presenting the digits and operations that needs to be performed and further result conversion will take place using some formula based calculation.

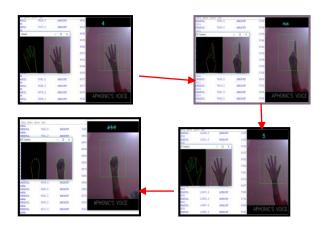


Figure 3: Gestures used in Gesture Based Calci

Say out loud

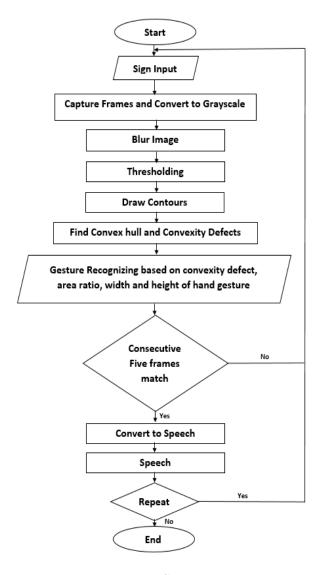
The purpose of this module in this paper is to show that how the word creation takes places using gestures based symbols. And further the words will be concatenated and helps in creating a sentence. The text will be converted into speech using the basic text to speech calculation. The picture shown below gives an idea of how the gestures have been used in creating a letter and further a word.



Figure 4: Gestures used in Gesture Based Calci (word creation)

These two modules work in a similar way logically but individually the processing will be different. The flow diagram will provide a better and easy ways to understand flow of this application.

Figure 5: Flow Chart



IV. CONCLUSION

Sign language is a language which provides an easy method to deaf-mute person. Using sign languages, a deaf-mute person can also communicate with a deaf, mute and a normal person without any means of acoustic sounds. Our main aim behind this work is to develop the system which can recognize the sign languages and further converts it into texts and spoken results. This system can provide communication between people with speech impairment and traditional folks and reduce the communication gap between them. The feature of these modules in the system is as follows:

Gesture-based Calculator – This module provides the facility to the user to do mathematical computations automatically by recognizing the gestures. Every operator and operand have a pre-defined gesture which will be recognized by the system then perform the computation and displays the result and voice output the result.

➤ Say Out Loud Module – This module provides the facility to the user for word formation by recognizing the gestures. Every letter has pre-defined gesture which is recognized by the system which then processes the recognized letters to form a word and the system then displays the word in the form of text an then convert it into voice.

ACKNOWLEDGEMENT

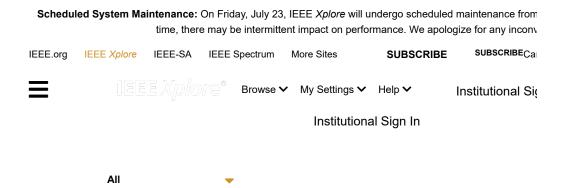
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III. Proposed Model

IV. Methodology

V. Implementation

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Abstract:

Most of the smart phone users prefer to read the news via social media over internet. The news websites are publishing the news and provide the source of authentication. The question is how to authenticate the news and articles which are circulated among social media like WhatsApp groups, Facebook Pages, Twitter and other micro blogs & social networking sites. It is harmful for the society to believe on the rumors and pretend

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Contents

I. Introduction

In Today's world, anybody can post the content over the internet. Unfortunately, counterfeit news gathers a lot of consideration over the web, particularly via web-based networking media. Individuals get misdirected and don't reconsider before flowing such mis-educational pieces to the most distant part of the arrangement. Such type of activities are not good for the society where some rumors or vague news evaporates the negative thought among the people or specific category of people^[1]. As fast the technology is moving, on the same pace the preventive measures are required to deal with such activities. Broad communications assumin biganging ton Coopolinime in Reacting the general public and as it is normal, a few people attempt to exploit it. There are numerous sites which give false data. They deliberately attempt to bring out purposeful publicity, deceptions and falsehood under the pretense of being true news. Their basic role is to control the data that can cause open to have confidence in it. There are loads of case of such sites everywhere throughout the world . Therefore, counterfeit news influences the brains of the individuals. As indicated by study Scientist accept that numerous man-made brainpower calculations can help in uncovering the bogus news.

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attacks. Some of the attacks include Black hole attack, Gray hole attack, sinkhole attack etc. In this paper we are discussing network layer Black hole attack along with its security measure to decrease its effect in the network.

Keywords

Wireless Sensor Network Black hole attack Motes Security issues

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research achieves higher accuracy of 98% which is better over existing methods.

Keywords

Brain tumor Segmentation Adaptive particle swarm optimization Deep learning Deep neural network Convolutional neural network

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Notes

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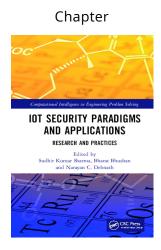
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By Abhishek Sharma, Nikhil Sharma, Ila Kaushik, Santosh Kumar, Naghma Khatoon

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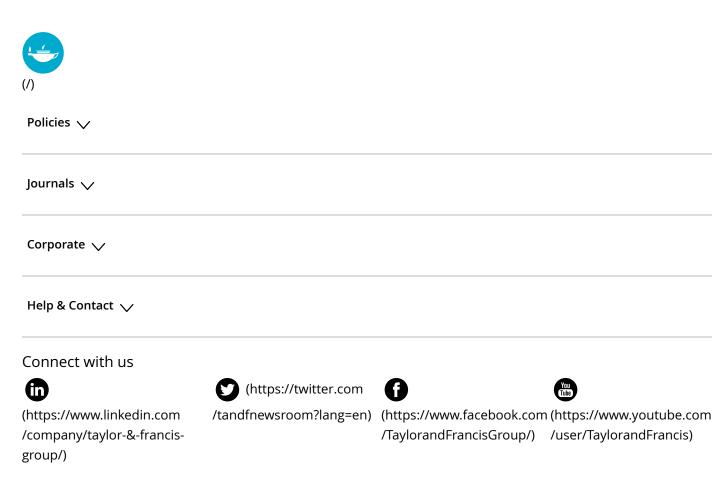
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Abstract

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Abstract:

Cost Estimation of any software is process of evaluating the estimating cost and effort which is must necessary to build any software system or project for increasing the output. The basic input is the cost drivers set and the size of code and the output is the effort which is calculated in terms of Person-Months (PM's). To estimate cost for software

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I. Introduction

Cost estimation of any software project is process of an generic estimated value of the cost idea of a product, program, project, which is basically computed on the basis of collected information (1). Software cost estimation is among one of the software development activity which basically focus on how-to-estimates of associated and calculations of time and stipulated effort Sight protector Three Continues Readingost estimation at the starting stage of the project is very important for avoiding any risk failures. If somehow fail to estimate then it would result the cost of the project to be very high and consequently reaching 150-200% more than the original cost (2). But there are many it difficulties to estimate this cost effectively.

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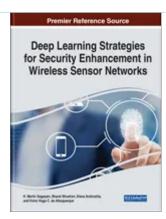
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Applicability of WSN and Biometric Models in the Field of Healthcare

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ost important ingredient in human life. Health is wealth is the most frequent used proverb. A healthy person can perform its entire task with full enthusiasm and great energy and can solve all problems as mind is a powerful weapon, which controls all our functioning. But now due to change in our lifestyles, we are becoming prone to all kinds of health hazards. Due to unhealthy mind, we are not able to perform any tasks. Humans are becoming victims of many diseases and one of the most common reason for our degradation in health is stress. In this chapter, the authors present role of WSN and biometric models such as two factor remote authentication, verifying fingerpriot operations are detailed by cloud technology with biometric application, and validation built hybrid trust computing perspective for confirmation of contributor profiles in online healthcare data. A comparison table is formulated listing all the advantages and disadvantages of various biometric-based models used in healthcare.

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Introduction

Health is one of the most essential state in human life. No task is carried out without being healthy, whether it is personal or professional life. In order to have proper functioning in all aspects one must be mentally and physically fit. Healthy living has the opportunity, motivation and capability to perform and act in all aspects. Some common factors such as specific diet requirements must be considered important for being healthy (Barbara et al., 2016). Proper diet plan, exercise, sound sleep are main ingredients of healthy life. But now a days, due to excessive work load and eating habits humans are becoming more vulnerable to diseases. Due to advancement in field of technology no physical work is carried out by humans due to which they are becoming unhealthy and prone to diseases. As increase in the number of humans visiting hospitals, taking appointments from doctors, lot of time is being wasted. Now as people have less time, they are not interested to have long span of time. For that purposes biometric have done tremendous work in health sector (Alpaslan, 2016). Everything is now automated which saves time. If person needs to visit doctor, patients' card is created which acts as a smart card having all the details of the patient such as his id, name, age, phone number, gender, address. Using this card, authenticity of the patient is being maintained and every time he need not have to get all his details entered. Just during his next visit card is being scanned and all the updates are being carried out. For treatment of iris and retina, biometric techniques are used which in very less amount of time are used for doing any eye surgery (Khosrowjerdi, 2016). Laser based techniques are also used for this purpose. Security plays a very crucial role in any type of secure system. Main features of security such as secrecy which means the intended message must be kept secret during transmission, integrity which means there must be no modification in between while sending and receiving messages, availability which means the message must be available in future for further references (Amjad et al., 2017). In order to have security in the system, many biometric systems are being installed which uses face, palm recognition techniques to have authentication within the system and the outside intruders cannot steal any confidential information from the system (Bakke, 2017). In the later section of the chapter, different biometric models such as two factor remote authentication, for security purposes effective fingerprint technique using biometric is adopted, privacy preserving in healthcare, Healthcare information using cloud technology with biometric application & Biometric Validation (Chattopadhyay, 2016) based combined technique for trust computing perspective for authentication of providers profile in online healthcare data are studied. A comparison table is designed listing all the Merits and Demerits of the biometric system used in health care.

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Security and Privacy Issues in IoT Devices and Sensor Networks

Advances in ubiquitous sensing applications for healthcare

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Chapter 10 - Blockchain as a solution for security attacks in named data networking of things

Sukriti Goyal^a, Nikhil Sharma^a, Ila Kaushik^b, BharatBhushan^c

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Abstract

In the world of technology, the Internet of Things (IoT) is a network to link entire things, that is, people, devices, and systems, with each other through an approach of common networking. This technology constructed a way, where many of the routine devices or things are interrelated and easily communicated with, their surroundings to gather or transfer the information over the network without the need of any human-to-system communication or human-to-human communication. It is born with features such as dynamics, scalability, and heterogeneity, and only that network solution can adapt to it which has strategy to incorporate its features. And here comes data centric interaction paradigm, it applies an approach of data naming to comprise the dynamics, scalability, and heterogeneity features to adapt to IoT and composes NDN of things, that is, Named Data Networking of Things (NDNoT). This paradigm FEEDBACK

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Chapter



Blockchain as a Lifesaver of IoT

Applications, Security, and Privacy Services and Challenges

By Sukriti Goyal, Nikhil Sharma, Ila Kaushik, Bharat Bhushan, Abhijeet Kumar

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Architectural Model of Security Threats & theirCountermeasures in IoT

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Internet of Things (IoT) depicts a future technology where devices establish a connection with internet for building the intelligent structural system and to implement self-configuration system IoT is an internetworking of devices which are physically present, function of that device is to sense the data In today's scenario IoT involves with different

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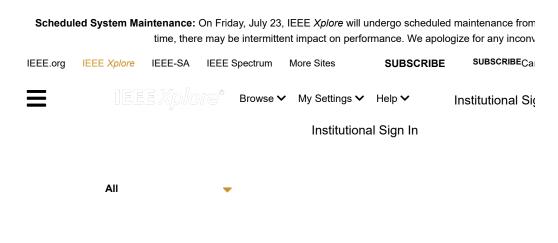
IoT is a very vast field in which the persons having different belief and queries about the various technology and applications used with it. IoT is a structure of interconnected reckoning device that has the ability to transmit information over a network without having the interaction between computer and human. In IoT the things can be related to person having Cardiac monitor-implant, an automobile with the integrated sensors through which the inferror continuous dentities of the integrated sensors and IoT ecosystem is a system that uses implanted sensors, processors and hardware's which are used to act, gather and transmit the information received by their domain. On connecting to a IoT gateways the information gets served by the sensors of the IoT devices. Most of the work can be done by the devices without human involvement.

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Abstract:

Without any involvement of third party, block chain has shown tremendous potential in establishing secure links with IoT. This technology can be widely used without using any centralized authority. By combining both the technologies throughput of the system can be enhanced. Due to its various applications it is being widely used in almost every field which makes it vulnerable to various attacks. In this paper, blockchain architecture along with its key properties has been discussed. Later part of paper comprises of various security principles such as confidentiality, integrity and availability, various attacks on network along with its countermeasures.

Published in: 2019 International Conference on Computing, Communication, and Intelligent Systems (ICCCIS)

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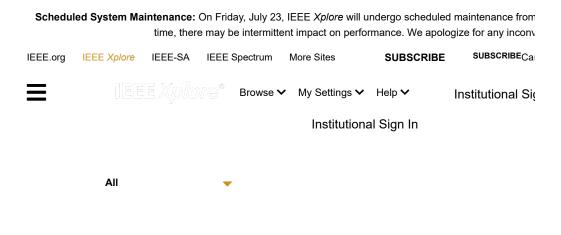
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I. Introduction

To facilitate the process of tracking and recording resources without requiring the centralized trustworthy authority, a ledger in blockchain is used. In blockchain two parties can exchange resource and communicate with each other in a network, decision making is being done by majority of user. In other words, decision in blockchain are being established by majority rather than a single central authority make decision for the whole network. Security of the network is full-proof, adversary is not being able to compromise the central authority and hence information is secure. Tangible resources like money, house etc.

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accuracy of 95.50% with 10 epochs from UCI dataset. The obtained result shows that deep neural network models have potential effect in healthcare domain especially in malaria diagnosis.

Keywords

CNN LeNet AlexNet ResNet Ensemble learning

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Diet Recommendation for Hypertension Patient on basis of Nutrient using AHP and Entropy

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Abstract:

Hypertension is named as silent killer. It is considered as one of alarming factor for chronic kidney disease, heart failure, impaired vision, Ischemic heart disease, Stroke etc. Hypertension is divided into systolic and diastolic blood pressure. According to studies 90-95% cause of hypertension is change in lifestyle therefore Diet plays essential role to

▶ ISBN Information: 10.1109/Confluence47617.2020.9057949

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Contents

I. Introduction

Hypertension is a general term known as high blood pressure. Many people are not able to identify its symptoms at early stages and untreated hypertension in long term can increase the risk of heart disease, dementia, and blindness. The hypertension is classified into primary and secondary stage. Several environmental factors affect at primary stage of hypertension such as excessive intake of salt due to deficiency of zinc, obesity, smoking, excessive alcohol etc. The proper diet is recommended in order to prevent and cure from hypertension. The secondary stage of hypertension increases the risk of heart myocardial infarction, chronic kidney disease (CDK), vision loss [1]. According to WHO research, it is observed that 40% of adults suffer from high blood pressure in developed and developing countries. Worldwide, 51% cerebrovascular disease and 45% of coronary heart disease deaths are attributable to high systolic blood pressure [2]. The diet chart consists of important minerals and vitamins required to intake by hypertension patient. Nutrition plays vital role in improving the health and standard of adequate balanced diet [3]. A consultation system has developed in order to recommend the diet to the patient suffering from chronic kidney diseases. It considers the amount of nutrition taken by patient by the food consumed. The system for evaluation is developed using web ontology language data model and semantic rules [4]. The personalized diet chart is constructed using the information regarding physical activity of person, the nutrition consumed and the seasonal activity of food items. The system considers the personal preference and appropriate dietary plan using technique fuzzy Ontology [5]. The increase in blood pressure is relatable to more amount of sodium intake whereas less amount of potassium and magnesium intake in dietary plan [6]. Kovasznai proposed an expert system for recommendation of diet sing case based reasoning and ripple down rule approach. The objective of system is to get deployed in health record management application [7]. The research has shown that DASH (Dietary approaches) is efficient way of reducing

suggesting dishes and food accordingly [12]. The nutrition plays indispensable part in recommendation of diet so we have presented its importance using technique known as Analytic hierarchy process (AHP). The method has significant advantage over the conventional used method for diet recommendation. The minerals and vitamins considered in diet are beneficial for hypertension patient. By using AHP a proper rational diet chart is developed which provides the well-maintained balance of nutrition in the body. AHP considers the consistency of data with the help of consistency ratio. Singh and Dubey [13] proposed the diet recommendation for anemia patient using AHP in which validation is performed using fuzzy TOPSIS approach. The AHP evaluates on the basis of critical factors thus provides precise assessment of considered data [14]. The objective of proposed paper is to provide the finest diet plan for hypertension patient using Analytic Hierarchy process.

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Date Written: March 28, 2020

<u>Abstract</u>

Hybrid Genetic algorithms are becoming reasonably important by its ever-increasing demand to solve real world pro results. In this paper, we present combined approach of support vector machine regression and linear regression for been taken from Government of India, which is further divided into various sub categories. Error rate has been calcu as female candidates has been reviewed by using age as one of the distinguishing parameters.

Keywords: Hybrid Genetic Algorithms, Support Vector Machine Regression, Linear Regression, Random Forest Clas

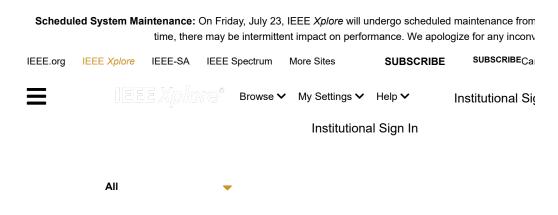
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In today's world, we are surrounded by enormous devices that sense some sort of data and gives a particular output. To track the record and manage that data by connecting all devices in a network in such an efficient manner that it can be utilized in favour of mankind, this is what we call as Internet of Things. It is very difficult task to manage such a huge amount of data with great efficiency, but here the Internet of Things along with concepts of Deep Learning plays a vital role in successful completion of the task. In this paper, you are about see an absolute overview about the analytics that are used to maintain and process huge amount of input data using the concepts of Deep Learning in the very domain of Internet of Things. Firstly, we start by giving a brief description about Internet of Things and some characteristics and requirements possessed by it. We will also explain some major key factors that make deep learning a good choice for implementation of Internet of Things. Also, we have discussed about the concept of Big Data and what role it has in Internet of Things. We have evaluated some research attempts made in the very domain of Internet of Things and Deep Learning. Finally, we have explained some real-life applications and the concept behind them in this paper.

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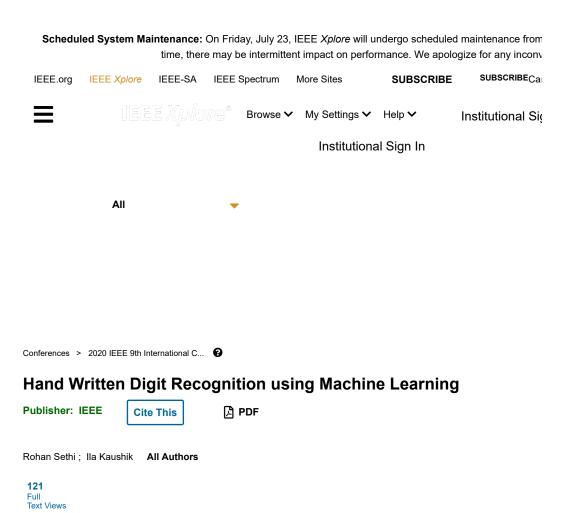
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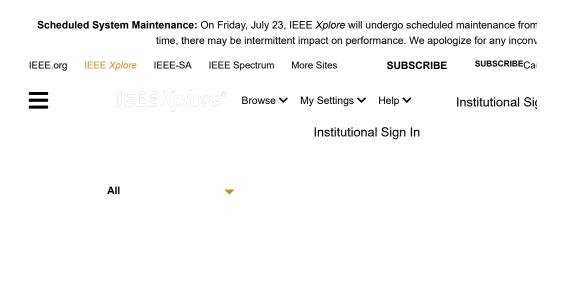
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Abstract:

Communication is considered as an essential part of our lives. Different medium was used for exchange of information, but due to advancement in field of technology, different network setup came into existence. One of the most suited in wireless field is Wireless Sensor Network (WSN). These networks are set up by self-organizing nodes which operate over radio environment. Since communication is done more rapidly, they are confined to many attacks which operate at different layers. In order to have efficient communication, some security measure must be introduced in the network ho have secure communication. In this paper, we describe various attacks functioning at different layers also one of the common network layer attack called Blackhole Attack with its mitigation technique using Intrusion Detection System (IDS) over network simulator ns2 has been discussed.

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Contents

I. Introduction

WSN is a distributed system that comprises of a large numbers of sensors nodes and base station that consolidate computing, micro sensing and wireless communication abilities which are able of identify various eventuality associated with its surrounding such as difference in displacement, temperature, light, speed, pressure. In ad-hoc networks nodes are employed and due to its tiny size, they have less numbers of

Vannuarda

of time, centralized monitoring, heterogeneity of nodes etc. To have an efficient functionality of the network, links must be maintained in good IEEE Personal Account ndition main with a sefect the fairligal applications of the principle of the principl Need sensor network they are prone to many attacks in order to breach the CHANGE USERNAME/PASSWSORD rity of PASMENT OF PASSENGER IN MOUNTAGE PASSWSORD FIRST PASSENCES US & (sensors, mineracontrolles (GP) CUMENTS PROFESSION AND EDUCATION WORL TECHNICAL INTERESTS CONT **Authors Figures** About IEEE Xplore | Contact Us | Help | Accessibility | Terms of Use | Nondiscrimination Policy | IEEE Ethics Reporting 🚰 | Sitemap | Privac A not-for-profit organization, I TELF is the world's largest technical professional organization dedicated to advancing technology for the benefit © Copyright 2021 IEEE - All rights reserved. Use of this web site signifies your agreement to the terms and conditions. **Citations**

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IOT Based Smart Polyhouse System using Data Analysis

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Adesh Kumar Pandey; Minakshi Chauhan All Authors

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Abstract

Abstract:A large part of the world's population depends upon agriculture industry for its source of livelihood. The growth of agriculture industry is bound to the two major parame... **View more**

Document Sections

- I. Introduction
- I. Data Analysis
 Requirements in
 Smart Farming
- II. Modelling Polyhouse Farming

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Abstract:

A large part of the world's population depends upon agriculture industry for its source of livelihood. The growth of agriculture industry is bound to the two major parameters; quality and quantity yield of the crops. Polyhouse farming is an excellent method which enables the production of crops with minimum resources and efforts and maximum yield by providing a controlled condition environment. Polyhouse is a methodology to grow

2020 **DOI:** 10.1109/ICICT46931.2019.8977665

Publisher: IEEE

▶ ISBN Information:

Conference Location: Ghaziabad, India

Contents

I. Introduction

Agriculture industry is important for providing food for the humans and raw materials for fulfilling the need of various other industries. Agriculture industry forms the basis-of-economic-growth-of-a-nation-by providing a large number of employn bigh opportanties. But dispersional forms a large number of employn bigh opportanties. In order to ensure better production of the food and raw materials, one type of farming technique has become more popular in present era that is polyhouse farming. [1].

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Modeling the Optimal Ways for Early Diagnosis of HIV-AIDS and its Preventive Measures

Proceedings of the International Conference on Innovative Computing & Communications (ICICC) 2020

5 Pages

Posted: 18 May 2020

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Pratik Kumar (https://papers.ssrn.com/sol3/cf_dev/AbsByAuth.cfm?per_id=4174704) Directorate of Education, Govt. of NCT

Date Written: May 14, 2020

<u>Abstract</u>

The HIV-AIDS, which is Human Immunodeficiency Virus-acquired immunodeficiency syndrome, is a disease of glob awareness about the disease spread. This disease infects the immune system of the human body and gradually desti diagnosis of HIV/AIDS. The Government, under the "Test and Treat policy for HIV" provides free treatment to HIV p $delivery\ to\ obtain\ efficient\ and\ effective\ operations\ of\ the\ healthcare\ systems.\ There\ is\ high\ expectation\ regarding\ th$ of various models proposed to early diagnosis of HIV/AIDS patients and highlights their efficiency.

Keywords: CD4 T-cells, Antiretroviral therapy, Long-term nonprogressor, Gene coexpression, HIV disease progression

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Performance Measurement Using Different Shortest Path Techniques in Wireless Sensor Network

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Nikhil Sharma; Ila Kaushik; Nanhay Singh; Ravinder Kumar All Authors

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Abstract

Abstract:Computers are being essential part of our daily lives. Different solutions came into existence for exchanging information. One of the suited networks based on wireless

Document Sections st... View more

I. Introduction

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II. Literature Review

Abstract:

III. Different Shortest Path Techniques Computers are being essential part of our daily lives. Different solutions came into existence for exchanging information. One of the suited networks based on wireless standard is wireless sensor networks (WSN). These networks comprise of nodes which are randomly distributed in any environment. They operate over radio frequency and

IV. Proposed

Conference Location: Coimbatore, India

Contents

I. Introduction

WSN comprises of self-organizing motes which are distributed in random fashion. The network is set up with small size, low power motes which are connected via single or multiple sinks [1]. Some of the applications include environmental or habitat monitoring, air pollution monitoring, landslide detection, machine health monitoring, forest fire detection, structural health monitoring etc. Sensor network falls under low power [2], and lossy networks (LLNs). These embedded devices can be connected by number of wired links, Bluetooth, IEEE802.15.4 [3], low power wi-fi, other low power communication links. Some of the difficulties in the network includes security issues [4], limited memory and power battery, processing capability and a restricted field of sensing [5]. Wireless communication network is implemented using radio communication. Different types of wireless network include wireless personal area network (WPAN), wireless ad-hoc network, wireless metropolitan area (WMAN), wireless wide area network (WWAN), cellular network, space network etc. A wireless sensor mote comprises of five major components - sensing unit, battery, transmitter or receiver, processor. Major factors which are to be taken into consideration while designing a sensor network are power consumption, scalability and fault tolerance. Sensor network is formed by two basic architecture-layered and clustered architectur Sidura ine ted Canotinite et Breadings single base station whereas clustered architecture maps sensor nodes into clusters. Each cluster has its own cluster head. Nodes within each cluster exchange messages within their cluster heads [6]-[8]. WSN uses star, tree and mesh topologies. To have an efficient functionality of the network, links must be maintained in good condition mainly in safety critical applications. In order to have maximum lifespan of wireless nodes, energy must be maintained at maximum. Using shortest path for data transfer, energy can be saved [9]. In these kinds of networks, routing plays an important role. Different strategies can be applied for selection of shortest path in terms of speed, cost and efficiency. Famous method to solve problem using greedy techniques in graph theory is Dijkstra algorithm [10]. In later section of paper, different shortest path techniques have been discussed. The research objectives are: •

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Precedence & Issues of IoT based on Edge Computing

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Sukriti Goyal; Nikhil Sharma; Ila Kaushik; Bharat Bhushan; Abhijeet Kumar All Authors

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Abstract

Abstract:In the network of IoT, a huge amount of data is frequently generated, major messages through complicated networks serving device-to-device communications are swapped and ... **View more**

Document Sections

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- II. Review of Edge Computing & lot
- III. Integration of Edge Computing and lot

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Abstract:

In the network of IoT, a huge amount of data is frequently generated, major messages through complicated networks serving device-to-device communications are swapped and also, sensitive smart world frameworks are controlled and monitored by thousands of gadgets and sensors. To extenuate the acceleration of overcrowding of resources in the network, as an approach edge computing, has risen as a modern approach to

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Contents

I. Introduction

In a world influenced by digital technology, the technology of the Internet of Things plays a major role in human lives. It has constructed an environment that connects many devices or systems to give best and smart performances in every action. The prevalence of the technology of the Internet of Things has constructed a new development home, mobile phones and many other embedded applications, that are all linked to the internet. Through content cont

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Privacy Issues & Security Techniques in Big Data

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Archit Tiwari; Nikhil Sharma; Ila Kaushik; Ratik Tiwari All Authors

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Abstract

Abstract:Big Data, as the name suggests is a process of collection of information in a very large amount and storing it in a multidimensional database of various organizations and... **View more**

Document Sections

I. Introduction

II. Literature Review

- III. Need of Data Security
- IV. Data Security & Privacy

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Abstract:

Big Data, as the name suggests is a process of collection of information in a very large amount and storing it in a multidimensional database of various organizations and thereby performing Analytical operations on it to increase their efficiency and enhance their ability of decision making. Strategies can be made using this technology which uses real time using Big Data Analytics. The main advantage of the technology of big data is

Date Added to IEEE Xplore: 30 January

DOI: 10.1109/ICCCIS48478.2019.8974511

2020

Publisher: IEEE

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Conference Location: Greater Noida, India

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I. Introduction

Big Data is a field that allows a user to deal with data sets, systematically extract information or ways to analyse the sets of information that are either too large or too complicated to be dealt with by using a conventional data processing application software is known as Big Data. [1] Typically sets of information with sizes more than the ability of software tools which are SignripothyQuadintedapadiagprocess and manage data within a tolerable elapsed time are included in Big Data. The aspects of Big Data include storage of data, analysis of data, capturing data, updating, search, data sharing, visualising, querying, data source, transferring data and information privacy. [2] The three main concepts to which Big Data is associated with are:

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Producing Energy Using Blind Man Stick

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Abstract

Abstract:We all are familiar with the problems a blind person faces while performing several daily life activities. These problems are generally related to walking on roads, walki... **View more**

Document Sections

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- II. Literature To Survey
- III. System
 Description
- IV. Functional

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Abstract:

We all are familiar with the problems a blind person faces while performing several daily life activities. These problems are generally related to walking on roads, walking on ramps, movement in staircases, looking for path in crowded streets and market places and many other situations. Of course, many of us come ahead to help them by guiding their way, but sometimes it becomes a matter of self-respect, or say, the person is not

Print on Demand(PoD) ISSN: 2329-7182

Contents

I. Introduction

In our day – to – day life we come across many visually impaired people who are not able to walk independently. According to a report by Times Of India [1] out of 37 million blind population of world 15 million are from India. Such people carry a white cane, some carry a guidance dog or they are simply dependent on others. Loss of visibility causes serious effects on the life of a visually impaired person. The most common effect is difficulty in mobility. [2] That is, they experience a lack of ability to travel around independently and safely. And major obstacles for them are staircases, pits, ramps, potholes, drainage and other things that they have to encounter daily. Especially, the descending staircases are hazardous of all. [3] Sometimes due to improper tactile paving in the streets lead to obstacles such as poles, bollards, and trees. There occurred an incident whe high visual Commitme Reading fell from the railway platform which ultimately resulted in the loss of his leg. [4] Such situations are sufficient to depict the importance of such a device which can guide blinds and visually impaired to perform their daily tasks without any fear of getting bruises on their body.bAlso, there are some Electronic Travel Aids (ETAs) available in the markets which help guide for obstacles and potholes present on the road. [5] The usage of sensor systems to solve this problem is worth complementing. But there is a possibility for that person to fall in a great trouble when the battery of ETA device suddenly gets discharged. [6] Aiming to solve this problem, the objective of this project is to develop a guiding stick which will be able to generate electricity and store that energy in the battery already present in the device. [7]

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Smart and Sustainable Intelligent Systems

Chapter 25

Study of Various Intrusion Detection Systems: A Survey

Minakshi Chauhan, Mohit Agarwal

Book Editor(s):Namita Gupta,Prasenjit Chatterjee,Tanupriya Choudhury

First published: 24 March 2021

https://doi.org/10.1002/9781119752134.ch25

Summary

Nowadays, Internet-based technologies are extensively being used to transfer, store and process the information. The massive growth of information over the Internet offers a rich environment to the attackers and intruders to expand the attack surface. In Information and System Security, intrusion detection is the act of detecting such actions that attempt to compromise the security of computer systems; Confidentiality, Integrity or Availability of a computer resource. Intrusion Detection is the process of observing and analyzing the activities happening in a computer system to identify any security violating activities. In this paper, the structure of IDS, different types of intrusion detection techniques and various types of attacks have been presented. This paper also presents the comparative study of various intrusion detection systems based on techniques used, various parameters of detection performance and their use in different domains.

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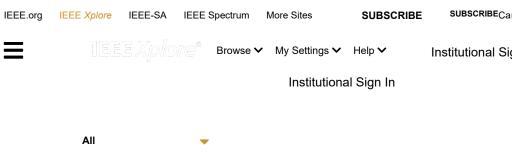
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Taxonomy of Attacks on Web Based Applications

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Ankit Singh; Aditi Sharma; Nikhil Sharma; Ila Kaushik; Bharat Bhushan All Authors

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II. Literature Review

I. Introduction

- III. How Attacker Harm the Security?
- IV. Steps Involved to Perform Web Attacks
- V. Taxonomy of Web Based Attacks

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Abstract:Computers are being reasonably important part of our day to day lives. Important information is being shared and received via web, which are now a day's very much vulnera... **View more**

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Abstract:

Computers are being reasonably important part of our day to day lives. Important information is being shared and received via web, which are now a day's very much vulnerable to attacks. Web based attacks are considered as most important aspect in breaching network security. Various applications of web comprise of health care, banking and e-business operations. Key elements of security include confidentiality, integrity, availability which must be preserved in all aspects. Some common attacks include Malformed XML, SQL Injection, XML Bomb, XPath Injection. During transmission of data attacker impersonates itself as an authorize user and try to conceal the confidential information. In this paper we will discuss various web-based attacks along with security measures to decrease the impact of attack in the network.

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Date of Conference: 5-6 July 2019

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INSPEC Accession Number: 19358396

Publisher: IEEE

Conference Location: Kannur, India

Contents

I. Introduction

Web Application or we can say a Web-Based Application is a program that interacts with the user and uses various web technologies and web browsers to perform various tasks for its users.[1] Now the most frequently asked question by the people is what differentiates a Web Application (Web-App) from a Website? The answer to this question is very simple and can be understood by a simple example of web screen

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Time Series Data Prediction using IoT and Machine Learning Technique

Raghavendr**x**umar^a, PardeepKumar^b, YugalKumar^b

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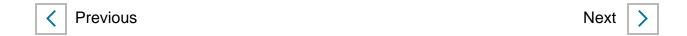
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Abstract

Time series analysis and prediction have been widely accepted in various domains from last two decades. Business analytics, Medical drugs & pharmaceutical, Dynamic Marketing, Weather forecasting, Pollution measures, nancial portfolio analysis and Stock market prediction are the favorite domains among research communities under time series analysis. Since air quality is one of the paramount factors which make life possible on earth and monitoring air quality data as time series analysis is a one of prime area. The most a ected air quality parameters on health are carbon monoxide (CO),carbon dioxide (CO2), Ammonia(NH3) and Acetone ((CH3)2CO). In this paper we have taken the sensor's data of three specic clocations of Delhi and National Capital Region (NCR) and predict air quality of next day using linear regression as machine learning algorithm. Model is evaluated through four performance measures Mean Absolute Error (MAE), Mean Square Error (MS FEEDBACK C

1 of 7 23-Jul-21, 8:45 Pi

Square Error (RMSE) and Mean Absolute Percentage Error (MAPE). The study further assesses with benchmark model and obtains signicant results.



Keywords

Time series; Regression Model ARIMA; Machine Learning



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Impact of Artificial Intelligence in Healthcare

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CURRENT STATUS OF ARTIFICIAL INTELLIGENCE IN EYE CARE

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Abstract

While population ageing has become a huge demographic phenomenon all over the globe, patients with eye problems are expected to rise drastically. Early treatment and effective eye disease care are of great importance to avoid vision loss and improve the quality of life. Traditional methods of diagnosis rely heavily on the clinical experience and expertise of physician's resulting in high error rates.

An important area in computer science is Artificial intelligence (AI). AI has an extensive implementation across many medical sectors and is useful especially in ophthalmology and therapy for several eye defects such as Corneal ectasias ,Glaucoma, Macular degeneration related to age, Diabetic retinopathy ,Cataract surgery, prediction of future high myopia and estimation of lens strength or intraocular disease. Therefore, the Al has the ability to radically change the current pattern of diagnosis of disease and generate a substantial clinical impact. U.S. Food and Drug Administration had approved the first advanced A.I diagnostic tool "IDX-DR" to diagnose Diabetic Macular Oedema and in the meantime, low-cost fundus camera based on smartphones such as DIYretcam, T3retcam was also created for imaging analysis. The article discusses how A.I approaches can deal with these complications and illnesses.

Keywords: cataract surgery, diabetic retinopathy, diagnostic methods, fundus camera, glaucoma

Introduction

Artificial intelligence is the analysis of complex information processing issues, mostly rooted in a type of biochemical data processing. The subject's goal is to recognize and solve interesting and solvable problems in the processing of information [1]. When new breakthroughs and innovations from technology firms and scientists are being revealed, AI has recently re-entered the science and public consciousness. Apart from its ornamentation and aspirations in science fiction, AI is fundamental to a computer industry, which strives to recognize and create intelligent structures, mostly implemented as software programs. The history of AI is long and goes back to a meeting in Dartmouth in 1956 when the term was first used[2]. AI systems have recently sent massive waves of healthcare, and are currently debating how AI doctors can replace human medical practitioners. Human doctors will not be replaced by machines in the foreseeable future. AI will definitely help doctors make better clinical decisions or even substitute human judgment in certain healthcare fields[3].

In the field of ophthalmology AI primarily represents the recognition of medical imaging and supporting diagnosis, particularly in blind-causing diseases. The execution of the AI technology mainly depends on machine learning which consists of a lot of input experimental mathematical algorithms and models[4]. Fundus photography is a non-invasive approach by clicking on images of the retina, optic disks and macula using retinal cameras. It can diagnose and monitor diseases including DR, glaucoma, retina and macular degeneration related to age and plays a vital role in recognizing preventable blindness causes[5]

A.I. in Glaucoma

Glaucoma is the third most visually impaired eye disease in the world and has a critical effect on global blindness. High intraocular pressure, optical nerve head (ONH), retinal nerve fiber (RNFL) defect and gradual loss of view in patients with glaucoma is affected. The automatic detection of glaucomarelated features has considerable significance for its timely interpretation[6]. The Cup to disk (CDR) optical ratio is ideal for detecting glaucoma in patients. Al models can calculate CDR to help diagnose glaucoma at an early stage [7]. Deficiency of RNFL can be the first symptom of glaucoma During recovery from glaucoma, visual field (VF) defect is an important visual function improvement. The use of ML approaches will substantially improve preperimetric glaucoma VF detection from healthy VFs[8The world's second leading cause of blindness is glaucoma. In 2010 the population affected 60.5 million, and it is estimated that this figure will hit 79.6 million by 2020. In reality, no cure exists and once this occurs, visual impairment is permanent. Early detection and treatment can delay or avoid the disease's progression and can protect against serious vision loss. Several investigators have studied whether glaucoma dependent on retinal images can be immediately identified. Historically, glucose optic neuropathy, including severe or extreme myopia, DR and AMD, with established visual disabilities was the main reasons. Pre-perimetric glaucoma and healthy eyes used in earlier studies different specific forms of perimetry[9].

Chronic primary open-angle glaucoma (POAG) is untreatable neuropathy in combination with normal visual field degeneration and IOP elevations. POAG can lead to permanent loss of vision without early diagnosis and treatment. POAG screening and monitoring are important [10]. An AI research in 2013 investigated the development of POAG in 180 patients. with various MLCs and individual characteristics (73 healthy eyes, 107 glaucoma progressed eyes). The features of RNFL alone offered enough details to distinguish between stable and early moderate progression in POAG for MLC to differentiate Random forest vine and lazy K star were the most probable MLCs. To build cost-effective, flexible or more accurate decision-making processes than current methods Al would use sets of data to screen and guide [11].

There are so many people who are at a higher risk of glaucoma than others. They include patients of diabetic, hypertension, migraine, myopia, hyperopia, and people who are above 40 years12] Three types of glaucoma are found normally that is, open angle glaucoma, low tension glaucoma, and congenital glaucoma [13]

Diagnosis of glaucoma

A technique scanning laser polarimetry (SLP) is used to evaluate the RNFL for early detection of glaucomatous injury. This system has many potential benefits. Because the RNFL area expects less biological variation from the optic nerve head, a narrower range for standard RNFL measuring can be described by physicians[14]. Another technology laser polarimetery that enables light (780 nm) using a polarized laser diode. It is a confocal ellipsometric laser that tests the absolute delay of the retina and calculates the RNFL (micron) thickness point to point in the peripapillary area from these results [15] The technique recently used for diagnosis of Glaucoma is the optical coherence tomocraphy (OCT). OCT is a high-resolution technique that produces direct retina observations and RNFL

measurements with a high level of test resistance variability For the identification of glaucoma AI employs artificial neural networks (ANN). ANN owe their name to the parallelism with the biological nervous system in structure and function. It is composed of a community of neurons. The neuron receives different inputs from other neurons at the same time and adds them according to the weights associated with each connection, generating a response that depends on the amount of inputs received and the weights associated with the links [16].

A.I in Cataract

In computational medicine AI holds great assurance. Much attention has been paid to the development of an all-round high accuracy robot with medical diagnostics[17] Cataract is a cloudy-lens disease that affected

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millions of elderly people. Early detection can provide light and improve quality of life for cataract patients. ML algorithms such as RF and SVM were used for diagnosis and assessment of cataracts in fundus images, ultrasound images and visible wavelength eye photographs. After phacoemulsification the risk prediction model was developed for the posterior opacification of the capsule [18]. In addition, a cloud-based framework has been developed that incorporates the AI agent for multihospital collaboration. They have also developed and used clinical application software in the ophthalmic centerZhong Shan [19] Nearly all cataract detection and grading systems have three basic steps. Firstly, the images are prepared: all the unnecessary information is removed and the image is appropriate for further steps. The second step is to remove the function: this is the most important step in extracting the features. Classification is performed according to the apps. Similar image processing methods are used for both of these steps. The final step is to figure it out. For this purpose different techniques of AI and neural networks used [20] A cataract is categorized into three types: (a) nuclear cataract (b) cortical cataract (c) sub capsular cataract depends upon its structure and mode of deposition[21] Wu, X et al. have developed and validated a comprehensive learning algorithm for collaborative cataract management, using three-stage (1) mode-recognition (2) cataract diagnosis and 3) actiological and gravitational revised cataracts[22].

Diagnosis of cataract

The FDS (focus detection system) tests Cataract frequency and vision acuity improvement. FDS could be useful for long term cataract development studies [23]. The parameters tested in the early cataract and post cataract surgery are better enhanced visual impairment (BCVA), contrast sensitivity (CS)[24].

An artificial neural network that is deep convolutional neural network, its discriminative features characterizing high-level information are efficiently and automatically collected, in place of artificially. Moreover extraction and classification roles were merged, demonstrating a higher level of intelligence. This technique is reported to be extremely important for early cataracts and to be diagnosed, and has a large potential for other eye diseases [25].

The deep learning network effectively differentiates the characteristics in the fundus picture from the different nonlinear combinations by a multi-layer nonlinear mapping according to the five-layer convolution layer [26].

AI in Diabetic Retinopathy

In ophthalmology, several early researches in AI concentrated on diabetic retinopathy [27]. The clinical usefulness of deep machine learning algorithm was demonstrated by Gulshan et al. in retinal fundus images measurement from teenagers that detected highly sensitive and precise reflected diabetic retinopathy. Specifically, 2 sets of pictures were evaluated: 9963 images, and 1748 ones, showing that an algorithm of 90.3% and 87% was sensitive and 98.1% and 98.5% was accurate, respectively, to the identification by seven US board certified eye specialists of moderate or worse diabetes or macular edema[28] An article showing how to classify diabetic retinopathy by means of deep learning. 75,137 fundus photographs from diabetic patients were used in public to train and check an AI model to distinguish a safe fundus from a patient suffering from diabetic retinopathy. Their model shows that 94% sensitivity and 98% accuracy used to track fundus images with high accuracy, using their AI-based algorithm. Such AI-algorithms can be applied internationally to reduce the workload and vision losses caused by diabetic retinopathy of qualified specialists [29]. Timely diagnosis and care for DR screening is a universally accepted blindness prevention technique. Different healthcare professionals such as ophthalmologists, optometers, general practitioners, imaging technicians and clinical photographers can do DR screening. Various screening methods include ophthalmoscopy, dilated slit lamp biomicroscopy, mydriatic and non mydriatic retinal photography, teleretinalscreeningand retinal video recording [30].

Diagnosis of DR

Support vector machine training methods are used to classify training data so that images are optimally categorized into PDR (proliferative diabetic retinopathy), NPDR (non-proliferative diabetic retinopathy) or Normal groups. SVM models look for a hyperplane capable of linearly separating object classes. Vector help is used to distinguish between different groups. Using a support vector machine learn, classification parameters are calculated. The training process analyses training data to ensure that photos are categorized in their respective classes in the best way possible. To be statistically significant, the training data should be satisfactory. To generate classification parameters according to determined characteristics, the SVM learning algorithm is used [31].

A modular solution is implemented to eliminate context variance in fovea and non-fovea areas where the image is segregated. The areas are prepared in three main phases 1) normalizing of the image / enhancing and dividing, 2) filtering and thresholding and 3) extraction function in non-fovea regions. The system makes a diagnosis on the basis of the number, size and location of abnormalities after both fovea and non-fovea regions were observed [32].

Conclusion

AI techniques had shown an implied interpretation kit for identification of various disorders in health care. The new model of understanding of disease is amazingly revamped and has a major clinical impact in the future. Using AI techniques had multiply and improved ophthalmologist's tool to diagnose and govern patients. Development of AI into comeal and retina care will create more efficient tool for patients in improving many conditions. This paper highlights the AI applications in the area of ophthalomology.

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VARIOUS TYPES OF QUALITY AUDITS IN PHARMACEUTICAL INDUSTRY

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Abstract

Auditing is one of the essential function in pharmaceutical industries. It is one of the essential part of Quality Management System, Quality audits are generally executed by external or independent experts or any team designated by management. Audits can also be performed for suppliers and contractors also. A well-executed quality audit results in overall improvement of the process and ultimate beneficial for the organization in many ways. The weakness and strengths of the process and quality assurance of any procedure can be easily understood by quality audits. This may be the reason that quality audits comprise important part of GMP system not only for the improvement of the internal procedure but also to comply with regulatory authorities. This article includes principle, objectives, various types of quality audits and preparation of audit reports in pharmaceutical industry. The presented review is not only beneficial for academicians but also to the personnel involved directly or indirectly related to audits in pharmaceutical industry.

Keywords: Quality audits, Pharmaceutical industry, Types of Quality audits, GMP, Quality assurance, Quality defects

1. Introduction

The purpose of conducting audit is to verify the validity and reliability of the information: and to provide assessment of control over any procedure or process. It provides basic the understand organizations control over the quality of its products and processes[1],[2]. The audit in simple term defined as:

"The inspection of a process or a system to ensure that it meets the requirements of its intended use" [1]

ISO defines quality audit as:

"Systematic, independent and documented process for obtaining audit evidence and evaluating them objectively to determine the degree to which the verification criteria are met".[3]

Quality audits should not be considered as threats or review of quality of products rather should be one of the mechanism for quality control in pharmaceutical industry. The results of audits and comments of experts for corrective action provides basis for the improvement of quality of process or products. Thus it should involve all parties to work in accordance with established rules to gain the maximum benefits of this practice. The quality audits also serves means to fulfilling the objective of management for assessment of compliance with the establish regulatory guidelines and also provides basis for continuous improvement program through feedback of every successful audit. Any pharmaceutical company capable of manufacturing drug should be capable of demonstrating with absolute reliability under given optimum conditions with uniformity allowing perfect reproduction of batches. Audit of both compliance and performance is essential part in both ISO and in FDA guidelines.[1]

2. Goals of an audit [2]

The important goal of quality audit is to evaluate existing activities and documentation process ensuring meeting required standards and compliance. Independent evaluation of strength and weakness of quality management system always proved to be in favour of industry because of sustain improvement of the process.

Quality assurance and quality control are tow essential process forming backbone of quality programs of pharmaceutical industry and thus proper control of these process will be beneficial in terms of quality end product and customer satisfaction. With proper planning and execution of Quality Audits any organization can achieve its goals easily. Proper compliance will certainly help in building of brand reputation and avoiding fines, deteriorate public reputations, court fines etc.

3. Benefits of auditing [1]

The major benefits of an effective audit system can be summarized as follows:

- Quality management system management
- Weak points detection in advance through identification of deviations of process or situations
- Minimize quality related issues in product
- Periodic data review decreases deviations and improved understanding about process
- Optimization of output through successful audits
- · Continuous improvement of process
- Combination of improvement of company's performance, compliance and successful audits will reduce the failure cost
- Improvement of understanding on quality related aspects and increase level of compliance
- Mutual confidence between partners, increase in trade and reliability of product

It is important to ensure preparation of clear documentation of procedure of conduct of all kinds of audits. There should be clear objective with brief explanation about the reason of conduct of audit. Some more points of document shall be: Frequency of Audit: Method of establishing frequency of audit should be explained. Frequency of audit should be followed and set according to the requirement.

Responsibilities: The responsibilities of every team member od audit should be properly defined and every person should be clear about the procedures and interpretation of operations that are being audited. If required they should be well equipped with the tools e.g. tools related to sampling etc.

Documentation: Proper document should be prepared for every audit which is also help auditors to review any process and also important for regulatory perspective.

4. Types of audits

There are three types of quality audits

- 4.1. Internal Audits
- 4.2. External Audits
- 4.3. Regulatory Audits
- 4.1. Internal audits:

The other names of this type of audit are First party audit or self audit. The auditors and the process or product being audited belongs to same company. Self audit helps to achieve goals of pharmaceutical industry in a professional way by advising them in improvement of any procedure

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THE APPLICATION AND UTILIZATION OF GAMMA SCINTIGRAPHY AS AN IMPORTANT TOOL FOR EVALUATING TARGETED DRUG DELIVERY SYSTEMS

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Abstract

Gamma- scintigraphy has been derived from the Latin word scintilla, meaning "spark". It is also known as gamma scan. It is an identification test in nuclear medicine. In this, radioisotopes are attached to a drug(radiopharmaceuticals) that are taken internally. It then travels to particular organ or tissue and the emitted gamma radiation is captured by external detectors (Gamma cameras) to form two-dimensional images in similar process to the capture of x-ray images. Gamma Scintigraphy is a widely used technique for development and evaluation of targeted drug delivery systems. The radio labeling is generally achieved by the introduction of an appropriate technetium- 99m or indium- 111 labelled radio pharmaceutical into the dosage form. Pharmaco-scintigraphy provides a sequence related to the site of drug release and absorption. Gamma scintigraphy also provides the information related to the disposition, diffusion and moment of the drug in to the body. Gastro intestinal transit measurement can be accessed through Pharmaco-scintigraphy technique. Pharmaco-scintigraphy can also be used to study multiple-dose study. This review discusses the implications of gamma scintigraphy in the estimation of pharmaceutical formulations including the past applications, current uses and future possible scopes of gamma scintigraphy in the assessment of the performance of various targeted drug delivery systems.

Key words: Gamma-scintigraphy, indium-111, iodine12, technetium-99m.

Introduction

Gamma scintigraphy method is primarily used for the analysis of the functioning of the organ, perfusion, receptor binding, etc. It also provides us with some anatomical insight. Gamma scintigraphy is a major tool that involves the introduction of gamma emitting substance [1]. Visualization is possible by introducing some of the gamma emitting radionuclides internally [1]. The most commonly used radionuclides are Iodine 123, Samarium 153, Indium- 111 (111 In) and technetium- 99m (99m Tc).

Gamma scintigraphy has also been used in the estimation of various drug delivery systems. It is usually applied to evaluate the dosage form intended for the respiratory tract and gastrointestinal tract [1]. For evaluating the amount of drug reaching the lungs, the technique used is called the planar imaging. It is also known as two-dimensional gamma scintigraphy [1]. Gamma scintigraphy can be classified into several different individual techniques, one of which is SPECT (Single photon emission computed tomography). The SPECT technique involves the introduction of cameras equipped with three-dimensional imaging data [2]. SPECT is further sub-divided into two different types based on the resolution, these are Low Resolution Computed Tomography (LRCT) and High-Resolution Computed Tomography (HRCT) [2]. SPECT is more advantageous than 2-D gamma scintigraphy because it allows the determination of regional lung deposition with high accuracy [3]

Gamma scintigraphy also plays an important role in oral drug delivery. Active pharmaceutical ingredients are usually given to the patients in the form of medications generally formulated as either solid, semisolid or liquid dosage forms based upon optimum route of administration, intended target of action, patient palatability etc. So,during the design and development of a particular dosage form, it is necessary to optimize the formulation system correctly in order to obtain the approval for the formulation from the concerned regulatory authorities [5].

This article primarily emphasizes on discussing the methodology, application and utilization of gamma scintigraphy for evaluating the targeted drug delivery system, along with its advantages and disadvantages. This article also provides some brief information regarding the recent advances and future prospects of this technique.

Methodology

Gamma scintigraphy relies heavily upon the detection of the radiation emitted from a radionuclide. The major equipment being used for this purpose is known as a gamma camera. It is equipped with a scintillator which transforms the gamma radiation into an emission of light. The most widely used scintillator is a monocrystal of sodium iodide activated by thallium [4]. The thickness of the crystal is limited to approximately 10 mm to optimize the detection efficiency. Joined to the crystal are the hexagonal array of photomultiplier tubes. They detect the light pulses. The whole arrangement is sheathed inside lead to shield the crystal from superfluous radiation[5]. A collimator made up of lead is placed straight away in front of the crystal to prevent any radiations arriving at angle. Electronic circuitry is used for amplifying the light signal produced in the crystal and for quantifying the intensity of the incident gamma ray and also for locating its origin. Thus, it becomes possible to determine the distribution of the tracer on an image formed as matrix pixels [4]. The pulse height analysis improves disparity resolution of gamma camera systems by somewhat eliminating scatter from the final image. Photons travelling directly from their point of origin will produce energy or Z pulses over a relatively narrow range [6]. The ability of a gamma camera to record a diagnostic image depends on the scientific capabilities of the gamma camera and on patient factors such as body habitus [7]. Nowadays, many of the population has tended toward a higher body mass index due to prevalence of obesity amongst the urban and semi-urban populations [8].

While comparing the different gamma-imaging agents, ⁶⁷Ga has several properties which are unacceptable for the clinical nuclear medicine diagnostic imaging. These include the unacceptable physical imaging characteristics of immense high energy emissions (397 keV and 300keV) and a 78-h half-life [11].Indium-111 has farbetter physical imaging characteristics compared to Gallium-67 with lower energy emissions (247keV and 172 keV) and a slightly lesser half-life of 67-h. But regrettably Indium-111 is comparatively expensive because it is being created by a cyclotron [11].

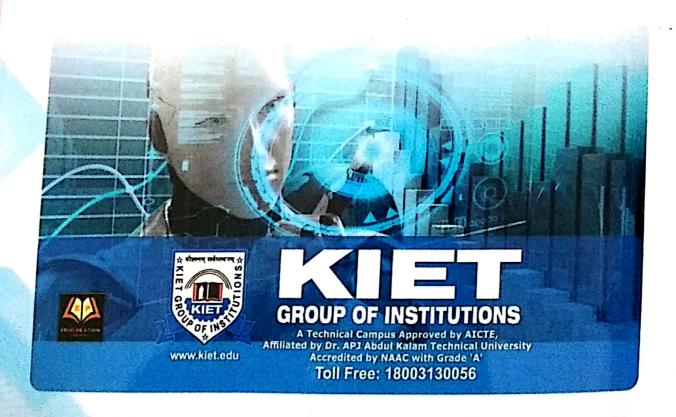
In nuclear medicine, ^{99m}Tc is the most widely used gamma-imaging isotope as about 70% of all gamma-scintigraphy procedures are being performed by using this isotope. It has an ideal short half-life of 6-h and gamma photon energy of 140 keV. Due to these properties the emitted photons of ^{99m}Tc escapes the body of the patient without an excessive dose of radiation being absorbed by the body tissues. ^{99m}Tc is being generated by its precursor ⁹⁹Mo.



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ANTI-INFLAMMATORY AND ANTI-ARTHRITIC ACTIVITY OF CHLOROFORM AND ETHANOLIC EXTRACT OF Punica Granatum Linn.

Anjali*1, Praveen K Dixit1, Ashish1

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Abstract

The study was performed to determine the anti-inflammatory and anti-arthritic action of *Punica granatum's* seed extract using in vitro models as well as their phytochemical analysis *Punica granatum's* seeds were extracted with ethanol and chloroform solvent and by using HRBC membrane stabilization method and protein denaturation inhibition test in-vitro anti-inflammatory potential was evaluated significantly. The results of the study demonstrate that the *Punica granatum* extracts contain various active constituents having anti-inflammatory activity and HRBC (Human red blood cell) membrane stabilization. Thus, the protein denaturation inhibition method and HRBC membrane stabilization assay showed the

Introduction

Plants has been used for medicinal purposes since prehistoric period and the medicinal plants always have a significant role in developing countries for potent therapeutic agents. Representation of rich in culture, natural and traditional biodiversity gives a unique opportunity for researchers on drug discovery all over India.

Inflammation is a host defence mechanism and a reaction to foreign substance, irritation, and infection to destroy and eliminate physical dysfunction. During inflammatory process, an enzyme, called Lysosomal enzymes is released to cause various disorder that leads to lipid peroxidation of membranes and damage the macromolecules for tissue injury. [1]

The responses involved in inflammation usually changes with time and follow some phases too. The first and rapid phase involved increase in blood flow, oedema, vasodilation, and pain. It mainly occurs within few seconds. The acute and chronic inflammatory phase involved moderate and dramatically increased inflammatory mediators respectively.^[2]

Rheumatoid arthritis (RA) is defined as an autoimmune diseases (systemie) that distinguish by destruction in cartilage and bone with chronic inflammation. It mainly causes synovial cell's hyperplasia and angiogenesis of influenced joints. The chronic inflammatory mediators that play an important role in this are TNF α , IL-6, CD4 cells, and macrophages. [3]

Punica granatum L. (Pomegranate or Anar) is a deciduous shrub or small tree, growth of 1.8-4 6m tall, belonging to the family Punicaceae. The fruits of pomegranate itself possess various therapeutically important constituents and many of these constituents are effective in treatments of various diseases. According to the recent and advanced studies, it was found that the Pomegranate whole plant parts contains various chemical constituents like tannins, saponins, ellagic acid, gallic acid, triterpenoids, polyphenol including punicalin, punicalagin, and anthocyanins, etc. All these chemical constituents have nutritional and medicinal use in treatment of arthritis, obesity, cardiovascular disease, neuroprotective, male infertility, erectile dysfunction, infant brain ischemia, cancer, diabetes, skin and dental problems.

Material and Methods

Plant Material

The seeds of *Punica granatum* was assembled from local market of Old Delhi, India in 2019 and its authentication was done by National Institute of Science Communication and Information Resources (NISCAIR), New Delhi, India having Ref. no. NISCAIR/RHMD/Consult/2019/3540-41.

Preparation of plant extracts

significant concentration/dose dependent activity. The result is compared with the reference drug Diclofenac sodium. The present study examined that the ethanolic and chloroform extract of *Pumca granatum* seed as anti-inflammatory potential due to presence of alkaloids, gallic and ellagic acids, steroids, tannins, terpenoid etc. and has given a pharmacological evidence for the use of *Pumca granatum* as an anti-inflammatory agent.

Keywords: Punica granatum, Anti-inflammatory activity, HRBC membrane stabilization method, protein denaturation inhibition method

The seeds were firstly dried under the shed condition for few days and then powdered into the course form. The powered seeds, using soxhlet apparatus, were successively extracted with chloroform and ethanol. After 24 hours of extraction the residues were collected and distillation was performed to separate or evaporate the solvent to give the required fractions. The fraction was suspended for concentrated dryness to obtain solid residues.

Preliminary phytochemical evaluation[2]

Both the chloroform and ethanolic extracts of *Punica granatum* seeds was conducted for detection of phytochemical constituents present in it. The screening of phytochemical properties was performed by using these methods as described below.

Detection of alkaloid

- Mayer's Test Test sample was tested by adding few drops of Mayer's reagent (Potassium mercuric iodide) and a yellow creamy precipitate formation shows the alkaloids test positive.
- Hager's Test Test sample was added with Hager's reagent (few drops)and a yellow precipitate indicates alkaloids presence.

Detection of carbohydrate

- Molisch's Test Few drops of reagent was added to the extracts and then few drops concentrated H2SO4 was poured by the side of the test tube. When a reddish violet ring appears at the junction of the two liquids, it indicates the positive sign for carbohydrates.
- Fehling's Test Fehling solution A and B was added equally to the sample extract then heated till yellow or brownish red cuprous oxide precipitate was formed for carbohydrate indication.

Detection of saponins

Foam Test The extract was mixed with normal water (2-3ml) and shaken until the froth or foam formation. If the froth would last in 10-15 minutes, saponins was detected in the sample.

Detection of flavonoids

- Ferric Chloride Test Add ferric chloride (few drops) to the sample extract and flavonoids presence was indicated by blackish red colour formation
- Lead Acetate Test In the test sample add 4-5 drops of lead acetate for the formation of a yellow precipitate to indicate flavonoids in sample.

Detection of steroids and triterpenoids

 Salkowski Test Few drops of Chloroform was added in the test sample and then treated with concentrated

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ARTIFICIAL INTELLIGENCE-HEALTHCARE, CURRENT TRENDS **ANDFUTURE**

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Abstract: AI the term broadly refers to computing technologies that resemble processes associated with human intelligence, such as reasoning, learning and adaptation, sensory understanding, and interaction. There is no universally agreed definition of AI. AI address to imitate the human intellectual functions. It is bringing a standard to healthcare sector, co-powered by increasing availability of healthcare data and momentum of analytics techniques. We present the current situation of AI applications in public healthcare and discuss its future. AI can be applied to various types of healthcare data for both analytical and non-analytical areas. AI is being trialled for a range of healthcare research purposes, such as detection of disease, management of chronic conditions, delivery of health services, and drug discovery. AI include the various techniques such as machine learning methods used for structured data, modern deep learning, and the classical support vector machine and neural network, and the as well as natural language processing for unstructured data. Cancer, cardiology, and nerve system they are major disease areas where AI tools are used. This full paper presents a review on details of the AI application in early detection and diagnosis, treatment, as well as conclusion prediction and evaluation. We wind up with the correlation

Early Detection Research Diagnosis AI and Robotics Decision Making Accuracy Diagnosis/ i reaument

Intelligence

In the case of chronic diseases, AI provides an early diagnosis. Such as "Lab-on-a-chip" devices that are used to detect and monitor the infected cells of bacteria or virus an invention of AI. The following example does support the argument.[5] an application of smartphone "AiCure" that takes care of patient adherence to the medical prescriptions. This in time reminding makes sure especially for geriatric patients to take their medication on the proper time to meet the tasks ordained by their doctors. AI models can better use in treatment processes based on patient's history too.

Predicting the future with AI is no more a magic art. Several platforms provide AI software development. For exampleTensorflow, Cloud Machine Learningplayment, Ayasd, etc.

of AI systems, such as IBM Watson, and hurdles for reallife deployment of AI.

Key words: Artificial Intelligence, analytics techniques, healthcare- research, Prediction- prognosis evaluation, sensory understanding.

1. Introduction

Artificial intelligence (AI), a human intelligence cloning, enables machines and computer systems to perform in a remarkably intelligent manner. AI system excises in a way that helps its analytical self to unimaginably maximize its possibilities of success.[1]

AI is a modern technique useful in medical healthcare. With the help of AI, doctors could easily diagnose and treat the disease and related symptoms.[2] AI is not a substitution of physicians but a catalytic tool that assists the physician to make batter clinical decisions towards individual patients thus boosting the customary decisions. This article represents the current trends of AI and future aspects as well. Day by day AI is getting increasingly refined at doing the tasks, which are otherwise done by humans, more competently, accurately, speedily, and with competitive cost.[3] The potentiality of both robotics and AI in the public healthcare sector is truly immense, becoming an indispensable part of the healthcare ecosystem.



AI is used in the working of the app Ada Health Companion to operate a chat-bot, which combines the information about symptoms, obtained from the user, with additional data to offer plausible diagnoses.[6]

Applications Of Artifical Intelligence In Research And Healthcare

Medical investigation

One of the uses of AI is in the analysis and identification of patterns in large and complicated datasets at a faster rate and better precision than has been possible previously. It can be used in the search of the experimental literature for related studies and also to even combine varied kinds of data in the field of new drug discovery.

Clinical application

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NANOROBOTICS: APPROACHES, APPLICATIONS AND FUTURE PROSPECTS

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Abstract

Nanotechnology has major impact in many fields like medicine and electronics. Nanorobotics is an emerging field dealing with minute things at molecular level. They can perform a particular function with precision at nano-scale dimension. Nanorobots in medical and pharmaceutical field would particularly use in the treatment of diseases such as Alzheimer's and Cancer. Nanorobots play a significant role in the field of biomedicine. Nanorobotic technology is also used in the elimination of faulty part in our DNA structure. These nanorobots can also be used as targeted drug delivery system as they are able to carry and deliver drugs into defective cells. Nanorobot is a magnificent tool for future medicine. Various approaches, concepts of design of nanorobot are proposed which shows rapid progression in this field. The aim of this review is to providebrief information about the nanorobotic technology with special focus on prospective applications in terms of pharmaceutical and medical field and the future prospects of this technology.

Keywords: Nanorobots, Nan robotics, Nanotechnology, Biomedical.

Introduction

Nanorobotics is a science that deals with designing and developing nano-size bio responsive system which are able to diagnose and deliver the drug to the targeted size [1]. The components of nanorobots consist of motors, power supplies, onboard sensors, manipulators and molecular computers. Nanorobots could carry and deliver drug to the target site. These Nanorobots will be capable of repairing tissues, cleaning blood vessel and airway and even likely to counteract the aging process. Nanotechnology consists of characterization, production and utilization of nanoparticles in medical field [2]. As the biomedical technologies require innovative systems to replace the typical procedures, the requirement for selective drug delivery system is increasing day by day. We can replace the traditional methodologies and instruments by designing a nano-scale delivery system. Nanorobots are the feasible solution to this and can overcome some other medical challenges. Nanorobots will have the ability of actuation, sensing, signaling, information, processing, intelligence, manipulation and surge behavior at nano-scale [3].

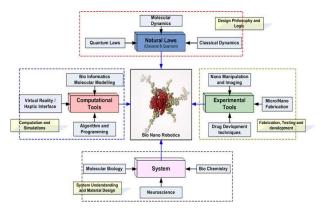


Fig.1: Nano robotics: Amultidisciplinary area [3].

Nanorobot is the minute structure that can easily transverse the human body. The scientific studies conclude that the exterior of the nanorobotsismade from carbon atoms in a diamonded structure because of its inert properties. Glucose and oxygen might be a source of impelling force and nanorobot will have other molecular components depending on its particular function [4]. Very large number of Nanorobots are required to work together to perform miniscule function as they would be microscopic in size. These Nanorobots swarms both those which are not able to replicate and which are capable of unconstrained replication in the natural environment are found in many science fiction tale such as the Borg, Nanoprobes in Star Trek [5].

Different approaches of nanorobot

Biochip

Biochip are applicable for fabrication of Nanorobots for healthcare application such as for surgical instrumentation, diagnosis and drug delivery. Currently Biochip is used for manufacturing by electronic industries. Nanorobot with biochip can be merged in nano-electronic devices which will make it capable of teleoperation and allow advanced capabilities for medical instrumentation [6,7].

Bacteria Based

This approach utilizes biological microorganism such as Escherichia Coli bacteria. This model uses flagellum as driving force for propulsion. In this biological integrated device, electromagnetic is also applied to control the motion [6,8].

Positional Nano Assembly

Robert Freitas and Ralph Merkle in 2000 were developing the agenda specially for developing positional-controlled diamond mechanic synthesis that would be able to fabricate diamonded medical nanorobots.

Nubots

Nubots is an abbreviation for "Nucleic acid Robot". Nubots are the molecular tools at nano-scale. Biological circuits gates based on the DNA material have been fabricated as molecular machines to allow in-vitro delivery of drugs for selective health problem [9].

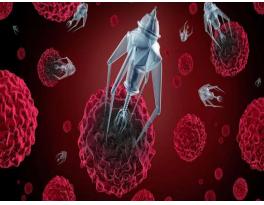


Fig.2: Nano robot treating cancerous cell [10].

Mechanism of nanorobots

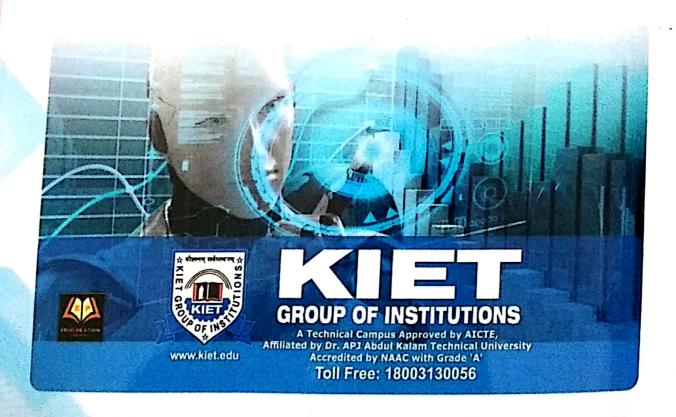
Nanorobots with implanted nano-bio sensors and actuators is considered to be the latest prospects for providing the advanced medical devices to doctor. Controls are sought to effectively



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ASSESSMENT OF ANTI-INFLAMMATORY AND ANTI-ARTHRITIC POTENTIAL OF JUSTICIA GENDARUSSA LEAF AND STEM IN FCA INDUCED ARTHRITIS IN WISTAR RATS

Ashish*1, Praveen K. Dixit², Anjali3

KIET School of Pharmacy, KIET Group of Institution Ghaziabad, APJ Abdul Kalam Techanical University, Delhi NCR, Ghaziabad, India

Justicia gendarussa Burm f. (family Acanthaceae) is also known as willow-leaves in English and commonly also known as Nili-Nirgundi, it is native to china and also very commonly found throughout the vastly part of India and Andaman islands, It is traditionally used to treat various diseases such as wound healing, anti-inflammatory, antioxidant, anti-proliferative, anti-arthritic etc.

The basic focus of this study is to find-out the antiinflammatory potential of ethanolic and chloroform extract of leaf and stem part of Justicia gendarussa by using protein denaturation method and (HRBC) human red blood cell membrane stabilization method.

gendarussa, Keywords: Anti-inflammatory, Justicia Acanthaceae, HRBC, Protein denaturation

Introduction

Inflammation is a defense mechanism of host response to the external inflammatory reactions that leads to the increase synthesis and release of the various inflammatory mediators, they play the crucial role in the restoration of the cellular structure and their function.[1]

Inflammation is a protective reactions of the human immune system against various sort of detrimental stimuli like as pathogens, damaged cells, toxins (Biological and Chemical toxins) or irradiation and acts by to inhibiting the pathway of these inflammatory responses.[3]

However the prolonged inflammation increase the chances of the severe cellular injury and play a very crucial part in the pathogenesis of the various inflammatory diseases.[1]

The beginning of inflammatory responses when the activation of the leukocytes occurs in inflamed tissues. An enzyme Phospholipase A2 (PLA2) breaks the membrane phospholipids and liberates the membrane bound archidonic acid (AA) and lipoxygenase (LOX) to synthesize the various sort of inflammatory mediators. [2]

At the level of tissue the sign and symptoms is redness, swelling, heat, pain and loss of function, while on the circulatory events they occur in the process of inflammatory events include increase vascular permeability, migration and accumulation of leukocytes and synthesis and release of various sort of inflammatory mediators.[1]

Activation of Inflammatory Pathway

The pathway of the inflammation involves in the pathogenesis of a number of acute or chronic inflammatory diseases and they also share the common inflammatory pathway in various sort of inflammatory diseases.

Activation of the intracellular inflammatory signaling pathway activates the production or synthesis of the various kind of inflammatory mediators. The main foremost inflammatory stimuli, which include biological products and cytokines such as interleukin-1β (IL-1β), interleukin-6 (IL-6), and tumor necrosis factor-a (TNF-a), mediate inflammation through interaction with the TLRs (Toll like receptors). II.-1 receptor (IL-IR), IL-6 receptor (II.-6R), and the TNF receptor (TNFR) Stimulation of inflammatory receptors play the major role in the activation of various

signaling pathways inside the inflammatory cells, including the mitogen-activated protein kinase (MAPK), nuclear factor kappa-B (NF-kB), and Janus kinase (JAK)-signal transducer and activator of transcription (STAT) pathways [3]

In the response against the extracellular stimuli, like bacterial lipopolysaccharide (LPS), is stimulated and promote the inflammatory genes transcription factor like NF-kB Activation of subsequent pathway promote the transcription of a number of genes involved in inflammation, such as cyclooxygenase-2 (COX- 2), inducible nitric oxide synthase (iNOS), and specific cytokines. The inducible iNOS promotes the synthesis and releasement of a colossal quantity of nitric oxide, which they play a vital role in pathophysiology of the disease. The induction of the COX-2 is depend on various kind of stimuli and mainly responsible in the synthesis of larger amount of the pro-inflammatory prostaglandins on the place of inflammatory reaction. The other pathway involve pro-inflammatory mediators like leukotrienes (LTs) which is synthesized by the action of membrane arachidonic acid through the involvement of the 5-LOX pathway are involved in a different sort of homeostatic biological reactions and different kind of allergic responses [1]

There are some plants having analgesic and antiinflammatory activities now become popular for the modem medicine system. So many plants which belongs to the family of the acanthaceae having the wide range of pharmacological and biological activity.[4]

Complementary and alternative medicine (CAM) is therapy of the disease by using the natural product they implicate the various sort of approaches like as herbal medicines. CAM steer relevant novel knowledge of the natural product therapy by the ethnopharmacologists and also helps to the person involves researchers and prove their clinical efficacy. In this category one important plant having the crucial medicinal value is Justicia gendarussa Burm.f., belonging to the family Acanthaceae.[2]

Material and methods

Plant Materials

The aerial part (leaf and stem) of Justicia gendarussa (F Acanthaceae) were procured from Delhi, India and the plant authenticated by National Institute of Science Communication and Information Resources Delhi (Ref. No-NISCAIR/Consult/2019/3539-40).

After procurement, the leaf and stem were shade dried and grounded into a coarse powder and kept into container for use in the study

Preparation of Extract

Aerial part of plant (leaf and stem) was extracted by using the solvent ethanol and chloroform through the soxhlet apparatus. Extract (JGLC, JGLE and JGSE) was filtered and evaporate to dryness and to get the dry extract. The extract was kept in vacuum desiceators until use. These extracts were screened for the presence of phytoconstituents like steroids, triterpenods, alkaloids, saponins, phenolics. flavanoids, etc.

HRBC (H method Reagents

For the p dextrose, 0.42gm sc up the vol Preparatio 0.36gm o To prepa Sodium c For the p 2.38gm d dihydoge dissolve Human r vitro anti extract) who has anti-infla The fres Alsever solution) separate washed (.85%, p make the The tota buffer. suspensi extract compou 1600 µg The wh period (the mix of 20m content spectop The t stabiliz % hen density The to by % Prot density Evalua denati The to

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TELEPHARMACY: A NEW CONCEPT FOR PHARMACY PROFESSION

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Abstract

The word "tele" is a term of Greek language "Telos" which is used for "at a distance", so Telepharmacy is a distribution of medication and providing pharmaceutical care using telecommunications to patient at a distance by a registered pharmacist. In telepharmacy profile pharmacist play a crucial role in the supply of pharma services. Pharma professional can minimize the adverse drug event by reviewing the medication orders. This concept is rapidly growing field, which has a very good focused impact on healthcare delivery in many areas. Backwoods area and communities, generally lack of easy access to Pharmaceutical care services due to some geographical and demographical factors, thus it is a rapidly increasing area in rural zone which include communication between pharmacist and patient. The objective of this review is to find out how telepharmacy is recently being practiced within rural zone and community, its usefulness, and how it is being control. on the other hand, it can minimize travel time and other extra expense, which are major obstacle for elderly and disabled veterans of rural community. Now a day, it is still a new approach, and there is a slow implementation of new laws to regulate this field, although professional and technical innovations are being used.

Keywords: Pharmacist, Pharmaceutical care, Patient counseling, Rural area and Telepharmacy.

Introduction: Telepharmacy is providing the pharmaceutical services to the patient by means of telecommunication in such a way when there is no direct contact of patient with pharmacist. In telepharmacy patient counseling is done through videoconferecing [1]. "Telepharmacy is a novel approach which can be used when pharmacist is physically absent to supply the quality of pharmaceutical care which is needed."

- Allie Woods, ASHP. Telepharmacy is still a new concept, and there is a lack of laws, although pharama professionals are being involved. The zones which include telepharmacy services, there is a deficit of symmetry in rules and regulation among various legal judgements. Accomplishment and effectuation of complete and systemic telepharmacy rules are still a challenge. The success of this services depends on an efficient internet connection [2].

Kinds of Telepharmacy:

Indoor patient (remote order-entry review): This type of pharmacy are related to inpatient pharmacy which runs under the supervision of professional pharmacist at a remote location of a hospital performing remote order-entry services

Remote dispensing (retail/outpatient/discharge): A Retail telepharmacy, is a certified pharmacy staffed by a professional pharmacy technician . A qualified pharmacist controls the technician and reviews prescriptions. Remote dispensing telepharmacy is just like a traditional pharmacy, except the professionalist is located on off-site.

Intra Venous admixture: The JCAHO describe Intra Venous admixture as, "the formulation of pharmaceutical related brand which essentially requires the calculated addition of a medicament to a 50 mL or larger bag or bottle of i.v fluid."

Remote counseling: Remote-patient counseling balances to pharma professional in providing patient guidance via a liveand-interactive video conferencing [3].

There is a very less chances in telepharmacies error rate just about $\leq 1\%$, approximately 50% positive change over traditional method. — United State Health and Human Services department. In rural areas there is a need of qualified pharmacist because of severe pharmacist storage. In rural zone, some communities do not possess a pharmacist, medicine center or pharmacy. Telepharmacy concept helps in availabling resources to supply pharmaceutical care, product and services to rural patients and remote zone of their states [4]. Pharmacists have extensive knowledge and skills that certify them to helps in reduction in the risk of medication related errors and Adverse Drug Events and to balanced medication-related outcomes in hospitalized patients [5].

Recent Telepharmacy Programs:

Pharmacist-Conducted clinics: Pharmacists, employed under collective practice agreements with doctor and using technology and the net, give patient care by checking lab test results, adjusting and providing medications, and controlling chronic diseases.

In house limited drug distribution organisation: Before doctor can write prescriptions for some medicines (such as, dofetilide and alpha one- proteinase inhibitor), professionals must ensure the clearly defined criteria have been encountered (i.e, lab tests are strickly performed or other precautionary ways performed). Some sofisticated pharmacy organizations show lab test record and other important patient related info at the same time of prescription refill. Computer and other personal digital assistant are utilized during home visits. Pharma professionals and nurses can become more effective when they use technology such as lappy, hand-held computers, tablets and—ultimately wearable computers when they reach patient homes. documentation is streamlined, paperwork is uniform, and technical programs (including CDROMs) are available. High effectiveness means that much more patients can be seen. Patient information is downloaded routinely in every evening and shared with other staff members. A link system is developed between the patient and the care team staff members that permits larger number of direct interactions and Supportive knowledge-based relationships. Call centers services and the net are being used to create supportive educational-based relationships between patients and healthcare professionals. The aim is to develop closer direct interactions between healthcare professionals and patients or consumers by providing suitable choice and well defined access through branded programs and services [6].

Telepharmacy is a recent developing concept which appears to be using technology that showed a unique and innovative way to deliver quality pharmacy related services to rural and regional field [7]. on the other hand it minimize travel time and other expense, which are major obstacle for elderly and disabled veterans of rural area[8]. A number of hospitals, medical store, clinics, and medical centers in rural area are currently facing the shortage of local pharmacy services where medications are provided without the involvement of a pharmacist[9, 10]

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FORECAST IN PHARMACEUTICAL INDUSTRY USING ARTIFICIAL INTELLIGENCE, CURRENT AND FUTURE ASPECTS

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Abstract: "Forecasting" The term broadly refers to the process of prediction as per the customer's demand based on the huge historical sales data in the pharmaceutics industry. The aim of forecasting help to understand the market value and enable to predict the optimum level of customer demands. There by business management facilitate to augment the future requirements from the previous sales quantity documents by considering both major and minor factors in broad spectrum. This full length Paper discuss the details of marketing, new product launch and specialized aspects such as orphans and bio-similar drugs. Artificial intelligence(AI) plays a strategic role to forecast the probable market requirements in advance for the industry and prepares to face future challenges. Forecasting could be multi directional, application based on various approaches of pharmaceutical industry such as Artificial neural network topology (ANN), Adaptive Network Based Fuzzy Inference System (ANFIS) which can be applied as a neuro fuzzy approach and proposed model approaches. This paper presents a detailed account on the key role of AI pertaining to the techniques that help pharmaceutical industry supported by applications, illustrates, effectiveness and approach.

Key words: Artificial intelligence, Artificial neural network topology, business management, forecasting techniques, pharmaceutical industry.

Introduction

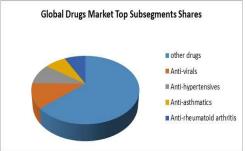
"Forecasting" is the process of using the pattern contained in huge historical past sales data to predict future values. Forecasts are helpful to predict the future levels of sales, demand, inventories costs, imports, exports, and prices among others in the forms of numeric. The aim of forecasting is to guide the management to plan the requirements for marketing effort, material, personnel, production and market shares of the competitive products as well as marketing conditions are assist. Clear and wellprepared forecasts should be accurate enough to allow for better future planning and control could not be validated without the forecast. Demand forecasting is one of the main inputs when developing long-term strategic plans. It is a method of analysing the past and current historical data to determine future values. Hence, forecasting is the making of predictions about the future performance based on past and current huge data. Forecasting is necessary because in recent era, health and treatment services are facing issues. AI application in the pharmaceutical industry is beneficial for attaining strategic records.

1.1 Forecasting in the Pharmaceutical Industry

In 2018, the Business Research Company has published a blog in *Market Research.com* that examined the largest pharma market globally is for major industries like Piroxicam Glaxo, Dolonex, Felden and Piroxicam Pfizer etc. Which are huge giants in the manufacturing of drugs for long term treatments such arthritis, osteoporosis, tunnel syndrome, tendonitis etc. This division counted for 14% of the global total in 2017. Cardiovascular, oncology and anti-infective are the drugs rated as the 2nd, 3rd and 4th largest markets.

Up to 2021, the fastest-growing segment of the global pharma market will be occupied with drugs for treating metabolic diseases, thyroid related and pituitary gland. This segment would constantly grow at 9% rate and their recent growth is of 11.6% high but, the forecast would be that it

will grow more to capture the 5th position of market size in future. Largest sub-segment of the global pharmaceutical industry is the anti-diabetics drugs worth over \$85 billion in 2017; 2nd are the anti-viral and 3rd comes to the anti-hypertensive. Drugs for some of the less prevalent cancers drugs are the fastest growing sub segments. Because the USFDA has allowed a less rigorous regulatory procedure and lower endpoint benchmark for cancer drugs, there are all the chances of increasing the rate of innovation.

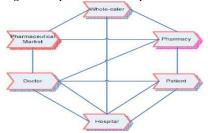


Materials and methods

2.1. Structure of the pharmaceutical industry

It is one of the main process of planning for forecasting in pharmaceuticals industry. It gives the information about which products are purchased, when, where and in what quantities. By incomplete forecasting techniques pharmaceuticals manufactures are affected. In a developed pharmaceutical market where predations are made using large data comparisons and AI, are seen on both valuable in terms of information and balanced market power about each product. In other words obtaining the forecasting techniques' by using terms & conditions, systematically sharing all available information and independently to develop demanding scenarios from political terms and conditions with greatest accuracy could be achieved by modern technology of AI.

Fig2.1. Complex structure of pharmaceutical market



All pharmaceutical companies are in a close relationship with pharmacy (wholesaler & retailer), doctors and patients. All pharmaceutical formulation should manufacture according to guidelines such as Food and Drugs Administration (FDA) and Goods Manufacturing Practices (GMP). For the new challenges of the modern economy. For new drugs development manufacturing management and supply chain cause the progressive effect on pharmaceuticals companies that help the economy growth for any country in the world.

2.2The proposed methodology

There exists an implicit and explicit assumption in direct human judgements with limited quantitative data. Two

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QUALITY BY DESIGN (QBD) AND MULTIFUNCTIONAL EXCIPENTS: A NOVEL HEAD-BRIDGE FOR THE RESEARCH &FORMULATION DEVELOPMENT

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¹KIET School of Pharmacy, KIET Group of Institutions, APJ Abdul Kalam Technical University
Ghaziabad, India

Abstract

The pharmaceutical industry demands innovation in short period of time so as to gain access to new products in market and has undergone a paradigm shift from traditional quality by testing (QbT) to the systematic quality by design (QbD) approach for attaining efficient development of drug products with enhanced quality and resource economics. Pharmaceutical formulators are demanding more performance and functionality from pharmaceutical excipients. Basically formulation development is nothing but playing with different additives of formulation. QbD and multifunctional excipients give patients a more effective and safe formulation. We play a critical role in ensuring reliability, efficacy, cost reduction, increasing production performance and helping to deliver a stable dosage type that is unaffected by process parameter variations or other ingredients. The need of the day is to improve drug formulations by reducing the investment in number of excipients. Implementing QbD and using multifunctional excipients have become a widely applicable production technique and go far beyond the pharmaceutical industry. This work approaches to give a insight to researchers that how working with multifunctional excipients and following QbD methodology beneficial, safe and effective formulation

Keywords: Quality by Design (QbD), Multifunctionality of excipients.

Introduction

The changing scenario of the pharmaceutical industry to fulfill global requirements is increasing the commercial pressure on research and development sectors to reduce duration of formulation development for increasing the launch of new pharmaceutical product into the market [1] while pharmaceutical QbD is an advanced methodical approach in formulation and development that starts with pre-defined objectives and emphasizes process and product understanding and quality control and risk management [2]. Sensibly all pharmaceutical products contain excipients, which are added for the purpose of controlling release profile, patient acceptability, improving statbility of formulation and increase rate of production [3]. Therefore, formulators are demanding more performance and functionality from pharmaceutical excipients. Basically formulation development is nothing but playing with different the additives of formulation composition [1-3]. Excipients participates an important role in the formulation development processes. They carry out an extensive range of functions to offer desired properties for the finished drug formulation. There are 13 categories of excipients for solid dosage forms and more than 1200 types of excipients. As per the International Pharmaceutical Excipients Council (IPEC) the essential excipients are binders, disintegrants, fillers, lubricants, glidants, compression aids, colors, sweeteners, preservatives, suspending /dispersing agents,

formers/coatings, flavors, and printing inks. In the similar

manner QbD has facilitate the advancement and continuous

development of drug product throughout the product lifecycle [4].

According to ICH Guidelines the Quality By Design is defined under the ICH guidelines as "A systematic strategy to develop a better understanding of predefined aims and emphasize on the product, manufacturing process and process control, based on sound science and quality risk managements". It also draws a relationship between pharmaceutical industrials and drug regulatory authorities to move ahead in a holistic, scientific, risk based and practical approach for pharmaceutical product development [6].

Also, these both approaches i.e. use of multifunctional excipient and following QbD strategies offer more effective, cheaper and safer finished products. They play a crucial role in achieving improved manufacturing efficiency, stability, cost effectiveness, and help to produce a robust formulation that is impervious by changes in standards [7].

The aim of this systematic review is provide a insight towards use of multifunctional excipients with following guidelines of QbD as they both are well-characterized and reliable development effort that can be established with a high degrees of assurance to regularly control to produced the data and finished product to meet out predefined criteria when operated within defined precincts [8].

Definitions

Excipients

The approved pharmaceutical ingredients that are introduced into the formulation to increase the bulk and stability are inert in nature and safe for human use. Excipients of the formulation also promote accuracy, stability and precision. They are used in the formulation for masking of the taste, enhance the flowability, improve the bulk density and control the release rate of the drug [9].

Co-processed excipient

According to the IPEC (international pharmaceutical excipients council) these are the combination of 2 or more compandial or non compandial excipients. These excipients are capable to modify the physical properties of the drug product, which is not possible with simple mixing and without chemical change [10].

Synthetic Excipients

These types of excipients are use for the prepration of tablet and solid dosage forms. With the help of these excipients we can improve binding ability, decreses the die wall friction between tablet and tablet punching press and maintains the pH also [10].

Multifunctional excipients

It is a combination of co-processed and preprocessed excipients that provides more than one functions to the formulations. For example silicified microcrystalline cellulose processed combination of colloidal silicon-di-oxide and micro crystalline cellulose [1, 9-10].

ObD

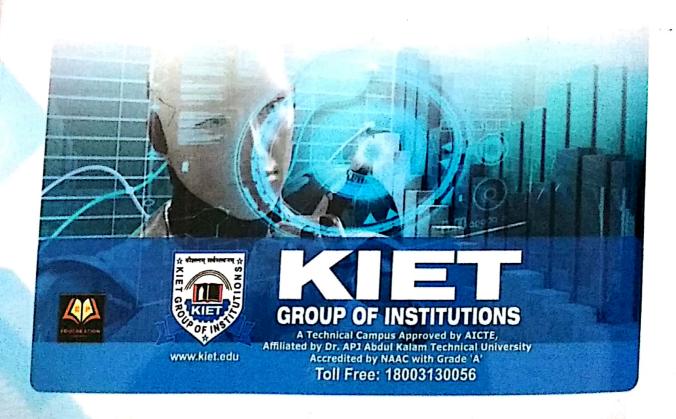
Quality by design is a systematic perception to widen a quality based and predefined objective of pharmaceutical finished product [11].



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ANTIOXIDANT EFFECT OF ALCOHOLIC AND HYDRO-ALCOHOLIC EXTRACT OF TERMINALIA ARJUNA & SYZYGIUM CUMINI.

¹ Harshit Takru, Praveen K. Dixit¹, Kapil Kumar¹ 'KIET School of Pharmacy, Ghaziabad

Objective The objective of the present analysis was to evaluate the antioxidant effect of Alcoholic and Hydro-Alcoholic extract to Terminalia arjuna & Syzygium cumini

Results An Ash value of the drug gave the organic composition or the earthy matter and other impurities with the drug. Both Terminalia arjuna and Syzygiumcumini plants extracts showed the presence tannins, phenolics, alkaloids, amino acids & proteins, saponins and flavanoids. The maximal activity of Standard (Ascorbic acid) against DPPH is 95.94% as shown in Table 4. IC50 has found to be 1.56 µg/ml in Figure 1. The maximal activity of Alcoholic extract of Terminalia arjuna against DPPH is 85.96% and IC50 has found to be 20.05 µg/ml in Figure 2. The maximal activity of Hydroalcoholic extract of Terminalia arjuna against DPPH is 90.63% and IC50 value has found to be 55.39 µg/ml in Figure 3. The maximal activity of Alcoholic extract of Syzygiumcumini against DPPH is 88.86% and IC50 values has found to be 24.39 μ/ml in Figure 4. The maximal activity of Hydroalcoholic extract of Syzygiumcumini against DPPH is 90.37% and IC50 value has found to be 33.05 µg/ml in Figure 5 respectively.

Conclusions: From the above study it can be evaluated that the high content of phytochemicals which are known to exhibit medicinal as well as physiological activities in Terminalia arjuna and Svzygiumcumini(Alcoholic and Hydro-alcoholic) can explain its antioxidant activity.

Introduction

Diabetes mellitus is a gathering of metabolic disorders which is described by high levels of glucose in the body because of imperfections in insulin resistance, insulin activity, or both [1] Type 1 diabetes & Type 2 diabetes are the two major subgroups of DM. In Type 1 Diabetes, there is blood sugar problem which is caused by deficiency of insulin or in Type 2 Diabetes insulin resistance, Insulin inadequacy or deficiency implies there is of breakdown of their insulin producing cells so that sufficient insulin isn't being made by the pancreas [2] It has been demonstrated that impaired antioxidant defense system and oxidative stress will be elevated in patients with diabetes mellitus. Elevated glucose levels initiates peroxidation of lipds and harm cells is due to hyperglycemia and complications of diabetes [3].

Terminalia arjuna (T. arjuna, -Family: Combretaceae), is a significant therapeutic plant generally utilized in restorative details for a few afflictions. It is found in abundance throughout Indosub-Himalayan tracts of Uttar Pradesh, Madhya Pradesh, South Bihar, Delhi and Deccan region near ponds and rivers. It is also found in forests of Sri Lanka, Burma and Mauritius [4] Syrygiumcumini(Linn.) Skeels (Myrtaceae) usually known as Indian blackberry. Jamun, is a huge tree disseminated all through Upper Gangetic Fields, Bihar, Orissa, planted in West Bengal, Deccan, Konkan area, all woodland region of South India, additionally, developed in Thailand, Philippines, Madagascar and developed broadly all through Africa, Caribbean and Tropical

The importance of herbal medicines to treat Diabetes mellitus looks advantageous Many work has been done in T.arjuna and S. cummon DM. So, I have to focusing to analyze the efficacy of composite extract of Terminalia arjuna and Syzygiumcuminionin

Material and Methods

Material and Methods Plants material and Preparation of Alcoholic and Hydn

The Stem bark of Terminalia arjuna and seeds of The Stem back of Syzyigiumcuminiwere purchased from Delhi, India and identified by the NISCAIR – National Institute of Science Communication and Information Resources, Delhi, India The powdered drug of and information and and Syzygiumcuminiwas extracted ung of Alcoholic Ethanol 90% and Ethanol 50% and Water 50% using the Soxhlet method. The extracts was filtered separately and evaporated to dryness to yield the dry extracts. The dry extracts was kept in a vacuum desiccators until use. A crude residue (150g) of Terminalia arjuna and Syzygiumcuminiawere obtained giving 2 yield of Alcoholic were 7 90% and 4.78% and Hydro alcoholic were 7.50% and 6.90% respectively.

Morphological evaluation

Color. The untreated piece of the two medications were taken exclusively and shade of the medications were inspected under daylight.

Odor and Taste: A little segment of the two medications were taken independently, gradually and more than once breathed noticeable all around over the materials and analyzed the scent Size and Shape: Width and length of the underlying foundations of T. arjuna and S. cumini were estimated with the assistance of scale. State of roots were affirmed by contrasting and writing

Standardization of plants:

Determination of moisture content:

The powdered drug 10g of both Terminalia arjuna and Syzygiumcumini were taken and placed in moisture disc and dried to constant weight in oven at 100-105°C. After drying for 30 minutes, Constant weight is reached when two consecutive weighings and cooling for 30 minutes in a desiccator, show not more than 0.01 g distinction Finally,moisture content was estimated legitimately in rate [6]

% of moisture content = Weight loss × 100 / Weight of the sample

Determination of Ash values:

Total Ash values:

Weighed 3gm of powdered drug of Terminalia arjuna and Syrygiumcumini and incinerated in silica dish at a temperature no longer exceeding 450°C till free from cooled, weighed and carbon The Total ash value of % was calculated with reference to air dried drug [6] [7

Total ash value = Weight of ash × 100/ Weight of drug Acid Insoluble Ash:

Boiled the ash acquire for 5 minutes with 25 ml of Dil HCL Collected the insoluble matter in ash less filter paper. The insoluble matter was washed with hot water and ignites to a constant weight. The acid insoluble ash of % with reference to all dried drug was calculated [6] [7].

Extractive values of Bark powder:

Alcohol soluble extractive:

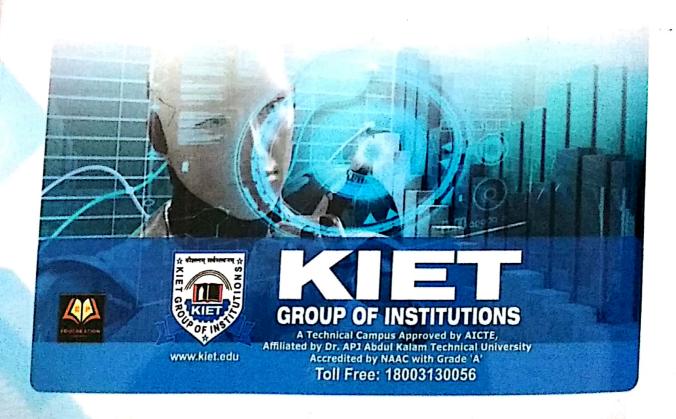
Weighed about 5gm of powdered drug of Terminalia arjuna and Syzygiumowania today Syzygiumcumini were taken in a Stoppard conical flask. Include 100ml of alcohol and shake continually for 6hr in an electric shaker population and shake continually for 6hr in an electric shaker population and shake continually for 6hr in an electric shaker population and shake continually for 6hr in an electric shaker population and shake continually for 6hr in an electric shaker population and shake continually for 6hr in an electric shaker population and shake continually for 6hr in an electric shaker population and shake continually for 6hr in an electric shaker population and shake continually for 6hr in an electric shaker population and shake continually for 6hr in an electric shaker population and shaker po shaker, permitted to represent eighteen hours. After the eighteen



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ANTIOXIDANT EFFECT OF ALCOHOLIC AND HYDRO-ALCOHOLIC EXTRACT

OF Tinospora Cordifolia & Juglans Regia

1ºKapil Kumar, Praveen K. Dixit1& Harshit Takru2 'KIET School of Pharmacy, Ghaziabad

Abstract

tims The objective of the present study was to evaluate the antioxidant effect of Alcoholic and Hydro-Alcoholic of Tinospora cordifolia& Juglans regia

Results The result showed that the alcoholic and hydroalcoholic extract of Tinospora cordifolia & Juglans regia contains physicochemicals, toxic heavy metals, microbial contaminants within the limits as per WHO guidelines. Alcoholic and hydroalcoholic extracts showed positive result for the presence of alkaloid, carbohydrate, flavonoids, proteins and amino acids, fixed oil and fat In the DPPH radical scavenging activity, alcoholic extract of Tinospora cordifolia (53 06%) and IC50 was found to be 8 583 µg/ml, hydroalcoholic extract of Tinospora cordifolia (66.78%) and IC50 was found to be 4 106 µg/ml, alcoholic extract of Juglans regia (63.53%). IC50 was found to be 6.459 µg/ml, hydroalcoholic extract of Juglans regia (95 82%) IC50 was found to be -30.335 μg/ml respectively

Conclusions: Results revealed that Timospora cordifolia and Juglans regta possess anti-oxidant property

Introduction

DM is a metabolism infection wherein an individual has high glucose level, described by, glycosuria, hyperglycemia, hyperlipidemia and negative nitrogen balance coming about because of deformities in insulin emission, insulin activity, or both. Over time, having too much glucose in your blood cause health problems [1] Unique cells in your pancreas increment of glucose and discharge insulin in your blood. Insulin has a variety of employments, however one of its primaries is to assist decline with blooding glucose levels. Type 1 diabetes is otherwise called insulin-subordinate diabetes. Less basic diabetes. It used to be called adolescent beginning diabetes, since it regularly starts in adolescence. It happens when your body assaults your pancreas (b-cell destroy) with antibodies. The organ is harmed and doesn't make insulin [2] Many of the medical issues that can accompany type I happen on account of harm to minor veins inyour eyes (called diabetic retinopathy), nerves (diabetic neuropathy), and kidneys (diabetic nephropathy) [3] Type 1 additionally have a higher danger of coronary illness and stroke [4] DM ketoacidosis is a complication of Type I DM Symptoms - Infection, Trauma, Hypotension, Coma Type 2 DM Type 2 DM used to be called non-insulin reliant or grown-up beginning diabetes. More common diabetes (90%). [17] This can create type 2 diabetes at any age in any event, during youth, center - matured and more established individuals. Moderate red in beta cell. [5] Reduce sensitivity of peripheral tissue of insulin receptor Excess hyperglycemic hormones. Gestational diabetes develops in some when they are pregnant. [6] This type diabetes goes away after the body is born. Secreted at low levels during fasting (basal insulin secretion). Pancreas insulin production in type 2 diabetes. [7] Gestational DM is a metabolic and inconvenience issue in pregnancy, come to fruition in one -14% of patients relying upon the populace portrayed and the criteria utilized for treatment. [16]

Tinospora cordifolia (T. cordifolia, Family: Menispermaceae), is an important plant widely used in medicinal formulations for severalfor example fever, diabetes Mellitus, Allergic, Antineoplastic, Leprotic, Malarial, Inflammatory, Fertility. The tree is long, deciduous plant that develops to 1 meter (3.3 feet) high and 0.5 meters (1.65 feet) wide broadly spreading climbing bush with a few extended twining branches. Stem of this plant is fairly succulent with long, filiform, beefy and moving in nature

Airborne roots emerge from the branches. The bark is velvely Airborne roots emerge home white to grey in shading and profoundly left spirally [9] Juglandaceae) this are are antidiabetic, antioxidant, anti-allergic, anti-stress, Antineoplasic antidiabetic, antioxidant, anti-allergic, antifungal. Antiproble this are effective antidiabetic, antioxidani, and obesity, antifungal, Antiproliferative Antihemolytic, this is Description Anti-inflammatory, and continuous this is Description kenter Antiviral, Anticancer, Antihemolytic, this is Description kenter allobose or slightly statements. Antiviral, Anticaneer, Anticaneer, globose or slightly ridge, not

Material and Methods

Plants material and Preparation of Alcoholic and Hydro alcoholic extracts

The stems of Tinospora cordifolia & Fruit of Juglans regia were purchased from Chawla & Co. Delhi, India and identified by Dr Sunita Gargof NISCAIR - National Institute of Science Communication and Information Resources, Delhi, India with Reference No NISCAIR/RHMD/Consult2018/3264-65-1 of and NISCAIR/RHMD/Consult2018/3264-65-2 of Juglans regia The Reference powdered drug of Tinospora cordifolia dry and Juglans regu was extracted with C₂H₂O & (50.50) and H2O with Ethanol 100% using Soxhlet method. The extracts were filtered separately and evaporated in rotatory evaporator to dry to yield the desert extracts. The dry concentrates were kept in a vacuum desiceator until use. [10]

Morphological evaluation

Colour the untreated pieces of the two medications were taken exclusively and shade of the colours were analysed under daylight Odour and Taste An exceptionally short part of the two medications were, gradually and more than once breathed noticeable all around over the materials and inspected the smell. Size and Shape Width and length of the foundations of Tinospora cordifolia and Juglans regia were estimated with the assistance of scale. State of stem & kernel were affirmed by contrasting and

Standardization of Plants

Determination of Moisture Content

Put 1.0g of stem powder of the Tinosporacordifolia and 1.0g of kernel tale of the Juglans regia, in fix weighted in disc for estimate of moisture content, its withered at 105 c for five hr in warm oven after 5 hours out of hot oven, reduced the temperature in a desiccator for 30 minutes, and weighted of without time waste, after that repeat the procedure moisture disc when come the same weight of moisture disc. after that the moisture tale was calculate of in mg/gram of air- dry sample

Determination of Extractive Values

5g crumb of TC and Juglans regia have been seized and individually macerated with 100ml of dissolvable (for example ethanol, Methanol, water, chloroform, ethyl acetic acid derivation and oil ether) in a shut cup for 24 hours, shaking habitually for the initial 6 hours. the initial 6 hrs and permitted to look for 18 hrs; at that point separated with playing it safe against loss of dissolvable Ultimately dried at a hundred and five and weighed. The % of the alcohol colubbane alcohol soluble, water soluble, had been calculated with regards to air dried crumb of TC and Juglans regia. [13], [14]

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DEVELOPMENT AND METHOD VALIDATION OF ORLISTAT BY UV-VISIBLE SPECTROPHOTOMETRIC METHOD FOR ITS QUANTITATIVE DETERMINATION IN BULK DRUG AND PHARMACEUTICAL FORMULATIONS

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¹KIET School of Pharmacy, KIET Group of Institutions, Delhi-NCR, Ghaziabad affiliated to Dr A.P.J. Abdul Kalam Technical University, Lucknow, Uttar Pradesh

Abstract

A simple, fast, selective, accurate and specific UV-Visible spectrophotometric technique was developed for the estimation of Orlistat in bulk drug and capsule dosage formulations. The drug detection was carried out by using UV-Visible spectrophotometer at λ max of 217.5 nm using methanol as solvent and the procedure employed extraction steps for the drug from the formulations. The method was validated for specificity, linearity, accuracy, precision, limit of detection (LOD), limit of quantification (LOQ), robustness and ruggedness according to the present ICH guidelines. The calibration graph was linear in the concentration range of 1 to 10 μg/ml with the correlation coefficient of 0.9993. The accuracy was found to be in between 99.3 and 100.9 %. The precision amongst six samples preparations was 0.42% with LOD and LO Q values 0.07 and 0.238 µg/ml, correspondingly. The percentage recovery of the drug was found to be 100.2% which indicates that there was no interference of the capsule excipients with the method and it can be suitably employed for regular estimation of Orlistat in bulk drug, marketed formulations and other dosage forms.

Key words: Orlistat, UV-Visible Spectrophotometer, ICH guidelines, validation

1. Introduction

Obesity is very common problem with young generation, as well as old people due to lifestyle changes and junk food. To treat this problem now a day's people uses a drug known as Orlistat. Orlistat usually acts by blocking the lipase thus reducing the aborption of fat that you eat or keeping it from being absorbed by our body. This medicine reduced the total calorie intake from the diet. It is mainly used with consultation from a health provider to reduce body fat. Xenical and Alli are some marketed drugs available for the orlistat as OTC drug in some of the countries.

Orlistat is a saturated derivative of lipstatin as shown in figure 1, which a storng innate inhibitor for pancreatic lipases which was obtained from the bacterium Streptomyces toxytricini. It was chosen over lipstatin for obesity treatment due to its quality and safety [1].

Figure 1: Structural formula for Orlistat

Orlistat acts by blocking the gastric and pancreatic lipase, these are the enzymes which break down the fat present in the intestine into triglycerides. When the function of these enzymes are blocked, then triglycerides from the diet are not able to get hydrolyzed into free fatty acids and thus get excreted from the body without being absorbed through feces [2].

Thioesterase domain of fatty acids synthase (FAS) was recently found to be block by the Orlistat drug. These enzymes were found to help in proliferation on cancer cells but do not affect the normal cells of the one body [3]. The probable adverse effects of orlistat are like blocking of the cellular off-targets or low bioavailability. One study depicted chemical proteomics approach to look for new cellular targets of Orlistat including drug other targets [4].

Orlistat was normally taken as the dose of strength 120 mg three times in a day previous to the meals as per the standard prescription of the drug. It also reduces approximately around 30% of intake dietary fat from being absorbed by the body [5].

Various analytical methods have been reported using HPLC, LC-MS, UPLC and other techniques for analysis of Orlistat in plasma and urine. So many formulations are available in market as single drug and in combination with other drugs, which calls for the requirement for a method which is simple, easy, fast, responsive, accurate, specific and reliable method for the determination of Orlistat in pharmaceutical formulations as well as in bulk drug. The main objective of the current work is to prepare a method for the routine analysis of Orlistat by UV-Visible spectrophotometer. The proposed method decreases the analysis time for the drug while avoiding any interference from the excipients or other ingredients of the formulation [6].

2. Materials and Methods

2.1. Materials

Orlistat was obtained as a gift sample from CMG Biotech Pvt. Ltd, India. Methanol AR Grade used was of Merk Chemicals, India. Marketed formulations (A, B & C) are purchased from the local market with drug equivalent to 60, 120 & 120 mg of orlistat. All the supplementary chemicals and reagents used in the study were of high quality grade.

2.2. Method development

2.2.1. Instrumentation

Double beam UV-Visible spectrophotometer model (Kyoto, Japan) 1601 with 10mm cell length and quartz cells were used for the analytical purpose and method development.

2.2.2. Standard stock solution

The Orlistat stock solution with concentration of $10\mu g/ml$ were prepared in methanol. The various dilutions were prepared from the stock solution by diluting 1, 2, 3, 4, 5, 6, 7, 8, 9 and 10 ml upto 10ml with methanol to get the different dilutions of the drug from 1 to $10\mu g/ml$.

2.3. Method optimization

2.3.1. Selection and Optimization of Solvent

Solvents have a very profound effect on the quality and the sharpness of the peak. Various solvents like methanol, chloroform, acetine, water were used to get the best peak in a particular solvent. All solvents were optimized and out of them methanol was found to give satisfactory results relating to quality and shape of the peak. Methanol also showed no



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FORCED DEGRADATION STUDIES FOR DRUG PRODUCTS AND DRUG SUBSTANCES: SCIENTIFIC AND REGULATORY DELIBERATIONS

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Abstract

Forced degradation experiments are important tool to evaluate the stability of a drug substance and understand its impending impact on a drug's purity and potency as well as on patient safety. Forced degradation is degradation of new drug product and drug substance at conditions more harsh than accelerated conditions. It is required to exhibit specificity of stability indicating methods and it also provides an insight into degradation pathways and degradation products of the drug substance and helps in elucidation of the structure of the degradation products. The U.S. Food and Drugs Administration (FDA) and International Council for Harmonization (ICH) guidelines affirm the requirement of stability testing data to understand how the quality of a drug substance and drug product changes with time under the influence of various environmental factors and demonstrate certain degradation conditions like oxidation, light, dry heat, hydrolysis, basic, acidic, hydrolysis etc. ICH Q1A, QIB and Q2B exemplify the forced degradation studies. The degradation products appearing during manufacturing and stability studies are required to be reported in the dossier submitted for product registration (ICH Q3B(R), 2003). Hence, the ICH guideline Q1A(R2) (2003) require forced degradation study on drug substances to provide data on decomposition products, which can be used to establish degradation pathways, intrinsic stability of the molecule and validation of SIAM (Q1A (R2), 2003).

Keywords: ICH, preformulation studies, forced degradation, stability.

Introduction:

The ICH guideline Q1A on Stability Testing of new Drug Substances and Products gives indications for the testing of factors which may be liable to change during long storage and are likely to affect quality, safety and efficacy. It must be done by validated stability indicating testing methods. It is mentioned that forced degradation studies [1] or stress testing at extremes pH, temperatures in 10 °C increments above the accelerated temperatures and under oxidative and photolytic conditions have to be carried out on the drug substance so to set up the stability characteristics and degradation pathways to back up the appropriateness of the proposed analytical procedures.

Objectives of forced degradation (FD) studies [2,3]:

These studies are carried out to achieve the following purposes:

- To ascertain the degradation pathways of drug products and drug substances.
- How each one of these factors has the capability to accelerate, catalyze or mediate one or more of the various degradation reactions like oxidation, hydrolysis, photolysis (photolysis) or some other unwanted conversion of the drug product or drug substance and understanding the degradation mechanism.
- To find out the intrinsic stability of a drug substance in formulation.

- iv) Development of stability indicating assay of method already developed. Establish shelf life of drug products or establish a re-test period for the drug substance and recommended storage conditions.
- v) To provide information on drug substance or product characteristics. Identification of potential degradants.
- vi) To generate more stable formulations.
- vii) To differentiate degradation products that are related to drug products from those that are generated from non-drug product in a formulation.
- viii)To explain the structure of degradation products.
- ix) Process development, design and optimization of manufacturing process.
- x) To understand the chemical properties of drug molecule.
- xi) Formulation design.
- xii) To generate a degradation profile similar to that of what would be observed in a formal stability study under ICH conditions.
- xiii)Packaging development, and
- xiv) To solve the stability related problems.
- xv) Stability studies are used to provide data to support registration submission, clinical trials, or commercialization.

Regulatory guidelines

Various International guidelines recommended FD studies ICH guidelines sometimes apply only to the marketing applications for new products and do not cover the part during clinical development. The ICH guidelines that are applicable to forced degradation studies are [4.5]:

- a. ICH Q1A: Stability Testing of New Drug Substances and Products,
- b. ICH Q1B: Photo stability Testing of New Drug Substances and Products.
- c. ICH Q2B: Validation of Analytical Procedures: Methodology.

ICH O1A (Stress testing): Recommended conditions for conducting FD studies on drug products and drug substances. The recommendations are to check the results of temperature (above that for accelerated testing, i.e., >50°C), oxidation, humidity (75% relative humidity), and photolysis. Wide pH range should be taken into account in the testing of suspension or solution. ICH Q1B: Recommended approaches to evaluating the photo stability of drug products or drug substances. For drug substance and drug product FD conditions are specified in Section II and Section III respectively. FD studies exposure levels are not defined. Photo stability testing can be performed in solid or in suspension/solution. These samples are then used to develop a stability indicating method. Some of the degradation products formed during FD studies may not really be empirical to form during stability studies in which case they need not be examined further [6]. ICH Q2B: Gives guidance to validate the analytical



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COST ANALYSIS OF PHARMACOTHERAPY IN DIFFERENT INTENSIVE **CARE UNIT**

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Abstract

The present study was conducted with the aim to study pattern of morbidity, cost of pharmacotherapy and the outcome in patients in medical, surgical and respiratory intensive care units of a tertiary care centre in the setting of a peripheral medical college in western UP. The data of patients from completed case record files was obtained from case record section of and retrospectively analysed Maximum patients were from rural area (86%) and predominance of male (56%) patients were observed. Observed morbidity pattern in MICU includes eardiovascular and cerebrovascular events, trauma, metabolic events, liver diseases, gastrointestinal disorders, haematological and renal complications, poisonings, infections, and acute abdominal conditions, and pneumonias, obstructive and restrictive respiratory conditions. Mean duration of stay was 6.36 days and ranged from 1-35 days with survival rate 80%. Treatment cost in medical, surgical and respiratory intensive care units was Rs.7062.5, Rs. 6529.43 and Rs. 8901.17 respectively and overall mean cost was Rs.7264. Daily cost of treatment was 1750 in MICU, Rs.1424 in SICU and Rs.2342.94 in RICU. Overall cost of drug treatment per day was Rs.1825.40 Cost of medicine was less in surgical cases. Overall 326 different types of drugs were prescribed, of these 84% were by brand names and 16 % by generic names, 45% were given as injectable and 55% by oral or other dosage forms. Antimicrobials were used in all the (100%) patients, monotherapy with antimicrobials was used only in 15% cases, two AMA were used in 56%, three in 26% and more than 3 in 3% cases. Taken together, branded antimicrobials were the major contributors for the overall cost of pharmacotherapy. Government initiative for the production and supply of antibiotics in major hospitals by generic name along with rationale use of antibiotics may reduce the overall cost of pharmacotherapy.

Keywords- ICU; Pharmacoeconomics;

Introduction

The Intensive Care Unit (ICU), an integral part of the health care system. Although most ICUs are found in high-income countries, they are increasingly a feature of health care systems in low- and middle-income countries. Basic care in ICU is generally perceived as costly and expanding [1]. It remains a test to precisely survey the cost of serious care because of absence of institutionalized philosophy. There is likewise significant heterogeneity amongst Nations and even inside the Nation in assignment of assets, dissemination of basic care administrations and cost of work force and cost of medications [2]. The unbreakable quality and immaterialness of a few human services results is likewise a worry, especially while assessing cost viability. Each intensivist ought to effectively include in understanding the expenses in their individual unit and how it identifies with remedial movement, case blend and clinical result. So as to enhance examination of costing information from various ICU, a working gathering distinguished six 'cost squares' i.e. expenses of staff, clinical help administrations, consumables, homes, non-clinical help

administrations and capital gear [3]. There are just not many examinations investigating expense of concentrated care in India. It is assessed that there are around 70,000 ICU beds accessible including numerous types and over all clinics and little time nursing homes in India that oblige five million patients requiring ICU confirmation consistently [4]. Tragically, the normal man sees that marvels consistently occur in ICU and does not have a sensible desire for basic care result. Consequently, quiet moderateness to get to basic care administrations turns into an essential factor and from a specialist Organization's point, installments may turn into an issue.

Pharmacoeconomics can be characterized as the branch of financial matters that utilizations money saving advantage, cost-viability, cost-minimization, cost-of-disease and costutility examinations to look at pharmaceutical items and treatment systems [5]. Learning of pharmacoeconomics is along these lines essential for clinical pharmacologists who are associated with advancing objective recommending [6] or in clinical preliminaries which fuse a financial segment. The significance of pharmacoeconomic data to medicinal services chiefly rely on the perspective from which the investigation is directed. In the course of the most recent decade there has been enormous enthusiasm for financial assessments of social insurance programs, particularly in the pharmaceutical field. It's worthwhile to note that, a few governments run ICUs where expenses of care may surpass accessible subsidizing, are noted to have restricted assets, absence of foundation, prepared intensivists and care staff. Thereby, interest for cost of medicinal services are expanding in all Nations. With a specific end goal to comprehend the cost, it is imperative to understand the present association of basic care benefits in India, present study was designed to evaluate the cost of ICUs in Private hospital.

MATERIAL AND METHOD

- Setting of the study:
 - ✓ The study was conducted in Chhatrapati Shivaji Subharti Hospital, Meerut
- The completed files of patients after discharge were procured from record section of hospital in a random order.
- The record of 100 medicals, surgical and respiratory intensive care unit patients were obtained.
- The confidentiality of patient's identity was maintained.
- Data was recorded-
 - Patient initial
 - Age
 - Sex
 - Rural /Urban
 - Morbidity /disease
 - Drugs prescribe with:
 - Formulation
 - Dose
 - Frequency
 - Duration of treatment
 - Patients outcome
 - Duration of stay in hospital

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THIAZOLO[2, 3-B]QUINAZOLINES DERIVATIVES AND HYBRIDS: A NOVEL Bhardwai² Gaurav Bhardwai³

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This review is focused on recent summarize overview of thianolo[2,3-b]quinazoline derivatives and its hybrids as a novel antitumor agent. Thiazolo[2,3-b]quinazoline is a class of fused nitrogenous heterocycles that are of substantial curiosity due to associed range of their pharmacological potential. Among a wide diversity of nitrogen heterocycles, thiazolo[2,3-b]quinazoline have been explored for developing pharmaccurically imperative molecules Countless derivatives of quinazoline are used in the pharmaceutical, medicine and agriculture due to their diverse range of biological activities like, antiinflammatory, antiallergic, diuretic. antihypertensive and antiparkinsonian. As per present scenario it has been observed that most of the thiazolo[2,3-b]quinazoline imparted antifumerogenic action. They exhibit action comparable to antimetabolites from the group of fol ic acid analogues of chemotherapeutics. This opinion survey assemble literature work done by researchers recently on thiazolo[2,3blquinazoline for their antitumor potential. This review also aims to confer potential future directions on the expansion of more effective and precise analogues of thiazolo[2,3blquinazoline for various antitumarogenic targets. Collectively, all these findings suggested that thiazolo[2,3-b]quinazoline derivatives could be potential drug candidates to treat careinogenic conditions

Keywords: Thiazolo[2,3-b]quinazoline derivatives and hybrid, antitumor agent

Introdution

Thiazolo[2,3-b]quinazoline is a class of fused hetrocycle quinazolines derivatives well known for diverse range of activity! It is interesting to note that available chemical Interature represent several organic compounds containing a fused heterocyclic ring, i.e., Thiazolo[2,3-b]quinazoline (1) makes a broad class that attracted attention in the ancient few years owing to its wide range of pharmacological activities, especially antiinflammatory, antimicrobial, diuretic, antiallergic, anticonvulsant, antihypertensive and antiparkinsonian.

It has been found that thiazolo[2,3-b]quinazoline analogues are centre of attraction from last few decades due to possess a broad spectrum therapeutic potential in variety of pathological Thiazolo[2,3-b]quinazolines were establish to own a significant antitumor activity3. suggested that thiazolo[2,3-b]quinazoline analogues and its complex hybrid with other fused moieties exhibits antitumor action acting as an inhibitor of antifolate thymidylate synthase and a few of these are now in clinical development⁴⁻⁷ Researches synthesized and tested a wide range of thiazolo[2,3b]quinazoline derivatives and hybrid for their significant cytotoxic potential It has been observed that this class of heterochemical have a significant potential to control proliferation in carcinogenic cells8.9 biological screening of the diverse range of molecules offer an excellent framework in pharmaceutical field, and which may lead to discovery of potent antitumor agents.

Thiazolo[2,3-b]quinazoline

Keshari et al (2017) synthesised a library of novel thiazology. Keshari et al (2017) synthesis method synthesis method blquinazoline analogues via one pot synthesis method blquinazoline analogues via one pot synthesis method blquinazoline analogues via one pot synthesis method in synthesis method synthesis method in synthesis me b]quinazoline analogues
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Gali et al (2015) synthesised a collection of novel derivative of derivatives quinazoline thiazolo[2,3-b] Knoevenagel condensation under conventional method All the synthesized compounds were screened and evaluated for their in vitro antitumor activities.

10-((1-bromo-1*H*-indol-3-yl)-methylene)-7-aryl-7,10-dihydro-5H-benzo[h]thiazolo[2,3-b] quinazolin-9(6H)-ones derivative (4) have exhibited excellent activity against MCF-7 (breas cancer cell line) than the positive control (Doxorubicin)[11]

(4)

Sangshetti et al (2014) synthesized benzothiazolo[23b]quinazolin-1-ones from aminobenzthiazoles, cyclic b diketone, and aromatic aldehydes via one pot green synthesis method. All the synthesized compounds were subjected to chemical and biological screening for their anticancer potential 8-methoxy-12-(4-methoxyphenyl)-2,3,4,12-tetrahydro-1Hbenzo[4,5]thiazolo[2,3-b]quinazolin-1-one (5) was found the most active member of this newly invented category during study[12]

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NANO-PARTICULATE CARRIER SYSTEMS IN RHEUMATOID ARTHRITIS MANAGEMENT

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Abstract

In modern practice rheumatoid arthritis is a well known autoimmune disease. The main aim of this review is to establish the evidence in favour of nanocarriers over conventional therapeutic approaches to treat the various pathologic conditions of arthritis efficiently. This review provides a complete account that why the nanocarriers are more preferable over other delivery system used in arthritis treatment for delivery of various therapeutic agents. In this review all those characteristic features are mentioned which are responsible for making the nanocarriers more efficient to deliver a therapeutic agent at desired site in various biological condition inside the body. In this review, all those aspects are discussed which are responsible for maintaining the pharmacokinetic challenges inside the body. This review is helpful to understand all the patients' complaints which mainly occur due to treatment by drugs given by conventional drug delivery system.

Key words: Rheumatoid arthritis, Nano-particulate carrier systems, nanoparticles, Gene therapy

1. Introduction

Inflammation, joint pain and degeneration mainly occurs in synovial lining but inflammation also occurs in other organs and tissues e.g. lungs, pericardium, pleura and sclera. About 1% of world population is affected by rheumatoid arthritis (RA) and women are affected three times more often than man. Onset is most frequent between the ages of 40 to 50 years, but the people of any age can be affected. It is Arthritis is a systemic, progressive and degenerative autoimmune joint disease. In arthritis well understood that there is no single cause for development of the rheumatoid arthritis in any men [1]. The development of arthritis is showing multi interacting mechanism. Genetic components, environmental condition, hyper activity of immune system against self molecule are some causes that can develop the disease.

Actually the main cause of RA is auto reactivity of immune system against self molecule due to environmental trigger and genetic susceptibility [2, 3]. Genetic susceptibility causes majority of RA cases (40-60%) [4], specific genes on chromosome-6 play role in genesis and severity of RA. HLA (Human Leukocyte Antigen) is defined as special type of cell surface protein encoded by MHC. 70% of arthritis patients (Caucasian) have HLA-DR4 class-2 antigen but Native Americans those have HLA-DR9 (3.5 times greater) Polymorphic gene causes the development of RA [2, 5]. In addition environmental trigger like Smoking, alcohol, periodontitis, infectious agent may also cause RA [2, 5, 6].

2. Infectious agent causing RA

The microbial agents which cause infection via which RA further occurs includes P. gingivalis, parvovirus, hepatitis virus, human immunodeficiency virus (HIV), P. mirabilis, Epstein-barr virus (EBV), mycoplasma, cytomegalovirus (CMV),herpes virus, human T-lymphotropic virus 1 (HTLV-1), enterobacterium, mycobacterium, Streptococcus, pyogenes (S. pyogenes) and Salmonella. Inflammatory processes in condition of RA are induced by T-cell, B-cell

and Macrophages, Plasma cell including cytokines, growth factor, and adhesion molecule and matrix metallo-protein. After presentation of antigenic peptide the T-cells become activated, initially causing pain and swelling [2, 7]. Separately two sets of T-cells called CD4+-Th1 and Th2 cell release the various cytokines by which inflammatory responses are propagated. Th1-cell releases IL-2, IFN-7, TNF-α, GMSF (Granulocyte Macrophage colony Stimulating Factor) which causes the delayed hypersensitivity seen during early onset RA and Th2-cell releases IL-4, IL-5, IL-6, IL-10 affects B-cell differentiation and activation which mediate the enhanced production of Rheumatoid factor (Anti IgG- antibody). Separately IL-1, IL-6, IL-8 and TNF-α cause bone and cartilage destruction [2, 4, 5, 7]. RF-IgG complex is dangerous because it cannot be cleared by complement system and so this complex causes inflammation by stimulating macrophages. RF-IgG complex binds on the surface of macrophages by receptor FcR-ша (CD-16a). These receptors present only on surface of RA affected tissue macrophages.

3. Therapeutic option for RA treatment -

After understanding the pathophysiology of RA several drugs have been used widely. There are many categories as mentioned NSAID'S, immunosuppressant, glucocorticoids, biologics and last one is kinase inhibitors. Previously NSAID'S were used most widely in RA treatment for lessening the pain, but it is not used longer owing to its several limitations such as limited effectiveness, serious adverse effects, and inability to modify disease course. Hence, Immunosuppressive drug are used for RA treatment in combination with NSAID'S [8]. Except corticosteroids all immunosuppressive drugs can be possibly used for suppressing the rheumatoid process and bring about an emission. Immunosuppressive drugs do not possess the antiinflammatory and analgesic action. These drugs are also called as disease modifying anti rheumatic drugs (DMARD) or slow acting anti rheumatic drug (SAARD). Corticosteroids are especially employed as adjuvant to NSAID'S alone or along with DMARD'S. In modern practice, combination therapies of NSAID'S and suppressive drug have been used increasingly to suppress the disease as soon as possible or to induce remission. Corticosteroids are an effective therapeutic option for RA treatment used in combination-therapy along with NSAIDS or DMARD. Glucocorticoids are more effective than DMARD'S and biologics in early phases of RA [9]. Biologics in RA treatment may create a revolution in treatment strategies. Biologics include mainly inhibitor or antagonist of those cytokine that are interlinked with the pathogenesis of RA. Basically these are TNF-α, IL-1β and IL-6 inhibitors or antagonist such as B-cell depleting agents and T-cell costimulator or modulators. The success ratio of biologics based therapy is generally 60-70%. TNF-alpha inhibitor-MTX combination has been investigated for improving arthritic threat [10].

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ROLE OF ARTIFICIAL INTELLIGENCEIN TREATMENTOF HYPERTENSION- A REVIEW

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Abstract

Nowadays Artificial Intelligence methods are becoming very popular in medical applications due to high reliability and ease. Hypertension is a principal for cardiovascular disease. Currently, around a third of people with hypertension are undiagnosed and those who are diagnosed in which around half of them are not taking antihypertensive medications. The World Health Organisation measures that high blood pressure directly or indirectly causes deaths of at least nine million people globally every year. The full article studies the capacity of variously designed & trained Artificial Neural Network to predict the possibility of occurrence of Hypertension in a mixed (healthy & hypertensive or both sexes) patients. In this review article, the introduction or survey of different artificial intelligence methods adopted by researchers for diagnosing or predicting hypertension will be explained in detail.

Keywords: Artificial Neural Network, Hypertension, Health Surveillance, Fuzzy system, Self-monitoring

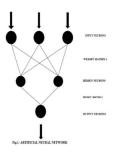
Introduction:

Hypertension has been distinguished by WHO as one of the most vital risk factors for mortality worldwide and is responsible for the deaths of nearly nine million people annually. In the UK, the National Institute for Health and Care Excellence defines high blood pressure also known as hypertension, as a clinic blood pressure of 140/90 mmHg or higher confirmed by thefollowing ambulatory blood pressure monitoring daytime average of 135/85 mmHg or higher [1]. Hypertension risk increases in older age whilst its control becomes difficult with rising age. To correctly evaluate the risk of permanent hypertension in a patient, doctors analyzevarious other factors from physical examinations of the patient. These factors incorporate heart conditions, diabetes, renal conditions, etc. Researchers have been suggesting artificial intelligence techniques including Neural networks and Fuzzyto estimate hypertension risk [2]. Artificial neural networks render a sturdy tool to help doctors to analyze, model and make sense of complicated clinical data across a wide range of medical applications [3]. In the practice of medication, Artificial neural networks are now being actively applied in areas of cardiology, pulmonology, genetics and clinical chemistry [4]. This articleisdesigned within different sections as follows: The next two sections present a brief introduction to Artificial Intelligence techniques i.e. Artificial neural network and fuzzy techniques respectively.

Artificial Neural Network

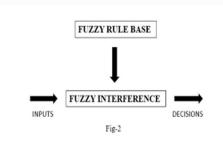
Artificial Neural Networks are electronic models based on the neural arrangement of the brain. The brain learns by experience. These biologically inspirited methods of computing may be the progression in computing application. Whenever we discuss a neural network, we should alsousually say -Artificial neural network, they typically consist of hundreds of simple processing units that are wired mutually in a complicated communication network. Each unit or node is a clear model of

genuineneuron which sends a new signal if it receives anadequately strong input signal from the other nodes to which it is connected [5]. Neural networks are based on invented neurons, which are joined together in a type of way to form networks. The Neural Network relates the human brain in the following two ways: I- A neural network acquires data throughout learning. II- A neural network's data is stored inside the interconnection strength known as synaptic weight. These weights describe the strength of the connection within the neurons. Each neuron has a united activation function which is performed on the input to get the output.



Fuzzy System

The methods of Artificial Intelligence have broadly used in medical applications for diagnosis and treatments such as Fuzzy expert systems, neural networks, etc. Henceforth, this study is intended to apply in the fuzzy system to diagnose hypertension disease. A human brain works with fuzzy concepts, now those computers may be artificially made fit with such concepts with the use of fuzzy systems. A fuzzy system composes of a fuzzy rule base and a Fuzzy Inference.



The fuzzy system liesin four parts is fuzzy rule base, fuzzy interference engine, Fuzzification, and defuzzification[6].

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ADOPTING IN SILICO DRUG DISCOVERY TECHNIQUES: NEED OF THE HOUR

Preeya Negi*, Surya Prakash, Vaishali M. Patil KIET School of Pharmacy, KIET Group of Institutions, Delhi-NCR, Ghaziabad, India

Abstract

Over the last two decades, the computer modeling/simulation software has secured a reliable place in various research labs involved in drug discovery and development. The softwarehas found to be successful in replacing the robots and reagents during high-throughput screening to investigate potential drug or lead candidates. The advantages of in silico methods are unlimited and have contributed towards faster, efficient methods with overcoming budgetary restrictions specifically for academic labs. Some of the Government Agencies are taking initiatives towards set up of the labs. With the advent of artificial intelligence (AI) in health care, the understanding and adopting application of in silico/computational approaches is getting convenient. The manuscript describes recent developments and requirements for effective application of in silico tools for drug development.

Keywords

In silico methods, Drug discovery, Drug development

Introduction

Over the last two decades, the computer modeling/simulation software has secured a reliable place in various research labs involved in drug discovery and development. The software has found to be successful in replacing the robots and reagents during high-throughput screening to investigate potential drug or lead candidates. The advantages of in silico methods are unlimited to screen a library of thousands of compounds and predict biological activity profile of non-synthesized compounds. These can be used for predicting mechanism of action, toxicity (carcinogenicity, teratogenicity, cardio toxicity, skin sensitization, etc.), pharmacokinetic properties as well as drug-likeness index. Some of the in silico methods applied at various stages at drug discovery process are shown in figure 1. This has contributed towards faster, efficient methods with overcoming budgetary restrictions specifically for academic labs that cannot afford purchase or synthesize thousand of compounds for in vivo and/or in vitro screening for various disease conditions. Various academic in silico labs are functioning and have been acknowledged for their efforts for drug discovery. Some of the Government Agencies are taking initiatives towards set up of the labs or making available required resources such as Department of Biotechnology (India) [1], Organization for Economic Co-operation and Development (OECD) [2], European Chemicals Agency (ECHA) [3] etc.

With the advent of artificial intelligence (AI) in health care, the understanding and adopting applications of in silico computational approaches is getting convenient. The academic institutes rely on various open source platforms/software to set up in silico facilities to give early exposure to undergraduates and graduates from various disciplines like applied sciences, pharmacy, biomedical sciences and bioengineering. The four in silico methods applied for drug design, lead discovery and modification are depicted in figure 2. In silico drug discovery process can be categorized in three stages [4].

General Drug Discovery Process					
	Lead Identification	Lead Optimization	Pre clinical Trials		
In silico					
Comparative Genomics	Pharmacophore Screening	Cheminformatics			
Comparative Proteomics	High throughput docking				
Annotation	Fragment based docking				
Functional	De novo Design				
Genomics	ADMET predictions				
Druggability	QSAR/SAR				

Figure 1: General drug discovery process and related in silico approaches

Stage 1

It involves selection of a target and preparing a heterogeneous molecule library that is to be tested against the target. This isdone through virtual screening either by molecular docking or building structures at active site by using De novo design methods.

Stage 2

The selected promising hits are then checked for their specificity by docking at binding sites of previously known drug targets.

Stage 3

Detailed *in silico* absorption, distribution, metabolism, elimination and toxicity (ADMET) studies are done for selected molecules and the molecules that pass these studies are termed as leads.

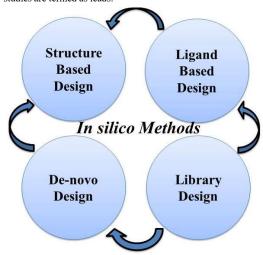


Figure 2: In silico methods for drug design

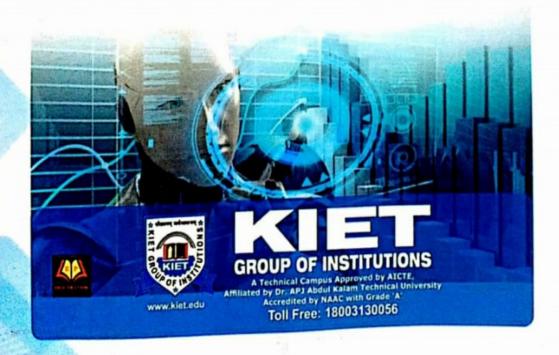
Some of the *in silico* tools, techniques and software are as narrated in Table 1.



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DESIGN OF EXPERIMENT APPROACH IN HPLC METHOD DEVELOPMENT AND VALIDATION

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Abstract

Design of experiment approaches is an important adjunct to the HPLC techniques as because a large number of variables can be controlled at a time to obtain the optimum conditions for the desired responses Also they can effectively determine the most optimum conditions for desired results in limited number of trial runs. In the current work we have discussed the various chemometric techniques in HPLC for a) Dissolution studies by HPLC analytical method development in view of increasing replacement of conventional detectors with mass detectors and increasing value of stability indicating assays b). validation using design of experiments techniques Different types of experimental designs and their particular use in specific situations using the statistical models in design of experiments have been highlighted. The progression of design of experiments to the Quality by Design model has been described. Chemometric techniques and different methods of peak separations have been reviewed

Key words: Design of experiment, Optimization Designs, Method Development/Validation, Mathematical Modelling

1.0 Introduction

Chemometrics, [1] has become a well-known branch in analytical chemistry in recent years. A large number of data is generated in modern analytical technique using high performance liquid chromatography (HPLC) because of several variables used in analytical measurements. Due to its large number of variables, the process becomes crucial and needs to be properly adjusted before every single run. Hence deeper understanding of the process becomes important. Thus, the statistical analysis of the processes by means of chemometric tools have become favorable i.e. in demand because of several advantages, such as reduced number of experiments, less solvent consumption and decreased labor work. Due to a large number of variables (mobile phase pH, buffer concentration, flow rate, column temperature, detector wave length, etc.) the optimization of HPLC methods for attaining the desired separations are complicated procedure [2]. These techniques helped in the development of statistical models which explained the significance of these variables on the desired responses. The peak separations in HPLC mostly depended on adjustable mobile phase variables such as viscosity, flow speed, buffer pH, content and certain innate attributes of matrices; stationary phase type; surrounding factors like temperature etc. [2]. For a long time, the HPLC methods have been developed by laborious trial and error approach by changing one factor at a time and keeping other factors as constant. This approach involved a lot of time, is costly and a laborious procedure besides being unable to remove flaws, erratic, and even complete failure [3].

A large number of book chapters, review articles, research articles have been reported on chemometries

thus emphasizing its increasing importance in analytical chemistry. Rozet et al. described design of experiments, an important feature of quality by design methodology to describe the design spaces [4]. Number of approaches of experimental design methods have been examined for detecting and removing the impurities in environmental analysis [5]. Certain complex extraction procedures involving experimental designs have been reviewed for some analytical methods [6]. Dejaegher & Heyden have reported some recent advances in optimization procedures using experimental designs [7].

But still a detailed review of QbD design of experimental techniques in HPLC method development and validation is desired. In the present work we have presented a detailed recap of reported articles on design of experimental techniques for analytical method development and validation on HPLC. The list of experimental design techniques for method development and validation of chromatographic methods are given in Table 3.

2.0 Mathematical Experimental Design Model

The mathematical model is an expression denoting the relationship between the independent variables and the dependent responses. It presents a way to depict the relation between the variables and the responses. Mainly it is a set of polynomials. Given below are the most commonly used mathematical equations 1 to 3 of the linear model.

Where, R(y) denotes the response, X1 and X2, are the independent variables, α_0 is the intercept α_1 , and α_2 are first order criteria, α_{12} is an interaction criteria, α_{11} and α_{22} second-order criteria, respectively The variables of equation (i) and (ii) are linear showing a plain surface and a distorted plane respectively. The quadratic variables in equation (iii) shows a distorted curved plane. The 3-D plots describes the effect of independent variables on the responses. The contour plots shows the parts of the response peaks. The design of experimental technique helps the analyst to understand the relationship between the critical responses and independent variables, the interaction between them and other complexities [8,9]. The data given by the mathematical model are analyzed statistically and inferences are made using multiple linear regression [10]. Flow diagram of the statistical regression model for the HPLC method development and validation is shown in Fig 2.

3.0 HPLC Method Development

A pictographic Fish-Bone figure (Fig. 3) shows the number of variables affecting the response factors. The multivariate design of experiment technique is used to revamp the response factors by adjusting the independent variables simultaneously. Against this if a univariate

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TROPANE ALKALOIDS ESTIMATION IN SUSPENSION CULTURES OF Datura innoxia Miller.

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Abstract

The tropane alkaloids present in Datura species mainly atropine and scopolamine have been used in various pharmaceutical preparations for their therapeutic activities and hence, these alkaloids are in demand. The amount of solanaceous alkaloids present in Datura innoxia is in small quantity, hence the aim of present study was to develop a tissue culture technology to produce its constituents in high concentration on liquid medium and to estimate the production of these tropane alkaloids in the cultured cells. A rapid, efficient and reproducible callus culture protocol was successfully established for Datura innoxia germinated seedlings on the MS medium supplemented with various growth hormones, resulting in a creamy soft callus. The callus developed was transferred onto a liquid MS medium and was maintained for 100 days resulting in cellular aggregates. The estimation of total Tropane alkaloids in D.innoxia plant organs and suspension cultured cells was done using Vitali-Morin reaction. The content of Tropane alkaloids was found to be higher in genetically transformed culture. The results obtained revealed that the suspension culture of Datura innoxia can be used as an alternative source for production of Tropane alkaloids.

Keywords: Tropane alkaloids, Datura innoxia, Suspension culture, scopolamine, Vitali-Morin reaction

Introduction

Datura innoxia has been used extensively in traditional system of medicine as preanaesthetic agent, in ophthalmology, as antispasmodic drug [1,2]. The natural source of these alkaloids are a very few solanaceous plants and it has always been an effort of the researchers to increase the content of these alkaloids in plants either growing naturally or in cultured conditions. Datura species have served as model plants for the development of tissue culture technologies for understanding the process of plant regeneration and a lot of work has already been attempted on increasing the content of the alkaloids in *Datura* species [3,4]. The present study deployed the plant Datura innoxia, developing a tissue culture technology to produce its main product scopolamine, an extensively used pharmaceutical, in high concentration on solid and liquid medium. It was done by monitoring the effect of different hormonal combinations on the development of fastgrowing cells and by studying the production of the tropane alkaloids in the cultured cells of Datura innoxia in MS basal medium.

Materials And Methods

The seeds of *D. innoxia* (Fig. 1a and 1b) were collected from the plants growing in the Herbal Garden of Jamia Hamdard, New Delhi, in the months of September and October. The identification of plant material was done by Raw Materials Herbarium and Museum, National Institute of Science Communication and Information Resources, New Delhi.

The previously scarified obtained from disease free plants of *D. innoxia* were treated with a very dilute soap solution for 1 min and then washed thoroughly under running tap water followed by rinsing with double distilled water for 3-4 times. *D. innoxia* seeds were surface sterilized by 1% sodium hypochlorite treatment for 10 min, followed by repeated washings with sterile double distilled water ^[5,6]. All the experimental work was carried out

under strictly aseptic conditions in laminar air flow bench fitted with a bactericidal U.V. tube. The floor of the chamber was thoroughly swabbed with cotton dipped in alcohol. The surface of all the vessels and other accessories such as instruments (spatula, forceps, scalpels, blade and gas burner) were also cleaned with alcohol. The chamber was then sterilized with U.V. rays continuously for 1hour. Body parts inside the inoculation chamber such as hands and arms were scrubbed with alcohol before inoculation.

For increase in % germination of seeds, they were treated aseptically with gibberellic acid (10 ppm) and warm water for 1 hour. Then seeds were transferred aseptically with the aid of sterile forceps into sterilized petridishes having sterile cotton pad and filter paper, moistened with sterilized water and wrapped with aluminium foil. These petridishes were then kept at room temperature. The 12 days old germinated seedlings (Fig.1c) were inoculated in sterilized solidified slants containing Murashige and Skoog (MS) medium.



Fig. 1a: Datura innoxia plant



Fig. 1b: Seeds of Datura innoxia

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SEPARATION AND ISOLATION OF SWERTIAMARIN FROM ENICOSTEMMA LITTORALE BLUME BY USING FLASH CHROMATOGRAPHY

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Abstract

Swertiamarin was successfully separated and isolated from *Enicostemma littorale* by using flash chromatography technique. Swertiamarin, was obtained as colorless crystals with a yield of 10.25% with purity (~98%) from the mixture containing swertiamarin. Identification and structure elucidation of isolated swertiamarin was done by melting point, TLC fingerprinting, HPTLC and different spectroscopic techniques (MS, FTIR, and ¹H-NMR), respectively. In this study, the fast, simple and efficient isolation of swertiamarin was carried out by flash chromatography which can be applied to the preparation of reference substance of Swertiamarin. So using this method the pace of research on swertiamarin will be increased.

Keywords: Swertiamarin, flash chromatography, separation, isolation, Enicostemma littorale.

1. Introduction

Separation and isolation of pure phytoconstituents from the extracts of natural sources mostly done by applying chromatography. However, it is very difficult that the pure phytoconstituents is obtained in a single step purification process and it can be easily achievable by the combination of one or more chromatography techniques [1]. Here, we report the efficient isolation of swertiamarin from Mamejava (Enicostemma littorale Blume) alcoholic extract using flash chromatography (CombiFlash Rf 200 Teledvne Isco, Nebraska, USA). Swertiamarin is the phtyoconstituent of plants like Anthocleista procera, Enicostemma littorale, Swertia chiraytiya, Swertia davidi, Swertia patens, Swertia mileensis, Swertia pseudochinesis [2,3] and represented as a biological lead compound of Enicostemma littorale. Swertiamarin displays a variety of pharmacological actions [3,4,13-19,5-12]. The separation, isolation and purification of bioactive compounds with purity, good quality as well as in quantity from a crude extract or fractions of an extract is a long and expensive process. Flash chromatography gives a inexpensive solution for the separation of mixtures from natural products which require moderate resolution [20]. It provides good separation in a short time under a proper chromatographic condition [21,22]. Thus, the separation of swertiamarin from Enicostemma littorale by flash chromatography which has not been done earlier.

Isolation of swertiamarin was done by solvent fractionation [18], column chromatography using silica gel (60-120 mesh) [23–25] and by centrifugal partition chromatography [25] from different *Enicostemma* and *Swertia* species. In our previous report, isolation of swertiamarin by using column chromatography with improved yield of swertiamarin was done [19]. But, column chromatography is considerable time consuming [26] for the separation and isolation of swertiamarin from different plants. In search of new fast and less time consuming process, we developed a method for the isolation of swertiamarin by fractionation of *Enicostemma littorale* alcoholic extract by column chromatography.

2. Materials and Methods

2.1 Equipment's and Materials

Rotary evaporator (R-210) was used for solvent evaporation and pre-coated TLC plates (silica gel 60 F254 (E. Merck), p- anisaldehyde reagent (Spectrochem), UV-cabinet (CAMAG), silica gel (particle size 40–60 μ/230-400 mesh) (Merck, Germany), melting point apparatus (VEEGO-VMP-PM), twin trough TLC chamber (10x10), HPTLC (CAMAG) were used during swertiamarin isolation. The solvents used for flash chromatography were analytical grade and were purchased from Fisher Scientific. The separation of SWR was carried out on an automated flash chromatography system (Combi*Flash* Rf 200, Teledyne Isco, Lincoln, NE, USA).

2.2 Collection and authentication of plant material Whole plant of Enicostemma littorale Blume (ELB) was collected from Dharampur, Valsad district in November 2012, authenticated by a taxonomist and identity confirmed by referring to Flora of Gujarat [26]. Voucher specimen no. NIPER-A/NP/1112/05 was preserved at NIPER- Ahmedabad, India. Plant material was dried in a hot air oven at 37°C, powdered and stored in an air tight container for further use [27].

2.3 Factionation of Enicostemma littorale Blume alcoholic extract by column chromatography

Powdered material (100 g) was extracted with absolute alcohol (5 x 200 ml) on a shaker at 70 rpm until the extraction no observation of swertiamarin (SWR) was found in thin layer chromatography (TLC). The solvent was removed under reduced pressure at 40°C in a rotary evaporator. The alcoholic extract obtained was treated with cold diethyl ether to obtain 29.5 g of a precipitate. The precipitate was loaded on a chromatography column with slurry of silica gel (60-120 mesh, E. Merck, Germany) and elution was done with petroleum ether followed by gradient elution containing ethyl acetate (0-80%). Ethyl acetate/petroleum ether (81:19 v/v) fractions were monitored by co- thin-layer chromatography (co-TLC) for swertiamarin. Fractions containing SWR were pooled and concentrated to dryness. The weight of dried mixture of compounds was 200 mg which was further subjected to flash chromatography separation.

2.4 Sample Preparation for Flash chromatography
Before preparation of empty solid sample cartridge it was assured that it had a bottom frit or not. The sample mixture (200 mg) was dissolved in binary solvent system (chloroform and methanol) and adsorbed on silica gel (40-60 μm (240-400 mesh) by using rotary evaporator under reduced pressure. The sample was loaded into cartridge which was tapped on bench top to settle the mixture. The frit was placed on the top of cartridge and forced down against the mixture using plastic plunger. The extra residual powder inside the cartridge was wiped out and capped. The solid sample cartridge with cap was loaded on the sample injection port.

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COMPARATIVE SUCCESS OF NATURAL SUPERDISINTEGRANT AND SYNTHETIC SUPERDISINTEGRANT IN IMMEDIATE RELEASE TABLET OF AMLODIPINE FOR ANGINAPECTORIS MANAGEMENT

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Abstract

Immediate release/fast distintegrating tablet has been recognized ever increasing in demand during last some decade inpharmaceutical field. Amlodipine is a longacting calcium channel blocker dihydropyridine derivative commonly used for the treatment of angina and hypertension. Oral bioavailability is restricted due to high first-pass metabolism.To overcome this problem in the present investigation immediate release tablet of amlodipine developedby usingsynthetic superdisintegrant(sodium starch glycolate) SSG and natural superdisintegrant(locust bean gum)at different concentration and their combination and the comparative success of natural and synthetic superdisintegrant in disintegration time by direct compression. Precompression parameter like angle of repose, moisture content, particle size estimation, bulk density, tapped density, carr'sindex, hausner ratio and post compression parameter like thickness ,drug content, wetting time , uniformity of weight , friability, dispersion time, disintegration time(DT), in vitro dissolution study, stability study are studied. F5 formulation showing maximum optimum activity optimize in form of immediate release tablet of Amlodinine

Keywords: AmlodipineDirectcompression ,Disintegrating time ,Locust bean gum, Sodium starch glycolate .

Introduction

Oral route is highly appropriate and most favored route of administration due to different factors such as ease of administration, high patient compliance, self-medication, accuracy in dosing one major drawback of this type of dosage is dysphagia (difficulty in swallowing) in geriatric, and another are patient suffering fromAlzheimer ,Parkinson diseases , sudden allergic episode, thyroid disorder ,motion sickness also result to non -patient compliance. To solve this problem major new approach in different form are present one of them is novel drugdelivery system main target to enhance the patient compliance safety and efficacy profile of the dosage form by formulating immediate release tablet .The development of solid dosage immediate release tablet result to enhance the oral dissolution fast absorption which ultimately increase thebioavailability of the drug. Immediate release tablet are formulated by various method such as direct compression solid dispersion method, lyophilization sublimation method, melt extrusion method , wet granulation method, compression molding method theyreveal the different disintegration property . The basic method for the developing of immediate release tablet in this paper use of synthetic as well as natural superdisintegrantad comparative success in the disintegrating rate. In the research study SSGused as synthetic superdisintegrant and locust bean gum use as natural superdisintegrant screened out and using direct compression method for the preparing of immediate release tablet of amlodipine. Angina pectoris is chest pain that is caused by heart muscle ischemia due to coronary artery obstruction or spasm. Amlodipine is a long-acting derivative of dihydropyridine commonly used for treating chronic stable angina, angina and vasospastic hypertension. It inhibitsthe calciumion transmembraneinfluxinto vascular smooth muscle

cardiac Peak plasma muscle. concentrations are reached 6-12 h. It has oral bioavailability of 64-90% and half-life of about 30-50 h. Amlodipine belongs to BCS class 1 (Highly solubility Highpermeability)More ever, drug molecule that undergoes pre-gastric absorption when formulated as immediate may show increased oral bioavailability.It provides good stability, appropriate easyproducing. In the present research we have deal with the development of safe and effective immediate release formulation of amlodipineby direct compression method withlow disintegrating time andadequate hardness and excellent release profile.

Materials And Methods

Material

Amlodipine and sodium starch glycolate is obtained from the Aurobindo pharmaceutical, Hyderabad,mannitol, microcrystalline cellulose PH 102, flavour, Locust bean gum, Magnesiumstearate, Talc obtained from KIET school of pharmacy, Ghaziabad, India. The other ingredient wereused of standard grade of laboratory.

Methods

Immediate release tablet containing 10 mg of amlodipine were prepared by Direct compression method. It is one of the simplest and cheapest method widely used to formulate variety of tablet because it require less processing steps as compared to another techniques. All the required quantity of ingredients sodium starch glycolate, locust bean gum in the different ratio, MCC PH 101, lactose pass through the 60 no sieve before mixing and add 10 mg amlodipine the mix the blend thoroughly magnesium stearate, talc and mint flavour were added in the last and mixed. The powder blend evaluated for the pre compression parameter and after the evaluation powder blend punch by single stationary punching machine with 6 mm flat punch.

Table 1: Formulation of amlodipine immediate release

tablet.					
Batch No.	F1	F2	F3	F4	F5
Ingredients	Formula (mg per Tablet)				
Amlodipine	10	10	10	10	10
SSG	2.5	1.5	3.5	2.5	3.5
Locust Bean Gum	1.5	2.5	2.5	3.5	4.5
MCC	95	93	90	89	85
Mannitol	46	48	49	50	52
Magnesium Stearate	3	3	3	3	3
Talc	2	2	2	2	2
Total	150	150	150	150	150

Determination of λ max of amlodipine

The UV spectrum of amlodipine was obtained by using a UV-visible spectrometer (UV-2450, Shimadzu). Accurately weigh 10 mg of the drug added to 100 ml of

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DEVELOPMENT AND CHARACTERIZATION OF A NANOEMULGEL FORMULATION OF CURCUMIN FOR THE TREATMENT OF SKIN INFLAMMATION

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Abstract

The main objective of this study was to formulate and characterize nanoemulsion gel formulation for poorly water soluble drug and to improve the permeability and solubility and to sort out the issues related to Curcumin. The Various Nanoemulsion constituents like oil, surfactant and co-surfactant was carefully chosen on the basis of their solubility and ability of emulsification with each other. Nanoemulsion was prepared using spontaneous or self emulsificationtechniquewhich was further incorporated into HPMC K4M to convert it into nanoemulsion gel. The nanoemulsion gel contains 1ml olive oil, 1ml Tween20 as a surfactant, 3ml PEG400 as a co-surfactant, 1ml water, 50mg drug, 5ml of Ethanol and 2% of HPMC K4M. Drug loaded nanoemulsion gel were characterized for particle size by using viscosity, percentage entrapment efficiency, in-vitro drug release and spreadability.HPMCK4M (2%) was found to be appropriate for forming a gel of prepared nanoemulsion according to its ease on spreadability and consistency. The in-vitro permeation of Curcumin was enhanced in comparison to conventional Curcumin. The limitations of poor bioavailability and low stability of Curcumin can be overcome by the formulation of nanoemulsion gel. The hydrophobic drug like curcumin can be effectively used in the nanoemulsion gel formulation. Spontaneous or self emulsification technique was found suitable for nanoemulsion gel formulation of curcumin.

Keywords: Curcumin, nanoemulsion, gel, spontaneous technique, skin disorders.

Introduction

Skin inflammation is one of the most common issue in

dermatology. Inflammation is a defense mechanism of the body as it is serves as the natural way of protecting itself against the injury and various infections. Skin inflammation is the occurrence of rashes followed by skin itching and redness and it may can lead to chronic conditions like dermatitis, allergy, acne, sun burn, rosacea and psoriasis. There are basically different types of skin inflammation that is acuteinflammation and chronic inflammation. Acute inflammation is the body's instant response to negative stimuli. While chronic inflammation is due to the environmental stresses and unhealthy lifestyle habits. Curcumin (1,7-bis(4hydroxy-3-methoxyphenyl)-1,6-heptadiene-3,5-dione) is constituent of Curcuma longa family belonging to Zingiberaceae, chemically known as diferuloylmethane is one of the famous ingredient in Indian spice and recognized for its extensive medicinal properties due to its anti-inflammatory, antimicrobial, anti-oxidative, anti-carcinogenic and anti-mutagenic. There are some of the novel formulations of curcumin which have being developed are Liposomes, transdermal patch, solid lipid nanoparticles, nanoemulsion and microspheres etc.

The Oral administration of curcumin is hindered due to the poor bioavailability as it undergoes extensive first pass metabolism discovery process so that suitable data as such physical and chemical data is attained. Melting point of curcumin was determined using Capillary tube method.

Solubility Studies

The solubility study of the curcumin was carried out by taking 2ml of different oils in small stoppered vials and the excess amount of curcumin was added into it. The tightly stoppered vialswas kept in mechanical shaker for 72hrs at $37\pm5^{\circ}$ C to reach the equilibrium. From the mechanical shaker the sample was removed and centrifuged for 15min at 2000rpm. After centrifugation supernatant was taken and filtered by usingthe membrane filter of size 0.44µm

mainly due to unconjugated curcumin molecule, which is hydrophobic in nature that means it is very poorly absorbed in gastrointestinal tract after the oral ingestion of curcumin a very lesser traces of curcumin is found in blood and tissues. Incontrast topical formulation of curcumin showed better absorption through skin specially when the skin barrier becomes weak as in case of skin injury, infection and in diseased condition. Topical formulations of curcumin are helpful in many of the skin conditions but particularly associated with skin injury and skin inflammation. Most of the inflammatory diseases occurs mostly near the surface of the body(locally), topical application of curcumin on the site of

inflammation can leads to advantageous effects of delivering the drug directly to the diseased site and producing its local action. These are the factors which are responsible for potential topical therapeutic value of curcumin more promising than oral administration of curcumin.

Nanoemulsion gel is basically is the combination of the emulsion and the gel together where the emulsion can be used in both of the types that is O/W and W/O as a vehicle for delivering the drug into the skin. These nanoemulsion gel has many advantages over classic emulsion or classic gel like easy spreadability, lesser greasiness, thixotropic, water soluble, easy removal from the skin, bio-friendly and longer shelf life of it. The nanoemulsion gel has being formulated to overcome the low viscosity issues related to nanoemulsion which restricts the topical application of it and the another factor is the presence of ingredients of nanoemulsion gel namely oil, surfactant and co-surfactant escalate the permeation of the drug by enhancing the partition coefficient of the drug towards the skin. The topical nanoemulsion gel is superior over the conventional formulations of the hydrophobic drugs because of its better permeation and enhanced therapeutic efficacy. Thus the nanoemulsion gel has all the positive aspects to become safe, effective and well accepted drug delivery system for topical delivery of hydrophobic drugs.

Materials and methods

Material

Curcumin was obtained from Central Drug House(New Delhi), HPMC K4M was obtained from Sigma Aldrich (Delhi), PEG 400, Tween 20 and Olive Oil was purchased from Central Drug House (New Delhi). All other chemicals were of analytical grade.

Preformulation studies

Preformulation studies is the process of optimizing the drug delivery through the determination of the physical and chemical properties of the drug molecule that will affects the drug performance and development of the safe and effective dosage form. These preformulation studies confirms that there is no barrier towards the product development. It is a initial step in the drug

and appropriately diluted with ethanoland amount of drug content was measured using UV-visible spectroscopy at 424nm. The same method was followed for determining the solubility in surfactant and co-surfactant of curcumin.

Determination of melting point

For the determination of the melting point of the curcumin capillary tube was being used. In a capillary tube a specific amount of the curcumin was taken and was closed at one end of it and kept in the apparatus used for melting point determination ,further the temperature was recorded.



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MANAGEMENT OF OBESITY BY DIFFERENT STRATEGIES

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Abstract

Obesity is a problem in developed countries like the US as well as in developing nations like India. "It is so frequent that obesity is one of the major contributors to ill health in replacing traditional public health issues, including malnutrition and infectious disease."The World Health Organisation and national health institutes define obesity in Class I, Class II and Class III (as 30-34.9, 35-39.9 and greater than 40) is further characterized by BMI. Sympathomimetic drug like phentermine has cardio stimulative properties. It's been tested only in short-term trials and is a controlled substance in the United States. Orlistat is the appropriate medication in this group and is approved for the use in teenagers. Lorcaserin is an agonist of a specific receptor serotonin 2c. It is notable for its tolerability and low side effect rate. Physical training helps combat the permissive and wealthy environment that predisposes individuals with reduced obesity to gain

Keywords: Agonist, Obesity, Receptor, Sympathomimetic,

Introduction

Obesity is a disease caused by a health damaging buildup of extra fat [1]. The rising prevalence of obesity(defined as a BMI >30 kg/m²) requires preventive measures to decrease the potential health and economic costs of this issue worldwide [2] Before the early 1970s, severe obesity was extremely rare but has since increasing faster than obesity, with no clue of retard [3].It is a very complex medical condition that arises from the genotypical vs. environmental factor interaction [4]. Obesity has been recognized for over 40 years as a major public health issue. It continues to rise rapidly among those who are overweight. The growing trend of diabetes is driven primarily by obesity. Genetic factors provide an important explanation for these events and account for up to 20% of the BMI variance; environmental factors also play a significant role[5], obesity is also an important factor in many illnesses that are non-transmitted, including diabetes mellitus, cardiovascular disease and cancer [6].

In addition to the short-term extreme weight loss, the first diagnosis of overweight and obesity patients requires an intensive procedure, which involves diet and nutrition, regular physical activity and behavioral change [7]. Obesity treatment today incorporates hypocaloric diet, surgery and medications. Hypocaloric diets are sluggish to achieve desirable results whereas pharmacotherapy and surgery are costly in addition to their dangerous side effects [1]. This article reviews the strategies for the management of the obesity and their outcomes.

Epidemiology

Although the epidemic of obesity began to rise sharply in the 1980s, it was only since 1997 that the WHO and many national governments understood the importance of obesity as a serious public health problem that affects both developed and developing countries. The epidemic of obesity in children and adults showed that this appears to be steadily rising, with 20% of all adults already obese in most European countries and higher rates often found in the countries of Southern, Central and Eastern Europe. Likewise, the Middle East is extremely obese and is also the most prevalent country in the world for type 2 diabetes [8]. The two countries with the greatest rates of overweight and obesity were the American and the European ones. Throughout the Americans, overweight

prevalence increased from 45.3 per cent to 64.2 per cent and obesity prevalence increased from 12.9 per cent to 28.3 per cent (from 1980 to 2015). The highest rates for both obese and overweight are in the US and Mexico. The overweightprevalence in the European region rosefrom 48 per cent to 59.6 per cent and that of obesity from 14.5 per cent to 22.9 per cent from 1980 to 2015. The rates ofprevalence of overweight and obesity within each of these two areas were fairly consistent across countries. Turkey and the USA have respectively had the highest excess weight and obesity levels in 2015, while France and Colombia have respectively the lowest prevalence rates in the American and European areas [9]. The prevalence of obesity is growing, but only a few countries have tried to quantify the economic costs of obesity [10].

Different strategies used for the management of obesity

Dietary counseling is a pillar of the treatment for weight loss. The majority of the dietary regimens suggested for losing weight, focus on energy content and the content of macronutrients.NIH(National Institute of Health) advises that persons with overweight or obese Class I and two or more risk factors may limit their consumption of energy by 500 kcal per day. People with Class II and Class III obesity should aim to limit their energy intake by 500-1000 kcal per day. A weight loss of 0.5 kg per week can be accomplished with a reduction of 500 kcal per day energy intake[11].

Obese people generally prefer highly processed foods with simple sugars to complex / raw carbohydrates and therefore a diet that promote consumption of sugars and refined carbohydrates that can exacerbate weight issues and facilitate dyslipidemia, especially in those with resistance to insulin. Due to the questionable effectiveness of these diets, there has been an increase in the interest in very low carbohydrate ketogenic diets (VLCKD), or simply ketogenic diets (KDs)[12]. There are also various types of diets used for controlling weight like low carbohydrate diet, low-fat diet, low-glycaemic-index diet, high protein diet [13].

Exercise

For overweight and obese adults, exercise leads modestly to weight loss. Exercise can reduce abdominal fat. Exercise increases mobility for cardiorespiratory fitness, it can help to keep weight loss. Exercise must be an integral part of the treatment for losing weight and itsmaintenance [7]. Exercise alone is not an efficient way to achieve the initial weight loss, although most people who are overweight or obese prefer to choose exercise as their first interventional choice [11].Regular activity prevents weight gain which often goes hand in hand with aging. Increasing physical activity helps in the determination of the negative energy balance needed in weight loss. Thermodynamic principles make it very difficult for humans by exercise alone to lose significant amounts of weight or at least to lose weight quickly [14].

Pharmacotherapy

Drugs are the last attempt to retain optimum weight. Weight slips insidiously on, so instead of instantly it should be taken off in a slow and steady manner. Medicines assist in the treatment. Drugs alter the human body's basic metabolic process and thus regulate its weight. The side effects weigh the benefits out. Drugs targeting obesity are a long-term solution to obesity. There are number of drugs available in the market like orlistat,

sibutramine. metformin, exenatide, pramlintide. rimonabant, mazindol, phendimetrazine, diazoxide. naltrexone, topiramate, sertraline. They all work by different mechanism like appetite suppressants, by inhibiting non-selective uptake of nor adrenaline, serotonin and dopamine, by inhibition of hepatic gluconeogenesis in reducing the weight [15]. Several clinical studies have shown that lifestyle intervention with pharmacotherapy is superior to lifestyle intervention alone in patients with overweight and obesity to achieve clinically meaningful weight loss (≥5 per cent weight loss) [16] The US classifies phentermine and diethylpropionas schedule IV drugs. Schedule III medications include benzphetamine and phendimetrazine. classification represents the belief of the government that these drugs have the potential for abuse, although this risk seems to be very small [17].

Surgery

Theresults of surgery are in great weight loss and weightrelated comorbidities compare to non-surgical procedures, regardless of the procedures used. As compare to oneanother, some treatments have results in great weight loss and comorbidity results than other methods [18]. Two surgical procedures are used: first one is vertical banded gastroplasty. In this, along the lower stomach curvature a small sack with a restricted outlet is mounted. The second one is gastric bypass, in this an adjacent stomach pouch is built with a Y-shaped small intestine limb outlet Gastric bypass is more common than vertical banded gastroplasty, as it leads to higher weight loss [19]. Several surgical have shown significant changes in lipid profiles, including significant reductions in lipoprotein with low density, rises in lipoprotein with high density, and significant decreases in triglyceride levels [20].

Herbal products

Herbal weight loss products can potentially be beneficial when paired with lifestyle and healthy diets improvements to reduce clinical obesity. The effectiveness and safety of the herbal products available for weight loss continue to be major issues to be addressed through research and training and better regulation of manufacturing and sale [21]. Chinese physicians use herbal medicines for treating obese patients which usually consist of a combination of various plants, such as turmeric (Curcuma Longa) and mulberry leafs (Morus Alba). Herbal treatments are not only popular in Asia but are increasingly common in the West [22]. These supplements mainly used for losing weight include ephedra alkaloids and herbal sources of caffeine [21].

Behavioral therapy

Behavioral therapy was incorporated into the overall intervention in order to reinforce lifestyle changes, believing that obesity is the result of ill-adaptive eating patterns and exercise habits. Behavioral therapy can help people who are predisposed to obesity develop a set of skills to help them achieve a normal weight [23]. The typical method of enforcement reform involves target setting, self-monitoring, control of stimuli (changing the environment to improve port weight management behaviors), cognitive enhancement (increase in selfawareness and weight sensitivity) and rebound prevention (weight rehabilitation) [13]. Behavioral change treatment is usually done in a group environment with the benefit of lower costs but can be completed independently with a health care professional on a one-to-one basis[18]. While successful long-term behavioral therapy is not widely available. However, if this strategy does not yield the additional weight loss needed by patients, it is difficult to convince patients to stay in therapy to sustain the smaller weight loss they have achieved [24]

Artificial Intelligence Technologies

The health care system is a financial constraint and costefficient solutions are the basis for a successful future. Infinitely scalable, digital interventions, such as AI will lead to safe behavioral changes of habits and improve the prevention and management of chronic diseases like obesity [25]. Patient health behavior and outcomes are enhanced with utilization of AI networks. It has been found in 15-week research, people have lose 2.38 per cent of baseline body weight, compare to the output achieve in person-based component-related interventions [26].

Conclusion

Obesity has become a challenge in the world which needs more concern from the society. It is the basic for causing the major risks of cardiovascular diseases, metabolic disorders, diabetes, and cancers. We have attempted to put some strategies to overcome the problem of overweight and obesity by which one can live a healthier lifestyle.

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ROLE OF ARTIFICIAL INTELLIGENCE IN HEALTH CARE

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Abstrac

Artificial Intelligence (AI) has wide-reaching potential and deals with various technical tasks, which would otherwise only be expressed in human brain. AI helps in investigation of new drugs as well as target based drug development, which reduces the cost and time consumed for of research and development. There are several pharmaceutical branches, where AI approaches (algorithms, machine learning, natural language processing, etc.) are used for the diagnosis and treatment of diseases ultimately leading to benefits of human being. AI based methods have been applied reasonably in various pharmaceutical areas for development of biogenic eyes, artificial taste buds and drug development and drug discovery software. This paper gives a summarised overview of role of AI in various sectors of health care with its pros and cons.

Keywords

Artificial Intelligence, Healthcare, Drug Discovery,

Machine learning

Introduction

Artificial Intelligence (AI) is now becoming an important part of drug development. As we have massive amount of data which now looking for human genetic medicines specifically for their treatment. Human Genome Project (HGP) is one of the common example and most important part of AI. As AI is considered be coming true of a fantasy in pharmacy field with respect to designing of more efficient drug by using human genetic code with the help of different software. These kinds of evolutionary practices in the field of health care, day by day leads to the acceptance of AI in health system. Today AI is to be considered more efficient and effective over human beings. The ability of AI of recognizing patterns and recalling from its previous data base for diagnosing conditions is considered to be its greatest strength. AI can also detect the right people for clinical trials. So if we look at the stages of the drug development process for which AI is being adopted [1-5].

Early stage includes the identification process of the drug which you might have studied in HGP and also looking for ways to improve different molecular reactions. AI can also work's biased in research by analysing the chemical, molecular and medical data for identifying new targets.

Types of AI in Health Care

a) Machine Learning:

It is a method by which scientist learns the human data in statistical form for predicting the patient's disease and its treatment. Convolutional Neural Network (CNN) is the advanced form of machine learning which was inspired by the connectivity pattern in between the neurons which represents the formation of the animal visual cortex [6-10].

b) Natural Language Processing:

Understanding the human language and making its sense has been the motive of AI researcher's from 1950's. Natural Learning Processing (NLP) basically includes various applications such as recognition of speech, text analysis, and translation and may more.

c) Rule-Based Expert System:

In the field of heath care rule based expert system is being pre-dominantly used commercially since 1980's. These rule based expert system were broadly employed in health care field for clinical decision support purposes for about couple of decades and still being widely use today [10].

d) Physical Robots:

About 200,000 of physical robots every year are installed in industries across the world. USA became the first country in 2000 to approve surgical robots for their surgeons to enhancing their abilities to create veracious and slightest incisions, wound stitching etc. Gynaecologic surgery, prostrate surgery, and neck and head surgery are the various surgeries in which physical robots are involved [11].

Application of AI in Healthcare

AI is implemented in healthcare with the primary aim to analyze relationship between disease prevention and patient outcomes. Some of the major areas with effective AI implementation are narrated below [12-14].

- Management of medical record and other data.
- Designing of treatment.
- 3. Digital consultancy.
- 4. Management of medications.
- 5. Creation and designing of drugs.
- 6. Monitoring of health.
- Reduction in error of dose.
- 8. Participation in clinical trials.

Diagnosis

Artificial Intelligence can also be used for the detection of Alzheimer's disease (AD) as the doctors came to know that by using artificial intelligence they have detected that the patients suffering with this disease most often use proper nouns instead of using pronouns in their early stage of disease. Google is also helping artificial intelligence in detecting the various deficiencies in human body just by recognising their facial expressions. AI is focusing on reducing the cost and improving quality of medicines for patients [15-20].

Treatment

BENEVOLENT AI has identified the drug which can prevent the death of neurons and prevents humans from diseases of motor neuron. Scientists were not much familiar with Artificial Intelligence at the early stage in the terms of clinical trials for their identifications [21-26].

Patient Engagement and Adherence

Patient engagement and adherence has been the greatest problem of health care and the ultimate barrier between ineffectual and satisfying health outcome. Increment in the active participation in their self well-being and care, the better will be the results. Failing to make essential behavioural acclimation and not following the treatment course or not taking the prescribed drugs on time is the biggest problem [28, 29].

AI Ethics in Health Care

In the last few years, AI has impacted the healthcare sector. The requirements for ethical implications are increasing as there is a need to minimize ethical risks associated with AI implementation. Some of the risks are threats to privacy and confidentiality, informed consent, and patient autonomy. The ethical policies are needed to be framed and implemented to consider integrate AI in clinical practice. Some of the important points to be considered for the need of AI ethics are as follows [30].

- Privacy and data security of the patient.
- Transparency towards patient.
- Patient should not be discriminated.
- Safety assurance of the patient.
- The use of artificial intelligence must be in the favour of the patient.

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FORMULATION AND EVALUATION OF INTRAGASTRIC SUSTAINED RELEASE MUCOADHESIVE ORAL TABLET OF BACLOFEN

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Abstract

Mucoadhesion occurs between two surfaces, one of which is a mucous membrane and another is drug delivery system. The bioavailability of baclofen by increasing the residence time of the drug by preparing gastroretentive mucoadhesive sustained release matrix tablet. Baclofen comes in the category of skeletal muscle relaxant. It is slightly Mucoadhesion had been a topic of interest in the design of drug delivery system to prolong the residence time of the dosage form with the under lying absorption surface to improve and enhance the bioavailability of the drugs. soluble in water, very slightly soluble in methanol, and insoluble in chloroform. It inhibits monosynaptic and polysynaptic reflex transmission at spinal level, probably by stimulating the GABAB receptors which in turn inhibit the release of found to be dependent on the composition of the polymer in the tablet.

Keywords: Mucoadhesion, Bioavailability, Mucoadhesive retention time, Mechanism of mucoadhesion

Introduction

Baclofen, a centrally acting skeletal muscle relaxant, it is found to be fast absorption and elimination pattern and having absorption window in the upper gastrointestinal tract which may lead to low bioavailability[1].Gastro retentive dosage forms are designed or formulated to sustained and prolong the release of drug to the stomach[2].An ideal dosage form is one, which attains the desired therapeutic concentration of drug in plasma and maintains constant for entire duration of treatment. This is possible through administration of a conventional dosage form in a particular dose and at particular frequency[3]. Reduction in fluctuation in steady state levels and therefore better control of disease condition and reduced intensity of local or systemic side effects [4]. Fast GI transit results in an incomplete release of drug in the absorption zone and diminishes the efficacy of the dose[5]. Theadvantages of controlled drug delivery system over the conventional dosage form are as follows

- Improved patient convenience and compliance due to less frequent drug administration.
- Increased safety margin of high potency drugs due to better control of plasma levels.
- Maximum utilization of drug enabling reduction in total amount of dose administered[6]

The present investigation aimed to improve the bioavailability of baclofen by increasing the residence time of the drug by formulating gastro-retentive mucoadhesive sustained release matrix tablet [7]. Different formulations of mucoadhesive Baclofen tablets were prepared using a different concentration of guar-gum, carbopol 974P, and combination of both.[8]

Materials and Methods

Materials

Baclofen was procured from KIET School of Pharmacy. Carbopol, Guar gum, Lactose (Anhydrous), Magnesium Stearate, Tale was obtained from KIET School of Pharmacy. glutamate and aspartate. Tablets were prepared by direct compression technique and evaluated for hardness, weight variation, thickness, content uniformity, swelling index, mucoadhesive force, mucoadhesive strength and in vitro drug release. Formulation B3, containing carbopol and guar gum was found to control the release of Baclofen for more than 12 hrs with cumulative percentage of drug release 70.67%. The mucoadhesive studies revealed that batch B3 found to be good mucoadhesive strength and mucoadhesive retention period. For all formulation's kinetics of drug release from tablet followed by Matrix and Korsemever Peppas Model, which states that the release of might follow Non-Fickian diffusion as predominant mechanism of drug release. The bioadhesion swelling and ability

All other reagents and chemicals used were of analytical reagent grade.

Methods

Preparation of Mucoadhesive Tablet using Direct Compression Method

Sustained release mucoadhesive oral tablet of Baclofen was prepared by Direct Compression Method.

- All the ingredients of tablet are blended in mortar with pestle to obtain uniform mixing.
- The powder of the tablet was then compressed on 08 mm flat surface punch by tablet machine.
- Tablets of Batch Bland B2 contain only single mucoadhesive polymer.
- While Batch B3 contain combination of mucoadhesive polymer.

Table 2. Composition of Baclofen Mucoadhesive Tablet

Code	B1	B2	В3				
Ingredients	Unit For	Unit Formula (mg per tablet)					
Baclofen	30	30	30				
Carbopol	43	-	45				
Guar-gum	-	30	15				
Magnessium	1.5	1.5	1.5				
Stearate							
Talc	1.5	1.5	1.5				
Lactose	72	87	57				
Total	150	150	150				

Evaluation Of Powder Blend

Bulk Density (Db)

It is the ratio between total powder mass and bulk powder volume. It was measured by pouring the weighed powder into a measuring cylinder (passed through standard sieve # 20), and the initial weight was noted. This initial volume was referred to as bulk volume. According to the formula mentioned below, the bulk density was calculated. It is in gm / ml, and is given by

Db = M/Vb

Where, M and Vb are powder mass and bulk powder volume, respectively.

Tapped Density (Dt)

It is the ratio of total powder mass to the powder volume that is tapped. Volume has been measured 750 times by tapping

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DIFFERENT STRATEGIES IN DRUG DESIGNING INCLUDING CHEMOGENOMICS

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Abstract

Chemogenomics unites the most influential ideas in current science and Biology, connecting combinatorial Chemistry with genomics and proteomics.chemogenomics , or concoction genomics, is the foundational screening of focused synthetic libraries of little particles against singular medication target families (model : GPCRs. atomic receptor, kinases and proteases and so forth.) With a definitive objective of distinguishing proof of novel medications and medications targets. Present day chemogenomics is an extraordinary order concentrating the organic impacts of substance mixes on a wide range of natural targets. In the present science, finding of medication structure any sort of malady put a significant job. Medication Institute and Pharma Companies continually doing research with new item under bioinformatic ways. These looks into completed distinctly for their business reason and beat the challenge. Medication configuration, frequently alluded to as reasonable medication configuration, is the creative procedure of finding new medicine dependent on the information on a natural objective. Furthermore, there are various procedures are likewise used to structure a medication.

Keywords: Chemogenomics , Drug design , Drug targets , Strategies.

Introduction

Modern chemogenomics is a unique control concentrating the organic impact of concoction mixes on a wide range of natural targets. By and by, bits of knowledge from chemogenomics are progressively utilized for the reasonable aggregation of screening sets and for the sound plan and combination of guided concoction libraries to quickened tranquilize Discovery. Be that as it may, thinking about enormous measures of existing synthetic and organic information (mixes targets and examines), investigation and compelling investigation of the information speak to an intricate issue. Right now explicit issues related with the chemogenomics based information mining methodologies including chemogenomics databases. And furthermore examines about the systems of medication configuration steps engaged with tranquilize planning strategies of medication structuring and procedure of medication planning.

Information mining procedures in the structure of GPCR focused on compound libraries

There are a few strategies for projection calculation dependent on neural and measurable methodologies . uncommonly, topology and separation safeguarding mappings model self arranging highlight guide of Kohonen or separation saving non direct mapping of Sammon. Utilized self sorting out maps (SOM) for examination and of representation of various gatherings of GPCR ligand based on7 determined atomic descriptors. Right now, (1400 mixes). Adreno receptor agonists (433 mixes) had all the earmarks of being grouped at unmistakably various zones of the guide. Such maps for specific gatherings of ligands can be utilized for anticipating potential subtype explicit movement. A virtual screening technique dependent on a topological pharmacophore comparability and SOM was applied to streamlining a library of P1 purinergic human A2A receptor enemies. At first, a SOM was created utilizing a

lot of organically tried atoms to built up a primer structure movement relationship (SAR). A combinatorial library configuration was performed by anticipating practically collected new particles onto the SOM. A Small center library of 17 chose combinatorial items was integrated and tried. By and large satire planned structures yielded are triple littler restricting consistent (33 versus-100 nm) and 3.5 - overlap higher specifically (50 versus 14) than the underlying library.A most particular compound uncovered a 121 crease relative selectivity for A2A versus A1. This outcome exhibited that it was conceivable to plan a little. action advanced centered library with an improved property profile utilizing the SOM virtual screening approach. The methodology may be especially helpful in ventures where structure best plan can't be applied on account of an absence of receptor structure data, for instance in the numerous tasks targeting discovering vagrant G protein coupled receptor (oGPCR) modulators. By difference to SOM, non - straight maps (NLM) speak to every single relative separation between all sets of mixes in the 2D form of descriptors space. The separation between two focuses on the guide straightforwardly reflect likeness of the mixes.

Strategies in drug design

Brug Design Strategies

Analogue based drug design

Denovo drug design

Structure based drug design

There must be integral restricting district present in restricting site of receptor or catalyst.

The medication would then be able to be combined and tried for movement. On the off chance that it demonstrates dynamic, the objective protein can be solidified with the new medication authoritative to restricting site and afterward X-beam crystallography and sub-atomic displaying can be utilized again to distinguish the structure of complex and to check whether restricting occurred true to form. This is called structure-based medication plan. Denovo drug design

- Involves the design of Novel drug structure based on the knowledge of binding site alone.
- This can lead to a novel lead compound successfully, which can then be a start point of structure based drug.
- Position of atoms in crystal structure is accurate to 0.2–0.4Å.
- Flexible molecules are better than rigid as they find alternative binding conformation
- Hit and trial
- Chances of hitting ideal structure are poor.
- Denovo does not identify whether the structures identified will have favourable pharmacokinetics/safety.

Analogue based drug design



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APPLICATIONS OF ARTIFICIAL INTELLIGENCE IN MEDICAL DATA RETRIEVATION AND ITS IMPACT ON DISEASE DIAGNOSIS

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Abstract

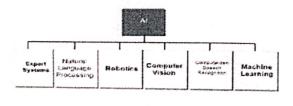
Man-made brainpower is a part of software engineering that means to make wise machines, which turns into a fundamental piece of innovation industry. Man-made brainpower in medicinal services is the utilization of complex calculations and programming to imitate human perception in the investigation of muddled restorative information particularly, Artificial knowledge is the capacity for PC calculation to inexact ends without direct human information. It is bringing a change in perspective to social insurance information and Rapid program of investigation methods. Computerized reasoning can be applied to different kinds of medicinal services information (sorted out and disorderly information) mainstream man-made brainpower strategies incorporate machines learning technique for composed information, for example, the old style bolster vector machine and neural system and the advanced profound learning just as Natural Language Processing, for example, python for chaotic information. The essential point of wellbeing related man-made reasoning application is to investigate the connection between counteraction or treatment systems and patient results.

Keywords: Algorithm , Aritificial intelligence , Healthcare , Neural Network.

Introduction

The expression man-made consciousness is when all is said in done alludes to figuring advances that comparative procedures related with human knowledge, for example, thinking ,learning, neural getting, change and connection. By and by, most uses of man-made reasoning are restricted in that they are just ready to complete explicit assignments or take care of foreordained issues . Manmade brainpower in an assortment of ways, drawing on standards and instruments including from maths, rationale and Biology. The primary highlights of current computerized reasoning is that they are continuously ready to comprehend differed and disorderly kinds of information, for example, Natural Language content and pictures. AI has been the best sort of computerized reasoning in most recent years and is the hidden methodology of a significant number of the applications by and by being used.

Applied Fields of Al



Types of artificial intelligence of appropriateness to Healthcare

Artificial intelligence is not single technology, but preferably a group of them. Almost all of these technologies have instant appropriateness to the Healthcare area, but the particular operation and job they support change broadly some specified artificial

intelligence technologies of excessive significance to Healthcare are explained and report below:

AI

Machine learning is a use of man-made brainpower that enables frameworks to automated gain and improve from episodes without being communicated modified. AI focus on the improvement of PC programs that can get to information and use it learn for themselves.

Profound learning

Deep learning is a piece of a more extensive level of AI strategy situate on counterfeit neural systems with delineation learning. Learning can be super plan, semi superintend or un superintend.

Neural network

Artificial neural network or assembler system are computing system roughly effects by the biological neural network that initiate animals brains. Such frameworks "learn"to execute task by wearing model for the most part without being program with task explicit principles.

Advantages of artificial intelligence

Decrease in human blunder

The expression "Human mistake" was conceived in light of the fact that human commit errors every now and then, PCs, be that as it may, don't commit this error on the off chance that they are customized accurately.

Faces challenge rather than people

This is one of the most stretched out bit of leeway of manmade consciousness. We can defeat any hazardous impediments of people by creating and man-made reasoning robot which thus can do the things for us.

Accessible 24 x 7

A normal human will work for 4 to 6 hours daily barring the breaks.

Aiding in tedious employments

In our everyday work , we will perform numerous monotonous works like sending an expressing gratitude toward mail, checking certain reports for blunders and a lot more things. Utilizing computerized reasoning we would productivity be able to robotize this Mundane undertakings and can even evacuate "Exhausting" assignments for people and treat them up to be progressively imaginative.

Computerized help

Some of the profoundly propelled associations utilize advanced help to interface with clients which spares the requirement for HR. The computerized help likewise utilized in numerous sites to give things that clients need. *Ouicker choices*

Using computerized reasoning nearby different advancements we can settle on machines take choices quicker than human and complete activity snappier.

Day by day applications

Daily applications, for example, Apple Siri, window's Cortana, Googles OK Google are regularly utilized in our every day schedule whether it is for looking through an area, taking a selfie, answering to a mail and some more

Challenges of artificial intelligence

Significant expenses of creation

The refreshing of man-made reasoning needs are utilized Range because of their Complex structure of apparatus, fix and their support.

Making human apathetic

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FORMULATION, EVALUATION AND CHARACTERIZATION OF ATORVASTATIN CALCIUM DISPERSIBLE TABLET

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Abstract

The main objective of the present study reported here was to produce a formulation of dispersible tablet of Atorvastatin calcium which provides rapid dissolution and rapid disintegration as compared to the conventional oral volume type. In order to identify the best formulation different trials has been study for different batches of different formulation methods. Here three methods with different excipients combination has been studied i.e. First method with direct compression, Second method with Dry granulation method and the third method were for wet granulation method was studied. In the first method all the batches of direct compression the disintegration time was found to be more than 1 min. In second method the same problem was found for dissolution and disintegration time was not suitable as the tablet take more time to disperse. Lastly In wet granulation method in which total four batches has been performed with change in excipients amount. In all four batches 1st and 4th trial was compared on dissolution basis study. In both the trials the difference is only with one excipients with MCC 101 in trial F-1 and MCC 102 in F4. On comparison it was found that the F4 trial with excipients MCC 102 showed good dissolution and disintegration behaviour in respect to F1 trial of wet granulation method. The stability performance has been done simultaneously on initial condition and accelerated condition at 40 °C and 75% RH and it was found that the Short-term stability studies on the promising formulation having no significant changes in drug content. Final tablet was optimized on the basis of drug content analysis, disintegration and by dissolution study. The formulation of F4 with the excipients MCC 102 by wet granulation was found to be best in comparison to other batches of different methods formulation.

Key Words: Dispersible tablets, Atorvastatin, Wet granulation.

Introduction

The basic aim of every formulation is to provide a safe and effective dosage form. Instead of having so many benefits of conventional dosages form sometimes do not prove useful in certain situation like in case of swallowing, elder patient because of tremors and dysphasia, in condition like nausea the patients who are disabled and mentally ill. The objective behind the present study formulation, development and characterization of Atorvastatin calcium tablet is to provide a fast dissolution and disintegration of drug in short time in order to provide rapid action.

Introduction to Dispersible tablet

Definition is according to European pharmacopeia: -They are the uncoated and film-coated tablets intended to be dispersed in water before administration giving a homogeneous dispersion. Oral dispersible tablets (ODTs) are uncoated tablets intended to be placed in the mouth where they disperse rapidly before being swallowed

The ideal properties of a drug for oral dispersible tablet having:-

- · Having the ability to permeate the oral mucosa.
- Ability to diffuse and partition into the epithelium of the upper GIT.
- Due to small size there will be no any moderate in molecular weight.
- Having low dose drug most preferable less than 50 mg.
- Having good stability of drug in water and saliva.

Introduction to drug (Atorvastatin calcium)

These drugs having the structural analogues of HMG – coenzymes A reductase. They work on the principle of inhibiting the rate limiting enzyme (HMG –coenzyme A reductase) in the biosynthesis of cholesterol in the liver. By inhibiting this enzyme, it significantly reduces plasma levels of total cholesterol, Low density lipid and Apo B. It also decreased the plasma triglycerides and a small increase in plasma level of HDL [1].

Another HMG –CoA reductase inhibitors include the diallyl disulphide (DADS) and diallylthiosulfinate. DADS are an organosulphur compound derived from garlic. It reduces the cholesterol synthesis by 10-25% at low concentration. Bis-(3-(4-nitrophenyl) prop-2-ene) disulfide, a new derivative of diallyldisulfide, is effective in reducing plasma total cholesterol [2].

Introduction to Disease Hyperlipidemia is a disease condition in which one or more of the plasma lipids including triglycerides, cholesterol, cholesterol esters and phospholipids and or plasma lipoprotein including very low density lipoprotein and reduced high density lipoprotein levels increase [3,4].

Experimental Method

Preparation Of Tablet By Wet Granulation Method

Weight intragranular part as per the formula. Pass through the sieve number # 40.With the help of Rapid mixer granulator, granulate with polysorbate 80 (1gm) and water (50 gm).After that keep the blend in hot dry oven at 60°C for drying purpose. Check the LOD until it comes to 1%.Now weight the extra granular part as per the formula. Pass the MCC 102, Acdisol and aerosil through the sieve number # 40 and magnesium stearate through #60.Mix the intragranular part with extra granular part by using the double cone blender. The resulting powder mixture was then compressed into tablets using rotary tablet machine equipped with 6.40 mm round concave punch. Sufficient pressure is applied to keep the hardness 4kg/cm2.

Invitro Drug Release Behaviour Of The Dispersible Tablet By Wet Granulation Method

Buffe

0.05M phosphate buffer prepared as follows. Dissolve 6.8g of monobasic potassium phosphate in 900 mL of water. Adjust with 6 N sodium hydroxide to get a pH of 6.8 and dilute with water to 1L. Medium: Buffer; 900mL Apparatus 2: 75ppm Time: 5, 10, 15, 30 min. Diluent: Acetonitrile and water (50:50).

Standard stock solution

Weigh and transfer about Atorvastatin calcium working standard equivalent to 25 mg Atorvastatin into 25 ml volumetric flask. Add 15 ml diluent and sonicate for 10min or until dissolve. Dilute with diluent to the volume. Standard solution

For 10 mg: Pipette2 ml of above standard stock solution to 200 ml volumetric flask. Dilute with dissolution media to the volume.

Test Preparation

Drop one tablet in each dissolution vessel and run the dissolution apparatus at specified time at specified rpm. After specified time interval withdraw specified volume and replace it with replenish dissolution medium. Filter through $0.45\mu m$ nylon filter.

Calculation Formula

% Atorvastatin dissolved (C 33 H 35 FN 2 O 5

"Equation (1)"

AT/AS×WS/DS×900/ 1×P/100×1/C × F×100

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COMPARATIVE STUDY BETWEEN NATURAL SUPER DISINTEGRANT AND SYNTHETIC SUPER DISINTEGRANT IN THE FORMULATION OF IMMEDIATE RELEASE TABLET OF FENOFIBRATE

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Abstract

Several dosage forms had been developed so as to release the drug immediately after administration and drug will slowly or incompletely dissolve in gastrointestinal tract. BCS classify, Fenofibrate under Class II (Solubility low and Permeability high). Fenofibrate is a drug used to lower the lipids which is difficult to solubilize in water. It is found that the rate of dissolution and bioavailability is less. Hence, the drug is formulated using different Super disintegrant such as Locust Bean Gum (Natural), Croscarmellose Sodium and Sodium Starch Glycolate (Synthetic) in addition to increase the release rate of drug from dosage so as to raise the solubility, or al usage rate and dissolution. The evaluation based on physiochemical substances and invitro dissolution examination was operated for the planned granules and tablets. It was observed that using the Locust Bean Gum, immediate release tablets with proper hardness, disintegration time and increased dissolution percentage can be formulated.

Keywords: Anti- hyperlipidaemic, Croscarmellose Sodium, Locust bean gum, Fenofibrate

Introduction

The oral way is most prominent and exists as perfect way for curative agent distribution due to small price therapy, construction and calmness of direction leading to upraised patient consent levels. Now appropriate therapeutic situation, many patients desire rapid commencement of action and wherefore immediate release of medication desired. To overpower these advantages, the pharmaceutic dosage form of immediate release has originated as substituted oral dosage forms that immediately disintegrate and dissolve to relief the medicines [1,2]. Immediate relief drug delivery system is based on a single or multiple- unit reservoir or matrix arrangement, describe to deliver immediate levels of drugs in a short time. Dose delivery with immediate release is desirable for drugs with long organic half-life, immense bioavailability, lower approval and lower half-life elimination [3].

Disintegrants are the factorscombined to the tablet and in certain enclosed formulations to stimulate the splitting of tablet and capsule "slugs" into smallerpiece in an aqueous conditionto rise of release of drug material. For disintegrating function, ability to interact strongly with water is crucial. The working of disintegrating activityisfusion of swelling and/or wicking and/or damage [3,4]. Disintegrating agent are required if a rapid event is desired, as in the case of pain recovery or pain relievers. Where the disintegrant starts to lose (part of) its performance during storage, the desired effect can be delayed or not occur at all [5]. Super disintegrant are classified in naturaland synthetic super disintegrant.

Natural superdisintegrants include ispaghula husk mucilage, locust bean gum, agar, alginates and so on.Synthetic superdisintegrants comprised of cross-linked polyvinyl pyrrolidone (Crospovidone, Polyplasdone xl, x110), microcrystalline cellulose (Avicel), modified cellulose (Croscarmellose Sodium, ac-di-sol), sodium starch glycolate (Explotab, Primogel) [6].There are three approaches of disintegrating into the formulation: intragranular (Inside Addition), extragranular (Extraneous

Addition), partly intragranular and extragranular [7-9].Fenofibrate can be classified as a BCS class II drug which haspronounced bioavailability effect on food [10]. Fenofibrate is used primarily to treat primary hypercholesterolemia or mixed dyslipidemia. It works by lowering the levels of low-density lipoprotein (LDL), very low-density lipoprotein (VLDL), and triglycerides and by increasing levels of high-density lipoprotein (HDL) [11-13].Moulding, lyophilisation, or freeze drying, direct compression, spray drying, and sublimation are the highest popular preparation methods. One of the approaches allowing the fusion of a superdisintegrant into the formulation is direct compression [14]. The aim of this paper to examine the comparison of variance super disintegrant and their efficacy in stimulating disintegration and dissolution of active ingredients from Fenofibrate's directly compressed tablets.

Materials and Methods

Materials

Fenofibrate was procured fromKIET School of Pharmacy. Microcrystalline Cellulose (MCC), Corn Starch, Croscarmellose Sodium, Sodium Starch Glycolate, Locust Bean Gum, Magnesium Stearate, Talc was obtained from KIET School of Pharmacy.

Preparation of Fenofibrate Immediate Release Tablet Using Direct Compression Method

Fenofibrate, Microcrystalline cellulose (MCC), Corn Starch were mixed in a polybag for 15 min withSuper disintegrant, passed through the 60# sieve. This combination was 5 minutes long kneaded with magnesium stearate and tale and processed as direct compression using 6 mm flat-faced rotary tablet machine punch. For all formulations, compression force was maintained constant. The magnesium stearate level for all formulations was set at 3 per cent

Different Synthetic (Croscarmellose Sodium, Sodium Starch Glycolate) and Natural Super disintegrants (Locust Bean Gum) were used at 5% & 7.5% in tablets.

Table 1: Different Composition of Fenofibrate Immediate Release Tablets

Release Tablets						
Lot No.	F1 (5%)	F2 (7.5%)	F3 (5%)	F4 7.5%)	F5 (5%)	F6 (7.5%)
Ingredients	Unit Formula (mg per tablet)					
Fenofibrate	40	40	40	40	40	40
Microcrystallin e Cellulose (MCC)	13 0	12 5	13 0	12 5	13 0	12 5
Corn Starch	10	10	10	10	10	10
Croscarmellose Sodium (Ac-di- sol)	10	15	-	-	-	-
Sodium Starch Glycolate	-	-	10	15	-	-
Locust Bean Gum	-	-	-	-	10	15
Magnesium	6	6	6	6	6	6

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CURRENT UPDATES ON NANOTECHNOLOGY IN DRUG DELIVERY: A REVIEW

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Abstract

The utmost developing wing in pharmaceutical science is known as 'Pharmaceutical nanotechnology' which presents various new devices, opportunity, extension in the application of disease diagnosis and therapeutics. The potential of nanotherapeutics to provide targeted drug delivery, enhance drug solubility, expand drug half-life, improve a drug's therapeutic index, and reduce a drug's immunogenicity has resulted to revolutionize the treatment of many diseases. One of the most potent nanosystems is nanoemulsion having the droplet size ranging to submicron size. Nanoemulsion (also known as mini emulsion) are clear oilin-water (O/W) or water-in-oil (W/O) droplets with a mean particle size between 100 and 500nm. The major components of nanoemulsion are oil, water, surfactant and co-surfactant (additionally). The stableness of nanoemulsion formulation can be constant/continuous by a surfactant and co-surfactant. Nanoemulsion has been considered as a promising method due to its advantage such as easy preparation, optical clarity, solubilizing for both hydrophilic and hydrophobic drug, less energy required and an additional advantage of greatly bypass the barrier and improve the drug targeting.

KEYWORDS: ANN, Characterization, Nanotechnology, Nanoemulsion, Patent, Regulatory aspects, Techniques

Introduction

Nanomedicine is the practice of nanotechnology to medicine and is vision to have animmense part on public health. It uses nanosized tools for the diagnosis, prevention, and treatment of diseases and enclosevarious definite application areas: drug delivery, drugs and therapies, in vivo imaging, in vitro diagnostics, biomaterials, and active implants. Over the decades, momentous development has been made in the field of nanomedicine, arise in a number of products, including therapeutics and imaging agents, enabling more potent and less toxic therapeutic and diagnostic interventions.¹

Nanoemulsions are o/w emulsions with a nano-size from 50 to 1000 nm. Generally, the moderate droplet size is between 100 and 500 nm. The particles can prevailO/W or W/O, where the core of the particle is either oil or water, respectively. Nanoemulsion also include the surfactants approved for human consumption and common food substances that are "Generally

by mixing a water-immiscible oil phase with an aqueous phase under high shear stress, or mechanical extrusion process. ²

The major advantages of nanoemulsion include targeted delivery of drugs, solubilising for both hydrophilic and hydrophobic

Recognized as Safe" (GRAS) by the FDA and additionally a co-

solvent. These emulsions are easily composed in giant batches

The major advantages of nanoemulsion include targeted delivery of drugs, solubilising for both hydrophilic and hydrophobic drugs, competence to protect drugs from degradation with long period stability thus making an ideal drug delivery system. The repetition and dose of injections can be diminished throughout the therapy as the release pattern of drugs takes place in a sustained and controlled mode over long duration.³

Nanoemulsion show extreme potential for the future of cosmetics, diagnostics, drug therapies and biotechnologies. Nanoemulsion have applications in distinct fields such as in cancer treatment, in drug targeting, as a mucosal vaccine, as a vehicle for transdermal drug delivery and lipophilic drug as a self-nanoemulsifying and solid self-nanoemulsifying drug delivery system, etc.⁴

Diminishing droplet sizes to the nanoscale induce some interesting physical properties, such as optical transparency and unusual elastic behaviour. Nanoemulsions are part of a vast class of multiphase colloidal dispersions. Despite some lyotropic liquid crystalline phases, also known as "mesophases", and "micro-emulsions", may occur to be related to nanoemulsion in composition and nanoscale structure, such phases are actually quite different.²

Nanoemulsion can be accomplished into several dosage forms, like liquid, cream, spray, gel, aerosol, foam and can be administered by variable routes like topical, oral, intravenous(i.v.), nasal, pulmonary, and ocular.⁵

Types of Nanoparticles^{6,7}

There are many types of nanoparticles (NP) with different size, shape, composition and functionalities. The major characteristics and functionalities of each NP are relevant for biomedical research. Some of them are;

Nanoemulsion (NE) has been considered as a promising method due to its advantage such as easy preparation, optical clarity, solubilizing for both hydrophilic and hydrophobic drug, less energy required and an additional advantage of greatly bypass the barrier and improve the drug targeting.

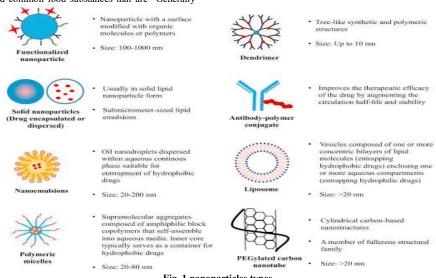


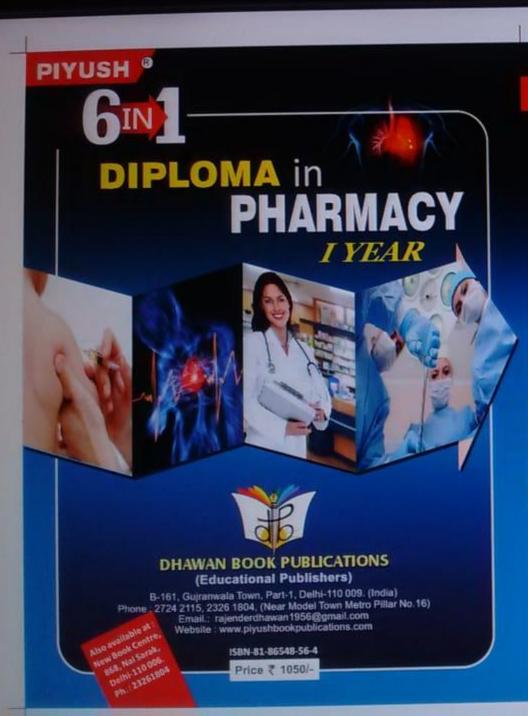
Fig. 1 nanoparticles types

Pre-clinical models of Depression: Nehavioral and Molecular Perspective

Ashok Jangra & Ashok Kumar Datusalia

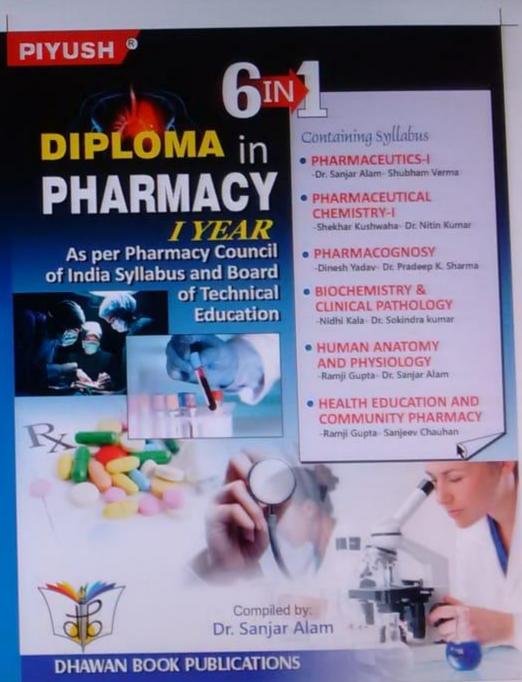
Abstract

Depression is a common, recurring, heterogeneous and potentially lethal psychiatric disorder that affects 350 million people across the globe. Core symptoms of depression include depressed mood, loss of interest, anhedonia, loss of energy, distorted thoughts, self-guilt, irregular patterns of sleep and appetite, and suicidal ideation. Animal models of depression play a crucial role in the screening and development of new antidepressant drugs during preclinical studies. Despite the high prevalence, substantial social and economic burden of depression on human population, its underlying etiology and pathological mechanisms are still not completely explored. Because some unique and multifaceted characteristics of depressive illness such as depressed mood, suicidal tendency are the major obstacles to be modeled in animals. An ideal animal model of depression offers opportunities to understand underlying molecular and genetic pathological mechanisms involved in the depression. Limited efficacy, delayed action and more side effects of the current antidepressant medications warrant a need to develop a novel antidepressant, which will be more efficacious and show a promising approach for the treatment of depression. In the past years, different animal models of depression have been proposed to screen the new pharmacological agents. Out of these, some animal models of depression are pharmacologically sensitive, and can thus utilize in the screening of new antidepressant drugs in rodents. These models are mainly based on actions of known antidepressants or responses to stress or both. The present chapter focuses on

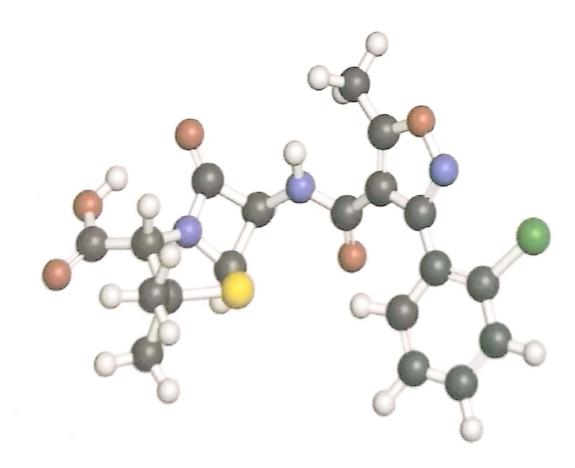


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PHARMACEUTICAL CHEMISTRY-I

Strictly according to New Syllabus for 1st Year Pharmacy Students

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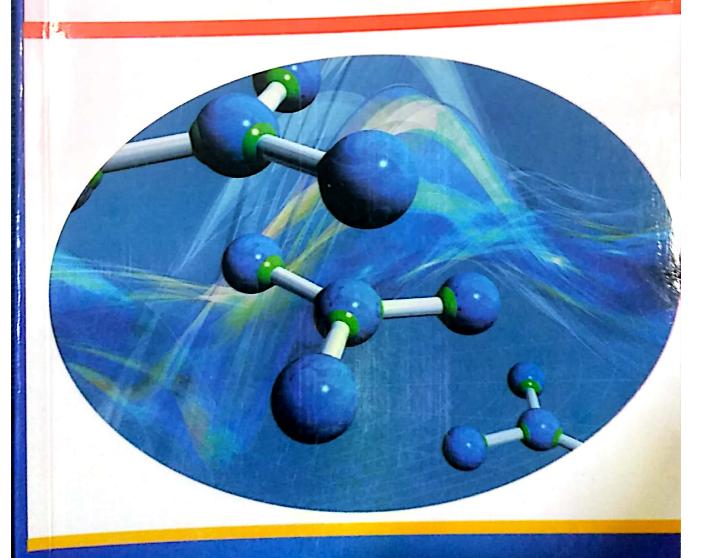
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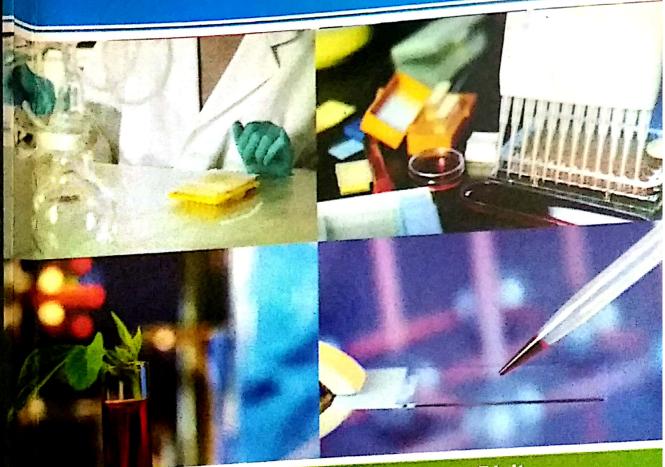
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Mr. Praveen Kumar Dixit is young, dynamic and competent pharmacy professional working as Assistant Professor in the Department of Pharmacology Kier C. Pharmacology, KIET School of Pharmacy, Ghaziabad since July 2014. His field of research mainly includes anti-diabetic, anti-inflammatory and anti-articles. and anti-arthritic activities. He has authored more than three books of Human Anatomy & Physiology and Remedial Biology for pharmacy He has published more than 28 research and review papers in peer reviewed national and international journals of repute. He has published more than 40 abstracts in various national and international seminars and conferences proceedings. He has participated in more than 35 various National and International Symposia, Seminars, Conferences, Faculty development programmes and Short term Training Courses. He has life time membership of various professional bodies like Association of Pharmaceutical Teachers of India (APTI), Indian Pharmacological Society (IPS) and Indian Pharmacy Graduate Association (IPGA).



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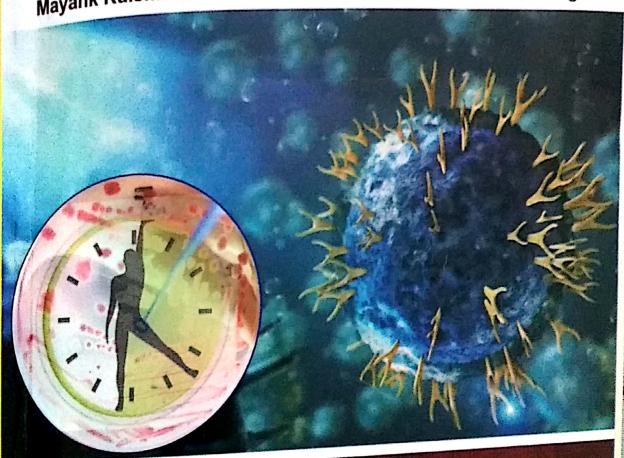
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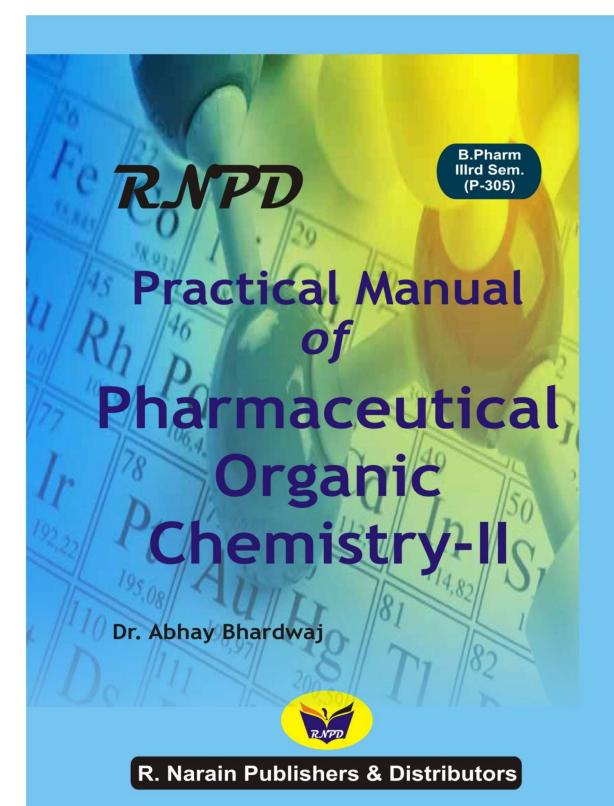
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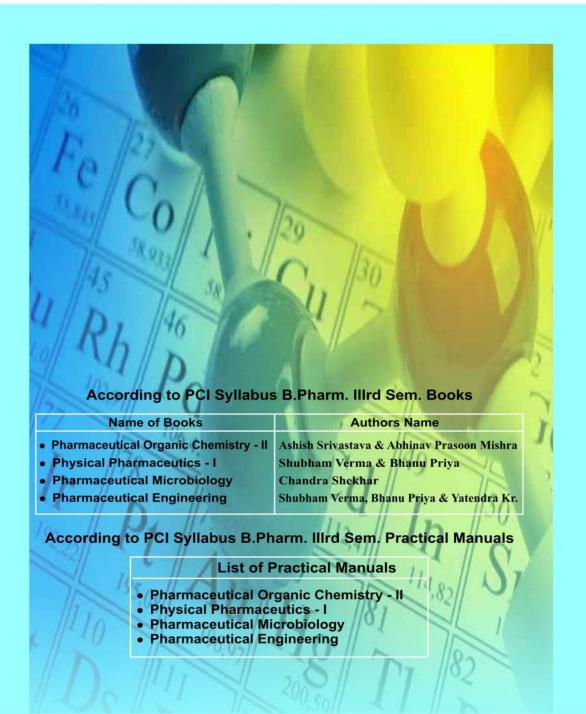
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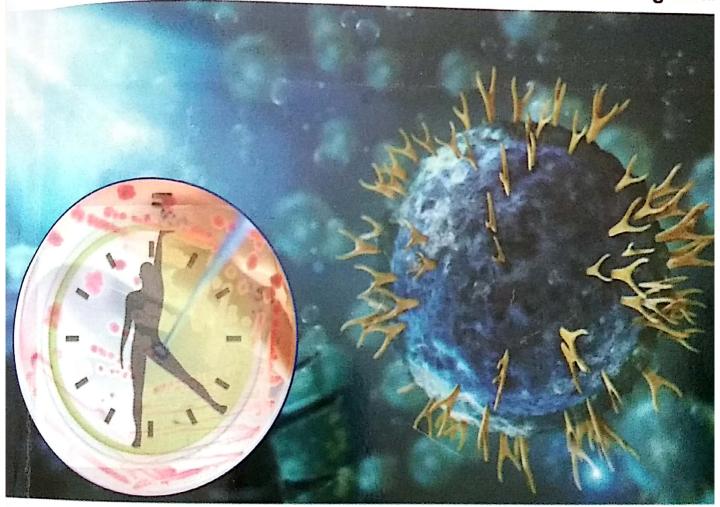
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Pharmacology-III

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About the Book

Pharmacology-III written as per New PCI Syllabus, kept in mind that student will get comprehensive knowledge and basic concepts. In this book, all the chapters are well described. The whole book is explained with diagrams and flow charts for better understanding. The substantial amount of information is added particularly in all major topics. This book contains five units that cover the entire syllabus prescribed by PCI. We hope that the students will learn various aspects of pharmacology in a better way.

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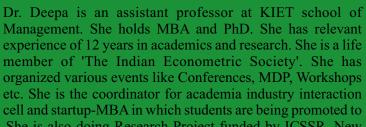
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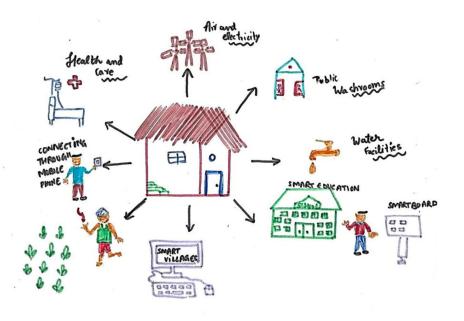




MAKING VILLAGES SMART THROUGH ATRMS

DR. PRATEEK GUPTA, DR. DEEPA

Making Villages **SMART** through **ATRMS**



Dr. DEEPA

Dr. PRATEEK GUPTA

MARKETING MANAGEMENT



Dr. Amit Tyagi

Dr. Ranchay Bhateja

Dr. Mani Tyagi

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The book is designed to meet the requirements of management students at the graduate and p graduate levels. It presents concepts that are clearly explained through live examples managerial applications. Students of other degrees such as BBA, B.Com, MBA, PGDM, ICWA,

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- Short and long answer type and applied questions at the end of each chapter.

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xperience in Marketing Management area covered hands on experience in practically all f marketing management from conceptualization, consumer behaviour, digital marketing narketing communications.



Dr. Ranchay Bhateja, an eminent professional author, teacher and trainer education system. She had illustrious career for more than two decades. S excelled herself in institute as a teacher, an administrator and an inst builder. She is presently working as an Associate Professor and Coor Carrier guidance Cell with KIET Group of Institutions and associated wit management institutes as a visiting professor. She has written many artic papers in journals. She has a considerable amount of experience in te writing in various management disciplines.



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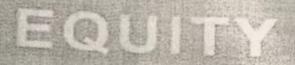
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Growth with Equity: Perspective of Bangladesh



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THE STANCES OF e-GOVERNMENT

POLICIES, PROCESSES AND TECHNOLOGIES

Edited by Puneet Kumar Vinod Kumar Jain Kumar Sambhav Pareek



Appraising the Societal Approach of India through the Social Cost Benefit Matrix

Deepa and Prateek Gupta

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8.1 Introduction

Capacity building is required within government and the creation of general awareness about e-governance among citizens. The consequent benefits can be a reduction in corruption, enhanced transparency, better convenience, growth in revenue, and/or cost reduction. Hence, e-governance has gained more popularity in the complex business world. e-Governance allows citizens to communicate with the government, participate in the government's policy making, and to communicate with each other. e-Governance creates opportunities for the government to revolutionize the procedure of the creation and execution of a sustainable approach from a system-focused to an actor-driven one.

Identifying the increasing use of electronics, the Government of India established the Department of Electronics in 1970. By the 1980s, a large number of government officers had computers but they were typically used for "word processing." The escalation of e-governance first stared with the National Informatics Centre (NIC) being established in 1977, and it was a first important footstep on the road to e-governance in India. The establishment of NICNET in 1987 was the major pushing force for e-governance. The National e-Governance Plan (NeGP) commenced in 2006, which showed a striking agenda for embryonic e-government services. "eKranti" or NeGP 2.0 was also gestated with a spotlight on electronically driven services. Later, Digital India, which commenced on July 1, 2015, became

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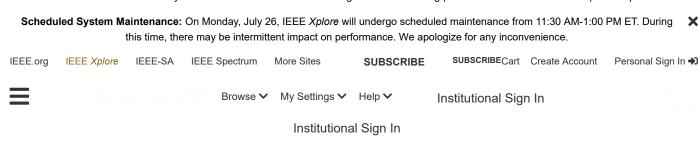
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Most of the smart phone users prefer to read the news via social media over internet. The news websites are publishing the news and provide the source of authentication. The question is how to authenticate the news and articles which are circulated among social media like WhatsApp groups, Facebook Pages, Twitter and other micro blogs & social networking sites. It is harmful for the society to believe on the rumors and pretend to be a news. The need of an hour is to stop the rumors especially in the developing countries like India, and focus on the correct, authenticated news articles. This paper demonstrates a model and the methodology for fake news detection. With the help of Machine learning and natural language processing, author tried to aggregate the news and later determine whether the news is real or fake using Support Vector Machine. The results of the proposed model is compared with existing models. The proposed model is working well and defining the correctness of results upto 93.6% of accuracy.

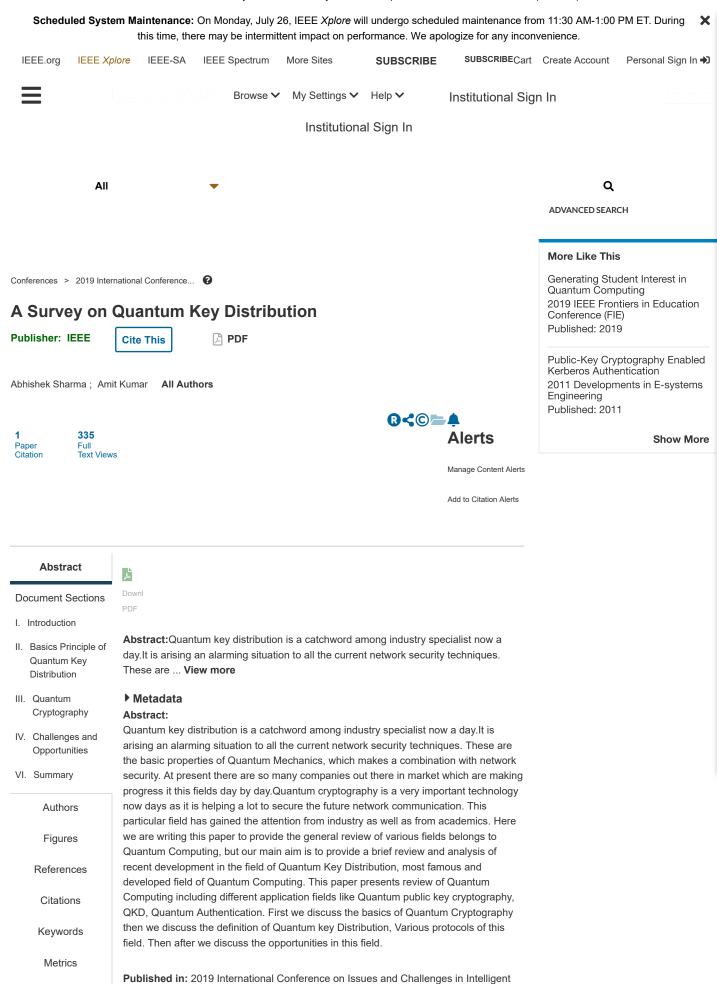
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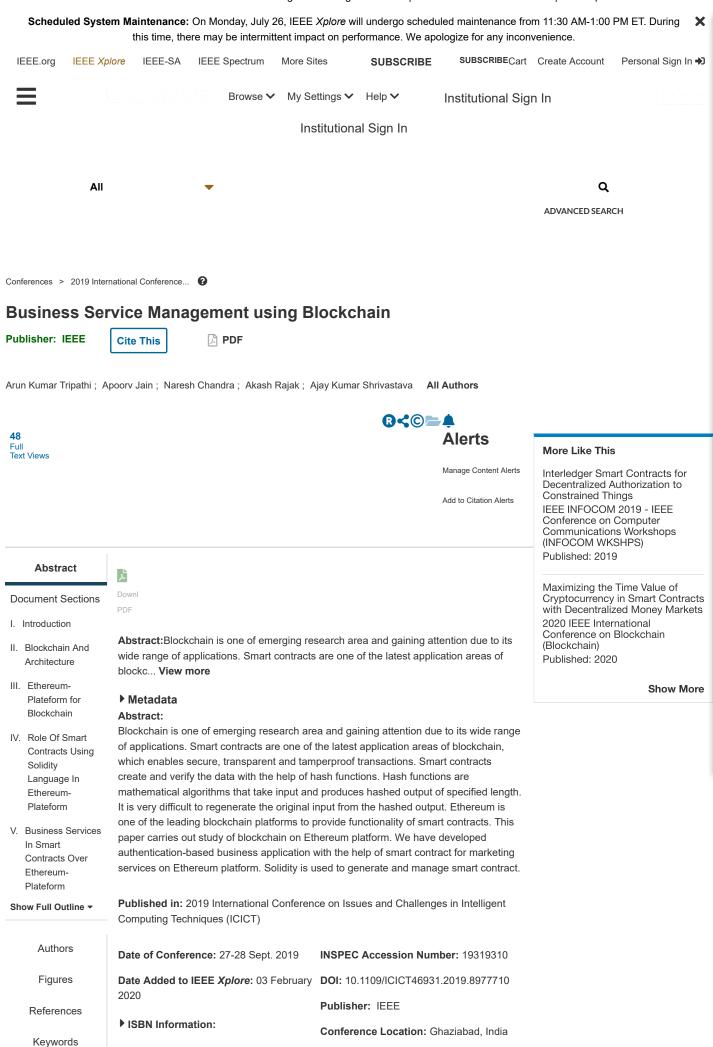


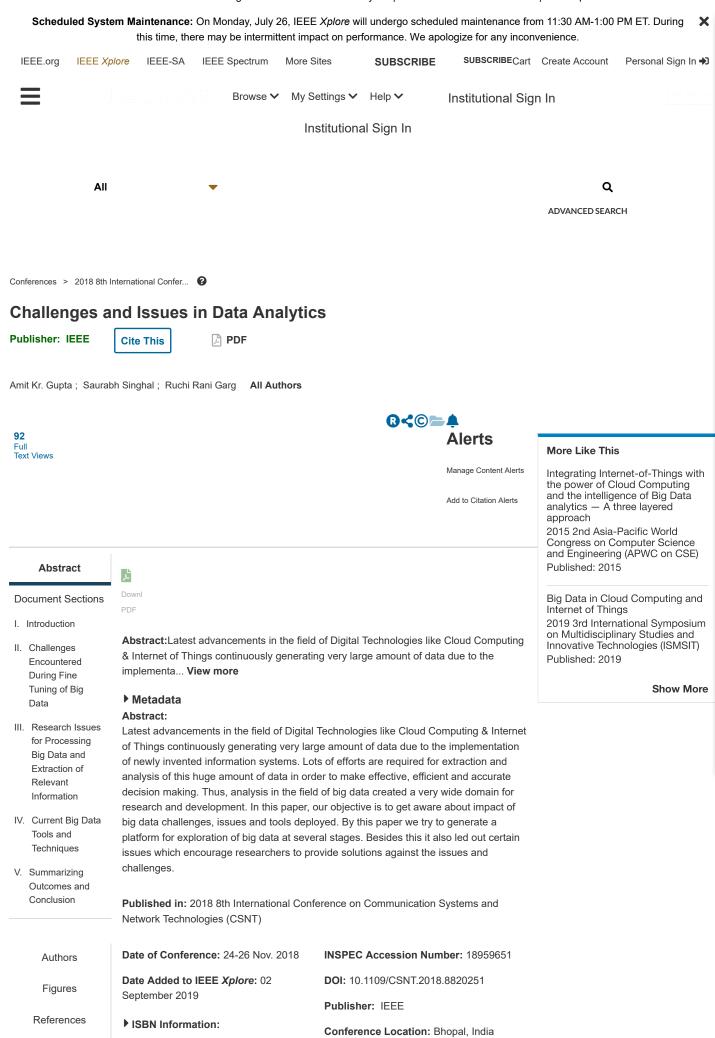
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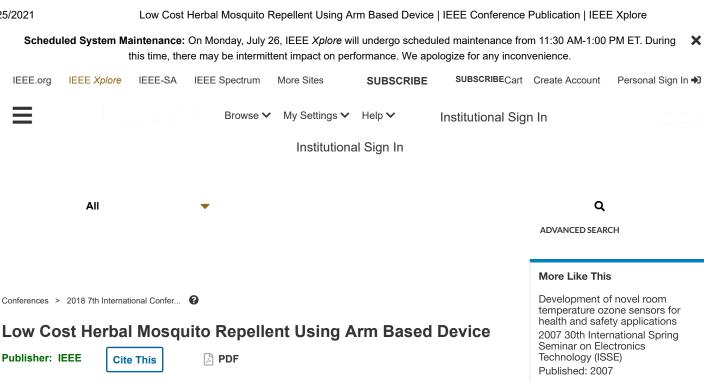
Data Broadcasting on wireless channel is the research area where many research has been done and are still going on. Earlier data is broadcasted on single channel but now multiple channels are introduced for data broadcasting. In this paper, we propose a hash based indexing method for multiple wireless data broadcast channels. Hashing indexing technique on multiple channels gives better result than on single channel. In this paper, we are proposing an enhanced hashing technique that improves the result of previous proposed broadcasting technique. In this paper, we are taking the advantage of the best features of hashing technique and proposing enhanced hashing technique for multiple channels. Our proposed technique also minimizes collision in hashing technique. The proposed hashing technique aims to address the problem of data broadcasting on wireless channels. The proposed algorithms broadcast the data items to significantly reduce access latency and parameter adjustment time to save time and reduce power consumption of the mobile devices.

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The present study reports the studies directed towards the development of safe and efficient herbal mosquito repellant formulations obtained by mixing a solutions of 20ml Neem extract, 20ml Tulsi Oil, 20ml Turmeric Oil, 20ml Orange Peel Oil, 20gm Clove. This unique solution is composed of herbal components and thus has no side effects on the human beings. This paper also defines a unique mosquito repellant sensor which is base don the density of mosquito in a given area. This paper describes a unique approach through which this sensor automatically sense the mosquito density and then regulate the quantity of fumes of our unique solution which is specially prepared from the herbal components, in order to repel mosquitoes as well as purify the air. We conducted several tests on different compositions and mosquito density and thus we conclude that our approach is better and unique than other existing mosquito repellants available in the market.

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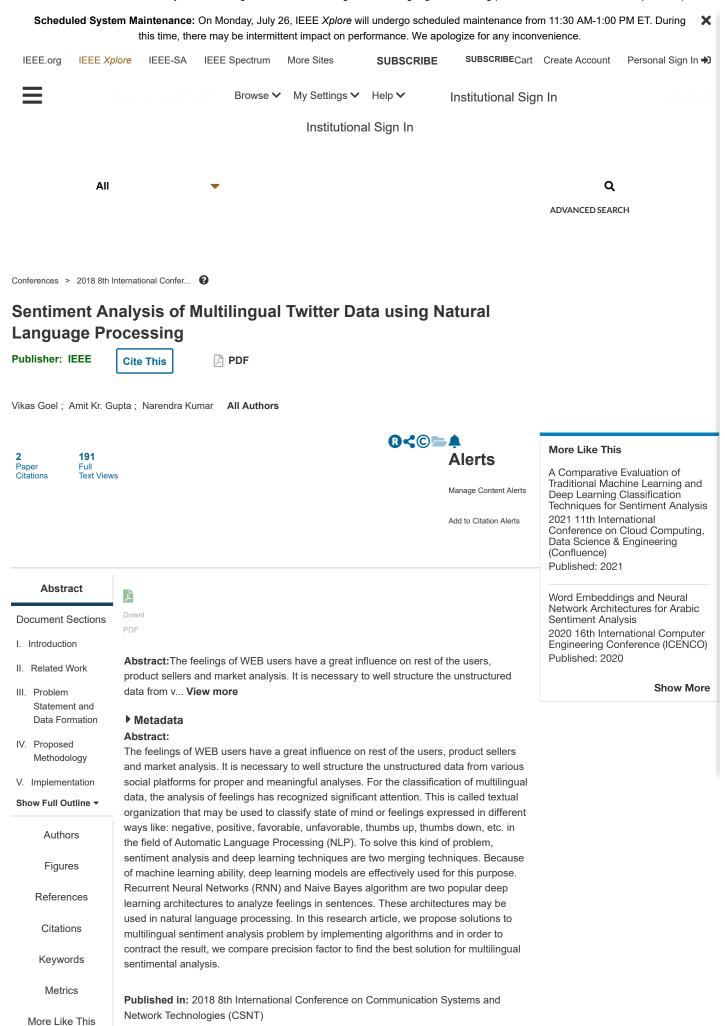
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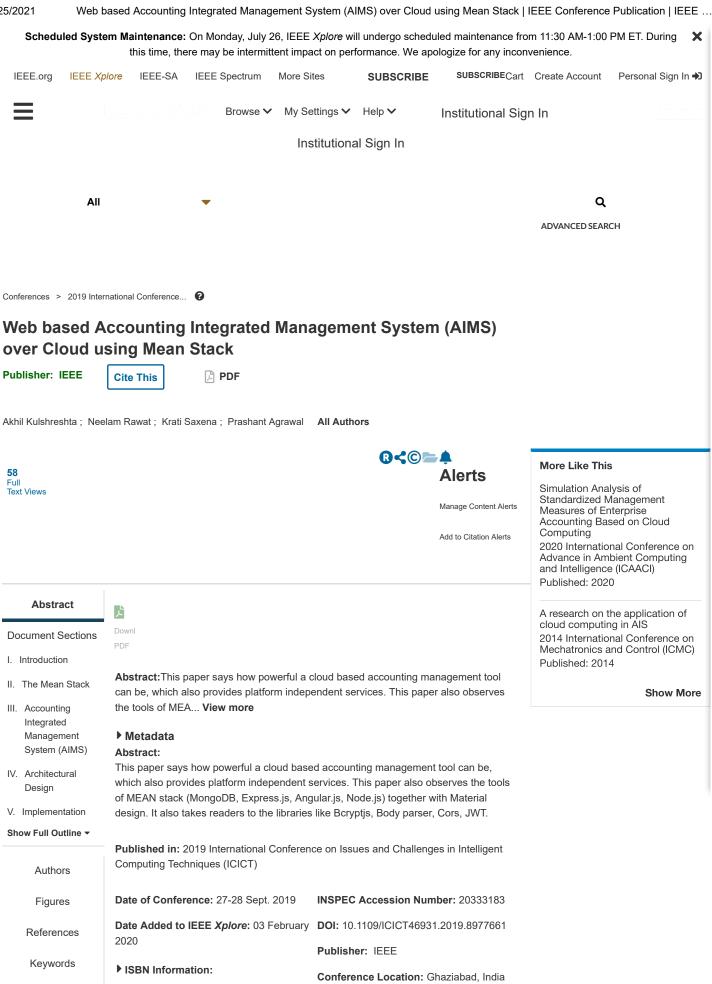
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HYBRID NON-DESTRUCTIVE TECHNIQUE OF SURFACE & SUBSURFACE FLAWS

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Abstract— In Non-Destructive Testing, when dye penetration inspections are done, to rectify the flaws. The dye is applied to the whole part or body so that it can fill up the cracks, the In this way, process uneconomical, complex and tedious. So, idea is to incorporate, the ultrasonic sensor with rotational motion on the borescope tube, so that it can identify the defects in the bulk of the body. As it increases the capability of a borescope to do both surface and subsurface inspectionsimultaneously. This gives the opportunity to identify the definite surface beneath the surface the flaws or defects is encountered. Thus, a dye can be applied to the particularly found surface beneath which flaws arecountered.

I. INTRODUCTION (HEADING 1)

Non-destructive testing (NDT)[10] is a testingtechnique used by industry to inspect the properties of a material, component, structure or system fordefects and discontinuities without causing damage to the object. NDT is also known as non-destructive examination (NDE), Non-destructive inspection (NDI) and non-destructive evaluation (NDE).

A. Non-Destructive Testing Methods [10]-

- Surface Inspection Methods
- Subsurface(bulk) Inspection Methods
- Visual-Optical Inspection
- Liquid-Penetration Inspection (LPI)
- Magnetic Particle Inspection (MPI)
- Ultrasonic Testing (UT)
- Radiographic Testing (RT)
- Eddy Current Testing (ET)
- Acoustic Emission Testing

B. Applications-

NDT has a wide range of applications, in industries where a defect in a component would cause significant hazard or economic loss, such as in transportation, pressure vessels, building structures, piping, and hoisting equipment.[10]

Relation to medical procedures-

Several NDT methods are related to clinical procedures, such as radiography, ultrasonic testing, and visual testing. Technological improvements or upgrades in these NDT methods have advanced over the years.[10]



Fig. 1. Chest radiography.[1]

C. Borescope-

A borescope is an optical tool used to view areas that would otherwise not be visible. A borescope is inserted into the item being evaluated without destroying the item of interest[11].

D. Why Borescope-

The borescope is used when flaws, defects cannot be visualized by naked eye i.e. Visual optical Method which also includes visual aides(magnifying glass, light microscope)

E. Components-

A Borescope can consist of[11]

- · Rigid or flexible working length
- Light Source to illuminate the target under inspection.
- An optical system that may consist of a relay lens system, rod lens system, fiber optic image guide a CCD or CMOS camera.
- Eyepiece or Monitor to view the image

II. TYPES OF BORESCOPE-

A. Rigid Borescope-

Rigid borescopes are similar to fiberscopes but generally provide anexact image at a lower cost compared to a flexible borescope. Rigid borescopes have the limitation that access to what is to be viewed must be in a straight line. Rigid borescopes are therefore better suited to certain tasks such as inspecting automotive cylinders, fuel injectors and hydraulic manifold bodies, and gunsmithing [11].

Criteria for selecting a borescope are usually imaging clarity and access.

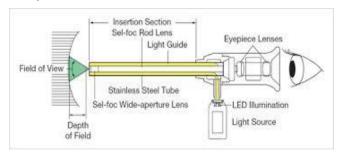


Fig. 2. Rigid Borescope With a Lamp at Distal end [2]

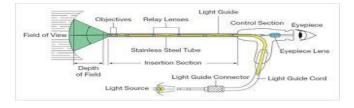


Fig. 3. Rigid Borescope With a Light Guide Bundle in Shaft [2]

B. Flexible Borescope-

The flexible borescope is used to inspect the areas where the rigid borescope has a limitation to inspect regions of the body.

This provides the flexibility to the borescope tube that makes inspection quite easier. The traditional flexible borescope includes a bundle of optical fibers which divide the image into pixels. this is also called fibrescope.

The ability to control the light at the end of the insertion tube allows the borescope user to make adjustments that can greatly improve the clarity of video or still images.[12]

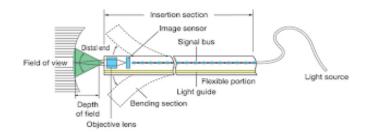


Fig. 4. Flexible Borescope [2]

III. APPLICATIONS AREAS OF BORESCOPE[19]-

- Areas of limited physical access or visibility such as the inner diameter of bolt holes and similar hollow parts.
- Small parts with lower visibility such as junction in electronic components.
- Visual inspection of difficult reach areas in aircrafts such as some parts of the engine.

An outcome-Here borescope can inspect the surface flaws only.

IV. REVIEW OF DYE PENETRATION INSPECTION-

Dye Penetrant Inspection (DPI)[13], also called Liquid Penetrant Inspection (LPI) or Penetrant Testing (PT), is one of the oldest and simplest NDT methods where its earliest versions (using kerosene and oil mixture) dates back to the 19th century.

Liquid penetrant inspection is used to detect any surface discontinuities such as cracks, fractures, flaws in joints.

This process is the ease of use and flexibility. LPI can be used to inspect almost any material provided that its surface is not extremely rough or porous. Materials that are commonly inspected using LPI include metals (aluminum, copper, steel, titanium, etc.), glass, many ceramic materials, rubber, and plastics.[13]

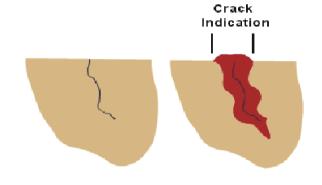


Fig. 5. Crack indication[3]

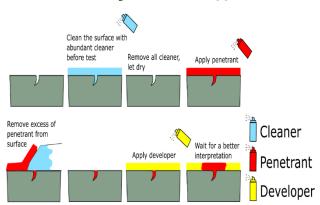


Fig. 6. Process of Dye Penetrate Inspection[3]

V. APPLICATIONS

Liquid penetrant inspection can only be used to inspect for flaws that break the surface of the sample. Some of these flaws are listed below:[13]

- Fatigue cracks
- Quench cracks
- Grinding cracks
- Overload and impact fractures
- Porosity
- Laps
- Seams
- Pinholes in welds
- Lack of fusion or braising along the edge of the bond line

An Outcome-In Dye Penetration inspection, Unnecessary use of dye on the surface which is not affected by flaws, defects.

VI. REVIEW OF ULTRASONIC TESTING

Ultrasonic Non-destructive testing also known as ultrasonic NDT.It is a method of inspecting,by the use of high-frequency sound waves. The frequencies, most commonly in the range from 500 kHz to 20 MHz.[14]

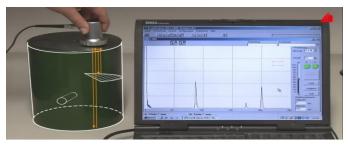


Fig. 7. Ultrasonic Testing[4]

VII. APPLICATION [15]

In industrial applications, ultrasonic testing is widely used on metals, plastics, composites, and ceramics. Ultrasonic technology is also widely used in the biomedical field for diagnostic imaging and medical research. Principle of ultrasonic testing. LEFT: A probe sends a sound wave into a test material.

An Outcome: Ultrasonic testing is performed separately for inspection.

VIII. METHODOLOGY DISCUSSIONS AND TECHNIQUE[16]-

Now we have discussed methods for non-destructive testing as borescope, Dyepenetrationinspection, ultrasonic testing. My researchis to incorporate dye penetration inspection and ultrasonic testing in the borescope [16]. So that borescope can function simultaneously as surface inspection as well as subsurface inspection(bulk). This can be done by incorporating the small ultrasonic sensors (like Pico+TFUltrasonic sensor) on a tube of borescope having a rotational motion. This rotational motion of the sensor can detect all the beneath surfaces to find out defects. On the other end i.e. distal end to illuminates the surface flaws.

This ultrasonic sensor with the CCD(charged coupled device)[17] image sensor to capture the digital image for further inspection.

This reduces the work in dye penetration testing as now we have known the exact surface where the defect is and treat accordingly.

This research also minimizes the use of dye on the object and makes it a simple and clean process.

It also reduces the time of the testing process[17].



Fig. 8. Pico+TF Ultrasonic sensor[5]

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IX. MODEL(PROTOTYPE OF 1ST KIND)

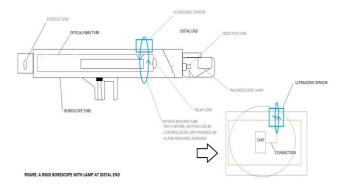


Fig. 9. Design Prototype

This is a rigid borescope with the lamp at distal ends. It consists of the following parts and its functions-

- Eyepiece Lens- It is used by the inspector to visualize the flaws.
- Optical Fibre Tube- Tt is used to process the image within the optical fiber tube from the distal end to the eyepiece lens by use of Total Internal Reflection.
- Borescope Tube- This tube incorporates the optical fiber tube to protect it from external impetuses.
- Objective Lens-This lens is used in the formation of the image of the defected region of the bodywhen the inspection is in process.
- Relay Lens-This lens is used to focus the light for the formation of the image of the defected region of the bodywhen the inspection is in process.
- Incandescent Lamp-It is a light source that is used to illuminate the area is in the inspection.

The main objective of Borescope-

Its main objective is to inspect and visualize the surface flaws and make available to the inspector with the help of the eyepiece lens for the further inspection process.

Now in this research, we found out the technique for the borescope. This technique makes borescope more capable to do surface as well as subsurface inspection simultaneously.

This technique uses an ultrasonic sensor incorporated in the borescope tube.it also has a rotational motion for more coverage of the area for inspection.this overcome the outcome of Dye penetration testing, where the dye is applied on all the surfaces. this ultrasonic sensor detects the particular region of the surface where flaws are there. and then in dye penetration inspection, the dye is applied to that particular area where flaws are detected by the ultrasonic sensor.

This is how my proposed prototype of technique for non-destructive testing can be done. By incorporating the ultrasonic sensor which rotates about the borescope tube. This sensor can be controlled by a chip that is based on AI and machine learning (FUTURE IMPLICATIONS). This will identify the particular surface beneath which flaws are detected and further on that particular identified portion Dye penetration inspection can be done. This will limit the use of dye, makes the process clean, simple. Thus borescope can simultaneously inspect at both surface and subsurface levels. [18][19]

X. IMPLICATIONS FOR FUTURE RESEARCH-

1. Future advancements in this technique can be done by controlling the motion of the ultrasonic sensor by the use of Artificial intelligence with chip incorporate in the tube of borescope which guides the distal end of borescope in the inspection.

2. With the help of CCD image sensor (charged coupled device) and camera at eyepiece makes Borescope capture and store image of the defected region which can be further inspected[19][20].

2.Here stacking of tubes (capillary tube-like) can be done to make the size of a tube of borescope large enough to make it robust for any condition of the inspection like doctors uses for the operation to affectingly small area of the body.



Fig. 10. Use of Capillary testing[6]

XI. CONCLUSIONS& RESULTS

The purpose of this research

- 1.To minimize the use of dye in dye penetration inspection (To make process economical and clean).
- 2.To make borescope more advanced so that it can identify definite surface beneath which part has flaws.
- 3.To increase the capability of a borescope to do both surface and subsurface inspection.
- 4.To make borescope robust in nature (By application of AI chip-for motion control and camera& (CCD image sensor))

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5.Less exposure of dye to the surface of the body is in the inspection

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Comparative Investigation of Process Capability of Surface Finish in Milling of EN19 Steel Using VMC

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Abstract

In this research investigation, input parameters—cutting speed (CS), feed rate (f) and depth of cut (doc)—were selected for process capability evaluation in milling process using CNC VMC. The process capability index of surface finish was calculated using two types of tools (titanium nitride coated carbide tool and solid carbide tool) during CNC milling operation of EN 19 alloy steel. The optimal process parametric setting was evaluated using single response optimization through Taguchi's robust design. The single response optimization was done for process capability index so that manufactured component could not fall beyond the criteria set for surface finish by customer in case of using both tools. Confirmatory experiments were conducted finally to validate the results.

Keywords

CNC vertical machining center Taguchi's DOE Process Capability index This is a preview of subscription content, <u>log in</u> to check access.

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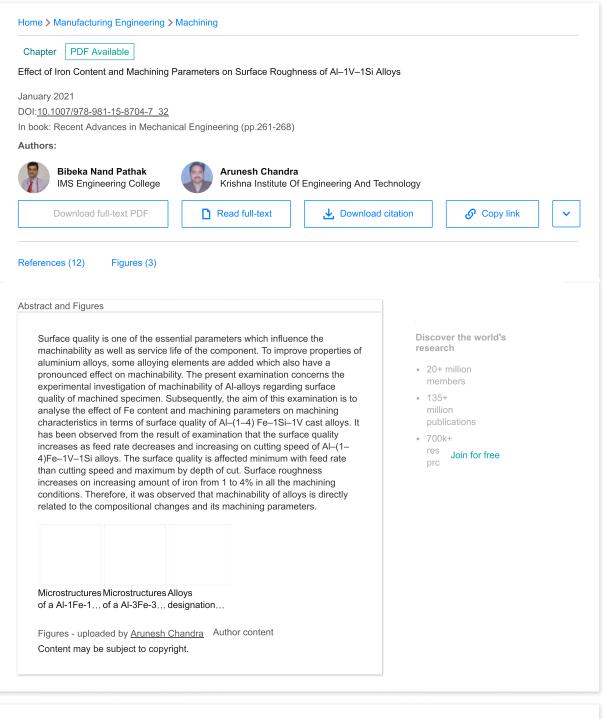
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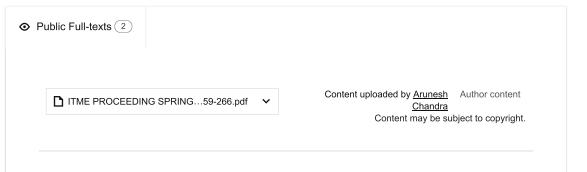
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Effect of Iron Content and Machining Parameters on Surface Roughness of Al–1V–1Si Alloys

Bibeka Nand Pathak and Arunesh Chandra

1 Introduction

Machinability is one of the major criteria for the selection of material for different applications. The simplicity with which a metal can be machined is an important variables influencing the utility, quality and cost of the item. On the basis of application, machinability is considered in terms of a tool wear rate, tool power consumption and surface quality. There are many ways that can be judged by the machinability of materials depending on the tool material, work material and machining operation for comparison purposes. The main criteria adopted for machinability assessment of the material are tool life, tool wear rate, cutting power and surface roughness created at the workpiece [1, 2]. Generally, it is related to the machining cost of production engineer, and they are serving to the actual behaviour of the material during machining [3].

Properties of the aluminium alloys can improve by addition of some alloying elements which also affect the machinability. Among all the alloying elements, silicon is mostly used and improves the fluidity and castability of Al alloys. Small amount of silicon (<0.8%) addition improves machinability but when silicon percentage is higher, it forms hard silicon particles which is quite abrasive to the tool [4]. Minimum 80 BHN (Brinell hardness number) hardness is required for good machinability; however, hardness is not the only judgement criteria for machinability. If there are higher content of iron in an Al–12Si–Cu–Mg alloy, then it results greater amount of coarser structure than lower content of iron alloy [5]. Modification of the internal structure with addition of alloying elements, selection of process, or subsequent

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Effect of Ni-20 mg treatment and machining parameters on surface quality of Al (1–4) Fe-IV-1Si alloys

Bibeka Nand Pathak ^a $\stackrel{\triangle}{\sim}$ $\stackrel{\boxtimes}{\sim}$, Pankul Goel ^a, Arunesh Chandra ^b

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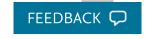
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Abstract

In this study, the machinability of Al-alloys regarding surface quality of machined specimen was investigated. Subsequently, the impact of Ni-20Mg treatment and machining parameters was analysed on machining characteristics in terms of surface quality of Al-(1–4) Fe-1Si-1V cast alloys. It is observed that Surface roughness (SR) increases with increasing amount of iron (Fe) from 1% to 4% by weight in all the machining parameters. It is also observed that in modified Al-Fe-Si-V alloys, SR increases for all cutting conditions when Fe content is increased from 1% to 2%. At 3% Fe, there is mixed mode of SR height at different cutting conditions, while surface quality significantly improves with modified Al alloys at 4% Fe during all the machining parameters. Therefore, machinability significantly relies on the compositional changes of alloys and modification treatment.





Keywords

Aluminium alloys; Ni-20Mg treatment; Surface roughness (SR); Machinability; Microstructure

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Exploration on Wear Characteristics: Performance of Gears of Polyamide66

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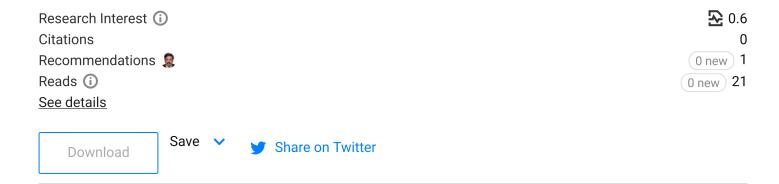
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In book: Recent Advances in Mechanical Engineering

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Abstract and figures

Overview

Gears of polymers are extensively preferred in low loads beyond metal gears on account of their ingrained properties like lightweight, lowly noise, self-lubrication and so on. Since, polymer gears are associated with the number of limitations like their use up to a very limited torques and lesser sustainability towards higher temperatures; these gears have the scope of important exploring research topics. For the use of polymers in gearing applications, investigators are exploring materials of high-strength and high-temperature resistance. The present work exhibits the use of Polyamide66 polymer with glass fibre reinforcement for making gears. It was, therefore, using injection moulding three categories of Polyamide66 gears were fabricated. These gears are designated as NPA66G, H15PA66G and H30PA66G having glass fibre contents by weight as 0, 15 and 30% one by one. The different gear pairs and the different torque levels were applied and the specific wear rates of driver as well as driven gears were determined. Accordingly, the polymer gear test rig was used and the experiments were carried out. The guidelines were applied for the design of experiment and accordingly factorial method is enforced. Through ANOVA, the results of experiments were investigated. The different gear pairs were also investigated analytically. The morphology was studied of the polymer gears, the most and the least touched. This was established that the polymer gears having higher fibre contents had the least



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Exploration on Wear Characteristics: Performance of Gears of Polyamide66

Shashank Singh, Yogesh Kumar Yadav, Siddhartha, and Arun

1 Introduction

Since 1950s, polymer gears are preferred in many low load applicat have some inherent properties such as noiseless operations, light self-lubrication and so on. After proliferation in manufacturing gears are being used in many essential practices such as food proc ATM machines, wiper devices in automobiles, copier machines Previously, plastic gears were used only for below 1/4-hp drives due t properties and uncertainties in their behaviour under varied envir tions such as temperature and moisture []. Nowadays, research p moulding controls encompassing environmental factors have booste drive power to 3/4 hp []. Plastic gears might be failed under different failure modes are wearing, pitting and cracking at root circle as well Wearing is defined as material removal from a surface and its defe interaction with any mechanical act in counter directions. Many c have found the occurrences of thermal failure in the plastic gears g generation of heat at the surface, which is due to the friction and mat This has been seen that wear rate grows with rise in temperature I



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Abstract

Due to the expansion of industrialization, the problems of water scarcity and the reduction of arable land due to soil contamination are rising. Solar stills are effective devices for the production of clean water through contaminated or impure water. This paper discusses the usage of wastewater from irrigation as feed water for solar stills. This method will increase water intake efficiency in irrigation. The low productivity of conventional solar stills could be enhanced by the utilization of nanoparticle-enhanced phase change materials. Integration of both these approaches will enhance the effectiveness of the process and will save a significant amount of water.

Keywords

Solar still Agriculture Phase change materials Nanoparticle This is a preview of subscription content, <u>log in</u> to check access.

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Investigation of Variation in Stress Concentration Factor with the Change in Orientation of Central Hole on a Rectangular Plate

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Abstract

The purpose of this study is to analyze the variation in stress concentration factor with the change in orientation of a central hole on a rectangular plate of specified dimensions, subject to uniaxial loading. The study is carried out using finite element analysis under static structural module on ANSYS software (version 14.5). To distillate effects of stress concentration, flat plates of structural steel having hole orientation at 30°, 45°, and 90° from longitudinal axis were used, and the uniaxial load is varied from 5000 to 20,000 N. After complete investigation of the flat structural steel plates on the software, results show that the value of stress concentration factor reduces by 17.2%, whereas the total deformation increases by 0.46% at 45° in comparison with the plate having vertical hole. All the values of stress concentration factors were analyzed, and it is found that it increases by 8.17% from 30° to 90° variation of hole inclination.

Keywords

Stress concentration factor Stress risers SCF Structural steel FEA This is a preview of subscription content, <u>log in</u> to check access.

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Microstructural and Wear Characteristic of Fe-Based Nanostructured Hardfacing Alloy

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Abstract

This study shows the effect of Fe-based hardfacing alloy deposited by GMAW on low carbon steel substrate on the microstructure and wear resistance. Optical microscopy and scanning electron microscopy were performed to examine and evaluate the microstructure of hardfacing alloy. Also, pin-on-disc wear test was performed on the weldment and wear resistance of the weldment was found to increase, due to the formation of carbide. The optical micro-graph of weldment shows the formation of carbide leading to increase in the hardness. No discontinuity and crack were in the weld zone.

Keywords

Hardfacing Hardness Abrasive wear Microstructure Carbide This is a preview of subscription content, <u>log in</u> to check access.

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Perspective on Effect of Metallic Fillers on Electrical Conductivity of FRP Composites

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Abstract

In general, the composites are electric insulators, but there are so many applications where the properties of composites are required along with partial conductivity. In aeronautical applications to avoid turbulence, it is required to provide electromagnetic shielding effect along with an increase in electrical conductivity. While improving electrical conductivity to serve the purpose for which the fiber-reinforced polymer (FRP) is fabricated, balancing other properties such as mechanical and thermal properties is an essential task. In this paper, a brief review of the previous work is carried out to understand the effect of various metallic fillers on the characteristics of FRP composite. After reviewing the scope of using metallic filler in FRP composites, it is figured out that the electrical conductivity of FRP can be improved by adopting metal particulates as fillers in the process of FRP fabrication. These procedures play an additional role in the FRP structure, and the electrical conductivity rises significantly in some of the cases.

Keywords

FRP Electrical conductivity Electromagnetic shielding Filler This is a preview of subscription content, <u>log in</u> to check access.

Notes

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Microstructural Evolution and Enhanced Mechanical Properties of Atomization Cast Al–40% Si Alloys

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Abstract

Atomization casting is a technique to produce the semi-finished product in a single step from the raw metal. No further heat treatment is required in the product. In the ingot cast alloy, the segregation of second phase can be seen in the microstructure. Due to coarse microstructure of ingot cast alloy, the mechanical properties are not good as compared to atomization cast alloy. The confined convergent divergent nozzle is used in the atomization casting of Al-40% Si. The mechanical properties of atomized cast and ingot cast alloys are compared, and the properties of atomized cast alloys are found better than ingot cast alloys.

Keywords

Atomization casting Microstructure Tensile properties Convergent divergent nozzle This is a preview of subscription content, <u>log in</u> to check access.

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Prediction of Wind Power Curve Based on Wind Speed and Direction Utilizing Artificial Neural Network

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Abstract

Wind power is dependent on several factors, and its prediction by complex mathematical model makes it prone to errors. Artificial neural network-based prediction models provides a solution to this problem. In this work, artificial neural network is employed for the energy prediction using wind direction and wind speed. Though the power curve is based on factors like wind velocity, air density, and swept area, there are many other dynamics which affect the performance of the wind turbines. A mathematical model is generated in the present work for wind energy production. The data is taken and fed to the back propagation algorithm in neural networks. The algorithm is run for thousand iterations, and by adjusting the weights, the model is created. It is observed that the prediction almost follow the actual power curve and hence can be used to predict different data of speed and direction.

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Abstract

A fiber-reinforced polymer (FRP) composite material may be defined as a judicious combination of two materials, i.e., reinforcing fiber and polymer matrix. The use of filler material is also very common to alter the characteristics FRP composites. A new area of FRP composite with nanofillers has emerged for scientific and industrial research in resent past. The inclusion of nanofillers into the FRP composite can enhance the mechanical, thermal, surface quality, erosion resistance, barrier, and flammability properties, without altering their processability. The objective of the review is to summarize the research work carried out in the field FRP composite filled with nanofiller and to draw the research gap for future work.

Keywords

Nano fillers $\mbox{ FRP composite } \mbox{SiO}_2 \mbox{ Al}_2\mbox{O}_3 \mbox{ TiO}_2 \mbox{ Carbon black } \mbox{SiC } \mbox{ CaCO}_3 \mbox{ CNT } \mbox{ Graphene}$

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Notes

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Abstract

A crane hook or a lifting hook is used for picking up the load with the help of devices such as a hoist, chain or wire ropes. It is subjected to bending stresses which makes it highly prone to failure. To prevent structural failure of a crane hook, we must study the stresses induced due to loading and unloading as well as stress concentration pattern. This review paper looks at the findings established in previous publications to determine the optimum cross section and material combination.

Keywords

Crane hook Lifting hook Bending stress Structural failure This is a preview of subscription content, <u>log in</u> to check access.

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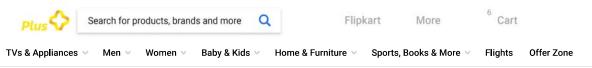
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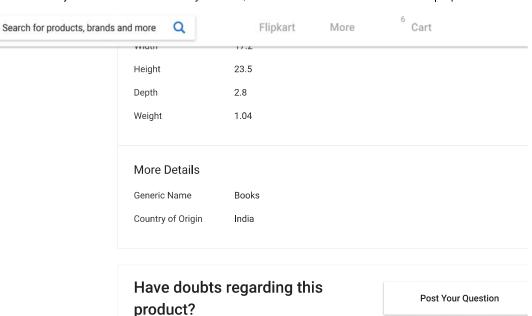
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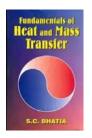
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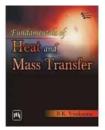


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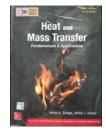
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Wear and enhancement of wear resistance – A review

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Abstract

This paper discusses the wear and its effect on the performance and life span of the components. The efforts made by researchers to improve the performance of materials have been discussed. Enhanced wear resistance has been reported due to refined grain structure and improved hardness. The reinforcement of particles is also reported to improve the wear resistance due to particle strengthening mechanism.





Keywords

Wear; Composites; Wear resistance; Surface composites; Wear mechanism

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Abstract

Water is very essential to human life. The origin and the continuation of the mankind are based on water. The supply of drinking water is an important problem for the developing countries. The provision of fresh water is becoming an increasingly important issue in many areas of the world. Desalinating water using solar still is a green and economical option. Various experiments have been conducted on different designs of solar stills. It has been found that solar still with nanoparticles has better productivity. These suspended particles play a vital role to increase the heat transfer rate to water by changing the transport and evaporation process of base fluid. This paper summarizes the work of various researchers using nano-particles.

Keywords

Solar still Desalination Solar energy Nanofluids This is a preview of subscription content, <u>log in</u> to check access.

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A Review of Nanofiller Coating on FRP Composites

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Abstract

In the present times, demand of fiber-reinforced polymer (FRP) composites materials is very high because of their enhanced mechanical, dynamic and thermal properties over the conventional material. The wide spread applications and growth of FRP composite demand need of protective coatings and barrier layers developed. The performance of composite in long term is heavily dependent upon the degree of protection provided to resist the corrosive and deteriorating environment to which these composites will be exposed. The use of nanofiller coating on FRP composite is expected to give significant protection against corrosion, blister or delaminate. A review of recent development in nanofiller coating of FRP composite along with overview of nanocomposite coating properties and characterization methods is presented in this paper.

Keywords

FRP Nanofiller Coating

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Notes

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A Review on Different Types of Hybrid Fiber Reinforced Composite

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Abstract

Composite materials are the judicious combination of two or more different phase material which produces the synergetic effect when combined. The two essential components of composite are matrix called primary phase and reinforcement called secondary phase, and the combination of these two produces products having different properties from it constitutes. Fiber reinforced polymer (FRP) composites show their importance in the applications where low weight and high strength is the prime requirement. Further, the development of hybrid FRP composite is another milestone as hybrid composites provide freedom to tailor the properties of FRP composite as per requirement. Hybrid composites having more than one type of reinforcement and have extensive engineering applications where the necessity of high strength material with less weight and cost is required. In this paper, the authors have presented a short review of the current and past development in the field of FRP hybrid composite materials. The authors discussed the possibilities of different fiber hybridization as reinforcement in FRP composite and their characterization in brief.

Keywords

Composite FRP Epoxy

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Abstract

Water touches each feature of life and access to pure water turns dilemma to clarity. Today, out of 843.2 million humans, every one out of nine, lack access to pure water and about 0.0139% of all water on our planet is potable & easily obtainable as well. While the 97% of water is salty and less than 2% is difficult to obtain. Due to this, about 14.8% of the world population is short of drinkable water. To overcome these problem various techniques were developed like MSFD, MED, RO, freezing, humidification and dehumidification, solar desalination, etc. This review paper discusses the works done so far on solar distillation. The solar-still is a boon in this field of solar desalination that uses natural rain water cycle in its operation and provides the pure water. The basic solar-still is the single-stage solar still whose efficiency lies between 30 and 40%. However, its efficiency can be brought up to 60% with different design and operational modifications.

Keywords

Solar energy PCMs Solar-still Distillation
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Biomedical Applications of Additive Manufacturing

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Abstract and figures

Additive manufacturing (AM) is a comparatively new, widely growing manufacturing method on which a lot of research work has been carried out and it is still a booming field that has multiple applications in industrial, medical, military, automobile, aircraft industries, and in many more areas. This review is regarding the use of additive manufacturing for biomedical applications. This review presents how additive manufacturing has brought a revolution in medical applications, by building customized implants of different body parts as per customer-specific requirements, building prosthetics, and other medical devices as well. Additive manufacturing is rapidly being used because of its ability to bring about innovation in manufacturing extremely complex parts easily by building parts layer by layer; thus, giving it the flexibility to manufacture distinct or difficult parts, which are otherwise difficult to machine by traditional subtractive manufacturing. This article highlights the use of 3D printing in dentistry, wherein by using the 3D scanner, a CAD model of patient's dentures is generated which is studied upon and then manufactured by additive manufacturing for research or generating artificial customized dentures for the patients. The use of 3D-printed prosthetics, virtual surgical planning wherein by using CAD data, the vital body organs are 3D printed in a 1:1 scale for the surgeons to perform virtual surgery on the 3D-printed organ before actually operating upon the patients. Thus, 3D printing is proving a boon.







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Page 1	

Biomedical Applications of Additive Manufacturing

Ankita Jaisingh Sheoran, Arunesh Chandra, and Harish Kum

Abbreviations

PEEK Polyether ether ketone

SLA Stereolithography

FDM Fused deposition modeling DMLS Direct metal laser sintering

SLS Selective laser sintering

API Active pharmaceutical ingredients

EBM Electron beam melting SLM Selective laser melting

1 Introduction

The intrinsic principle of AM for building parts in a layer-wise ma extensive customization in fabricating patient-specific medical c



ments in AM techniques such as FDM, SLA, DMLS, EBM, SLM of biomedical and health-care applications of AM can be classific sub-groups as depicted in Table [].

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An aggregate methodology of process re engineering with the reverse logistics coordination in an OEM UNIT

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Abstract

Characteristic and financial issues stake significant effects on Reverse designing (Reengineering). These are a reflection to shape one of the advancing establishments of the legitimate production network. Reverse Logistics is a trick- unwavering directorial ingenuity, essentially reconsider and reform business training with the objective of completing reasonable stage on ward in quality, receptivity, outflow, customer contentment and other serious course performance measures. This investigation contributing an assessment of figuring out dream cantering upon, the utilization of instructive methods to give a move away from direct successive work relationship towards equal work and multi disciplinary collaboration.

Keywords: Introduction, development cycle of product, methodology, work structure, results & discussion, references

1. Introduction

It is an expediently developing order, which wraps countless activities. While regular designing believers building ideas and models into genuine segments, however in figuring out genuine parts are changed into designing models and ideas favored situation of the wide-running usage of computer assisted structures need not be rehashed now. BPR was first exemplified by Michael Hammer in quite a while fundamental article 'Re-designing work: don't mechanize, pulverize. [1]

1.1 Reengineering

The procedure is an organized, estimated set of exercises intended to create a predetermined yield for a specific client or market. It suggests a solid accentuation on how work is done inside an association.[2]

Elements

a. Tasks Reformation:

Join littler procedure sub-errands and sub-exercises into bigger, incorporated units and bundles. The administration ought to decrease the quantity of components, sections and ingredients in articles and procedures just diminish the quantity of parts in items and procedures.[13]

b. Workforce Reformation:

It permits the labourers to perform and co-ordinate bigger as opposed to littler segments of the procedure. The administration ought to energize multi usefulness, work turn, de-specialization and coordinated procedure structure.

c. Information Reformation:

Reformation, the capacity to arrange activities deliberately which is particular, atomized, and decrease to a machine extremity who can't facilitate the activity, however, just performs single and basic and orders. There requirement for a coordinated as opposed to the particular instruction. [3]

1.2 Reverse Logistics

"The way toward arranging, executing and controlling the productive, practical progression of crude materials, inprocess stock, completed merchandise, and related data from the purpose of birthplace to the point of utilization to fit in with client prerequisites." [5]

Reverse Logistics/supply chain, the return business actions because of manufactured goods recovery, overflow form a clogged loop supply chain. The evidence achievements of RSCM premise on proportions of the two makers and supporters. [11] The time makers require delivering items that are simple for disassembling, reprocess, reuse and

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duplicating paid to the law of environmental indemnity. On the opposite side no of clients helping society assurance by conveying their pre-owned items to assortment focuses is increasing. [5] As indicated by the overview, the all-out expense that happened in RSCM is the exceptionally gigantic sum, and to diminish it, high use of assortment focuses, choice of proper area are basic issues. [3] Even more unequivocally, figuring out coordination is the path toward moving product from their average last objective with the ultimate objective of getting worth, or fitting expulsion. Re fabricating and redoing practices furthermore may be associated with the significance of converse reengineering. [12] It is more than reusing compartments and reusing packaging materials. Refreshing packaging to use less material, or reducing the imperativeness and pollution from transportation are noteworthy activities, anyway, they might be better placed in the space of "green logistics" [14]

1.3. Reverse Logistics Management:

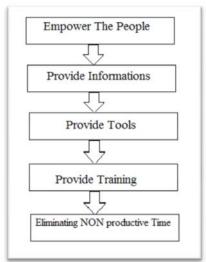
- Procedure advancement
- Information support systems
- Level connections
- Execution estimation
- Transportation issues
- Transportation issues
- Warehousing issues

1.4 Company Profile

The organization is a main producer of automotive brakes pads in India, using asbestos free technology, began its production as of late in 1998. The organization is persistently providing its grinding material to exceptionally serious European market. The organization items are very much acknowledged in the worldwide market due to their quality, seriousness, and conveyance duty. The organization is a completely possessed auxiliary of Midwest-Air Technologies (MAT), situated in USA. The organization's complete labor is 1.5k and turnover is Rs 220 Billion P.A and holds the enormous use of hydraulic and mechanical presses for production.

2. Maturity Cycle of Product

- Back plate incoming
- Powder mixing
- Hydraulic pressing
- Compression & molding
- Curing and powder covering
- Grinding and wrapping up
- Shim fitment
- Pressing and riveting
- Final item (Disc Brake Pads)



3. Methodology actualized in plant

- Initiation: Firstly an official agreement on break however business objectives and goals that connote the raison of this re-designing venture. This stage likewise unmistakably builds up the fundamental linkage between the advancement business objectives and the Re-designing procedure execution parameters in regards to the calendar, hazard, and hierarchical change. Additionally unites the re-building group and brings from the underlying change the executives plan. [7]
- **Recognition:** Builds up a client situated replica of business, recognizes key worth included procedures and maps associations, assets and volumes to explicit procedures and needs and suggests explicit procedures as the most elevated effect Re-designing targets.
- **Visualization:** Arches to get through circumstances in the procedures, examination and understanding them as "vision" of radical change.[8]
- **Elucidation:** Separated into two about equal sub-stages, one to build up the specialized structure to execute the dreams and the "societal" map which arranges and structures the HR that will staff the restoration process.
- **Renovation:** Understands the procedure vision, propelling, pilot and full creation adaptations to the new procedures. Along these lines, this model gives pretty much a direct procedure of undertaking re-designing activity. [9]

4. Work Structure

Complains	Course	Counter Measure	Improvements
Spots	Pressing	Unknown material catching, underneath coating formation.	onslaught of punch frequently
Porosity	Pressing	Fewer mass of face powder blend, unfortunate temperature	accurate scenery of balance, sufficient information of machine constraint to operators
Cracks	Pressing	Groove unclear, unacceptable treatment	Guarantee correct onslaught of the groove earlier than the operation
Green pads/rusted pads	Curing	occurrence of moistures at plate face, unacceptable curing	assurance moisture- free plate earlier than curing, inspection of process parameters
Low thickness	Grinding	indecent recipe assortment, not having knowledge of process parameters	Provide guidance to machinist of recipe and parameters assortment
Setup failure	Grinding	Operator negligence , unskilled operator	Give all necessary instructions to operators before the operation

Gap formation between cover and shim	Shim fitment	indecent clear out of pads, meager quality material used	Guarantee appropriate maintenance of pads following each hit and exercise high-quality material
Back plate failure	Assembly	Over sized, undersized of tool, improper tool selection	Guarantee physically checking of the tool after each stroke
Counter thickness	Powder mixing	Improper balance of powder, operator negligence	make sure appropriate functioning of weighing scales, appoint solitary man for it
Unclear gap between layer	Powder mixing	Improper mixing of powder	certify reasonable powder

5. Results & Conclusion

An energetic client center, prevalent procedure structure and a solid spurred authority are indispensable putting in place of the methodology for the achievement of any production organization. BPR plus RSCM, the method that each association ought to receive to accomplish their essentials for progress. Neither one of the its give a sensation fix on a plate nor an effortless convenient solution, rather it advances laborious difficult work and initiate the individuals required to the change what they do as well as focuses at different their essential perspective itself. In this paper I have endeavored in advancing an organized way to deal with reengineering

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An Integrated Maintenance Management: A Practical Approach

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Abstract

In the present-day competitive environment, industries are facing with a new crisis of shrinking profit margins. Organizations'/companies cannot ill afford quality, safety, poor environment and productivity issues. There is thus the requirement of an integrated approach towards management of maintenance. The aim is to present a framework for a programme for an effective continuous improvement of issues related to maintenance. Maintenance undoubtedly plays a key role in an organization's long-term profitability. In this article, there is a proposal for an integrated maintenance management. The suggested proposal is based on maintenance management, maintenance operation and equipment management (predictive maintenance, preventive maintenance, total productive maintenance). This article explores the benefits of integrated maintenance management compared with the traditional maintenance approach and discusses some of the latest tools in this area.

Keywords

Integrated maintenance management Productivity Preventive maintenance Predictive maintenance Equipment management TPM Benchmarking This is a preview of subscription content, <u>log in</u> to check access.

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Analyses of Temperature and Thermal Stresses of a Ceramic-Coated Diesel Engine Valve

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Abstract

This work is carried out to detect temperature, thermal strain and stress variation in plasma-sprayed zirconia-coated valve head and further to enhance the function of a diesel engine. Impacts of thermal barrier coating (TBC) thicknesses on engine valve are analyzed, and additionally, examinations with results from an uncoated valve have been prepared. Temperature, thermal strain and stress investigation are performed for different thicknesses of zirconia coating, which varies from 0.2 to 1.0 mm. It was found that the valve head where coating was done is considerably having high temperature as compared to the uncoated valve head surface and also found that the coated surface temperature rises with coating thickness by declining rate. Result shows that the highest temperature expanded up to 33.81% for 1.0 mm thick TBC as compared to the traditional uncoated valve. With the help of TBC, temperature level is increased in combustion chamber, which enhanced the thermal efficiency of the engine and declined the substrate temperature. The average stress on the coated surface increases with increasing coating thickness up to a certain limit. Maximum stress achieves on the top coat surface, and approximately, its value is 1.5 times higher than the substrate. Additional benefits include protection of component metal surface from thermal distortion and reduced cooling necessities.

Keywords

Diesel engine valve Ceramics coating TBC Thermal stresses This is a preview of subscription content, <u>log in</u> to check access.

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