Diagnosis of Pulmonary Tuberculosis using fuzzy Inference System

Publisher: IEEE

Ekata ; Praveen Kumar Tyagi ; Neeraj Kumar Gupta ; Shivam Gupta **All Authors**

Abstract: Artificial intelligence is a set of real time computational methodologies to address complex real-world problems. In this paper, Neurofuzzy Inference System for analysis ... **View more**

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Abstract:
Artificial intelligence is a set of real time computational methodologies to address complex real-world problems. In this paper, Neurofuzzy Inference System for analysis of pulmonary tuberculosis (TB)disease is discussed. For effective result, simulation is being done by using the realistic causes of pulmonary TB. The Neurofuzzy system is used for decision making based on a predefined rule based upon the symptoms of the patient are taken as inputs and the corresponding TB risk quotient is evaluated as the output. This crisp result obtained allows us to diagnose the low or high risk of the disease in the patient. Hybrid learning algorithm is applied for minimization of error in the output.

Published in: 2016 Second International Innovative Applications of Computational Intelligence on Power, Energy and Controls with their Impact on Humanity (CIPECH)

Date of Conference: 18-19 Nov. 2016 **INSPEC Accession Number:** 16854436

Date Added to IEEE *Xplore*: 04 May 2017 **DOI:** 10.1109/CIPECH.2016.7918726

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Publisher: IEEE

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Contents

As concern about rural areas or villages, some time patients hardly get any medical assistance. Online diagnosis of some chronic diseases is increasingly becoming popular day by day. The paper thus proposes intelligence based virtual doctor that uses the service of online diagnostic system [1] for the people to get an easy check up and analysis report based on the individual medical condition. According to the report patient may consult the specialist doctor. The spine of this system is the “knowledge base” which is indeed a well-organized collection of conventional data base with simple if-then rules and practices prevalent in that perspective. Diagnosis and treatment of Tuberculosis, a painful communicable disease, will be focused using artificial intelligence approach.

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Pages	322
Language	English
Publishing Year	Feb 2020

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International Journal of Advanced Technology in Engineering and Science
Vol. No.5, Issue No. 05, May 2017
www.ijates.com
ijates
ISSN 2348 - 7550

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

Proceedings of the National Conference on
Role of Science and Technology Towards 'Make in India',
YMCA University of Science & Technology, Faridabad, Haryana, March 5-7, 2016

Recent Trends in Electrical Power Generation

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Abstract— **As the electrical power generation depends upon the fossil fuels which are exhausting fast, there is a strong need to switch to renewable sources. But harvesting energy from renewable sources needs new technologies. The main problems which we face with these energy sources are cost and availability: wind and solar power are not always available everywhere and also when we need it. Unlike conventional sources of electric power, the power output of these renewable sources cannot be controlled as they are effected by seasonal effect and limited**

I. INTRODUCTION

Concentrated solar power (also called concentrating solar power, concentrated solar thermal, and CSP) systems generate solar power by using mirrors or lenses to concentrate a large area of sunlight, or solar thermal energy, onto a small area. Electricity is generated when the concentrated light is converted to heat, which drives a heat engine(usually a steam

Role of Science and Technology Towards 'Make in India',
YMCA University of Science & Technology, Faridabad, Haryana, March 5-7, 2016

Low Cost Photo-Voltaic Module for Electrical Power Generation

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Abstract— **It's something of an uncomfortable fact that civilized society is almost completely reliant upon fossil fuels for nearly every aspect of its existence. Whether you believe there are hundreds of years or just a few decades left of this resource, the fact remains that it is a finite resource. Fossil Fuels Contribute to Climate Change: While there are some who will say that "the science is still out" on climate change, it's a fact that the climate is changing and that fossil fuel emissions are contributing greatly to that change. By contrast, solar energy panels and wind turbines generate zero emissions in their generation of electricity. This gives rise to the necessity of renewable energy development.**

To collect electrical energy from solar energy, Photovoltaics (PV) are used. It is the name of a method of converting solarenergy into directcurrent electricity using semico

PEROVSKITE solar cells have emerged as the new key material for the photovoltaic community with certified efficiency reaching approximately 19-20%. The name 'Perovskite solar cell' is derived from the ABX_3 crystal structure of the absorber materials, which is referred to as Perovskite structure. The most commonly studied perovskite absorber is methylammonium lead trihalide ($CH_3NH_3PbX_3$, where X is a halogen atom such as iodine, bromine or chlorine), with an optical bandgap between 1.5 and 2.3 eV depending on halide content. Formamidinum lead trihalide ($H_2NCHNH_2PbX_3$) has also shown promise, with bandgaps between 1.5 and 2.2 eV. The minimum bandgap is closer to the optimal for a single-

A modified Haar wavelet based approach for state analysis of a pendulum problem

Publisher: IEEE

Sheetal ; Monika Mittal All Authors

Abstract: In this paper, the state analysis of a pendulum problem via a modified Haar wavelet based approach is presented. Based upon some useful properties of Haar functions like ... **View more**

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Abstract:
In this paper, the state analysis of a pendulum problem via a modified Haar wavelet based approach is presented. Based upon some useful properties of Haar functions like operational matrix of integration, a special product matrix and a related coefficient matrix, problem of a pendulum is solved. Computational savings achieved with the modified method as compared to existing Hsiao method have been demonstrated using MATLAB PROFILER for different resolutions.

Published in: 2016 Second International Innovative Applications of Computational Intelligence on Power, Energy and Controls with their Impact on Humanity (CIPECH)

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Date of Conference: 18-19 Nov. 2016 **INSPEC Accession Number:** 16854433
Date Added to IEEE *Xplore*: 04 May 2017 **DOI:** 10.1109/CIPECH.2016.7918727
ISBN Information: **Publisher:** IEEE
Conference Location: Ghaziabad, India

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Contents

The parametric pendulum is a paradigm model. And because of its dynamic behavior, great attention is given to it for many years. As a pendulum swings, the angular acceleration of the pendulum will vary due to effect of gravity - it depends on θ, the angle between the pendulum and the vertically downwards position. The diagram below shows a simple pendulum with the forces acting on it. A classical-mechanical pendulum consisting of a bob of mass m and a string of length L in a uniform gravitational field of magnitude g. The gravitational potential energy of the system is defined to be zero at the height of the pivot point of the string. The pendulum bob swings through an angle θ.
Fig. 1

A simple pendulum

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Data flow based quality testing approach using ACO for component based software development

Publisher: IEEE

Neha Prajapati ; Naveen Kumar All Authors

Abstract: Component-based Software Engineering (CBSE) has been centered around advancements identified with configuration and implementation of software components and frameworks a... **View more**

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Abstract:
Component-based Software Engineering (CBSE) has been centered around advancements identified with configuration and implementation of software components and frameworks assembled from software components. Quality Assurance (QA) for CBSE is a new subject in the software development research area. In this paper an enhanced data flow based QA model is presented for CBSE by employing the Ant Colony Optimization (ACO)algorithm to optimize the given code for automatic generation and prioritization of optimal path in decision to decision Control Flow Graph (CFG), which results an enhanced testing phase for QA model with reduced complexity. After that, proposed ACO based approach is also utilized for the generation of test data to satisfy the generated set of paths. This paper additionally exhibits the proposed

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approach applying it in a program module. Results show that a better testing is achieved by applying proposed ACO based scheme on component based software. Proposed approach ensures full software coverage with least redundancy.

Published in: 2016 International Conference on Computing, Communication and Automation (ICCCA)

Date of Conference: 29-30 April 2016

Date Added to IEEE *Xplore*: 16 January 2017

▸ **ISBN Information:**

INSPEC Accession Number: 16598938

DOI: 10.1109/CCAA.2016.7813850

Publisher: IEEE

Conference Location: Greater Noida, India

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Contents

I. Introduction

Current programming frameworks turn out to be more complex and extensive scale, bringing abouthigh advancement cost, low profitability and unmanageablesoftware quality [1]. Subsequently, there is a developinginterest oflooking for another, proficient and cost-effective softwareadvancement paradigm. A standout amongst the most encouraging solutions today is thecomponent-based software development technology.

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Economic load dispatch with ATC improvement in power system network including solar power generation systems

Publisher: IEEE

Brijesh Singh ; R. Mahanty ; S.P. Singh All Authors

Abstract: The present work deals with the active power rescheduling in an hour-ahead electricity market including solar energy based power generation. The schedules of various gene... **View more**

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Abstract:
The present work deals with the active power rescheduling in an hour-ahead electricity market including solar energy based power generation. The schedules of various generators have been optimized according to active power demand bids by various load buses and availability of solar energy. In this work, various aspects such as congestion management, voltage deviation, and loss minimization have also been taken into consideration to achieve the goal. The interior point (IP) based optimal power flow (OPF) methodology has been used to obtain the economic system operation. The IP-based OPF methodology has been tested on a modified IEEE-30 bus system. The obtained test results show that not only the generation cost is reduced also the available transfer capabilities of transmission lines have also been improved.

Published in: 2016 Second International Innovative Applications of Computational Intelligence on Power, Energy and Controls with their Impact on Humanity (CIPECH)

Date of Conference: 18-19 Nov. 2016 **INSPEC Accession Number:** 16854435

Date Added to IEEE *Xplore*: 04 May 2017 **DOI:** 10.1109/CIPECH.2016.7918754

ISBN Information: **Publisher:** IEEE

Conference Location: Ghaziabad, India

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Analysis and application of 2 D.O.F robotic arm

Publisher: IEEE

Devvrat Arya ; Alok Kumar Pandey ; Deva Harsha Bolisetty **All Authors**

Abstract: This paper presents an in-depth examination of 2 degree of freedom robotic arm which moves in a plane. Firstly, a simulation model of this arm is generated on MATLAB. Sim... **View more**

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Abstract:

This paper presents an in-depth examination of 2 degree of freedom robotic arm which moves in a plane. Firstly, a simulation model of this arm is generated on MATLAB. Simulation analysis performed on the model is discussed later for range and accuracy calculations. A hardware model is rendered through it which can perform movements as per requirement. It is refined for real-time operation, moreover it offers high precision for correct positioning on theory plane. The robotic arm is controlled using an arduino microcontroller which is interfaced with MATLAB. This paper concludes with some possible applications of 2 D.O.F robotic arm mechanism based on type of end-effector attached to the robotic arm.

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Published in: 2016 Second International Innovative Applications of Computational Intelligence on Power, Energy and Controls with their Impact on Humanity (CIPECH)

Date of Conference: 18-19 Nov. 2016 **INSPEC Accession Number:** 16854392

Date Added to IEEE *Xplore*: 04 May 2017 **DOI:** 10.1109/CIPECH.2016.7918743

ISBN Information: **Publisher:** IEEE

Conference Location: Ghaziabad, India

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Coordinated Fault Ride through Strategy for SCIG Based WECS

Publisher: IEEE

H. Ahuja ; S. Sharma ; G. Singh ; Arvind Sharma ; Arika Singh **All Authors**

Abstract: Wind technology is one of the fastest developing renewable technologies. Squirrel cage induction generator (SCIG) with back to back fully rated converter used for wind en... **View more**

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Abstract:

Wind technology is one of the fastest developing renewable technologies. Squirrel cage induction generator (SCIG) with back to back fully rated converter used for wind energy conversion systems (WECS) is a meritorious option among its class. SCIG's offer advantages of being robust, suitable for any harsh environment, cheaply available and unsophisticated than the other types available. To enable increased share of wind energy in the grid without compromising power system stability, the generator ought to stay connected and continue to feed the grid even in case of disturbances such as voltage sag. This paper presents a coordinated control scheme to address the fault ride through of SCIG based WECS. A WECS based on SCIG having back to back connected voltage source converters involving Rotor flux oriented vector controlled drive at machine side and hysteresis current controlled inverter for grid interface has been

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simulated in MATLAB/SIMULINK. Abnormal rise in dc link voltage during symmetrical faults is controlled by de-loading control while positive-negative sequence control is used for real and reactive power control during symmetrical and unsymmetrical faults. During this work, coordinated performance of all the above stated control strategies during most severe symmetrical (LLL) and most frequently occurring unsymmetrical (LG) fault has been examined.

Published in: 2016 Second International Conference on Computational Intelligence & Communication Technology (CICT)

Date of Conference: 12-13 Feb. 2016

INSPEC Accession Number: 16232793

Date Added to IEEE *Xplore*: 18 August 2016

DOI: 10.1109/CICT.2016.90

Publisher: IEEE

ISBN Information:

Conference Location: Ghaziabad, India

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Contents

Over last decade, global wind power capacity has sustained to rise at an average cumulative rate of superior than 31.7%. During year 2014, more than 50 GW of capacity was added. This has brought total worldwide wind power close to 370 GW [1]. Out of this capacity, total cumulative capacity of India as on December 2014 is approximately 22.5 GW [2]. With the escalating penetration of wind energy; its control, efficiency and cost related aspects are gaining an emergent concern. With large penetration of renewable energy in power system, power system stability and fault ride through (FRT) capabilities of WECS has become a very important issue that need urgent focus.

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Performance comparison of most prevalent wind energy conversion systems

Publisher: IEEE

Hemant Ahuja ; Rahul Virmani ; Arika Ahuja **All Authors**

Abstract: This paper envisages comparing the performance of grid connected variable speed wind energy conversion systems (WECS) that are based on DFIG, PMSG and SCIG. The compariso... **View more**

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Abstract:

This paper envisages comparing the performance of grid connected variable speed wind energy conversion systems (WECS) that are based on DFIG, PMSG and SCIG. The comparison criteria used are mainly the quality of power injected to the grid, range of wind speeds that each generator can handle, converter ratings, real power harnessed by each configuration and reactive power requirements. Models for these variable speed WECS based on DFIG, PMSG and SCIG have been developed in MATLAB/Simulink environment, considering the same machine ratings and similar control techniques for all of them. Maximum Power Point Tracking (MPPT) also has been implemented for all of them under normal operating conditions. Careful analysis of the results shows that an appropriate choice of a particular WECS technology can be

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made based on the geographic location of the wind turbine and strength of the power grid.

Published in: 2016 7th India International Conference on Power Electronics (IICPE)

Date of Conference: 17-19 Nov. 2016

INSPEC Accession Number: 17285660

Date Added to IEEE *Xplore*: 23 October 2017

DOI: 10.1109/IICPE.2016.8079427

Publisher: IEEE

ISBN Information:

Conference Location: Patiala, India

Electronic ISSN: 2160-3170

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Contents

Wind energy is the most promising and the largest renewable energy resource among the all alternatives available with about 432.9 GW installed capacity world-wide and 25.088 GW in India in the year 2015. Worldwide total cumulative installed capacity from wind power has been increased by 17% compared to year 2014 when the capacity was 369.55 GW [1]. A rapid development in WECSs has been observed since the 1990's and various WT concepts with different generators have been built. Based on electrical topology, WT generators are largely classified as fixed speed and variable speed configurations with partially rated and full-rated converters (FRC) [3]. A grid connected DFIG is an interesting option with a significantly growing reached demand as it offers high controllability, allows maximum power point tracking (MPPT) and independent control of active and reactive power components in the rotor side [4]. On the other hand, SCIG or PMSG use FRCs and offer complete control of active and reactive powers from their stator sides. In recent years, the improving performance and decreasing cost of the permanent magnets (PM) allow direct driven (gearless) wind generators to be used at as large a power level as 5 MW with large number of poles. PMSG also offers advantages like its self-excitation property, operation at higher power factor and better efficiency compared to other variable speed WECSs [5].

Signature Completed

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Feasibility Analysis of Solar Photovoltaic Array Configurations under Partial Shading Conditions

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***Abstract*– Operation of photovoltaic plants globally registered issues related to shading. Shading may be due neighboring construction, passing clouds, birds or birds litter will significantly reduce the power production of photovoltaic plants. In this paper feasibility analysis has been done for different array configurations under partial shading conditions. The performance of Series-Parallel(SP), Bridge-linked(BL), Honey Comb(HC) and Total Cross Tied(TCT) array configuration are analyzed and compared for 7×7 PV array under different shading conditions.The performance and characteristics (I-V and P-V) are compared with and without bypass diode; use of bypass diode in antiparallel across module or modules increases the power output but causes multiple peaks in P-V characteristics.**

Index Terms—Array configuration, maximum powerpoint tracking (MPPT),partial shading, mismatch losses.

I. INTRODUCTION

Fast depleting fossil fuel reserves, increasing power demand and environmental concerns has created larger intersect in the utilization of renewable energy. Among renewable energy sources, solar photovoltaic system is most simple, reliable and clean way to produce electricity from conversion of solar energy[1,2]. The high initial cost, low energy conversion efficiency and dependence of energy output on varying atmospheric conditions are some

shortcomings of solar photovoltaic system. In a solar photovoltaic array spread over large area, it is probable that shadow may fall over some of its cells or modules due to shade of a neighboring construction, clouds passing through, shadow of trees etc.[3,5,6].In large PV installation, shading may cause significant amount of economic losses and therefore reduces overall efficiency of the system. It is impossible to avoid partial shading of the array in all seasons and weather conditions. These shadows reduce overall generation to large degree; hence photovoltaic installation cost is increased as number photovoltaic module unit is increased.This makes the study of partial shading of modules a sensitive issue.

The model is developed using basic circuit equations of the photovoltaic (PV) module including the effects of solar irradiation and temperature changes.

It is very important to understand characteristics of solar photovoltaic array under partial shading condition to maximize its output and to effectively use solar photovoltaic installations under all conditions.

This paper presents feasibility analysis on various PV array configurationsand to eliminate the losses faced in photovoltaic system due to introduction of bypassdiode. It is difficult to make analysis on physical PV module as field testing is costly, time consuming and dependent on weather conditions. Use of bypass diode in antiparallel increase power output in partial shading condition but causes multiple peak power-voltage characteristics.

II. PHOTOVOLTAIC CELL

Simple equivalent circuit and single diode model of solar cell is shown in figure 1.

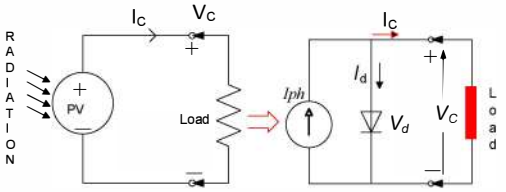

Fig.1. PV cell and its simple equivalent circuit

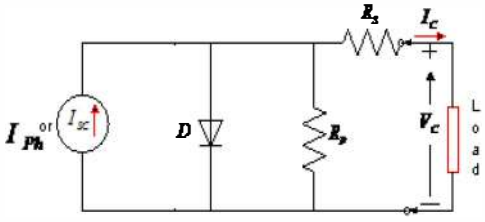

Fig.2.Single diode model of PV source.

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Equivalent circuit of single diode model of a PV source is shown in figure.2. It consists of a current source, a diode, series and shunt resistances.

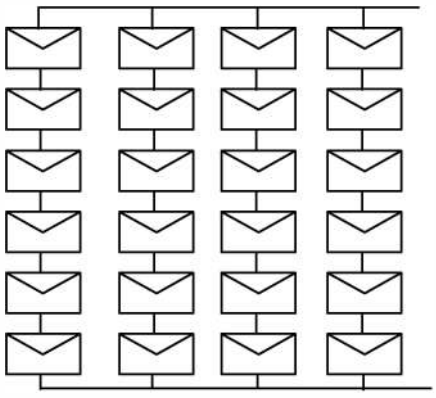
Parameters of solar photovoltaic module [5] are shown in Table 1.

TABLE1:Parameters of the adjusted model of the KC200GTsolar array at nominal operating conditions.

TABLE 1 Parameters of the PV array at 25 ◦C, AM1.5, 1000W/m2.	
I_{mp}	7.61A
V_{mp}	26.3V
$P_{max,e}$	200.143W
I_{sc}	8.21A
V_{oc}	32.9V
K_V	−0.1230V/K
K_I	0.003 A/K
N_s	54

III. SP, BL, HC,TCT CONFIGURATION UNDER PARTIAL SHADED CONDITIONS

Series-Parallel(S-P),Bridge-linked(B-L), honey-comb(H-C) and Total-Cross-Tied(TCT) configurations of photovoltaic array are analyzed in this paper under partial shading condition with and without bypass.The demerits of using basic series and parallel connections of PV array are less current and voltage respectively. The Photovoltaic modules are connected in series to increase voltage level and in parallel to increase current level of array, Series-Parallel is shown in figure.3.a, now Series-Parallel connection are modified by connecting tie across junctions to form TCT configuration as shown infigure.3.d, in BL configuration modules are connected in a bridge rectifier fashion as shown in figure.3.b, it consist of two parallel string having two series connected modules, there exists tie between the bridges. Further modification of BL configuration leads to Honey comb configurations as shown in figure.3.c.[4].



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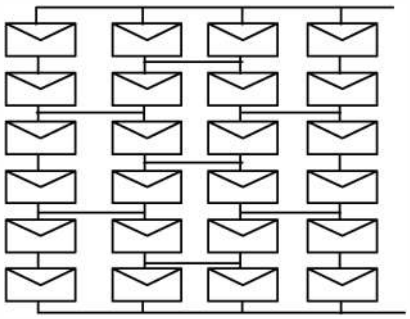

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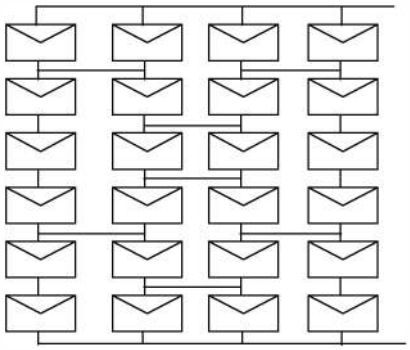

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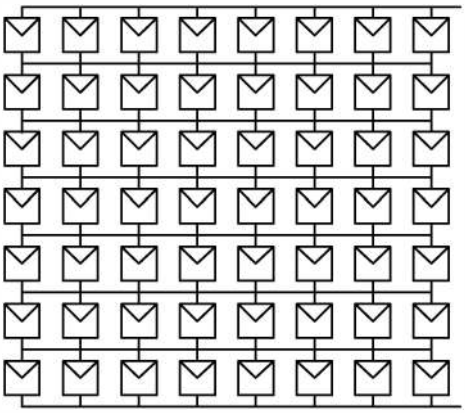
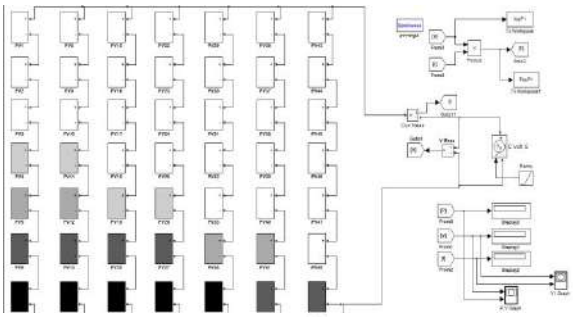


(d)

Fig.3 Photovoltaic Array for a) Series-Parallel b) Bridge-Linked c) Honey-Comb d) Total Cross Tied Configurations.

In this work we have analyzed Photovoltaic array under partial shading conditions for above four mentioned configuration having constant R_p with and without bypass diode for two shading pattern, In first case of shading pattern we have taken row wise shading P1 and in secondcase we have taken column wise shading P2. Figure.4 and figure.5 shows Simulink model of S-P, B-L, H-C, TCT without and with bypass diode respectively for row wise shading P1.



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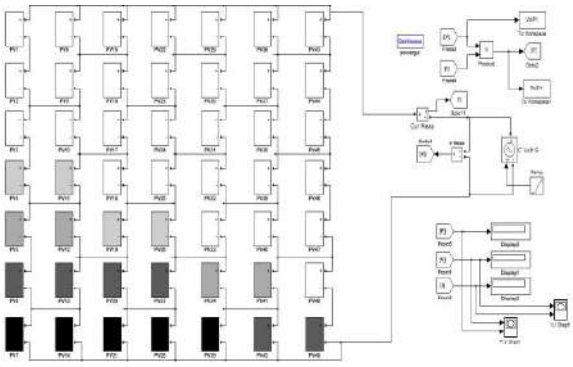

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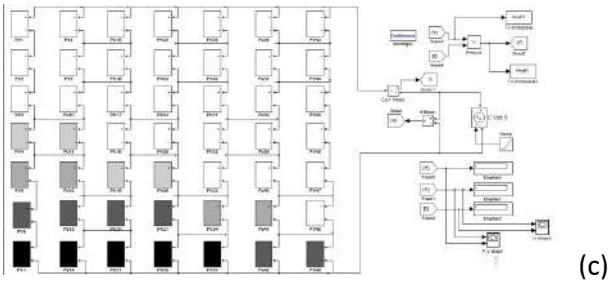

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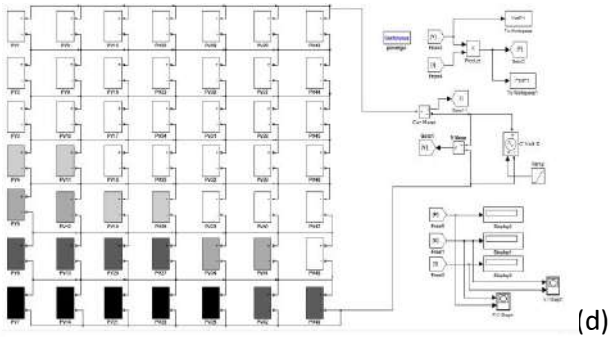

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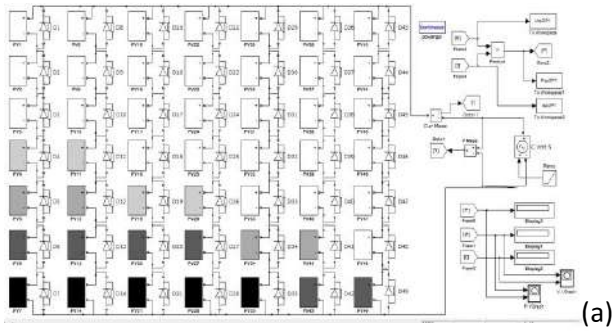
Fig.4 Simulink model of Photovoltaic Array without bypass diode for shading pattern P1 a) Series-Parallel b) Bridge-Linked c) Honey-Comb d) Total Cross Tied Configurations.



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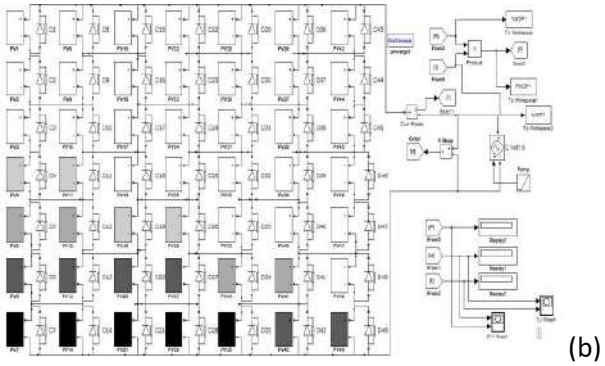

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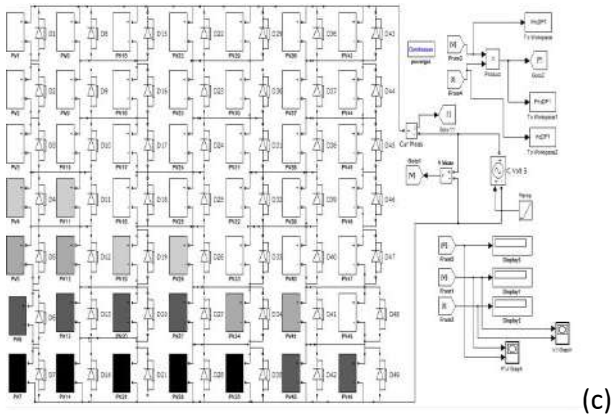

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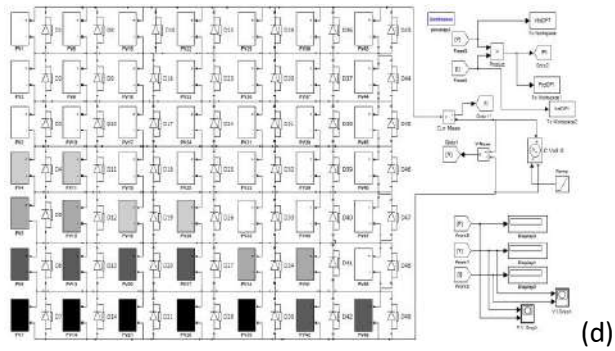

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Fig.5 Simulink model of Photovoltaic Array with bypass diode for shading pattern P1 a) Series-Parallel b) Bridge-Linked c) Honey-Comb d) Total Cross Tied Configurations.

Table 2 shows parameters of various configurations under uniform insolation conditions whereas tables 3 and 4 shows the comparison of power for S-P,B-L,H-C, TCT

configurations with and without bypass diode respectively for shading pattern P1(row wise shading). Maximum power is almost constant for all configurations and there is no multiple peaks in power-voltage characteristics without bypass diode, whereas there are multiple peaks in power-voltage characteristics for all configurations with bypass diode as shown in figure.6.

Table 2:Parameters of configurations under uniform insolation conditions

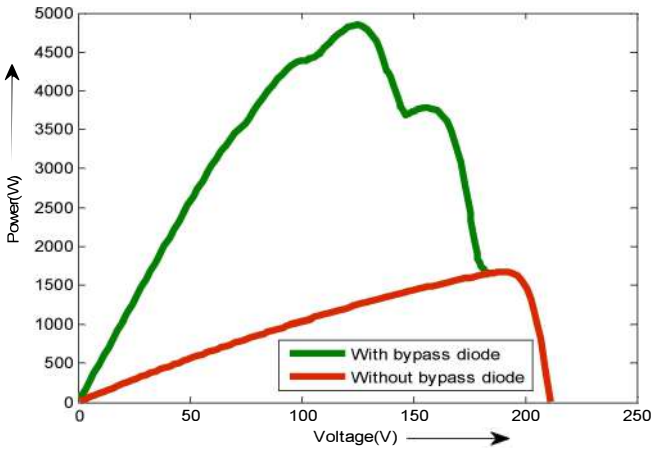
Configuration	P_m(W)	V_m(V)	I_m(A)
SP	7599	171	44.45
BL	7599	171	44.45
HC	7599	171	44.45
TCT	7599	171	44.45

TABLE 3: Comparison of power without bypass diodes for shading pattern P1

Configuration	P_m(W)	Number of Peaks
Series-Parallel	1665	One
Bridge Linked	1670	One
Honey Comb	1671	One
Total Cross Tied	1674	One

TABLE 4:Comparison of power with bypass diodesfor shading pattern P1

Configuration	P_m(W)	Number of Peaks
Series-Parallel	4421,**4847**,3773,1651	Four
Bridge Linked	4275,**4806**,3992,1658	Four
Honey Comb	4328,**4767**,3973,1660	Four
Total Cross Tied	4144,**4913**,4040,1664	Four



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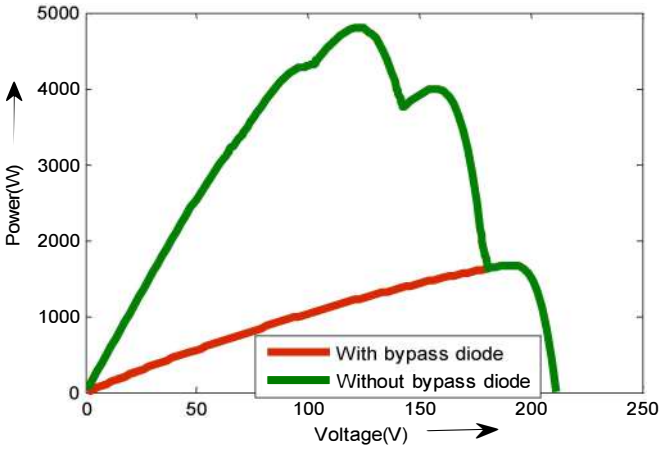

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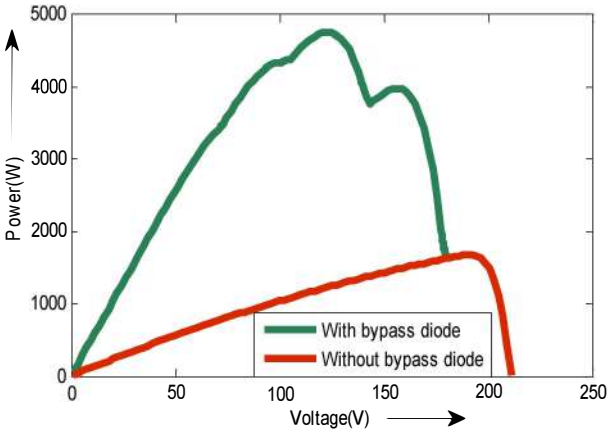

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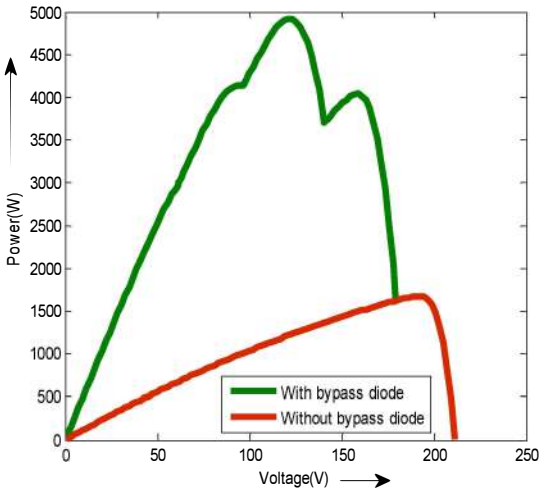

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Fig.6.Power-Voltage Characteristics of photovoltaic Array with and without bypass diode for shading pattern P1 a) Series-Parallel b) Bridge-Linked c) Honey-Comb d) Total Cross Tied Configurations.

In shading pattern P2 we have taken column wise shading as shown figure.7 which is Simulink model for above pattern P2 for TCT configuration, in column wise shading analysis showsthatthe maximum power and power –voltage characteristics remainsalmost same with and without bypass diode forS-P,B-L,H-C, TCT configurations as shown in figure.8. Table.5 shows comparison of power with bypass diodes and without bypass diodes for all above configurations having shading pattern P2.

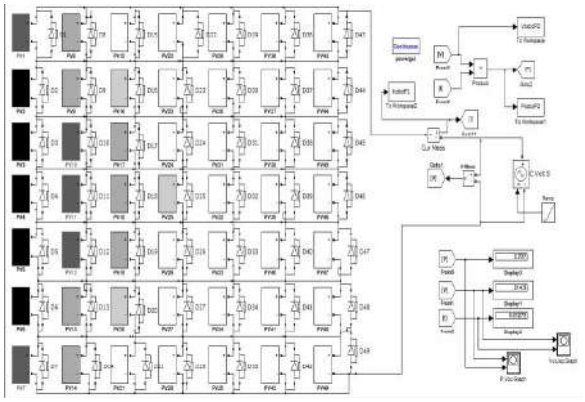
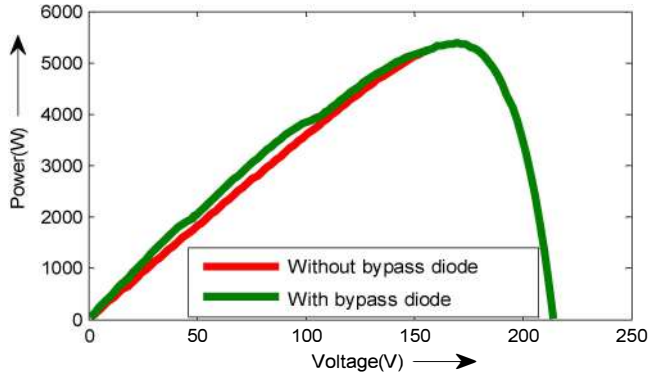


Fig.7 Simulink model of TCT connected photovoltaic Array for with bypass diode for shading pattern P2.

TABLE 5:Comparison of power with bypass diodes and without bypass diode for shading pattern P2

Configuration	P_m(W)	Number of Peaks
Series-Parallel	5370	One
Bridge Linked	5452	One
Honey Comb	5412	One
Total Cross Tied	5561	One



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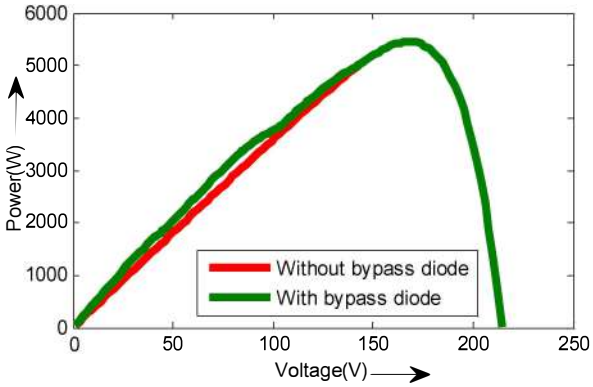

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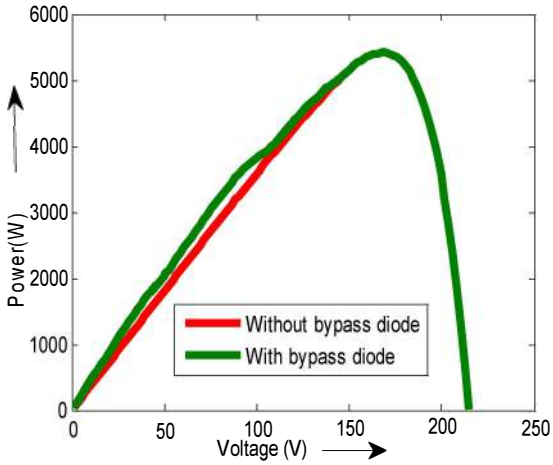

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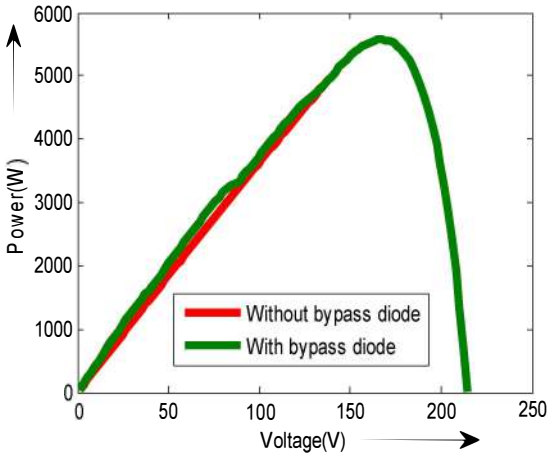

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Fig.8.Power-Voltage Characteristics of photovoltaic Array for with andwithout bypass diode for shading pattern P2 a) Series-Parallel b) Bridge-Linked c) Honey-Comb d) Total Cross Tied Configurations.

IV. CONCLUSION

Feasibility analysis of solar photovoltaic array configurations under partial shading condition is done by developing a more accurate model of photovoltaic module. In comparative

analysis under partial shading conditionsSP,BL,HC and TCT configurations, has been taken, TCT configuration is best suited configuration under partial shading conditions. Extraction of maximum possible power under partial shading is done by using bypass diode in antiparallel across module or modules. By the use of bypass diode stress on shaded modules is reduced and causes multiple peak in power-voltagecharacteristics but gives increased power as compare to photovoltaic array without bypass diodes. In analysis of various array configurations for different shading pattern that is row wise shading and column wise shading, it is found that TCT has given higher power output in comparison with other array configuration. In row wise shading pattern there are multiple peaks in power-voltage characteristics, whereas in column wise shading there is almost single peak in power-voltage characteristics, it is also concluded that shading losses aredependent on shading pattern that is it is not dependent on shading area.

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Proceedings of the 11th INDIACom; INDIACom-2017; IEEE Conference ID: 40353
2017 4th International Conference on "Computing for Sustainable Global Development", 01st - 03rd March, 2017
Bharati Vidyapeeth's Institute of Computer Applications and Management (BVICAM), New Delhi (INDIA)

Threshold Based Ship Tracking With Ordered Weighted Averaging Method

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Abstract — **Infrared imaging is one of the popular image acquisition method in complex environment due to its strong heat signatures that is why in proposed work infrared image of ship is used as input. Moreover for segmentation, concept global thresholding is applied to increase the information objects of interest (ship) while reducing the irrelevant detail in this very case flood waves. Global thresholding expected to be successful in highly control environment, while sea is a very complex and uncontrolled environment. Hence Ordered Weighted Averaging (OWA) method is used to specify global threshold 'T' of infrared image. The results are compared with the Sobel Object detection algorithm. Three linguistic quantifier of OWA operator 'most' 'at least half ', and 'as many as possible' are used. Values of 'T' produces by 'at least half ', and 'as many as possible' linguistic quantifier are much closer to visual inspection i.e.129. The results produces by Sobel object detection algorithm is very blur. The performance of 'at least half ', and 'as many as possible' are slightly better than 'most' quantifier. However it is observed that 'at least half ', and 'as many as possible' quantifier have tie on the basis of visibility as well as estimated threshold value. Proposed work is for static position of targeted ship. Moreover in future, it is accepted from proposed method to produce same results for moving ship.**

Keywords—image processing, thresholding, infrared image, OWA)

I. INTRODUCTION

In autonomous object tracking there is no control over complex environment specifically that contains flooding wave and noise. In this case background and noise are almost submerged with the target e.g. in sea targeted ship is submerged in flooding waves. These challenges attract the attention, and in proposed work this interesting problem is selected.

Infrared imaging of ship due to its strong heat signatures is as input as shown in Figure1. Heat sensors increase the objects of interest while reducing the contribution of irrelevant detail [2]. To estimate strong heat signature concept of Basic global threshold 'T' is used. Global thresholding expected to be successful in highly control environment. The key objective of thresholding is to produce a clean segmented image by eliminating the noise and flood waves. In proposed work global thresholding is used. Global thresholding expected to be successful in highly control environment. Hence there is a requirement of a method that can be specifying threshold 'T'. To process infrared image and specification of Threshold 'T', Ordered Weighted Averaging (OWA) method is used that was introduced by Yager [1].

The results are compared with the Sobel Object detection algorithm. The results produced by 'OWA' method are more promising than Sobel edge detection algorithm. View from result the proposed method lays a strong basis for ship target tracking system and ship target detection is obtained in complex sea background.

Fig. 1. Infrared Image of ship

Proposed work is for static positions of ship, same methodology can be used for moving ship and it is accepted to produce good results. This paper is organized as below. In Section 2, the related work has been discussed. The section 3 comprises the formalization of thresholding. Section 4, discuss the basic Sobel Object Detection algorithm. In section 5, we discuss OWA method. In section 6, we estimate the threshold of infrared image by using OWA, and in section 7 results of experimental work have been discussed. The final section 8 comprises conclusion.

II. RELATED WORK

Segmentation has central role in autonomous image processing, image analysis, and computer vision, detail literature is reported in Shaprio and Stockman [3] Several model of image processing have been already proposed.

However , they are mainly proposed for image restoration [4,5] indexing [6],or coding [7] rather than for identification. Thresholding techniques enjoy a significant degree of popularity due to its simple and speedy implementation [1]. A good appreciation of the extent of projectile location measurement using multi-screen target method in the literature reported by Li et [8]. The researchers have given the attention towards Infrared imaging information processing technology and they researched deeply. In Infrared image technology the basic research is related to description of infrared background. The infrared detector's inner noise is lowest by the amelioration and development of infrared detection manufacture technology, in some conditions; the obstacle of infrared detection is the jamming of background [9-10].

In web searching, OWA was used by the user to find the importance of weight for each of the document [11]. With different aggregation techniques introduced in fuzzy information processing tasks [12], detailed description of OWA operators [1], has been applied in many applications like market analysis [13], decision making [14,15], fuzzy logic controller [16], image compression [17]. With the use of fuzzy numbers OWA operators, the environmental indices were developed, for finding similarity with multiple linguistic parameters as inputs [18]. In [19], for retrieval of similar images from the database, the similarities among images are computed. It combines Choquet Integral and weighted averaging, and relevance feedback for a better performance. However, there has been a lot of work in image retrieval but with very little intelligence to recognize fuzzy objects and image. To estimate membership of different fuzzy objects OWA operators were used [20, 21].

III. THRESHOLDING

Thresholding, region splitting and merging, region growing are example of Segmentation. Segmentation is one of the image processing method whose output(s) are attributes extracted from input image(s).

Thresholding is the central concept among the segmentation methods. The popularity of thresholding is due to its simplicity and speed.

The key objective of using thresholding is to produce a clean segmented image of targeted ship by eliminating the noise and flood waves. Hence there is a requirement of a method that can be specifying threshold 'T'. In proposed work global thresholding is used. Global thresholding expected to be successful in highly control environment. However to process these noises and the targeted ship the image is processed by Ordered Weighted Averaging (OWA) method and produce promising results.

A. Foramilization of Global Threshol

Global thresholding is simplest one, by using single global threshold 'T' , it segments the image.

Suppose that gray level in an image $f(x, y)$, composed of lights objects on a dark background, in such a way that object and background pixels have gray levels grouped into two dominant modes [1]. The objective is to select a threshold 'T' that split up these modes. Then any spatial coordinate (x,y) for which $f(x,y)>T$ is related to object otherwise it is background.

A threshold image $g(x,y)$ is defined as

$$g(x,y) = \begin{cases} L & \text{if } f(x, y)>T \\ 0 & \text{if } f(x, y)\leq T \end{cases} \qquad (1)$$

When T depends only on $f(x, y)$ the threshold is called global.

IV. THE SOBEL OBJECT DETECTION ALGORITHM ON INFRARED IMAGE

The *Sobel object* detection algorithm is weighted computation on gray in the neighborhood [20]. The size of which is 3×3, and the center of which is the pixel. The *Sobel* edge detection algorithm is defined as:

$$S(x,y)=(f_x^2+f_y^2)^{1/2}$$

Where f_x and f_y defined as:

$$f_x = \begin{pmatrix} -1 & 0 & 1 \\ -2 & 0 & 2 \\ -1 & 0 & 1 \end{pmatrix}$$

$$f_y = \begin{pmatrix} 1 & 2 & 1 \\ 0 & 0 & 0 \\ -1 & -2 & -1 \end{pmatrix}$$

In Sobel edge detection algorithm weighted sum on gray of every pixels, which are the above point, the lower point, the left point and the right point of image is calculated. When the pixel is closer to the center of the model, the higher the weighted value is. In similar manner, if we can decide the threshold T and if $f(x, y) >T$, we says that the point (x,y) is the object point.

V. ORDERED WEIGHTED AVERAGING METHOD

Yager [1] discovered the OWA operator which is basis for t information aggregation. OWA orovides the method of aggregation in solving the problems related to multi criteria decision making. A parameterized family of aggregation operator like k-order statistics, arithmetic mean, median, maximum and minimum is provided by OWA operator. In some cases of multi criteria decision making exact —and-ness required which produces minimum value and in some cases exact —or-ness which produces maximum value. T aggregation operator based on OWA provide a value in between two extremes of and-ness and or-ness. Two extremes and-ness and or-ness are limited to mutually exclusive probabilities for multiplication (like and gate) and summation (like or gate). A brief account of OWA operators discloses in

later part and then detail discussion was made regarding the behavior of operators in [1]. Three steps in OWA operation are as follows– 1) Reordering of inputs, 2) Weight determination related with OWA operators, and 3) Aggregation process.

A. *Yager's OWA Operator Weights Methods*

Definition: "Mapping the OWA operator R from R m→ R, (where R = [0, 1]), with dimension m, has weighting vector w= $(w_1, w_2, w_3, \ldots w_m)^T$, where $w_j \in [0, 1]$ and $\Sigma w_j = 1$, the s ummation of individual weights will always found to be one. Thus, for the multi-criteria of size m, the input parameter $(x_1, x_2, x_3 \ldots\ldots x_m)$, the OWA determines the f-validity in f-geometry shapes as follows".

$$OWA(x_1, x_2, x_3 \ldots\ldots x_m) = \sum w_j y_i \qquad (2)$$

$$\beta = \frac{1}{m-1} \sum_{j=1}^{m} w_j (m-1) \qquad (3)$$

In this, β (*Orness*) lies in the range [0, 1]. At every instance when β = 1, produces the weight vector as (1, 0, 0,...0), means that the entire weight is acquired by the maximum value of x_j producing the OWA operator as *maximum* operator. On the other side, if β = 0, produces the weight vector as (0, 0, 0,…, 1), means that the entire weight is acquired by the *minimum* value of x_j, producing the OWA operator as *minimum* operator. When the value of β = 0.5, the weight vector as (1/n, 1/n, 1/n,…, 1/n) is *generated resulting* that the arithmetic mean of weights are evenly distributed among the inputs [1]. The relative quantifier's membership function can be expressed as

$$Q(r) = \begin{cases} 0 & \text{if } r < a \\ \frac{r-a}{b-a} & \text{if } b \le r \le a \\ 1 & \text{if } r > b \end{cases} \qquad (4)$$

where a,b,r ∈ [0,1].[3]

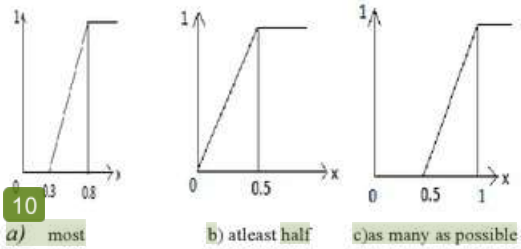
The weights w_j of the OWA aggregation calculated in [1], Yager from the function Q discusses the quantifier, with m number of criteria.

$$w_j = Q\left(\frac{j}{m}\right) - Q\left(\frac{j-1}{m}\right) \qquad (5)$$

where j=1,2,…,m and $Q(0) = 0$.

The relative quantifiers pictorially represented as in Figure 5 This shows the relative quantifiers "most", "at least half" and "as many as possible" taking the parameter a and b as (0.3, 0.8), (0, 0.5) and (0.5, 1) respectively.

Now for determination of weights, we review the OWA operator models with nonlinear objective function. The next section consists of experimental work and results.



a) most b) atleast half c)as many as possible

Fig. 2. Lingustic Quantifier

VI. Proposed Methodology

Proposed method is based on algorithm given below. The results of proposed method are compared with Sobel Object detection algorithm.

A. *Proposed Algorithm*

START

STEP 1: Read Infrared Image

STEP 2: Change image into gray scale

STEP 3: Apply histogram equalization

STEP 4: Store all distinct gray levels

STEP 5: Estimation of threshold 'T'

(a) Arrange all gray levels in decreasing order

(b) Estimate Weights by using linguistic quantifier by using equation (4) and (5)

(c) Aggregate product of these weights with corresponding gray level inputs by using equation (2).

STEP 6: Segment the image on the basis of estimated Threshold by pixel by pixel analysis of gray level.

(a) If f(x,y) >T Then g(x,y)=f(x,y)

(b) Else f(x,y)==0

END

Based on proposed methodology the experiments are carried out and results along with experimental work are discussed in next section.

VII. EXPERIMENTAL WORK AND RESULTS

The experimental work is carried out by taking infrared image of ship as shown in Figure 1. Initially threshold is specified by using heuristic approach based on visual inspection, i.e. 129. Figure 4 to 6 are showing results after applying '*most*', '*at least half*', and '*as many as possible*' linguistic quantifier to estimate threshold respectively.

The value of threshold 'T' estimated by 'most' linguistic quantifier is 115 whereas 'at least half', and 'as many as possible' linguistic quantifier produces 131 and 125 respectively. Values of 'T' produces by 'at least half', and 'as many as possible' linguistic quantifier are much closer to visual inspection i.e.129.

In Figure 3 output of Sobel object detection algorithm is shown that is very blur. After observing Figures 3-6 it is found

'at least half' and 'as many as possible' producing output that are much better and clear than Sobel algorithm.

The performance of 'at least half ', and 'as many as possible' are slightly better than 'most' quantifier. However it can be observed very clearly both of these quantifier have tie on the basis of visibility as well as estimated threshold value.

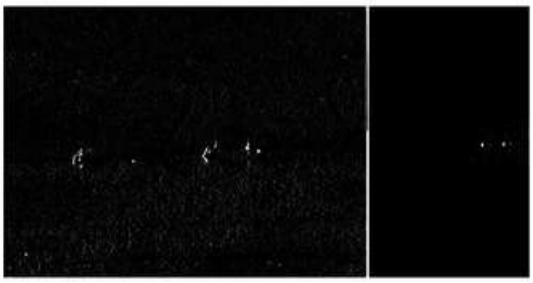


Fig. 3. Output of *Sobel object detection algorithm*

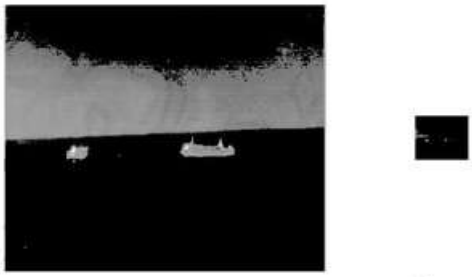


Fig. 4. Output of *Most Linguistic* Quantifier

Fig. 5. Output of *Atleast Half Linguistic* Quantifier

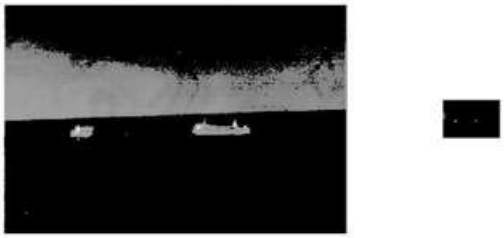


Fig. 6. *Output of As many as possible Linguistic* Quantifier

Fig. 7. *Output of Invert Image As many as possible Linguistic* Quantifier

In Figure 7 invert image of *As many as possible Linguistic* Quantifier is shown. The key objective is merely to generate a binary image so that black and white relationship could be reversal.

VIII. CONCLUSION & FUTURE DIRECTIONS

In this paper, we have estimate global thresholding to identify the location of ship in sea water. Infrared image is taken as input due to its high heat signature. Threshold value of heuristic approach based on visual inspection is 129.

The value of global threshold produced by 'most' linguistic quantifier is 115 whereas 'at least half ', and 'as many as possible' linguistic quantifier produces 131 and 125 respectively.

Results produced by 'at least half ', and 'as many as possible' linguistic quantifier are much closer to visual inspection. The output of Sobel object detection is not very clear.

Proposed work is for static positions of ship, In future same methodology can be used for moving ship and it is accepted to produce good results.

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4	Chaturvedi, D. K., Md. Sharif Iqbal, and Mayank Pratap. "Intelligent health monitoring system for three phase induction motor using infrared thermal image", 2015 International Conference on Energy Economics and Environment (ICEEE), 2015. Publication	%1

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Performance analysis of SMC controlled PV fed VSI

Publisher: IEEE

Shruti Pandey ; Bharti Dwivedi ; Anurag Tripathi **All Authors**

Abstract: With ever increasing trend of implementation of renewable energy resources in power systems it has become relevant to study the dynamics of their integration with the ava... **View more**

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Abstract:
With ever increasing trend of implementation of renewable energy resources in power systems it has become relevant to study the dynamics of their integration with the available technologies. Of all renewable resources, Photovoltaic generation is going to be the most prevalent in India. Keeping this in mind, an attempt has been made in this paper to analyze the performance of a Voltage Source Inverter using Sliding Mode Controller when it is fed with a PV source. The performance, when compared with a PI controlled DC fed Voltage Source Inverter, is found to be superior in terms of the quality of power obtained as inverter output. The effect of variable output of PV generation due to varying solar irradiation has also been taken into consideration.

Keywords

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Published in: 2016 IEEE 1st International Conference on Power Electronics, Intelligent Control and Energy Systems (ICPEICES)

Date of Conference: 4-6 July 2016

INSPEC Accession Number: 16672820

Date Added to IEEE *Xplore*: 16 February 2017

DOI: 10.1109/ICPEICES.2016.7853523

Publisher: IEEE

ISBN Information:

Conference Location: Delhi

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Contents

Due to increase in population there is subsequent increase in the demand of gas and oil. The fossil fuels have become an essential part of our day to day lives and they play vital role in the working of the world. With this stretch in the demand of the fuels, they are becoming more scant and pricey every day. People are forced to choose alternate energy sources due to imminent energy calamity and the elevated fuel prices to meet their energy requisite. Moreover, it has always been a challenge strap up the energy from these sources. With the current technical advancements, this challenge is been successfully met. The photo-voltaic (PV) systems are the most admired energy source among all the existing renewable energy sources both in high as well as in low power applications because of a numerous enviable characteristics. Due to low efficiency of conversion and high initial installation cost, the production of energy by PV systems is bit expensive than other conventional resources. Therefore, to get efficient output for applications demanding a constant output it is required to interface power electronic converters with PV systems. Power electronic converter works as a regulator thereby helping the PV system in meeting the constant load demand.

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Figures

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Keywords

Metrics

Performance analysis of PV fed multistage converter with SMC controlled VSI

Shruti Pandey ; Bharti Dwivedi ; Anurag Tripathi All Authors

Abstract: The trend of growing penetration of renewable energy resources in power systems has become pertinent in wake of fast depleting fuel and rising carbon emission. It has, th... **View more**

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Abstract:
The trend of growing penetration of renewable energy resources in power systems has become pertinent in wake of fast depleting fuel and rising carbon emission. It has, therefore, become relevant to study the dynamics of their integration with the available technologies. Of all renewable resources, Photovoltaic generation is the most prevalent resource in India. Keeping this in mind, a multistage cascaded converter system is developed in this paper. The proposed technique comprises of a PV (Photo voltaic) fed MPPT (Maximum Power Point Tracking) controlled boost converter in cascade with a sliding mode controlled inverter. The paper aims at extracting maximum power from a PV source and converting it to a good quality ac power. The effect of variable output of PV generation due to varying solar irradiation has also been taken into consideration to

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establish the effectiveness of MPPT controlled boost converter. The performance of the sliding mode controlled voltage source inverter, when compared with a PI controlled voltage source inverter, is found to be superior in terms of the quality of the ac power.

Published in: 2016 IEEE Uttar Pradesh Section International Conference on Electrical, Computer and Electronics Engineering (UPCON)

Date of Conference: 9-11 Dec. 2016

Date Added to IEEE *Xplore*: 12 April 2017

ISBN Information:

INSPEC Accession Number: 16807895

DOI: 10.1109/UPCON.2016.7894700

Publisher: IEEE

Conference Location: Varanasi, India

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Contents

I. Introduction

Due to increase in population there is subsequent increase in the demand of gas and oil. The fossil fuels have become an essential part of our day to day lives and they play a vital role in the working of the world. With this stretch in the demand of the fuels, they are becoming more scant and pricey every day. People are forced to choose alternate energy sources due to imminent energy calamity and the elevated fuel prices to meet their energy requisite. Moreover, it has always been a challenge strap up the energy from these sources. With the current technology, this challenge is met. The photo-voltaic (PV) systems are the most admired energy source among all the existing renewable energy sources both in high as well as in low power applications because of a numerous enviable characteristics. Due to low efficiency of conversion and high initial installation cost, the production of energy by PV is bit pricy than other conventional resources. Therefore, to get efficient output for applications which require a constant output it is obligatory to use power electronic converters with PV systems. These convertersact as a regulator thereby helping the PV system in meeting the required constant load demand. DC-DC converters are the power processors, generally adopted for the energy conversions. Due to a single switch, the boost converter possesses very good conversion efficiency. With the economic pointof view in today's society, theseDC-DC converters are of great economic importance and are most commonly used with PV system.

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Sensitivity index based load optimization and impact of FACTS devices in pool and hybrid electricity market model

Publisher: IEEE Cite This PDF

Satish Kumar ; Ashwani Kumar ; Nikhlesh Kr. Sharma ; Yaduvir Singh All Authors

Abstract:
Congestion management process is very crucial and important for better planning and successful operation of electrical power system. Due to increase in load, power flow for the system must be calculated to ensure system stability and security. In this paper Congestion management is implemented by minimization and optimization of loads. Use of FACTS devices is also included for optimal power flow for congestion management. Nodal price based sensitivity index is also implemented for economic load dispatch using optimal power flow method. IEEE 24 RTS is simulated on PSAT for performance analysis and evaluation.

Published in: 2016 Second International Innovative Applications of Computational Intelligence on Power, Energy and Controls with their Impact on Humanity (CIPECH)

Metamaterial superstrate for performance enhancement of microstrip patch antenna array

Publisher: IEEE Cite This PDF

Chirag Arora ; Shyam S. Pattnaik ; R. N. Baral All Authors

Abstract:
A metamaterial superstrate loaded microstrip patch antenna array has been proposed in this paper. The unloaded array resonates at 5.8 GHz with gain of 4.3 dBi and bandwidth of 425 MHz whereas, when the array is loaded with a metamaterial superstrate, composed of Multiple Split Ring Resonators (MSRR), gain and bandwidth reaches to 8 dBi and 680 MHz, respectively. The transmission line model of the composite structure has also been developed.

Published in: 2016 3rd International Conference on Signal Processing and Integrated Networks (SPIN)

Date of Conference: 11-12 Feb. 2016
INSPEC Accession Number: 16304646
Date Added to IEEE *Xplore*: 15 September 2016
DOI: 10.1109/SPIN.2016.7566804
ISBN Information:
Publisher: IEEE
Conference Location: Noida, India

Proceedings of the National Conference on
Role of Science and Technology Towards 'Make in India',
YMCA University of Science & Technology, Faridabad, Haryana, March 5-7, 2016

Recent Trends in Electrical Power Generation

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Abstract— **As the electrical power generation depends upon the fossil fuels which are exhausting fast, there is a strong need to switch to renewable sources. But harvesting energy from renewable sources needs new technologies. The main problems which we face with these energy sources are cost and availability: wind and solar power are not always available everywhere and also when we need it. Unlike conventional sources of electric power, the power output of these renewable sources cannot be controlled as they are effected by seasonal effect and limited**

I. INTRODUCTION

Concentrated solar power (also called concentrating solar power, concentrated solar thermal, and CSP) systems generate solar power by using mirrors or lenses to concentrate a large area of sunlight, or solar thermal energy, onto a small area. Electricity is generated when the concentrated light is converted to heat, which drives a heat engine(usually a steam

Role of Science and Technology Towards 'Make in India',
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Low Cost Photo-Voltaic Module for Electrical Power Generation

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Abstract— **It's something of an uncomfortable fact that civilized society is almost completely reliant upon fossil fuels for nearly every aspect of its existence. Whether you believe there are hundreds of years or just a few decades left of this resource, the fact remains that it is a finite resource. Fossil Fuels Contribute to Climate Change: While there are some who will say that "the science is still out" on climate change, it's a fact that the climate is changing and that fossil fuel emissions are contributing greatly to that change. By contrast, solar energy panels and wind turbines generate zero emissions in their generation of electricity. This gives rise to the necessity of renewable energy development.**

To collect electrical energy from solar energy, Photovoltaics (PV) are used. It is the name of a method of converting solarenergy into directcurrent electricity using semico

PEROVSKITE solar cells have emerged as the new key material for the photovoltaic community with certified efficiency reaching approximately 19-20%. The name 'Perovskite solar cell' is derived from the ABX_3 crystal structure of the absorber materials, which is referred to as Perovskite structure. The most commonly studied perovskite absorber is methylammonium lead trihalide ($CH_3NH_3PbX_3$, where X is a halogen atom such as iodine, bromine or chlorine), with an optical bandgap between 1.5 and 2.3 eV depending on halide content. Formamidinum lead trihalide ($H_2NCHNH_2PbX_3$) has also shown promise, with bandgaps between 1.5 and 2.2 eV. The minimum bandgap is closer to the optimal for a single-

A modified Haar wavelet based approach for state analysis of a pendulum problem

Publisher: IEEE

Sheetal ; Monika Mittal All Authors

Abstract: In this paper, the state analysis of a pendulum problem via a modified Haar wavelet based approach is presented. Based upon some useful properties of Haar functions like ... **View more**

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Abstract:
In this paper, the state analysis of a pendulum problem via a modified Haar wavelet based approach is presented. Based upon some useful properties of Haar functions like operational matrix of integration, a special product matrix and a related coefficient matrix, problem of a pendulum is solved. Computational savings achieved with the modified method as compared to existing Hsiao method have been demonstrated using MATLAB PROFILER for different resolutions.

Published in: 2016 Second International Innovative Applications of Computational Intelligence on Power, Energy and Controls with their Impact on Humanity (CIPECH)

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Date of Conference: 18-19 Nov. 2016 **INSPEC Accession Number:** 16854433
Date Added to IEEE *Xplore*: 04 May 2017 **DOI:** 10.1109/CIPECH.2016.7918727
ISBN Information: **Publisher:** IEEE
Conference Location: Ghaziabad, India

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Contents

The parametric pendulum is a paradigm model. And because of its dynamic behavior, great attention is given to it for many years. As a pendulum swings, the angular acceleration of the pendulum will vary due to effect of gravity - it depends on θ, the angle between the pendulum and the vertically downwards position. The diagram below shows a simple pendulum with the forces acting on it. A classical-mechanical pendulum consisting of a bob of mass m and a string of length L in a uniform gravitational field of magnitude g. The gravitational potential energy of the system is defined to be zero at the height of the pivot point of the string. The pendulum bob swings through an angle θ.
Fig. 1

A simple pendulum

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Figures
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Keywords
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Data flow based quality testing approach using ACO for component based software development

Publisher: IEEE

Neha Prajapati ; Naveen Kumar All Authors

Abstract: Component-based Software Engineering (CBSE) has been centered around advancements identified with configuration and implementation of software components and frameworks a... **View more**

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Abstract:
Component-based Software Engineering (CBSE) has been centered around advancements identified with configuration and implementation of software components and frameworks assembled from software components. Quality Assurance (QA) for CBSE is a new subject in the software development research area. In this paper an enhanced data flow based QA model is presented for CBSE by employing the Ant Colony Optimization (ACO)algorithm to optimize the given code for automatic generation and prioritization of optimal path in decision to decision Control Flow Graph (CFG), which results an enhanced testing phase for QA model with reduced complexity. After that, proposed ACO based approach is also utilized for the generation of test data to satisfy the generated set of paths. This paper additionally exhibits the proposed

approach applying it in a program module. Results show that a better testing is achieved by applying proposed ACO based scheme on component based software. Proposed approach ensures full software coverage with least redundancy.

Published in: 2016 International Conference on Computing, Communication and Automation (ICCCA)

Date of Conference: 29-30 April 2016

Date Added to IEEE *Xplore*: 16 January 2017

▸ **ISBN Information:**

INSPEC Accession Number: 16598938

DOI: 10.1109/CCAA.2016.7813850

Publisher: IEEE

Conference Location: Greater Noida, India

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Contents

I. Introduction

Current programming frameworks turn out to be more complex and extensive scale, bringing abouthigh advancement cost, low profitability and unmanageablesoftware quality [1]. Subsequently, there is a developinginterest oflooking for another, more proficient, and cost-effective softwareadvancement paradigm. A standout amongst the most encouraging solutions today is thecomponent-based software development technology.

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Economic load dispatch with ATC improvement in power system network including solar power generation systems

Publisher: IEEE

Brijesh Singh ; R. Mahanty ; S.P. Singh All Authors

Abstract: The present work deals with the active power rescheduling in an hour-ahead electricity market including solar energy based power generation. The schedules of various gene... **View more**

Metadata

Abstract:
The present work deals with the active power rescheduling in an hour-ahead electricity market including solar energy based power generation. The schedules of various generators have been optimized according to active power demand bids by various load buses and availability of solar energy. In this work, various aspects such as congestion management, voltage deviation, and loss minimization have also been taken into consideration to achieve the goal. The interior point (IP) based optimal power flow (OPF) methodology has been used to obtain the economic system operation. The IP-based OPF methodology has been tested on a modified IEEE-30 bus system. The obtained test results show that not only the generation cost is reduced also the available transfer capabilities of transmission lines have also been improved.

Published in: 2016 Second International Innovative Applications of Computational Intelligence on Power, Energy and Controls with their Impact on Humanity (CIPECH)

Date of Conference: 18-19 Nov. 2016 **INSPEC Accession Number:** 16854435

Date Added to IEEE *Xplore*: 04 May 2017 **DOI:** 10.1109/CIPECH.2016.7918754

ISBN Information: **Publisher:** IEEE

Conference Location: Ghaziabad, India

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Keywords

Metrics

Analysis and application of 2 D.O.F robotic arm

Publisher: IEEE

Devvrat Arya ; Alok Kumar Pandey ; Deva Harsha Bolisetty **All Authors**

Abstract: This paper presents an in-depth examination of 2 degree of freedom robotic arm which moves in a plane. Firstly, a simulation model of this arm is generated on MATLAB. Sim... **View more**

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Abstract:

This paper presents an in-depth examination of 2 degree of freedom robotic arm which moves in a plane. Firstly, a simulation model of this arm is generated on MATLAB. Simulation analysis performed on the model is discussed later for range and accuracy calculations. A hardware model is rendered through it which can perform movements as per requirement. It is refined for real-time operation, moreover it offers high precision for correct positioning on theory plane. The robotic arm is controlled using an arduino microcontroller which is interfaced with MATLAB. This paper concludes with some possible applications of 2 D.O.F robotic arm mechanism based on type of end-effector attached to the robotic arm.

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Published in: 2016 Second International Innovative Applications of Computational Intelligence on Power, Energy and Controls with their Impact on Humanity (CIPECH)

Date of Conference: 18-19 Nov. 2016 **INSPEC Accession Number:** 16854392

Date Added to IEEE *Xplore*: 04 May 2017 **DOI:** 10.1109/CIPECH.2016.7918743

ISBN Information: **Publisher:** IEEE

Conference Location: Ghaziabad, India

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Metrics

Coordinated Fault Ride through Strategy for SCIG Based WECS

Publisher: IEEE

H. Ahuja ; S. Sharma ; G. Singh ; Arvind Sharma ; Arika Singh **All Authors**

Abstract: Wind technology is one of the fastest developing renewable technologies. Squirrel cage induction generator (SCIG) with back to back fully rated converter used for wind en... **View more**

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Abstract:

Wind technology is one of the fastest developing renewable technologies. Squirrel cage induction generator (SCIG) with back to back fully rated converter used for wind energy conversion systems (WECS) is a meritorious option among its class. SCIG's offer advantages of being robust, suitable for any harsh environment, cheaply available and unsophisticated than the other types available. To enable increased share of wind energy in the grid without compromising power system stability, the generator ought to stay connected and continue to feed the grid even in case of disturbances such as voltage sag. This paper presents a coordinated control scheme to address the fault ride through of SCIG based WECS. A WECS based on SCIG having back to back connected voltage source converters involving Rotor flux oriented vector controlled drive at machine side and hysteresis current controlled inverter for grid interface has been

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simulated in MATLAB/SIMULINK. Abnormal rise in dc link voltage during symmetrical faults is controlled by de-loading control while positive-negative sequence control is used for real and reactive power control during symmetrical and unsymmetrical faults. During this work, coordinated performance of all the above stated control strategies during most severe symmetrical (LLL) and most frequently occurring unsymmetrical (LG) fault has been examined.

Published in: 2016 Second International Conference on Computational Intelligence & Communication Technology (CICT)

Date of Conference: 12-13 Feb. 2016

INSPEC Accession Number: 16232793

Date Added to IEEE *Xplore*: 18 August 2016

DOI: 10.1109/CICT.2016.90

Publisher: IEEE

ISBN Information:

Conference Location: Ghaziabad, India

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Contents

Over last decade, global wind power capacity has sustained to rise at an average cumulative rate of superior than 31.7%. During year 2014, more than 50 GW of capacity was added. This has brought total worldwide wind power close to 370 GW [1]. Out of this capacity, total cumulative capacity of India as on December 2014 is approximately 22.5 GW [2]. With the escalating penetration of wind energy; its control, efficiency and cost related aspects are gaining an emergent concern. With large penetration of renewable energy in power system, power system stability and fault ride through (FRT) capabilities of WECS has become a very important issue that need urgent focus.

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Keywords
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Performance comparison of most prevalent wind energy conversion systems

Publisher: IEEE

Hemant Ahuja ; Rahul Virmani ; Arika Ahuja **All Authors**

Abstract: This paper envisages comparing the performance of grid connected variable speed wind energy conversion systems (WECS) that are based on DFIG, PMSG and SCIG. The compariso... **View more**

Metadata

Abstract:

This paper envisages comparing the performance of grid connected variable speed wind energy conversion systems (WECS) that are based on DFIG, PMSG and SCIG. The comparison criteria used are mainly the quality of power injected to the grid, range of wind speeds that each generator can handle, converter ratings, real power harnessed by each configuration and reactive power requirements. Models for these variable speed WECS based on DFIG, PMSG and SCIG have been developed in MATLAB/Simulink environment, considering the same machine ratings and similar control techniques for all of them. Maximum Power Point Tracking (MPPT) also has been implemented for all of them under normal operating conditions. Careful analysis of the results shows that an appropriate choice of a particular WECS technology can be

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made based on the geographic location of the wind turbine and strength of the power grid.

Published in: 2016 7th India International Conference on Power Electronics (IICPE)

Date of Conference: 17-19 Nov. 2016

INSPEC Accession Number: 17285660

Date Added to IEEE *Xplore*: 23 October 2017

DOI: 10.1109/IICPE.2016.8079427

Publisher: IEEE

ISBN Information:

Conference Location: Patiala, India

Electronic ISSN: 2160-3170

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Contents

Wind energy is the most promising and the largest renewable energy resource among the all alternatives available with about 432.9 GW installed capacity world-wide and 25.088 GW in India in the year 2015. Worldwide total cumulative installed capacity from wind power has been increased by 17% compared to year 2014 when the capacity was 369.55 GW [1]. A rapid development in WECSs has been observed since the 1990's and various WT concepts with different generators have been built. Based on electrical topology, WT generators are largely classified as fixed speed and variable speed configurations with partially rated and full-rated converters (FRC) [3]. A grid connected DFIG is an interesting option with a significantly growing reached demand as it offers high controllability, allows maximum power point tracking (MPPT) and independent control of active and reactive power components in the rotor side [4]. On the other hand, SCIG or PMSG use FRCs and offer complete control of active and reactive powers from their stator sides. In recent years, the improving performance and decreasing cost of the permanent magnets (PM) allow direct driven (gearless) wind generators to be used at as large a power level as 5 MW with large number of poles. PMSG also offers advantages like its self-excitation property, operation at higher power factor and better efficiency compared to other variable speed WECSs [5].

Signature Completed

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Figures

References

Citations

Keywords

Metrics

Feasibility Analysis of Solar Photovoltaic Array Configurations under Partial Shading Conditions

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***Abstract*– Operation of photovoltaic plants globally registered issues related to shading. Shading may be due neighboring construction, passing clouds, birds or birds litter will significantly reduce the power production of photovoltaic plants. In this paper feasibility analysis has been done for different array configurations under partial shading conditions. The performance of Series-Parallel(SP), Bridge-linked(BL), Honey Comb(HC) and Total Cross Tied(TCT) array configuration are analyzed and compared for 7×7 PV array under different shading conditions.The performance and characteristics (I-V and P-V) are compared with and without bypass diode; use of bypass diode in antiparallel across module or modules increases the power output but causes multiple peaks in P-V characteristics.**

Index Terms—Array configuration, maximum powerpoint tracking (MPPT),partial shading, mismatch losses.

I. INTRODUCTION

Fast depleting fossil fuel reserves, increasing power demand and environmental concerns has created larger intersect in the utilization of renewable energy. Among renewable energy sources, solar photovoltaic system is most simple, reliable and clean way to produce electricity from conversion of solar energy[1,2]. The high initial cost, low energy conversion efficiency and dependence of energy output on varying atmospheric conditions are some

shortcomings of solar photovoltaic system. In a solar photovoltaic array spread over large area, it is probable that shadow may fall over some of its cells or modules due to shade of a neighboring construction, clouds passing through, shadow of trees etc.[3,5,6].In large PV installation, shading may cause significant amount of economic losses and therefore reduces overall efficiency of the system. It is impossible to avoid partial shading of the array in all seasons and weather conditions. These shadows reduce overall generation to large degree; hence photovoltaic installation cost is increased as number photovoltaic module unit is increased.This makes the study of partial shading of modules a sensitive issue.

The model is developed using basic circuit equations of the photovoltaic (PV) module including the effects of solar irradiation and temperature changes.

It is very important to understand characteristics of solar photovoltaic array under partial shading condition to maximize its output and to effectively use solar photovoltaic installations under all conditions.

This paper presents feasibility analysis on various PV array configurationsand to eliminate the losses faced in photovoltaic system due to introduction of bypassdiode. It is difficult to make analysis on physical PV module as field testing is costly, time consuming and dependent on weather conditions. Use of bypass diode in antiparallel increase power output in partial shading condition but causes multiple peak power-voltage characteristics.

II. PHOTOVOLTAIC CELL

Simple equivalent circuit and single diode model of solar cell is shown in figure 1.

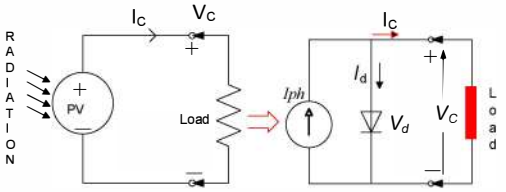

Fig.1. PV cell and its simple equivalent circuit

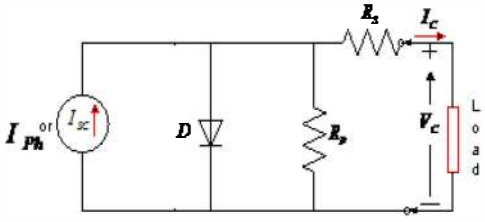

Fig.2.Single diode model of PV source.

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Equivalent circuit of single diode model of a PV source is shown in figure.2. It consists of a current source, a diode, series and shunt resistances.

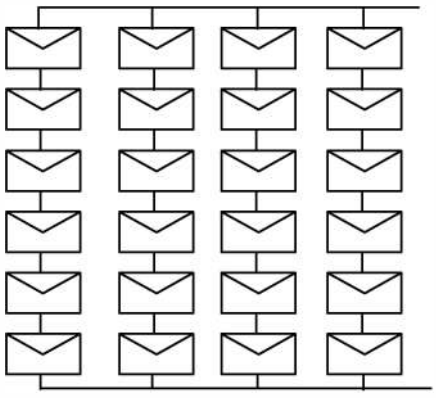
Parameters of solar photovoltaic module [5] are shown in Table 1.

TABLE1:Parameters of the adjusted model of the KC200GTsolar array at nominal operating conditions.

TABLE 1 Parameters of the PV array at 25 ◦C, AM1.5, 1000W/m2.	
I_{mp}	7.61A
V_{mp}	26.3V
$P_{max,e}$	200.143W
I_{sc}	8.21A
V_{oc}	32.9V
K_V	−0.1230V/K
K_I	0.003 A/K
N_s	54

III. SP, BL, HC,TCT CONFIGURATION UNDER PARTIAL SHADED CONDITIONS

Series-Parallel(S-P),Bridge-linked(B-L), honey-comb(H-C) and Total-Cross-Tied(TCT) configurations of photovoltaic array are analyzed in this paper under partial shading condition with and without bypass.The demerits of using basic series and parallel connections of PV array are less current and voltage respectively. The Photovoltaic modules are connected in series to increase voltage level and in parallel to increase current level of array, Series-Parallel is shown in figure.3.a, now Series-Parallel connection are modified by connecting tie across junctions to form TCT configuration as shown infigure.3.d, in BL configuration modules are connected in a bridge rectifier fashion as shown in figure.3.b, it consist of two parallel string having two series connected modules, there exists tie between the bridges. Further modification of BL configuration leads to Honey comb configurations as shown in figure.3.c.[4].



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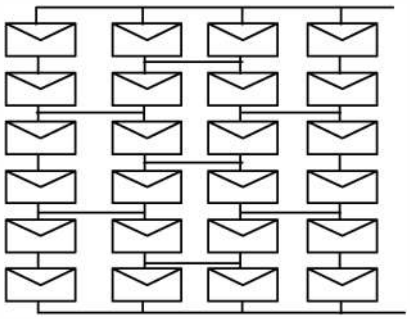

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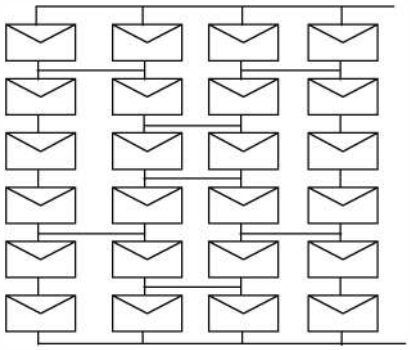

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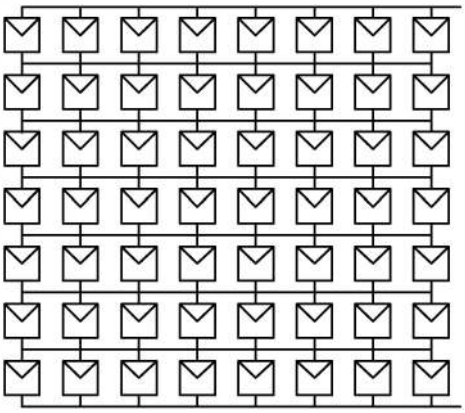
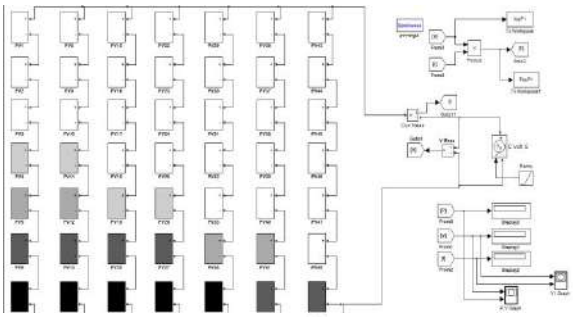


(d)

Fig.3 Photovoltaic Array for a) Series-Parallel b) Bridge-Linked c) Honey-Comb d) Total Cross Tied Configurations.

In this work we have analyzed Photovoltaic array under partial shading conditions for above four mentioned configuration having constant R_p with and without bypass diode for two shading pattern, In first case of shading pattern we have taken row wise shading P1 and in secondcase we have taken column wise shading P2. Figure.4 and figure.5 shows Simulink model of S-P, B-L, H-C, TCT without and with bypass diode respectively for row wise shading P1.



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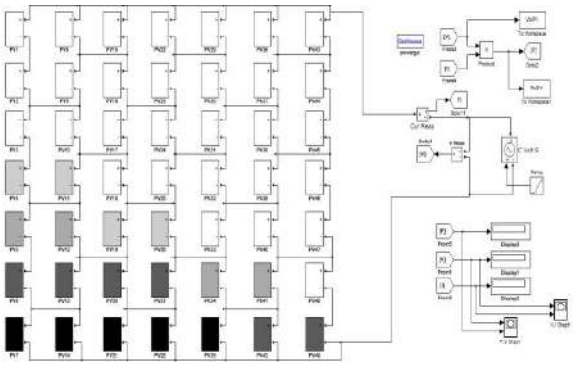

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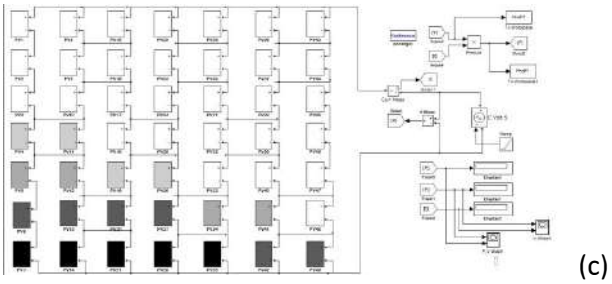

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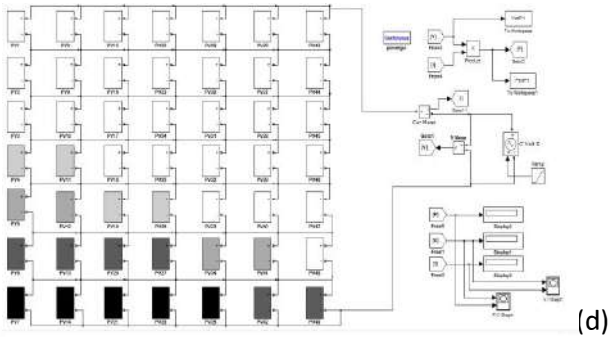
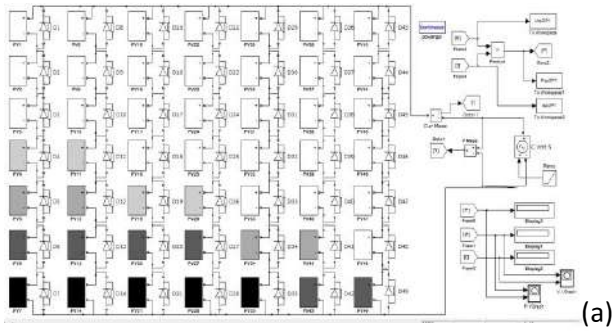


(d)

Fig.4 Simulink model of Photovoltaic Array without bypass diode for shading pattern P1 a) Series-Parallel b) Bridge-Linked c) Honey-Comb d) Total Cross Tied Configurations.



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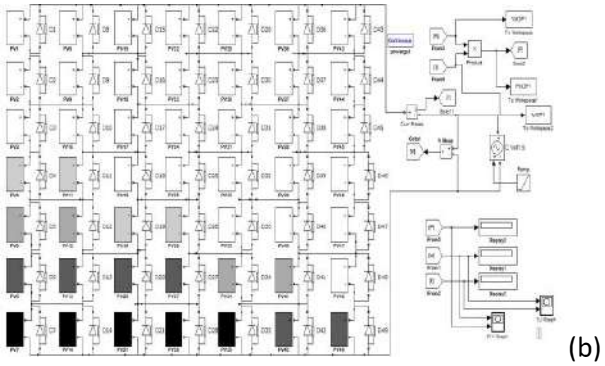

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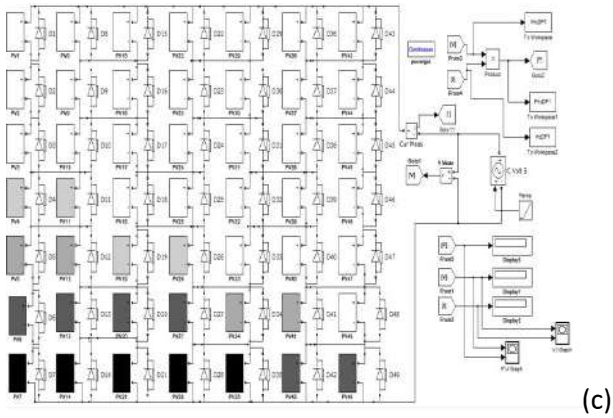

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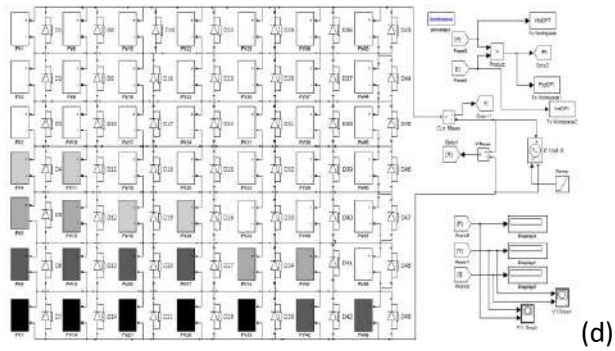


(d)

Fig.5 Simulink model of Photovoltaic Array with bypass diode for shading pattern P1 a) Series-Parallel b) Bridge-Linked c) Honey-Comb d) Total Cross Tied Configurations.

Table 2 shows parameters of various configurations under uniform insolation conditions whereas tables 3 and 4 shows the comparison of power for S-P,B-L,H-C, TCT

configurations with and without bypass diode respectively for shading pattern P1(row wise shading). Maximum power is almost constant for all configurations and there is no multiple peaks in power-voltage characteristics without bypass diode, whereas there are multiple peaks in power-voltage characteristics for all configurations with bypass diode as shown in figure.6.

Table 2:Parameters of configurations under uniform insolation conditions

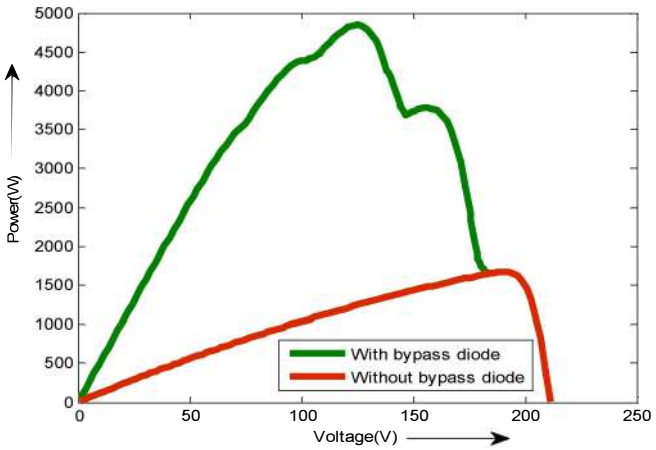
Configuration	P_m(W)	V_m(V)	I_m(A)
SP	7599	171	44.45
BL	7599	171	44.45
HC	7599	171	44.45
TCT	7599	171	44.45

TABLE 3: Comparison of power without bypass diodes for shading pattern P1

Configuration	P_m(W)	Number of Peaks
Series-Parallel	1665	One
Bridge Linked	1670	One
Honey Comb	1671	One
Total Cross Tied	1674	One

TABLE 4:Comparison of power with bypass diodesfor shading pattern P1

Configuration	P_m(W)	Number of Peaks
Series-Parallel	4421,**4847**,3773,1651	Four
Bridge Linked	4275,**4806**,3992,1658	Four
Honey Comb	4328,**4767**,3973,1660	Four
Total Cross Tied	4144,**4913**,4040,1664	Four



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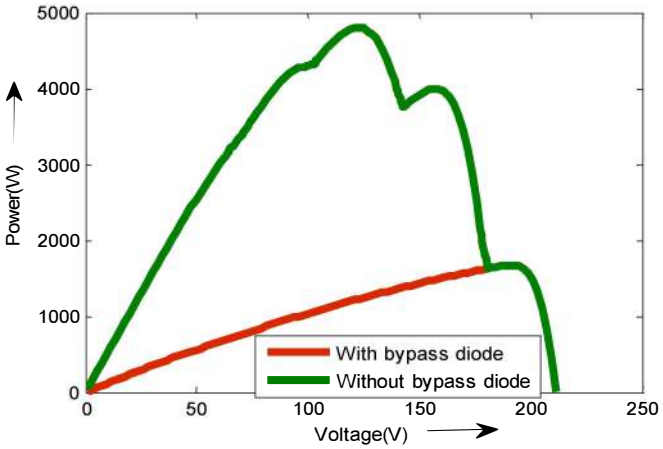

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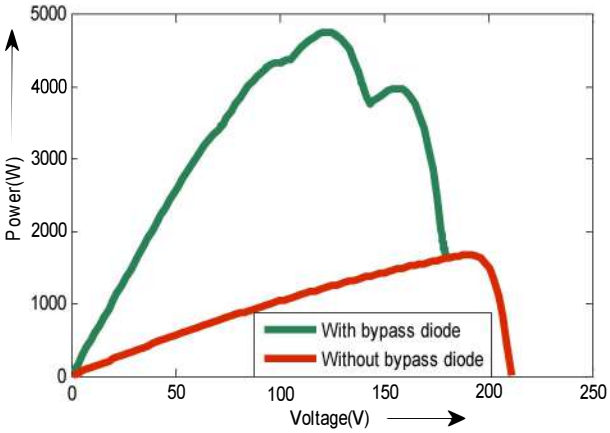

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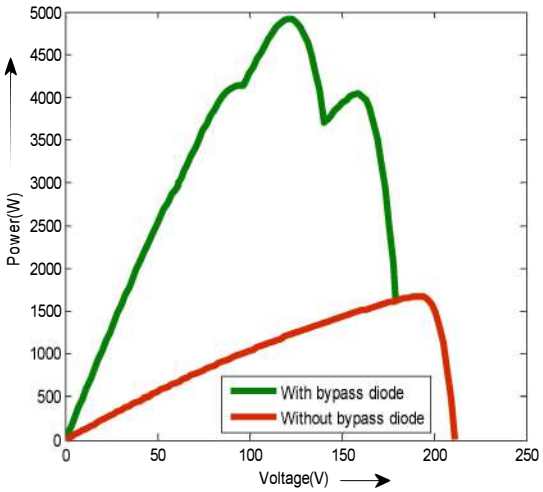


(d)

Fig.6.Power-Voltage Characteristics of photovoltaic Array with and without bypass diode for shading pattern P1 a) Series-Parallel b) Bridge-Linked c) Honey-Comb d) Total Cross Tied Configurations.

In shading pattern P2 we have taken column wise shading as shown figure.7 which is Simulink model for above pattern P2 for TCT configuration, in column wise shading analysis showsthatthe maximum power and power –voltage characteristics remainsalmost same with and without bypass diode forS-P,B-L,H-C, TCT configurations as shown in figure.8. Table.5 shows comparison of power with bypass diodes and without bypass diodes for all above configurations having shading pattern P2.

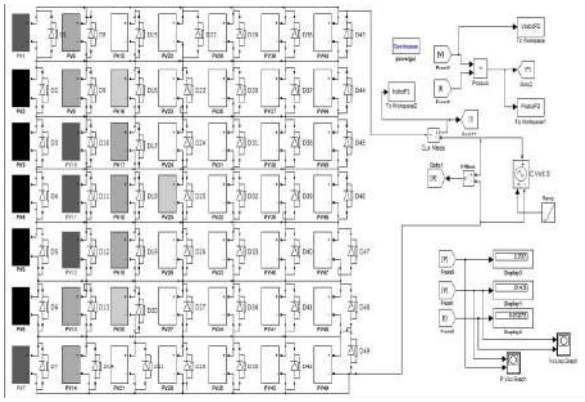
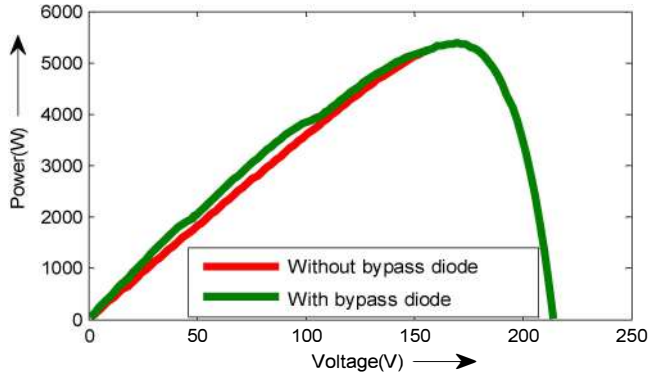


Fig.7 Simulink model of TCT connected photovoltaic Array for with bypass diode for shading pattern P2.

TABLE 5:Comparison of power with bypass diodes and without bypass diode for shading pattern P2

Configuration	P_m(W)	Number of Peaks
Series-Parallel	5370	One
Bridge Linked	5452	One
Honey Comb	5412	One
Total Cross Tied	5561	One



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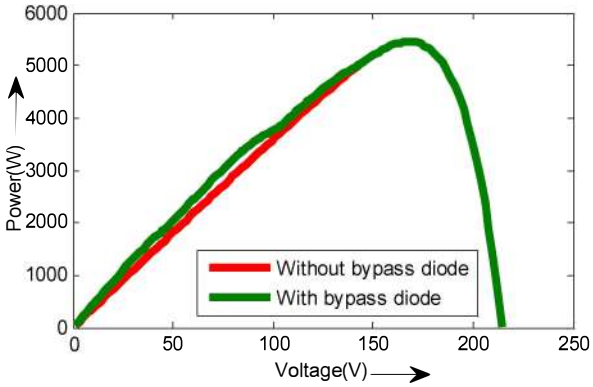

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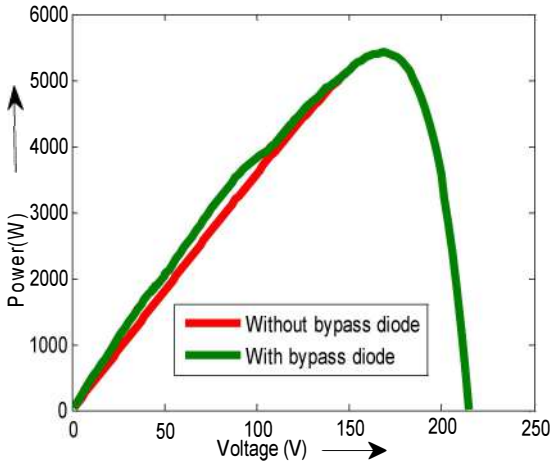

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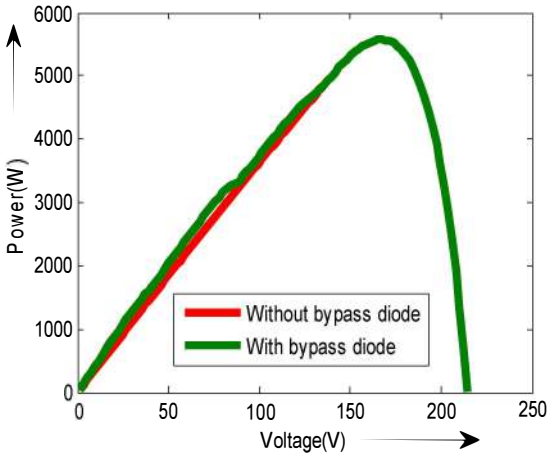

(d)

Fig.8.Power-Voltage Characteristics of photovoltaic Array for with andwithout bypass diode for shading pattern P2 a) Series-Parallel b) Bridge-Linked c) Honey-Comb d) Total Cross Tied Configurations.

IV. CONCLUSION

Feasibility analysis of solar photovoltaic array configurations under partial shading condition is done by developing a more accurate model of photovoltaic module. In comparative

analysis under partial shading conditionsSP,BL,HC and TCT configurations, has been taken, TCT configuration is best suited configuration under partial shading conditions. Extraction of maximum possible power under partial shading is done by using bypass diode in antiparallel across module or modules. By the use of bypass diode stress on shaded modules is reduced and causes multiple peak in power-voltagecharacteristics but gives increased power as compare to photovoltaic array without bypass diodes. In analysis of various array configurations for different shading pattern that is row wise shading and column wise shading, it is found that TCT has given higher power output in comparison with other array configuration. In row wise shading pattern there are multiple peaks in power-voltage characteristics, whereas in column wise shading there is almost single peak in power-voltage characteristics, it is also concluded that shading losses aredependent on shading pattern that is it is not dependent on shading area.

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Proceedings of the 11th INDIACom; INDIACom-2017; IEEE Conference ID: 40353
2017 4th International Conference on "Computing for Sustainable Global Development", 01st - 03rd March, 2017
Bharati Vidyapeeth's Institute of Computer Applications and Management (BVICAM), New Delhi (INDIA)

Threshold Based Ship Tracking With Ordered Weighted Averaging Method

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Abstract — **Infrared imaging is one of the popular image acquisition method in complex environment due to its strong heat signatures that is why in proposed work infrared image of ship is used as input. Moreover for segmentation, concept global thresholding is applied to increase the information objects of interest (ship) while reducing the irrelevant detail in this very case flood waves. Global thresholding expected to be successful in highly control environment, while sea is a very complex and uncontrolled environment. Hence Ordered Weighted Averaging (OWA) method is used to specify global threshold 'T' of infrared image. The results are compared with the Sobel Object detection algorithm. Three linguistic quantifier of OWA operator 'most' 'at least half ', and 'as many as possible' are used. Values of 'T' produces by 'at least half ', and 'as many as possible' linguistic quantifier are much closer to visual inspection i.e.129. The results produces by Sobel object detection algorithm is very blur. The performance of 'at least half ', and 'as many as possible' are slightly better than 'most' quantifier. However it is observed that 'at least half ', and 'as many as possible' quantifier have tie on the basis of visibility as well as estimated threshold value. Proposed work is for static position of targeted ship. Moreover in future, it is accepted from proposed method to produce same results for moving ship.**

Keywords—image processing, thresholding, infrared image, OWA)

I. INTRODUCTION

In autonomous object tracking there is no control over complex environment specifically that contains flooding wave and noise. In this case background and noise are almost submerged with the target e.g. in sea targeted ship is submerged in flooding waves. These challenges attract the attention, and in proposed work this interesting problem is selected.

Infrared imaging of ship due to its strong heat signatures is as input as shown in Figure1. Heat sensors increase the objects of interest while reducing the contribution of irrelevant detail [2]. To estimate strong heat signature concept of Basic global threshold 'T' is used. Global thresholding expected to be successful in highly control environment. The key objective of thresholding is to produce a clean segmented image by eliminating the noise and flood waves. In proposed work global thresholding is used. Global thresholding expected to be successful in highly control environment. Hence there is a requirement of a method that can be specifying threshold 'T'. To process infrared image and specification of Threshold 'T', Ordered Weighted Averaging (OWA) method is used that was introduced by Yager [1].

The results are compared with the Sobel Object detection algorithm. The results produced by 'OWA' method are more promising than Sobel edge detection algorithm. View from result the proposed method lays a strong basis for ship target tracking system and ship target detection is obtained in complex sea background.

Fig. 1. Infrared Image of ship

Proposed work is for static positions of ship, same methodology can be used for moving ship and it is accepted to produce good results. This paper is organized as below. In Section 2, the related work has been discussed. The section 3 comprises the formalization of thresholding. Section 4, discuss the basic Sobel Object Detection algorithm. In section 5, we discuss OWA method. In section 6, we estimate the threshold of infrared image by using OWA, and in section 7 results of experimental work have been discussed. The final section 8 comprises conclusion.

II. RELATED WORK

Segmentation has central role in autonomous image processing, image analysis, and computer vision, detail literature is reported in Shaprio and Stockman [3] Several model of image processing have been already proposed.

However , they are mainly proposed for image restoration [4,5] indexing [6],or coding [7] rather than for identification. Thresholding techniques enjoy a significant degree of popularity due to its simple and speedy implementation [1]. A good appreciation of the extent of projectile location measurement using multi-screen target method in the literature reported by Li et [8]. The researchers have given the attention towards Infrared imaging information processing technology and they researched deeply. In Infrared image technology the basic research is related to description of infrared background. The infrared detector's inner noise is lowest by the amelioration and development of infrared detection manufacture technology, in some conditions; the obstacle of infrared detection is the jamming of background [9-10].

In web searching, OWA was used by the user to find the importance of weight for each of the document [11]. With different aggregation techniques introduced in fuzzy information processing tasks [12], detailed description of OWA operators [1], has been applied in many applications like market analysis [13], decision making [14,15], fuzzy logic controller [16], image compression [17]. With the use of fuzzy numbers OWA operators, the environmental indices were developed, for finding similarity with multiple linguistic parameters as inputs [18]. In [19], for retrieval of similar images from the database, the similarities among images are computed. It combines Choquet Integral and weighted averaging, and relevance feedback for a better performance. However, there has been a lot of work in image retrieval but with very little intelligence to recognize fuzzy objects and image. To estimate membership of different fuzzy objects OWA operators were used [20, 21].

III. THRESHOLDING

Thresholding, region splitting and merging, region growing are example of Segmentation. Segmentation is one of the image processing method whose output(s) are attributes extracted from input image(s).

Thresholding is the central concept among the segmentation methods. The popularity of thresholding is due to its simplicity and speed.

The key objective of using thresholding is to produce a clean segmented image of targeted ship by eliminating the noise and flood waves. Hence there is a requirement of a method that can be specifying threshold 'T'. In proposed work global thresholding is used. Global thresholding expected to be successful in highly control environment. However to process these noises and the targeted ship the image is processed by Ordered Weighted Averaging (OWA) method and produce promising results.

A. Foramilization of Global Threshol

Global thresholding is simplest one, by using single global threshold 'T' , it segments the image.

Suppose that gray level in an image $f(x, y)$, composed of lights objects on a dark background, in such a way that object and background pixels have gray levels grouped into two dominant modes [1]. The objective is to select a threshold 'T' that split up these modes. Then any spatial coordinate (x,y) for which $f(x,y)>T$ is related to object otherwise it is background.

A threshold image $g(x,y)$ is defined as

$$g(x,y) = \begin{cases} L & \text{if } f(x, y)>T \\ 0 & \text{if } f(x, y)\leq T \end{cases} \qquad (1)$$

When T depends only on $f(x, y)$ the threshold is called global.

IV. THE SOBEL OBJECT DETECTION ALGORITHM ON INFRARED IMAGE

The *Sobel object* detection algorithm is weighted computation on gray in the neighborhood [20]. The size of which is 3×3, and the center of which is the pixel. The *Sobel* edge detection algorithm is defined as:

$$S(x,y)=(f_x^2+f_y^2)^{1/2}$$

Where f_x and f_y defined as:

$$f_x = \begin{pmatrix} -1 & 0 & 1 \\ -2 & 0 & 2 \\ -1 & 0 & 1 \end{pmatrix}$$

$$f_y = \begin{pmatrix} 1 & 2 & 1 \\ 0 & 0 & 0 \\ -1 & -2 & -1 \end{pmatrix}$$

In Sobel edge detection algorithm weighted sum on gray of every pixels, which are the above point, the lower point, the left point and the right point of image is calculated. When the pixel is closer to the center of the model, the higher the weighted value is. In similar manner, if we can decide the threshold T and if $f(x, y) >T$, we says that the point (x,y) is the object point.

V. ORDERED WEIGHTED AVERAGING METHOD

Yager [1] discovered the OWA operator which is basis for t information aggregation. OWA orovides the method of aggregation in solving the problems related to multi criteria decision making. A parameterized family of aggregation operator like k-order statistics, arithmetic mean, median, maximum and minimum is provided by OWA operator. In some cases of multi criteria decision making exact —and-ness required which produces minimum value and in some cases exact —or-ness which produces maximum value. T aggregation operator based on OWA provide a value in between two extremes of and-ness and or-ness. Two extremes and-ness and or-ness are limited to mutually exclusive probabilities for multiplication (like and gate) and summation (like or gate). A brief account of OWA operators discloses in

later part and then detail discussion was made regarding the behavior of operators in [1]. Three steps in OWA operation are as follows– 1) Reordering of inputs, 2) Weight determination related with OWA operators, and 3) Aggregation process.

A. *Yager's OWA Operator Weights Methods*

Definition: "Mapping the OWA operator R from R m→ R, (where R = [0, 1]), with dimension m, has weighting vector w= $(w_1, w_2, w_3, \ldots w_m)^T$, where $w_j \in [0, 1]$ and $\Sigma w_j = 1$, the s ummation of individual weights will always found to be one. Thus, for the multi-criteria of size m, the input parameter $(x_1, x_2, x_3 \ldots\ldots x_m)$, the OWA determines the f-validity in f-geometry shapes as follows".

$$OWA(x_1, x_2, x_3 \ldots\ldots x_m) = \sum w_j y_i \qquad (2)$$

$$\beta = \frac{1}{m-1} \sum_{j=1}^{m} w_j (m-1) \qquad (3)$$

In this, β (*Orness*) lies in the range [0, 1]. At every instance when β = 1, produces the weight vector as (1, 0, 0,...0), means that the entire weight is acquired by the maximum value of x_j producing the OWA operator as *maximum* operator. On the other side, if β = 0, produces the weight vector as (0, 0, 0,…, 1), means that the entire weight is acquired by the *minimum* value of x_j, producing the OWA operator as *minimum* operator. When the value of β = 0.5, the weight vector as (1/n, 1/n, 1/n,…, 1/n) is *generated resulting* that the arithmetic mean of weights are evenly distributed among the inputs [1]. The relative quantifier's membership function can be expressed as

$$Q(r) = \begin{cases} 0 & \text{if } r < a \\ \frac{r-a}{b-a} & \text{if } b \le r \le a \\ 1 & \text{if } r > b \end{cases} \qquad (4)$$

where a,b,r ∈ [0,1].[3]

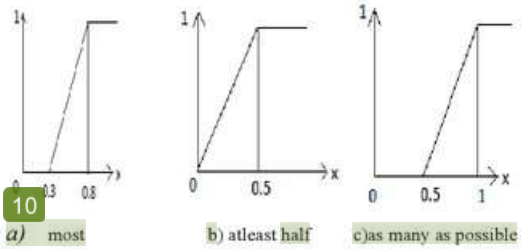
The weights w_j of the OWA aggregation calculated in [1], Yager from the function Q discusses the quantifier, with m number of criteria.

$$w_j = Q\left(\frac{j}{m}\right) - Q\left(\frac{j-1}{m}\right) \qquad (5)$$

where j=1,2,…,m and $Q(0) = 0$.

The relative quantifiers pictorially represented as in Figure 5 This shows the relative quantifiers "most", "at least half" and "as many as possible" taking the parameter a and b as (0.3, 0.8), (0, 0.5) and (0.5, 1) respectively.

Now for determination of weights, we review the OWA operator models with nonlinear objective function. The next section consists of experimental work and results.



a) most b) atleast half c)as many as possible

Fig. 2. Lingustic Quantifier

VI. Proposed Methodology

Proposed method is based on algorithm given below. The results of proposed method are compared with Sobel Object detection algorithm.

A. *Proposed Algorithm*

START

STEP 1: Read Infrared Image

STEP 2: Change image into gray scale

STEP 3: Apply histogram equalization

STEP 4: Store all distinct gray levels

STEP 5: Estimation of threshold 'T'

(a) Arrange all gray levels in decreasing order

(b) Estimate Weights by using linguistic quantifier by using equation (4) and (5)

(c) Aggregate product of these weights with corresponding gray level inputs by using equation (2).

STEP 6: Segment the image on the basis of estimated Threshold by pixel by pixel analysis of gray level.

(a) If f(x,y) >T Then g(x,y)=f(x,y)

(b) Else f(x,y)==0

END

Based on proposed methodology the experiments are carried out and results along with experimental work are discussed in next section.

VII. EXPERIMENTAL WORK AND RESULTS

The experimental work is carried out by taking infrared image of ship as shown in Figure 1. Initially threshold is specified by using heuristic approach based on visual inspection, i.e. 129. Figure 4 to 6 are showing results after applying '*most*', '*at least half*', and '*as many as possible*' linguistic quantifier to estimate threshold respectively.

The value of threshold 'T' estimated by 'most' linguistic quantifier is 115 whereas 'at least half', and 'as many as possible' linguistic quantifier produces 131 and 125 respectively. Values of 'T' produces by 'at least half', and 'as many as possible' linguistic quantifier are much closer to visual inspection i.e.129.

In Figure 3 output of Sobel object detection algorithm is shown that is very blur. After observing Figures 3-6 it is found

'at least half' and 'as many as possible' producing output that are much better and clear than Sobel algorithm.

The performance of 'at least half ', and 'as many as possible' are slightly better than 'most' quantifier. However it can be observed very clearly both of these quantifier have tie on the basis of visibility as well as estimated threshold value.

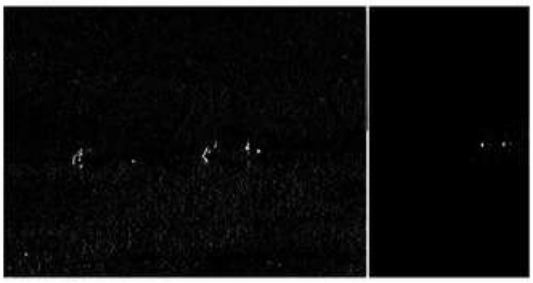


Fig. 3. Output of *Sobel object detection algorithm*

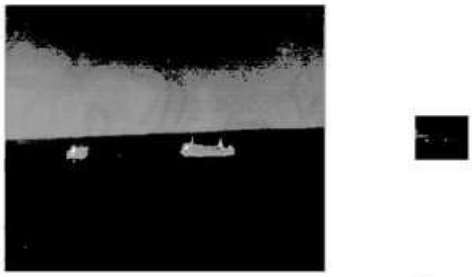


Fig. 4. Output of *Most Linguistic* Quantifier

Fig. 5. Output of *Atleast Half Linguistic* Quantifier

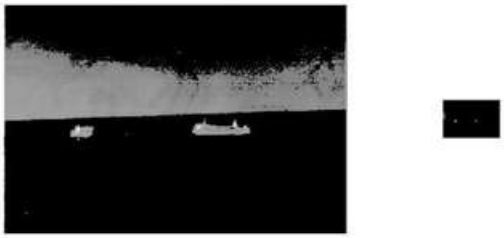


Fig. 6. *Output of As many as possible Linguistic* Quantifier

Fig. 7. *Output of Invert Image As many as possible Linguistic* Quantifier

In Figure 7 invert image of *As many as possible Linguistic* Quantifier is shown. The key objective is merely to generate a binary image so that black and white relationship could be reversal.

VIII. CONCLUSION & FUTURE DIRECTIONS

In this paper, we have estimate global thresholding to identify the location of ship in sea water. Infrared image is taken as input due to its high heat signature. Threshold value of heuristic approach based on visual inspection is 129.

The value of global threshold produced by 'most' linguistic quantifier is 115 whereas 'at least half ', and 'as many as possible' linguistic quantifier produces 131 and 125 respectively.

Results produced by 'at least half ', and 'as many as possible' linguistic quantifier are much closer to visual inspection. The output of Sobel object detection is not very clear.

Proposed work is for static positions of ship, In future same methodology can be used for moving ship and it is accepted to produce good results.

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Performance analysis of SMC controlled PV fed VSI

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Shruti Pandey ; Bharti Dwivedi ; Anurag Tripathi **All Authors**

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Abstract:
With ever increasing trend of implementation of renewable energy resources in power systems it has become relevant to study the dynamics of their integration with the available technologies. Of all renewable resources, Photovoltaic generation is going to be the most prevalent in India. Keeping this in mind, an attempt has been made in this paper to analyze the performance of a Voltage Source Inverter using Sliding Mode Controller when it is fed with a PV source. The performance, when compared with a PI controlled DC fed Voltage Source Inverter, is found to be superior in terms of the quality of power obtained as inverter output. The effect of variable output of PV generation due to varying solar irradiation has also been taken into consideration.

Keywords

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Published in: 2016 IEEE 1st International Conference on Power Electronics, Intelligent Control and Energy Systems (ICPEICES)

Date of Conference: 4-6 July 2016

INSPEC Accession Number: 16672820

Date Added to IEEE *Xplore*: 16 February 2017

DOI: 10.1109/ICPEICES.2016.7853523

Publisher: IEEE

ISBN Information:

Conference Location: Delhi

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Contents

Due to increase in population there is subsequent increase in the demand of gas and oil. The fossil fuels have become an essential part of our day to day lives and they play vital role in the working of the world. With this stretch in the demand of the fuels, they are becoming more scant and pricey every day. People are forced to choose alternate energy sources due to imminent energy calamity and the elevated fuel prices to meet their energy requisite. Moreover, it has always been a challenge strap up the energy from these sources. With the current technical advancements, this challenge is been successfully met. The photo-voltaic (PV) systems are the most admired energy source among all the existing renewable energy sources both in high as well as in low power applications because of a numerous enviable characteristics. Due to low efficiency of conversion and high initial installation cost, the production of energy by PV systems is bit expensive than other conventional resources. Therefore, to get efficient output for applications demanding a constant output it is required to interface power electronic converters with PV systems. Power electronic converter works as a regulator thereby helping the PV system in meeting the constant load demand.

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Figures

References

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Performance analysis of PV fed multistage converter with SMC controlled VSI

Shruti Pandey ; Bharti Dwivedi ; Anurag Tripathi All Authors

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Abstract:
The trend of growing penetration of renewable energy resources in power systems has become pertinent in wake of fast depleting fuel and rising carbon emission. It has, therefore, become relevant to study the dynamics of their integration with the available technologies. Of all renewable resources, Photovoltaic generation is the most prevalent resource in India. Keeping this in mind, a multistage cascaded converter system is developed in this paper. The proposed technique comprises of a PV (Photo voltaic) fed MPPT (Maximum Power Point Tracking) controlled boost converter in cascade with a sliding mode controlled inverter. The paper aims at extracting maximum power from a PV source and converting it to a good quality ac power. The effect of variable output of PV generation due to varying solar irradiation has also been taken into consideration to

References

Keywords

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establish the effectiveness of MPPT controlled boost converter. The performance of the sliding mode controlled voltage source inverter, when compared with a PI controlled voltage source inverter, is found to be superior in terms of the quality of the ac power.

Published in: 2016 IEEE Uttar Pradesh Section International Conference on Electrical, Computer and Electronics Engineering (UPCON)

Date of Conference: 9-11 Dec. 2016

Date Added to IEEE *Xplore*: 12 April 2017

ISBN Information:

INSPEC Accession Number: 16807895

DOI: 10.1109/UPCON.2016.7894700

Publisher: IEEE

Conference Location: Varanasi, India

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I. Introduction

Due to increase in population there is subsequent increase in the demand of gas and oil. The fossil fuels have become an essential part of our day to day lives and they play a vital role in the working of the world. With this stretch in the demand of the fuels, they are becoming more scant and pricey every day. People are forced to choose alternate energy sources due to imminent energy calamity and the elevated fuel prices to meet their energy requisite. Moreover, it has always been a challenge strap up the energy from these sources. With the current technology, this challenge is met. The photo-voltaic (PV) systems are the most admired energy source among all the existing renewable energy sources both in high as well as in low power applications because of a numerous enviable characteristics. Due to low efficiency of conversion and high initial installation cost, the production of energy by PV is bit pricy than other conventional resources. Therefore, to get efficient output for applications which require a constant output it is obligatory to use power electronic converters with PV systems. These convertersact as a regulator thereby helping the PV system in meeting the required constant load demand. DC-DC converters are the power processors, generally adopted for the energy conversions. Due to a single switch, the boost converter possesses very good conversion efficiency. With the economic pointof view in today's society, theseDC-DC converters are of great economic importance and are most commonly used with PV system.

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Indian Journal of Science and Technology, Vol 9(39), DOI: 10.17485/ijst/2016/v9i39/100733, October 2016
ISSN (Print) : 0974-6846
ISSN (Online) : 0974-5645

Artificial Bee Colony based Test Data Generation for Data-Flow Testing

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Abstract

Objectives: It is a challenging task to generate and identify an optimal test set that satisfies a robust adequacy criterion, like data flow testing. A number of heuristic and meta-heuristics algorithms like GA, PSO have been applied to optimize the Test Data Generation (TDG) problem. The aim of this research work is to handle the automatic Test Data Generation problem. **Methods/Statistical Analysis**: This research work focuses on the application of Artificial Bee Colony (ABC) algorithm guided by a novel Fitness Function (FF) for TDG problem. The construction of FF based on the concept of dominance relations, weighted branch distance for ABC to guide the search direction. Ten well known academic programs were taken for experimental analysis. The proposed algorithm is implemented in C environment. **Findings:** To examine the effectiveness of ABC algorithm in Test Data Generation, ten academic programs were taken experiment. The effectiveness of proposed algorithm is evaluated using average number of generations and coverage percentages achieve parameters. The experimental results show that proposed ABC algorithm requires less number of generations in comparison to other algorithms. It is also noted that the proposed algorithm coverage almost all def-path for all programs. **Application/Improvements**: The experimental results depict that the ABC algorithm performs far better than other existing algorithm for optimizing test data.

Keywords: Artificial Bee Colony, Branch Testing, Data Flow Testing, Structural Testing, Test Data Generation

1. Introduction

Software testing is most vital phase in the process of making good quality software. The aim of the software testing is for the improvement in quality and reliability of the software product. It consumes more the 50% cost of making the software. The cost of software testing is proportional to the size of input search space. Hence automatically generating and identifying an optimal test data will definitely diminish the cost of software. The generation of automatic test data is still a research field and many testing tools are available with capture and playback features to automate the execution of test scripts. However, the test cases are manually selected by the human tester and may not be optimal. Hence to reduce human effort as well cost benefit, lots of research is going in this direction. The term "Software Testing" involves functional and structural testing. Structural testing is more efficient because of its capability of finding more defects in the software[1]. Structural testing involves testing the code in such a manner that each statement, branch, path and/or structure is tested at least once. From literature, it is observed that data flow test adequacy criteria is widely popular, efficient and effective method which is based on the "definitions" and "uses" of various data items[2]. TDG can be viewed as an optimization problem in software testing. Many heuristic algorithms have been applied for improving the Test Data Generation process. Some of these are Genetic Algorithm, Tabu Search, Ant Colony Optimization, Simulated Annealing, Particle Swarm Optimization (PSO) have been used with mixed results[3]. The detailed description of these algorithms is given in related work section. It is

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also observed that in recent years, ABC algorithm attracts researchers due to its simplicity, capability of solving large complex problems, few control parameters and ease to use. In this research, an ABC based algorithm is proposed for test data optimization. ABC algorithm proves its competency in various research fields like design digital IIR filters[4] to estimate electricity energy demand[5] image processing and data clustering[6,7], Wireless Sensor Networks[8] and many more. Hence, the intent of this study is to investigate the potent of ABC algorithm for generating the optimal test cases. The main intent of this study is to examine the application of ABC algorithm in the area of software testing especially for optimal test suite generation. In the proposed approach, ABC algorithm leaded by a novel Fitness Function is proposed to generate test data using data flow coverage criteria. The Fitness Function is based on dominance relation between the nodes of a program's control flow graph with branch distance and branch weight. Experiments on 10 well known academic programs were performed and the results are promising and imply that the suggested ABC algorithm is more suitable to generate structural test cases as compared to Random, GA and PSO. The paper structure is as follow: Section 2 describes automated software TDG process and related work. Section 3 gives information about Data Flow Testing (DFT). Section 4 describes the ABC algorithm. The proposed methodology is defined in Section 5 and discussion on results of our approach is given in Section 6. Finally, outcomes of research work are concluded in Section 7.

2. Related Work

It has always been a challenging task to generate optimal test data based on any adequacy criteria. In past few decades, a lot of research was done on test data generation. This literature survey is mainly focused on Test Data Generation approach based on meta-heuristic algorithms in structural testing. In early 90s, Genetic Algorithm is mainly used for automatically generating test data using Branch Testing[9–12]. In[13] used control flow graph information for identifying the paths to be travelled and generated test data for such paths using GA. However, data flow coverage approach has not got the same attention because of its difficulties to find test cases around data flow dependencies of a program[14]. GA is mostly preferred in Data Flow Testing techniques[15–18], but GA has chances of obtaining local optima in the search space solution and the slow convergence rate. To overcome the demerits of GA, in[19] proposed PSO. PSO has also been applied for test data generation. In[20,21] applied PSO for Test Data Generation according to branch adequacy criteria and their research shows that PSO works efficiently compared to GA. But many times PSO also fall in local optima and premature convergence. In[22] applied the ABC algorithm for path testing. A new technique for TDG using DFT is presented. In this work, an improved Fitness Function is developed by including weight of a branch while calculating the branch distance thereby taking into account the nesting level and complexity of a branch. This provides a more robust fitness value.

3. Background

3.1 Data Flow Analysis

Data Flow Testing contains data flow information, extracted from control flow graph. Detailed information about these has been found. In Data Flow Testing, all the variables are defined either as "definition" occurrence (def) or "use" occurrence. A value associated with a variable is called "definition" whereas when a value is referred to a variable known as "use" occurrence. The "usage" of a variable can be beyond sub-categorized as a "computational use (c-use) or a predicate use (p-use)". The occurrence of "c-use and p-use" depends on usage of the value of variables for selecting execution path. If a statement is predicate statement, then it is p-use otherwise it is c-use. Figure 1 shows average of three subjects program and Figure 2 shows CFG of the program. Table 1 shows all def-use paths for an average of three subjects program.

3.2 Dominator Tree

In a CFG, node "a" is said to dominate node "b" if every path from starting node (source) to "b" contains "a", where each node's children are the nodes it immediately dominates. This forms a dominator tree[23]. The corresponding dominator tree (*DomT* (G)) for an average of three subjects program shown in Figure 3.

3.3 Artificial Bee Colony Algorithm

The ABC algorithm was developed by Dervis Karaboga in 2006 for solving constrained optimization problems such as task scheduling, knapsack, Travelling Salesman Problem (TSP), classification, clustering, path planning,

```
1.  1     #include<stdio.h>
2.  1     Void main()
3.  1     {
4.  1     int m1,m2,m3,avg,i,j;
5.  1     printf("Enter the marks of three subjects : ");
6.  1     scanf("%d %d %d",&m1,&m2,&m3);
7.  2     if(m1>100||m1<0||m2>100||m2<0||m3>100||m3<0)
8.  3     {
9.  3     printf("\nInvalid Marks! Please try again.");
10. 3     }
11. 4     else
12. 4     {
13. 4     avg=(m1+m2+m3)/3;
14. 5     if(avg<40)
15. 6     {
16. 6     printf("\nResult: Fail");
17. 6     }
18. 7     else
19. 7     {
20. 7     if(avg>=40&&avg<50)
21. 8     {
22. 8     printf("\nResult: Third Division");
23. 8     }

24. 9       else
25. 9       {
26. 9       if(avg>=50&&avg<60)
27. 10      printf("\nResult: Second Division");
28. 11      }
29. 11      else    //avg>=60
30. 11      {
31. 11      printf("\nResult: First Division.");
32. 12      if((fprintf(f2,"12
                "))&&(m1>=75&&m2>=75&&m3>=75))
33. 13      {
34. 13      printf("\tDistinction in all the subjects.");
35. 13      }
36. 14      else if((fprintf(f2,"14
                )&&((m1>=75&&m2>=75)||(m2>=75
    &&m3>=75)||(m1>=75&&m3>=75)))
37. 15      {
38. 15      printf("\tDistinction in two subjects.");
39. 15      }
40. 16      else if((fprintf(f2,"16
                "))&&(m1>=75||m2>=75||m3>=75))
41. 17      {
42. 17      printf("\tDistinction in one subject.");
43. 18      }
44. 19      }
45. 20      }
46. 21      }
47. 22      }
48. }
49. printf("\n");
50. }
```

Figure 1. Average of three subjects program.

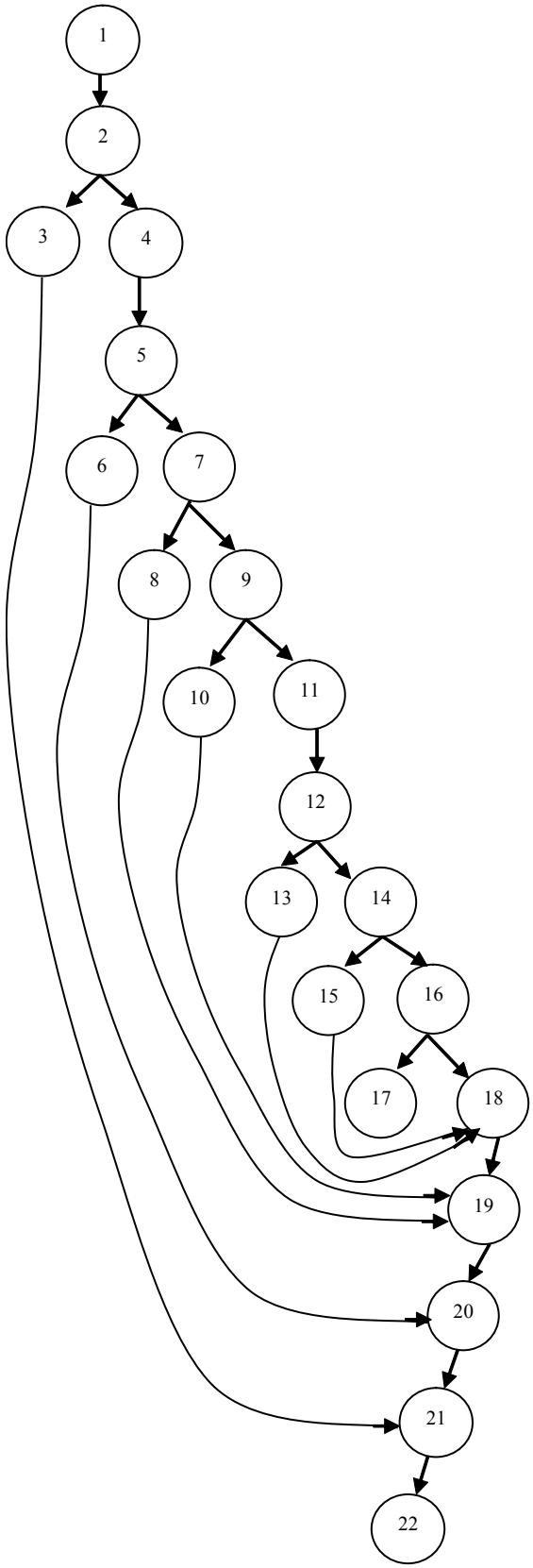

Figure 2. CFG for average of three subjects program.

Table 1. All def-use paths for average of three subjects program

Var	def node	use-node	def-use path
m1	1	2-3	1-2-3
m2		2-4	1-2-4
m3		4	1-4-1
		12-13	1-12-13
		12-14	1-12-14
		14-15	1-14-15
		14-16	1-14-16
		16-17	1-16-17
		16-18	1-16-18
Avg	4	5-6	4-5-6
		5-7	4-5-7
		7-8	4-7-8
		7-9	4-7-9
		9-10	4-9-10
		9-11	4-9-11

forecasting and many more. The main reason for this upsurge in usage of ABC algorithm is owing to the fact that it is simple to use and has very less number of user defined parameters. ABC is a meta-heuristic algorithm which consists of a population of individual vectors in a D-dimensional space it is defined in terms of food sources which represents an individual feasible solution for the problem. The position of food sources is evolved during the different phases of ABC algorithm which is divided into three main phases namely employed bees phase, onlooker bees phase and scout bee phase, where each of the different phases is signified by different types of bees namely employed bees, onlooker bees and scout bee, which operate during their respective phases of the overall algorithm. In Artificial Bee Colony algorithm, number of employed bees, onlooker bees and number of food sources, represented by the population vector is same. Each bee moves towards a particular food source and tries to improve the food source position in its adjacent neighborhood. While, there is only one scout bee in ABC.

The entire population consists of S_N food sources, that are to be evolved upon by three subroutines or three types of bees as stated earlier i.e. employee bees, scout bees and onlooker bees. These bees/subroutines work on the basis of the Fitness Function to evaluate the effectiveness of a

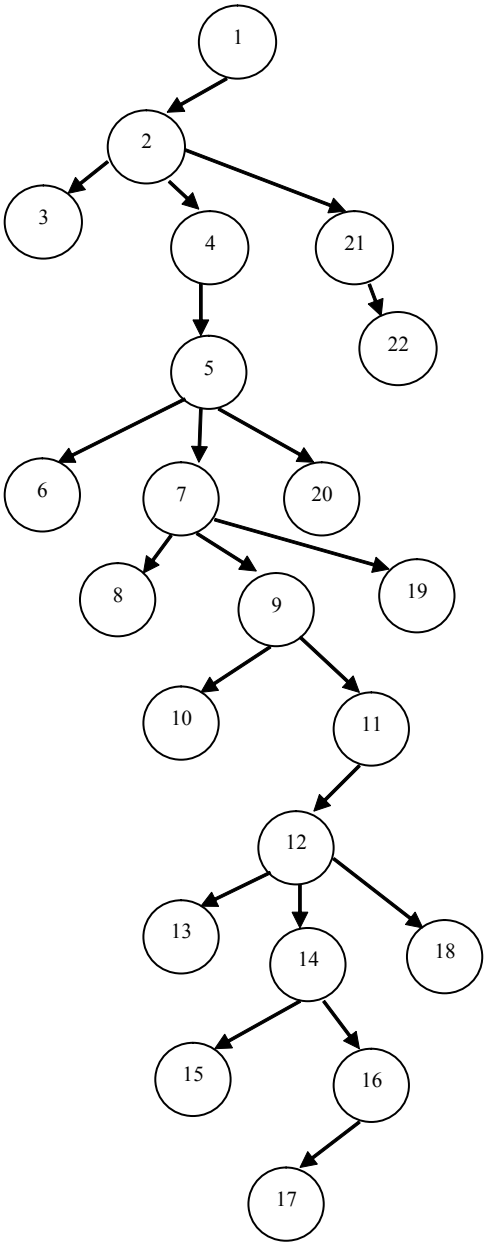

Figure 3. Dominator tree of an average of three subjects program.

food source which represents a prospective solution. The Fitness Function used is stated as:

$$fit_m(x) = \begin{cases} \frac{1}{1 + fit_m(x)} iffit_m(x) \geq 0 \\ 1 + abs(fit_m(x)) iffit_m(x) < 0 \end{cases} \quad (1)$$

Employee bees form the first subroutine and each bee relates to a particular food source selected by it, the bee then exploits the solution to find a better candidate solution, according to the Equation given below. Afterwards,

exploitation of the new food source is reported with onlooker bees.

$$u_{mi} = x_{mi} + \emptyset_{mi}(x_{mi} - x_{ki}) \quad (2)$$

The functioning of onlooker bees is rather different from the functionality of employed bees. Onlooker bees exploit the solution by roulette wheel mechanism, i.e. each onlooker bee selects a candidate solution based on probability, with respect to its quality to process the solution further. Onlooker bees perform this operation of probabilistic selection on the basis of the Equation given below.

$$p_i = \frac{fit_i}{\sum fit_m} \quad (3)$$

Sometimes, we use a different type of bee called scout bee to explore the search space. Scout bees come into effect when we are unable to improve a candidate solution after a number of iterations which have been arbitrarily defined earlier. Three scout bees are sent iteratively to search for a new candidate solution in the search space until we are able to satisfy a termination condition, i.e. the maximum number of generations is achieved. The number of employee bees and onlooker bees equals the number of candidate solutions in a particular search space.

4. Proposed Approach

4.1 ABC based Test Data Generation

The framework of automatic TDG mainly consists of two phases i.e. test environment construction and ABC algorithm phase. The first phase of this framework is the test environment construction. In this phase we perform the following:

- Static analysis on PUT.
- Construct fitness function.
- Instrument the PUT.
- Extract the def-use paths and dom paths.

In the ABC phase initialize the initial position of food sources randomly, no. of bees, colony size, ub and lb. The proposed ABC based Test Data Generation framework accepts the CFG of the program and data flow path. This information is computed by our self-developed tool reported in[24]. It is also used to remove infeasible paths. The proposed algorithm is shown by flow chart in Figure 4.

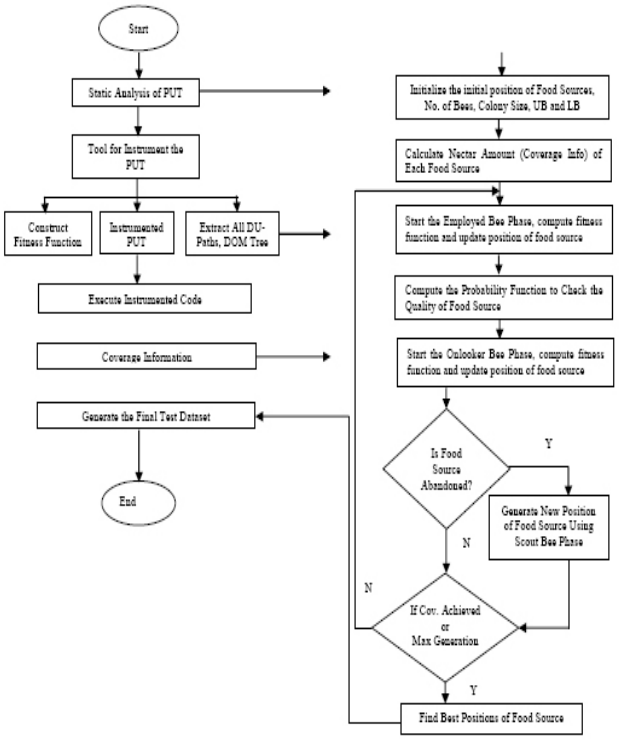

Figure 4. Proposed ABC based Test Data Generation framework.

The steps of the proposed approach are given as:

Step 1: Assign the initial position of food sources randomly, no. of bees, colony size, ub and lb.

Step 2: Compute the nectar amount (coverage info) of every food source.

Step 3: Start the Employed Bee Phase, compute Fitness Function and update position of food source.

Step 4: Compute the probability function to check the effectiveness of food source.

Step 5: Start the Onlooker Bee Phase, compute Fitness Function and update position of food source.

Step 6: When a food source is abandoned, and then generates new position of food source using Scout Bee Phase.

Step 7: If convergence achieved or max generations reached, then stop and find best positions of food source. Otherwise repeat step 3 to 4.

4.2 Fitness Function

Fitness Function is significant in finding the optimal solution in TDG problem as fitness information is used to direct the search process. The performance of the particle

in a PSO is judged on the basis of the fitness function. Every particle's fitness value is compared to every other particle's fitness value in order to calculate the optimal solution. DFT coverage criteria are picked to derive the fitness function. Def-use paths are the combination of use node and definition node. Def-use paths does not have concrete path between the nodes in control flow graph and thus represents a node-node fitness function. The Fitness Function proposed in improved by including branch weight to examine test data for DFT coverage criteria. The improved Fitness Function takes into account the difficulty of branch predicates, thereby assigning better fitness value to test data.

For a dcu-path (d, m), where d is the *def. node* and m is the *c-use node,* the fitness value f (d, m, t_i) of test case t_i (i=1...p) is given by Equation below:

$$ft(d, m, t_i) = \frac{1}{2} \times \left(\frac{|cdom(d, t_i)|}{|dom(d)|} \times wbd(d, t_i) + \frac{|cdom(m, t_i)|}{|dom(m)|} \times wbd(m, t_i) \right) \quad (4)$$

Where,

- dom (d):"dominance path of the def. node".
- dom (m): "dominance path of the c-use node".
- cdom (d, t_i) and cdom (m, t_i): "the covered nodes of dom (d) and dom (m), respectively".
- wbd_i (d, t_i) and wbd_i (m, t_i): "branch weight for the definition node and the c-use node respectively using eq.9".

Similarly, for a dpu-path (d, (m_1, m_2)), where d is the *definition node* and (m_1, m_2) is the *p-use edge,* the fitness value f (d, (m_1, m_2), t_i) of test case t_i (i = 1... p) is given by Equation below:

$$ft(d, (m_1, m_2), t_i) = \frac{1}{3} \times \left(\begin{array}{c} \frac{|cdom(d, t_i)|}{|dom(d)|} \times wbd(d, t_i) + \frac{|cdom(m_1, t_i)|}{|dom(m_1)|} \times wbd(u_1, t_i) \\ + \frac{|cdom(m_2, t_i)|}{|dom(m_2)|} \times wbd(m_2, t_i) \end{array} \right) \quad (5)$$

Where,

- dom (d): "dominance path of the definition node".
- Dom (m_1) and dom (m_2): "the dominance paths of the p-use edge nodes respectively".
- Cdom (d, t_i), cdom (m_1, t_i) and cdom (m_2, t_i), "the covered nodes of dom (d), dom (m_1) and dom (m_2) respectively".
- wbd_i (d, t_i), wbd_i (m_1, t_i) and wbd_i (m_2, t_i) "branch weight for the definition node and the p-use node respectively using Equation 9".

The target is covered if the fitness value of t_i is 1.

Branch distance and branch weight are also used if only partial aim is acquired. Branch distance and branch weight are calculated using Equation 10 and 15. Weight branch distance wbd (x, t_i), where x is the intended node and t_i (i = 1...p) is an individual of the present population (test case) is evaluated as follows:

$$wbd(x, t_i) = \begin{cases} 1 & if\ target\ node\ is\ covered \\ \frac{1}{f(C) * wi} & otherwise \end{cases} \quad (6)$$

4.3 Branch Distance Computation

Branch distance of a node is calculated by Equation 7.

$$NodeDistance = ApproachLevel + v(branchdistance) \quad (7)$$

Where, approach level is the nearest point of the execution to the intended point. If the target node is not executed, branch distance is computed at the node, where control flow deviated on the basis of the values of the variables and constants included in predicates used at the node. If the predicate holds true branch distance is set to 0, otherwise k, where k refers to the penalty factor for deviating from its expected path to the real executed path. The value of the branch distance is normalized between range 0 and 1 using normalized function *v*. To compute branch distance for single and multiple predicates having logical and arithmetic expressions as per in[25].

4.4 Branch Weight Computation

Branch weight plays major role in calculating Fitness Function in the proposed study. In order to drive the efficient Fitness Function of a particle, it is required that a branch is assigned weight based on the reachable difficulty of the branch in execution. Branch weight is directly proportional to nesting weight and predicate weight.

It is difficult to reach the branch having deep nesting level. For branch $_i$(bh_i) (1< = i< = z) nesting weight of the branch can be calculated as:

$$w_{nest}(bh_i) = \frac{nest_i}{nest_{\max}} \quad (8)$$

Where, w_{nest} is the weight of i-th nested branch, $nest_i$ is the i^{th} nesting level and $nest_{max}$ is the max nesting level.

Nesting weight can be normalized by using Equation 12.

$$\hat{w}_{nest}(bh_i) = \frac{w_{nest}(bh_i)}{\sum \left([w_{nest}(bh]_i) \right)} \quad (9)$$

The predicate conditions are also accountable for satisfying the difficulty level. There could be many predicate conditions in a program, which will have different difficulties in satisfying it. The predicate condition '==' will

be more difficult to satisfy as compared to '>', '<' or '! = '. Table 2 depicts the reference weights for different predicate conditions.

In any program, many conditions could be present in one branch predicate. Let's consider the branch predicate of bh_i (1< = i< = z) contain *n* conditions. For each condition con_j (1< = j< = n), its referral weight $w_{ref}(con_j)$ can be calculated as per Table 4. When predicate branch bh_i is the combination of multiple conditions *n* joined with *AND* operator, its predicate weight is square root of the sum of $w^2_{ref}(con_j)$ and if bh_i is the combination of multiple conditions *n* joined with *OR* operator, its predicate weight is set to minimum of the values in the weight set $w_{ref}(con_j)$.

$$w_{pd}(bh_i) = \begin{cases} \sqrt{\sum_{j=1}^{n} w^2_{ref}(con_j)} \; if \; condition \; is \; AND \\ \min w_{ref}(con_j) \; if \; condition \; is \; OR \end{cases} \quad (10)$$

Predicate weight can be normalized by using Equation 11.

$$w'_{pd}(bh_i) = \frac{w_{pd}(bh_i)}{\sum_{i=1}^{s} w_{pd}(bh_i)} \quad (11)$$

For each predicate of bh_i (1< = i< = z), the associated corresponding weight w_i can be calculated as the joint sum of $w'_{nest}(bh_i)$ and $w'_{pd}(bh_i)$.

$$w_i = \beta . w'_{nest}(bh_i) + (1 - \beta) . w'_{pd}(bh_i) \quad (12)$$

Where β is the adjustment coefficient and it is set to 0.5 for the experiment.

5. Result and Discussion

5.1 Experimental Setup

To validate the proposed ABC based TDG approach, experiments are performed on some widely used 10 academic programs and details of these programs are shown in Table 3. The parameters tuning of ABC, PSO and GA are shown in Table 4.

Table 2. Reference weight of predicate condition

S. No.	Condition Type	Weight
1	= =	0.9
2	<,<=,>,>=	0.6
3	Boolean	0.5
4	!=	0.2

Table 3. Benchmark programs

Prog. No.	Program	#Vars	LOC	#def-use Paths
1	Quadratic Equation	5	37	20
2	Triangle Classifier Problem	4	41	11
3	Next Date	5	107	66
4	Calendar Problem	10	121	80
5	Line in a Rectangle	8	67	52
6	Avg. Marks of 3 Subjects	4	42	15
7	Income Tax Problem	8	45	34
8	Prime Number	2	27	12
9	MidVal	4	32	19
10	Factorial of a number	2	21	8

Table 4. Algorithmic parameter settings

Algorithm	Parameters	Value
Common Parameters	Population Size	10, 15, 20, 25
	Maximum number of generations	10^3
	Number of experiments for each program	100
	Fitness Function	As given by Equation 7 and Equation 8
ABC	Colony Size	20
	No. of Bee (Onlooker, employed Bee)	5
	Limit	10
PSO	Inertia weight	Varies from 0.4 to 0.9
	c1 and c2	c1=c2=2.0
	Vmax	Varies according to the program
GA	Population selection method	Roulette Wheel
	Crossover probability	0.8
	Mutation probability	0.15

5.2 Performance Evaluation Parameter

To compare the efficiency and the accuracy of proposed ABC with PSO, GA and random search, the following performance evaluation parameters are defined:

- Average number of generations: It is the average of evolutionary generations for achieving the 100% data flow paths coverage. The stopping condition for

each program is either 100% def-use coverage or 10^3 iterations.

- Average percentage coverage achieved: It is the average of data flow paths coverage of all test input in each experiments.

5.3 Results

This sub section describes the results of proposed ABC based Test Data Generation based on performance evaluation parameters as explained above. To assess the performance of proposed approach ten benchmark programs are considered. The proposed approach is applied using C language on a core i3 processor with 2 GB RAM using window operating system. For every program each algorithm runs 1000 times individually to check the effectiveness of proposed approach. The proposed ABC-based approach is compared with GA proposed by Varshney and Mehrotra, PSO and random search. The overall experimental results for the ABC, PSO, GA and Random with respect to 10 benchmark programs on population size 10 are shown in Table 5 and Table 6. The experimental results depict that proposed ABC approach takes less number of generations and achieves higher average coverage as compare to PSO-based, GA-based and random Test Data Generation approach. On the basis of experimental results we can conclude that proposed ABC based Test Data Generation approach outperforms when compared to PSO-based, GA-based and random

Table 5. Experimental results on average no. of generation

S. No.	Program	ABC	PSO	GA	Random
1	Quadratic Equation	138	157	271	659
2	Triangle Classifier Problem	184	217	341	862
3	Next Date	226	275	409	843
4	Calendar Problem	183	205	263	498
5	Line in a Rectangle	107	102	257	743
6	Avg. Marks of 3 Subjects	34	51	108	668
7	Income Tax Problem	39	45	62	75
8	Prime Number	6	9	12	15
9	MidVal	4	4	5	17
10	Factorial of a number	4	5	7	9

Table 6. Experimental results on average coverage

S. No.	Program	ABC	PSO	GA	Random
1	Quadratic Equation	99	98	95	88
2	Triangle Classifier Problem	97	97	96	84
3	Next Date	99	98	94	82
4	Calendar Problem	100	98	95	86
5	Line in a Rectangle	98	99	96	92
6	Avg. Marks of 3 Subjects	100	100	100	98
7	Income Tax Problem	100	100	99	97
8	Prime Number	100	100	100	100
9	MidVal	100	100	100	100
10	Factorial of a number	100	100	100	100

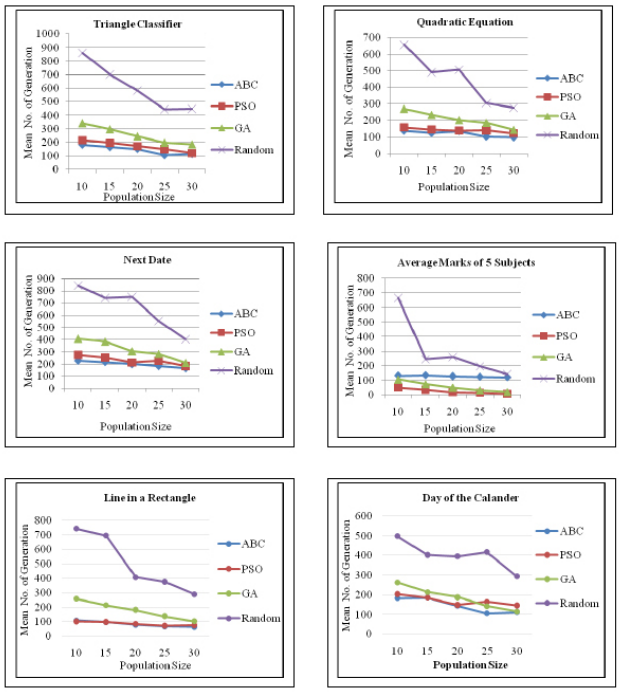

Figure 5. Graphs for average generation vs. population size.

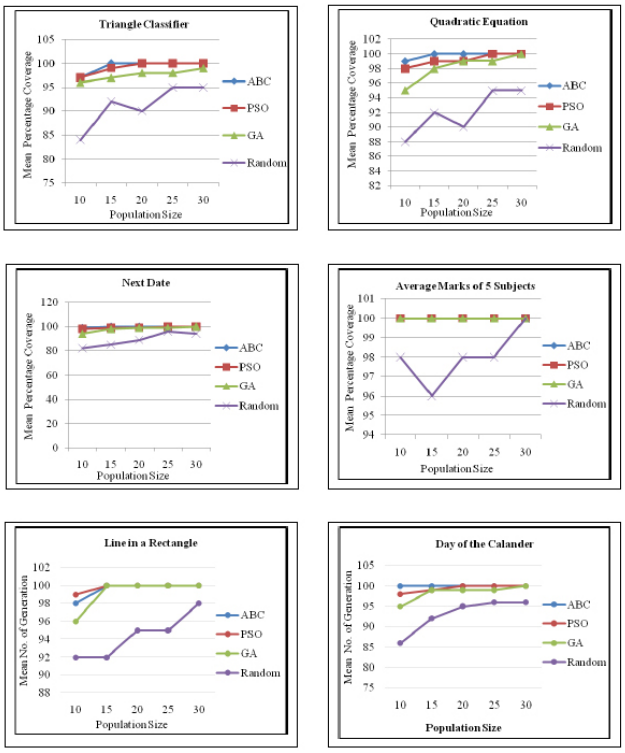

Figure 6. Graphs for average coverage on benchmarks program.

Test Data Generation approach. The graphical comparison of the proposed algorithm and other algorithm being compared using average number of generations and coverage percentage achieve parameters is shown in Figure 5 and Figure 6 respectively. From these figures, it is clearly stated that proposed algorithm take less number of generation to coverage the maximum def-path.

6. Conclusion

In this study, ABC based algorithm is applied for test data generation. It is an NP-hard problem and conventional methods are not given accurate results for such type of problems. It is also noted that these methods have no capability to change itself according to problem domain. Hence, to generate the optimize suite of test data and also to overcome limitations of conventional methods, an ABC based algorithm is adopted to deal this problem. ABC algorithm is characterized by the bee behavior and this algorithm has strong exploration and exploitation capabilities among same class of algorithms. In this work, ten benchmark problems of different dimensions are used to examine the performance of the proposed ABC algorithm. The performance of the proposed algorithm is measured on two performance matrices and also compared other well know algorithms exist in literature such as random search, GA and PSO for data-flow coverage. It is seen that proposed algorithm coverage most of def-path for all benchmark programs. It is also concluded that proposed algorithm outperforms than other algorithm being compared. In future, we intend to execute the proposed algorithm on more real and industrial programs.

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Implementation and Analysis of TL-SMD Cryptographic Hash Algorithm

Data Engineering and Intelligent Computing pp 583-593 | Cite as

Conference paper

First Online: 01 June 2017

Part of the Advances in Intelligent Systems and Computing book series (AISC, volume 542)

Abstract

Keywords

TL-SMD Merkle-Demgard construction Avalanche effect
Fast wind pipe construction Block chaining technique

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Grewal M., Roy N.R., Tiwari T. (2018) Implementation and Analysis of TL-SMD Cryptographic Hash Algorithm. In: Satapathy S., Bhateja V., Raju K., Janakiramaiah B. (eds) Data Engineering and Intelligent Computing. Advances in Intelligent Systems and Computing, vol 542. Springer, Singapore. https://doi.org/10.1007/978-981-10-3223-3_56

First Online

01 June 2017

DOI

https://doi.org/10.1007/978-981-10-3223-3_56

Publisher Name

Springer, Singapore

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Big Data - An Emerging and Innovative Technology: Survey

Publisher: IEEE

Sonali Srivastava ; Surbhi Agarwal ; Aman Srivastava ; Adesh Kumar Pandey **All Authors**

Abstract: This paper is a review of the big data concept, its dimensions, its architecture comparison between the earlier concept and the latest, the storage possible i.e. the data... **View more**

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This paper is a review of the big data concept, its dimensions, its architecture comparison between the earlier concept and the latest, the storage possible i.e. the databases and origin of big data. The relational database, having rigid schema, has been prevailing since a long time but it is difficult to store the unstructured data in relational database. The unstructured data has mainly text nature or is in the form of

Contents

In the early years of 21st century, due to the rising use of internet, the term ‘Big Data’ was introduced but suddenly it got a boom lately near 2013, due to some need. This need was the analysis of data. Storage was never an issue. It was the inability of traditional relational databases that led to the evolution of NoSQL databases. The traditional databases have rigid schema whereas the NoSQL databases have flexible schema without downtime (a situation when system fails to perform primary operations). It was then this data got famous as big data. Big Data is nothing but small data with large data size. The data management tools which are present since decades find it difficult to process complicated data sets. Certain processing applications are also unable to process such voluminous and dynamic data. Such data sets form the big data [2].

Opinion mining to strengthen teaching learning process

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Abstract:
Online exchange of information is very common now a day. It offers opportunity & challenges to extract knowledge for individual use. There are different techniques to achieve this purpose. Therefore in this paper details about web mining especially about web content mining is presented. A comprehensive review about web mining techniques and their use in getting structured, semi structured and unstructured data from the ocean

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The Kohonen self-organizing feature map (KSOFM) also known the Kohonen self-organizing map (KSOM) under comes the artificial neural network. An important characteristic of ANN is ability to learn. Learning is a process by adjusting the weight with respect to input features so that the actual output response will matches to the desired output. The role of learning based network is that the point distributes

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Contents

I. Introduction

Learning is based on input data only. Only one neuron in a group will have a non zero output signal when the competition is completed. The main purpose to collect the same type of information or having the those information which have same properties collected in one database means cluster data sample uses the the squared Euclidean distance between the input vector and the weight vector. Between input vector and output vector the dot product take place. This is easy to understand or visualize neurons situated to each other in a two dimensional array but it is so complex to find which classes of vectors are next to each other in a high dimensional space. The beauty of this paper are concerned the classical set. In this paper will improve the algorithm with classical set for finding the information fast and more accurately.

LAN on Mobile Network

[1]*Surendra Kumar Keshari (surendra.keshari@kiet.edu)*
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Abstract— **In this study, we aim to develop a new system for internetworking between the computers. By this, Existing mobile networks can be used to connect a computer situated away from the LAN area without bringing it in the area covered by the LAN. This will provide easy and cheap access to the LAN without any hurdle. This system extends the capabilities of Mobile Networks.**

Keywords— *LAN*: Local Area Network.

MOBILE PHONE: It is device which is capable to connect with the mobile network containing GPRS configuration and any operating system like Android, Symbian, iOS and Windows.

MOBILE NETWORK: 2G or 3G mobile network.

CONNECTING DEVICE: A device capable of connecting to both Cellular Network and LAN, it will also serve as a router.

DATA CALL: A new type of call called data call by which we transfer the data.

I. INTRODUCTION

In today's world if we want to use resources of a LAN then, it is must for us to be physically present in the area covered by LAN. But in some scenario's we can't be physically present in the area of the LAN.

So, the question arises how we can connect to a LAN without being physically present in that area. This problem can be solved by using existing mobile networks. Mobile Networks can be used to create a connection between a computer and a LAN without bringing the computer physically in the LAN area.

This can be realized using Data Call. As we transfer "voice" in Voice Call and "video" in Video Calls, similarly "data" will be transferred in Data Call. We are using data call for transferring the data through the mobile network without using any media like MMS, Bluetooth, etc.

Data Calls can also be used to develop Cellular Networks i.e. similar to Computer Networks. These cellular networks will function similarly like computer networks, similar to computers cell phones will also be able to share their files, folders, storage (Drives) and their Internet Connection.

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Far East Journal of Electronics and Communications

Far East Journal of Electronics and Communications

Special Volume 3, ICCS - 2016, Part II, Pages 307 - 317 (November 2016)

http://dx.doi.org/10.17654/ECSV3PII16307

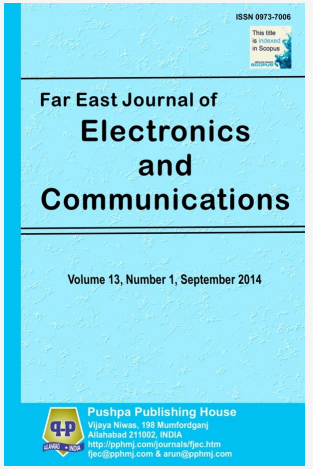
DYNAMIC STRATEGY FOR BOTNET DETECTION USING BBA

Sanjeev Kumar Dwivedi, Om Prakash, Surendra Kumar Keshari and K. Muthumanickam

Abstract

Apart from well known malwares viruses, worms and Trojan houses; there is less familiar threat known as the botnet. The term botnet (network of bots) is a combination of two words: bot (victim host) and net (network). In relation of botnet taxonomy bot is referred as a victim host which is under the control of the attacker called BotMaster (or Botherder). These botnets are frequently used for many cyber attacks and crimes, and they are root causes for several illegal activities like click fraud, DDOS, etc. Botnets operate under the command and control infrastructure (C & C) which makes botnets functioning unique giving serious problems in defending from this malware. Botnets become more elaborate and efficient. Their use is growing at an exponential rate. Although botnets showed their existence several years ago, it became an interesting area for research only recently. Various types of technique are proposed for detection and prevention from botnet attacks. Current detection models deal with only a limited set of bots behavior and thus are not able to resolve protocol independent and architecture independent (PI & AI) problem, and autoupdation mechanism used by the botnet. The proposed model addresses

ISSN: 0973-7006



these problems along with the detection of advanced botnets. In this paper, we have taken up a survey report for detection of hybrid botnets.

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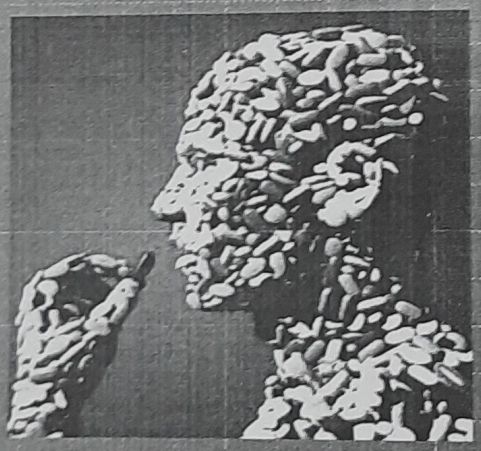

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Edition: 2017
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1

Phytochemical and Pharmacological Profile of *Momordica charantia* : A Review

[1]Deepti Katiyar, [2]Vijender Singh and [3]Mohd. Ali

ABSTRACT

The natural products derived from plants, animals and minerals are becoming popular day by day as medicine because they contain diverse active principles to produce maximum therapeutic response with minimum side effects. In past few decades, more emphasis has been given to the herbal treatment of various human ailments. Thus, in order to ensure the safety, purity and efficacy of herbs and to explore the gray areas, several research investigations are being performed throughout the world. *Momordica charantia* (MC) is one such herbal drug which is a part of various traditional systems of medicine. The current investigation aims to focus on the opulence of MC with respect to its phytoconstituents and pharmacological activities. More than 200 medicinal compounds have been isolated from its leaves, stems, pericarp, entire plants, callus tissues and seeds. These biologically dynamic chemicals include various glycosides, saponins, alkaloids, fixed oils, triterpenes, proteins, steroids, inorganic compounds, carotenoids, carbohydrates etc. The pharmacological profile of MC exhibits its potential as antidiabetic, antibacterial, antiviral, anticancer, antifertility, antiulcer, immunomodulator, antipsoriasis, analgesic, anti-inflammatory, hypotensive, hypocholesterolemic, antioxidant, cardioprotective, anthelmintic and antimalarial agent. Various findings have also suggested its utility in the treatment of eczema, dysmenorrhoea, emmenagogoue, galactagogue, gout, jaundice, kidney stone, leucorrhoea, piles, pneumonia, rheumatism, scabies and constipation.

GRAPHICAL ABSTRACT

Chemical Compounds Studied in this Article

Charantin (PubChem CID: 161333932); Vicine (PubChem CID: 91446); Cucurbitacin A (PubChem CID: 5281315); Cucurbitacin B (PubChem CID: 5281316); Momordin Ic (PubChem CID: 176596); Kuguacin J (PubChem CID: 49768546); Beta-sitosterol (PubChem CID: 222284); Trehalose (PubChem CID: 7427).

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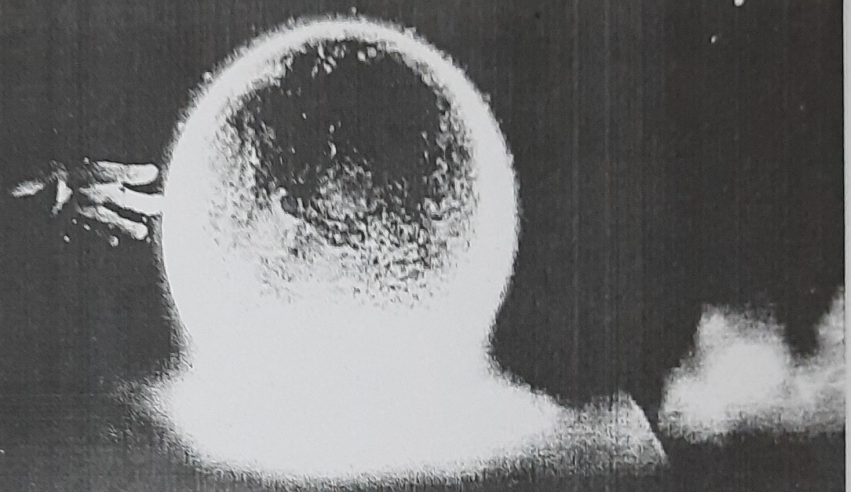
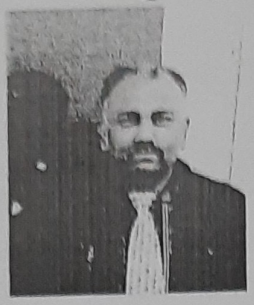
... an endeavour to retrieve smiles



Dr. Preeti Chitkara
Pawan Jain

Dr K. Nagarajan



Dr K Nagarajan has Specialized in M. Pharm (Pharmaceutical Chemistry) from Birla Institute of Technology, Mesra and he has been awarded Ph.D by Jadavpur University, Kolkata. Accelerating students Teaching Learning process is his passion. He has an overall teaching & research experience of 15 years. He has guided 28 projects for B.Pharm, M. Pharm. and Ph.D (Persuing), 8 projects through consultancy services and 6 projects through working as Scientist-II in MCD drug discovery Lab of Pharmaceutical R & D sector (Torrent Research Centre, Gujarat). He has more than 75 research publications in peer reviewed National and International journals and authored 5 Text Books with reputed National and International Publishers. His research areas of concern are Bioactive Peptide leads in cancer, Antimicrobial Chemotherapy and Drug Design. He holds life membership in various professional bodies, member of Editorial Board of Reputed Journals, Question Paper Setter for various Universities and National Co-ordinator/ Scientific Committee member for various Conferences.

He has completed a major Research Project entitled "Design and Development of novel peptidomimetics as potential anticancer agents" through AICTE-RPS under Government of India in the year 2015 with a grant of 11 Lacs as Principal Investigator. He was also Selected for Colonel Fairleigh S.Dickinson International Scholarship of U.S $ 5000 for the year 2005-2006 under the higher education program of Fairleigh Dickinson University, New Jersey. He is currently working as Professor& Head, Department of Pharmaceutical Chemistry, KIET School of Pharmacy, Ghaziabad since 2010.

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Glycopeptides and their medicinal potency as antioxidants

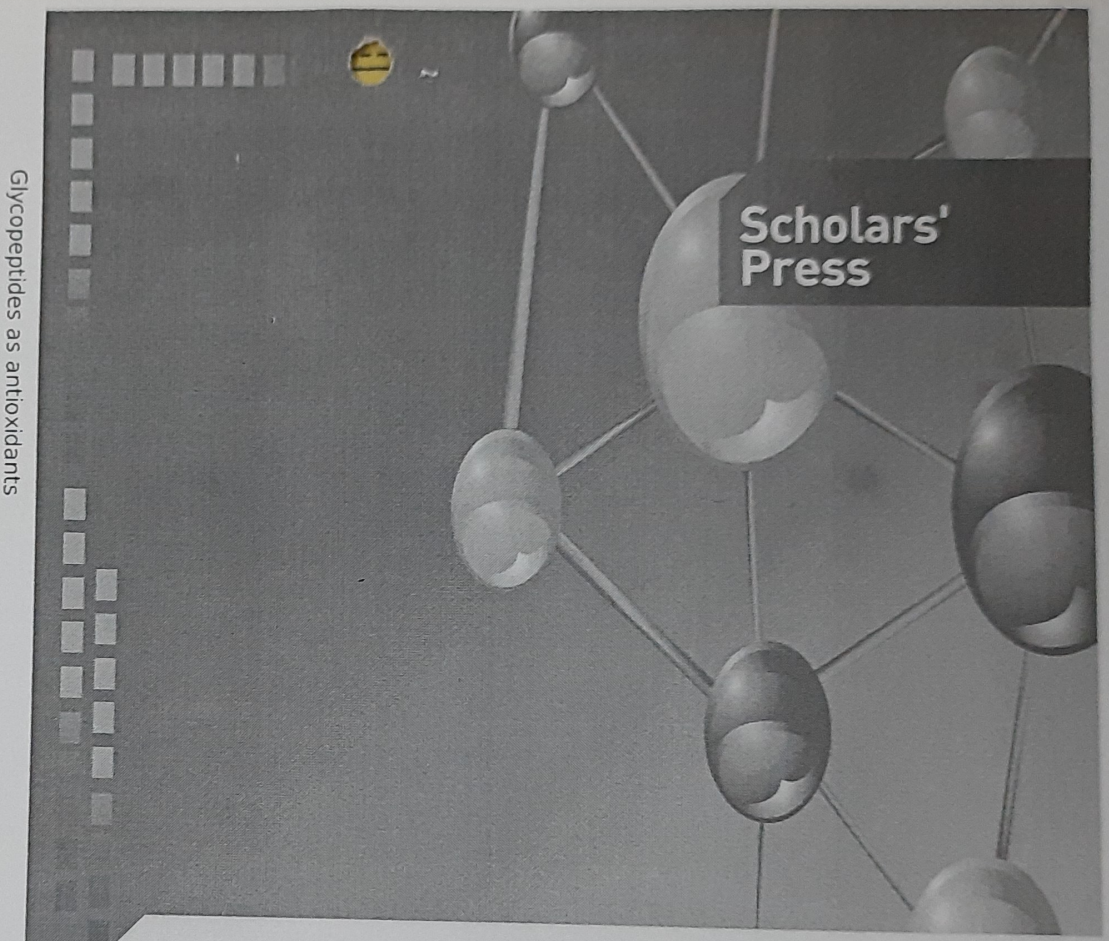
"Glycopeptides and their medicinal potency as antioxidants" presents state-of-the-art method of synthesis of glycopeptides and their antioxidant activity. In this book, special emphasis is given to chemical development of these complex glycopeptides molecules. The inclusion of typical experimental procedures and protocols makes this book an essential purchase for synthetic chemists, bio–organic chemists and biochemists working on glycoprotein or glycopeptide research.

Dr. K. Nagarajan is presently working as Professor & HOD, Dept. of P'ceutical Chemistry, KIET School of Pharmacy, Ghaziabad. He has a total work experience of 15.5 years. He is M.Pharm(Gold Medalist) from BIT, Mesra and did his Ph.D from Jadavpur University, Kolkata. He has published 50 research papers and authored 5 books and has applied 1 patent.

978-3-659-84305-1

Glycopeptides as antioxidants

Nagarajan, Grover, Khar



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Glycopeptides and their medicinal potency as antioxidants

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A Comparative Study of Internet Protocols in MANET

International Conference on Advances in Computing and Data Sciences

ICACDS 2016: Advances in Computing and Data Sciences pp 221-231 | Cite as

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Conference paper
First Online: 22 July 2017

Part of the Communications in Computer and Information Science book series (CCIS, volume 721)

Abstract

In present era, a growing ease to work in an more sophisticated environment, independent of geographical locations, ease to use resources at distant devices on an anytime-anywhere basis with higher space availability is seen. Taking this into consideration a technology has introduced, namely cloud computing. To emerge with this situation a factor of cloud computing is established that provides an environment with no or minimum infrastructure physically to establish a communication in between the two communicating devices. Besides this, to provide an operating unit of smartness ad-hoc technology along with IPv6 protocol came into existence that is being proven as one of the most encouraging and satisfactory way to use technology and meet today's IT needs and deeds. To attain this infrastructure OPNET IT GURU EDUCATIONAL VERSION 14.5 Modeler is being used.

Keywords

Cloud computing Ad-hoc network MANET Delay Throughput PPP Digital signal IP routing protocol IPv4 IPv6 RIPng OSPF IS-IS TORA

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CrossRef (https://doi.org/10.1109/MCC.2016.55)

Eco- Friendly Fuels for Vehicles

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Abstract—**The growing industrialization and motorization of the world has led to a steep increase for the demand of petroleum-based fuels. Petroleum-based fuels are obtained from limited reserves. These limited reserves are highly rigorous in certain regions of the world. Therefore, those countries not having these resources are facing energy exchange crisis, mainly due to the import of crude petroleum. The use of petroleum fuels in the ever-increasing number of vehicles is on the one hand causing economic inequity due to the fast escalating expenditure on fuel oil imports, while on the other hand it is resulting in speedy degradation of the air environment due to vehicular emissions. Hence, it is necessary to look for alternative fuels that can be produced from resources available locally within the country such as biodiesel, alcohol, vegetable oils etc. Use of eco-friendly alternative fuels such as Bio-diesel, Alcohols, Natural gas and ultimately the cleanest burning fuel Hydrogen could provide a solution to the twin problems of the rapidly growing petroleum fuel oil scarcity and ever rising vehicular exhaust pollution**

Keywords— Fossil fuels; Bio-diesel; Alternative fuels; Fuel oil; Alcohol fuels component.

I. INTRODUCTION

During the recent years there has been a rising demand for petroleum fuels. Petroleum based fuels are 'stored' fuels, extracted from ground. There are insufficient reserves of these 'stored' fuels and they are irreplaceable. With our present recognized reserves of petroleum fuels and their rising rate of utilization, it is feared that they are not going to last long. The world is currently confronted with the twin crises of fossil fuel exhaustion and environmental dilapidation. Haphazard extraction and lavish utilization of fossil fuels have led to reduction in underground-based carbon resources. The search for alternative fuels, which promise a pleasant correlation with sustainable development, energy conservation, efficiency and environmental preservation, has become highly pronounced in the present context. The fuels of bio-origin can offer a viable solution to this worldwide petroleum crisis. Petrol and diesel driven automobiles are the most important sources of greenhouse gases (GHG) emission [1–3]. Scientists around the world have explored numerous alternative energy resources, which have the potential to satisfy the ever-increasing energy desire of today's population. Various bio-fuel energy resources explored include biogas, biomass [4], vegetable oils, primary alcohols, biodiesel, etc. These alternative energy resources are mainly environment-friendly but they need to be evaluated on case-to-case basis for their advantages, disadvantages and specific applications. Several of these fuels can be used directly although others need to be formulated to bring the relevant properties closer to conventional fuels. Due to the recent widespread use of petroleum fuels in various sectors, this study concentrates on assessing the feasibility of using alternative fuels in the existing internal combustion engines. The present energy situation has stimulated active research interest in non-petroleum, non-polluting, and renewable fuels. The world reserves of primary energy and raw materials are, obviously, limited. According to an approximation, the reserves will last for 218 years for coal, 41 years for oil, and 63 years for natural gas, under a business-as-usual scenario [1,5,6]. The enormous growth of world population, increased technical development, and standard of living in the industrial nations has led to this intricate situation in the world of energy supply and demand.

Extreme use of fossil fuels has also led to worldwide environmental degradation effects such as greenhouse effect, ozone depletion, acid rain, climate change, etc. There is a growing realization globally that something constructive has to be done soon to reduce the GHG emissions. These CO2 levels are still climbing as a function of fuel burnt leading to greenhouse effect, acid rains, smoke and alter of climate world-over. These ecological implications are being felt in day-to-day life in the form of charging weather patterns, more severe winters and summer globally, foggy conditions in some parts of the world for a prolonged period during winter months. The ignition of fossil fuel has an unfavorable affect on human health through increased air pollution in cities, build up of carbon dioxide, acid rains; Crude oil price ($). In view of these problems of fast declining reserves of non-renewable petroleum fuels and the hazards of ecological pollution caused by their ignition, attempts must be made to develop the technology of alternative "clean" burning fuels. These fuels in order to be helpful should be such that they have attributes of permanent renewal, they perform well in the engines, and their potential for environmental pollution is moderately low. Various fuels have been considered as substitutes for petroleum fuels. The most well-known among these are Alcohols (Ethanol/Methanol), Bio-diesel, Natural Gas (CNG/Methane) and Hydrogen.

II. NATURAL GAS/ METHANE

While the last century belonged to liquid fuels, this century will witness their replacement with gaseous fuels. In India natural gas with an indigenous proven reserve of 32.58 trillion cubic feet could provide a relief in the mounting oil import expenditure. Compressed natural Gas (CNG) is mainly methane (80-90%) with small percentages of ethane, butane, propane and other paraffin's along with carbon dioxide, nitrogen and traces of hydrogen sulphite. Its low density and ready miscibility with air, permits engine to be started with ease and have smooth running even in the coldest weather. It

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ELK Asia Pacific Journals – Special Issue
ISBN: 978-81-930411-8-5

ANALYSIS OF TEMPERATURE AND THERMAL STRESSES IN FUNCTIONALLY GRADED DIESEL ENGINE VALVE

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Abstract—

MgZrO3 and NiCrAl based coatings are mostly used because of their higher properties such as low thermal conductivity, high hardness, oxidation resistance, chemical and thermal stability at cryogenic and high temperatures. These properties build them useful for many applications, including thermal barrier coatings (TBCs) on metallic substrates used at high temperatures in the fields of aircraft and aerospace, especially for thermal protection of components in gas turbines and diesel engine. In diesel engine high temperature flue gases come in direct contact of valve so the rate of heat transfer through valve is a critical parameter. Due to such high temperature inside the engine, thermal stresses are developed in the valve. In this paper our main aim is to increase performance of valve which is made by using functionally graded material coating. This coating consist two materials like NiCrAl and MgZrO3 which is done on substrate material (steel) and coating thickness kept constant. Temperature and thermal stress analysis are performed for different coating compositions of NiCrAl and MgZrO3 without considering the effect of radiation. Effects of the coating composition on temperature field, thermal stress field and deformation are investigated theoretically; including comparisons with results from an uncoated valve by means of the finite element method. In the study it was found that Temperature at the coated surface is significantly higher than that of the uncoated valve surface so as to allow for higher operating temperature to increase thermal efficiency or reduce fuel consumption of engines makes to achieve higher compression ratios.

Keywords—Combustion component; Engine valve, FEM, TBC.

I. INTRODUCTION

Intake and exhaust valves are very important engine components that are used to control the flow and exchange of gases in internal combustion engines. They are used to seal the working space inside the cylinder against the manifolds; and are opened and closed by means of what is known as the valve train mechanism. Such valves are loaded by spring forces and subjected to thermal loading due to high temperature and pressure inside the cylinder. Internal combustion engine valves are precision engine components. They open and close as and when needed. The fresh charge (air - fuel mixture in Spark Ignition Engines and air alone in Compression Ignition Engines) is induced through inlet valves and the products of combustion get discharged to atmosphere through exhaust valves. They are also used to seal the working space inside the cylinder against the manifolds. There are different types of valves used by the manufactures; some common types of valves being poppet valves, slide valves, rotary valves and sleeve valve. Any type of valve failure affects the engine performance thus making it mandatory to give due importance to temperature and stress analysis of IC valves.

MgZrO3 and NiCrAl based coatings are broadly used because of their superior properties such as low thermal conductivity, and oxidation resistance, high hardness, chemical and thermal stability at cryogenic and high temperatures These properties make them useful for many applications, including thermal barrier coatings (TBCs) on metallic substrates used at high temperatures in the fields of aircraft and aerospace, especially for thermal protection of components in gas turbines and diesel engine. Thermal barrier coatings (TBCs) are commonly applied to substrates to insulate them thermally so as to allow for higher operating temperature to increase thermal efficiency or reduce fuel consumption of engines makes toachive higher compression ratios, for diesel engines, and reduced heat rejection from inside the cylinder TBCs permit working fluid temperatures higher than the melting point of the metal airfoil in some turbine applications. The objective of this paper is Evaluation of stresses in diesel engine valve made of Functional Graded Material (FGM) using Finite Element Method (FEM).In materials science functionally graded material (FGM) may be characterized by the variation in composition and structure gradually over volume, resulting in corresponding changes in the properties of the material. The materials can be designed for specific function and applications TBCs are mostly fails at the ceramic top coat from the bond coat and there are many factors that influence the overall performance of coatings and cause miscarriage of the coating. However, oxidation and thermal mismatch are identified as two major factors influencing the life of the coating system. There is bond coat layer which is used between the TBC and the metal substrate. The bond coat material is an intermetallic alloy that provides oxidation resistance at high temperatures and supports adhesion of the TBC layer to the substrate. The bond coat shows an important role in dropping the internal stresses which may ascend between the substrate and the ceramic coating because of thermal shock. The coefficient of thermal expansion of the bond coat should be between that of the TBC and the metal substrate.

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II. LITERATURE REVIEW

The study of previous works always is the first stepping stone to every research in any particular field. This section deals with the elaborate analysis of related research papers and publications for an initial knowledge base for the analysis of the temperature field in a valve, piston and cylinder wall. A large number of research papers have been read out. A study is performed on piston head modeling, experimental study of the piston head and experimental study of the cylinder head fuelled with different mixtures (E5, E10, E15) by Krisztina Uzuneanu et al. (2009) [1] . he found that a lower polytropic exponent of compression which results in lower pressures and temperatures and the mean thermal stress of the spark ignition engine is lower when using E10 then gasoline in the same engine operating conditions. C.D. Rakopoulos et al. (1996) [2] describes the development of a model for the calculation of the temperature field and heat flow in the combustion chamber components of internal combustion piston engines, which occur both under steady and transient engine operating conditions. A satisfactory degree of agreement is found between theoretical predictions and experimental data proving the validity of the analysis at the expense of a reasonable computational cost. L. H. You et al. (2005) [3] presented an accurate method to carry out elastic analysis of thick-walled spherical pressure vessels subjected to internal pressure. author found that an almost constant circumferential stress which significantly reduces the maximum value of the stress can be achieved. Sburlati (2012) [4] focuses to analyze the influence on the deformation of different through-the-thickness variation laws of Young's modulus in FGMs thick-walled cylinders in pressure, by considering power and exponential laws. Ekrem Buyukkaya et al. (2007) [5], R. Mikalsen et al. (2008) [6] and Muhammet Cerit et al. (2011) [8] worked to investigate thermal analyses on a conventional (uncoated) diesel piston, made of aluminum silicon alloy and steel further thermal analyses are performed on pistons, coated with MgO–ZrO2 material by means of using a commercial code, namely ANSYS. Finally, the results of four different pistons are compared with each other. Effects of varying engine stroke length and compression ratio were not found to give any large advantages.

The work based on instantaneous local heat transfer coefficient in spark-ignition engines was done by A. Mohammadi et al. (2010) [7]. He found that with increasing engine speed the values of nusselt and reynolds numbers increase. E. Abu-Nada et al. (2006) [9] worked on Thermodynamic modelling of spark-ignition engine: Effect of temperature dependent specific heats and it is concluded that engine working parameters are affected by variable specific heats, significantly. The results show that there is a great effect of the temperature dependent specific heat of the working fluid on the performance of the air-standard Otto cycle. Therefore, it is more realistic to use temperature dependent specific heat during the investigation of air-standard power cycles. C.D. Rakopoulos et al. (2010) [10] worked on evaluation of current heat transfer models used in CFD in cylinder Engine simulations and establishment of a comprehensive wall-function formulation. A new heat transfer formulation has been derived, based on widely used existing ones and mainly on the original law-of-the-wall developed by Launder and Spalding.

M. Shalevet al. (1983) [11] worked experimentally and theoretically to investigate the mechanism of crack development in cylinder heads of two-stroke diesel engines and find that the phenomenon of crack development is related to the mechanism of "low cycle thermal fatigue" induced by starting, loading and shutting off of the engine. Sharma et al. (2012) [12] analyze the thermal stress distribution of ceramic-coated pistons, and found that he wavelet finite-element method had a faster convergence speed than the traditional finite-element method and could achieve greater numerical computational precision than the traditional finite-element method. Sharma et al. (2011) [13], Thet T. Mon et al. (2011) [14], M. Hahn et al. (2009) [14] and Sharma et al. (2009) [15] documents the results of a finite element analysis for the prediction of the steady state temperature distribution in a high speed diesel engine piston. The commercially available package used for the analysis is MSC/NASTRAN. An axisymmetric model neglecting temperature differences in the circumferential direction was analyzed. The result shows good correlations between predicted and measured temperatures. K. Kokini et al. (1993) [16] worked on Thermal Fracture Mechanisms in Ceramic Thermal Barrier Coatings and found that that the design of a TBC is a complex process that has to consider the thermal loading and other conditions that can be vastly different from one application to another. On the other hand, since the function of a TBC is to protect metallic substrates from high temperatures, the thermal resistance of the coating is also an important consideration.

III. PROBLEM STATEMENTS

From the previous study it was found that by using thermal barrier coatings of various compositions on piston it's performance improved and overall efficiency of the diesel engine increases. Hence, we choose to analyse the effect of coatings on valve. This will increase the knowledge about the way to find the suitable composition for the coating. The completion of the study comprises of five steps which are as follows:-Selection of the Diesel Engine Valve for study, Find the boundary conditions, Meshing of the valve diagram, Selection of composition materials for coating, FEM analyses and analyze the result.

A. Kirloskar Engine has been used with following specifications: RPM- 1500, Power - 3.7 kW, Brake Horse Power – 5hp.

B. Diesel engine valve has been used with following specifications: Material : Steel, Length : 110mm, Stem diameter: 7mm, Head diameter: 30mm.

For the determination of temperature and stress on different points, we have used Finite Element Method. For the analysis we have divided the valve into 89 nodes. The shape of an element is taken as triangular because it occupies very less area as compared to geometrical shape element like Quadra. The temperatures and stress at all the nodes are found and the results are drawn to find the best composition for coating.

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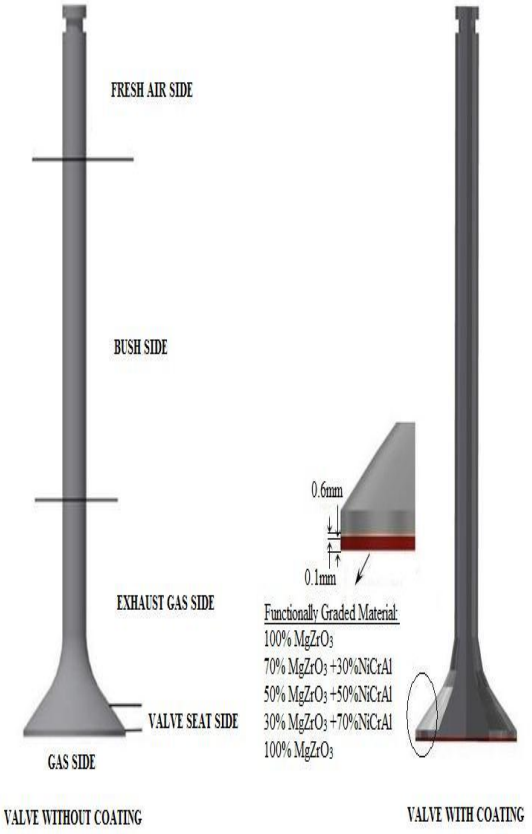

Fig. 1. Valve diagram without and with coating

The table 4.1 shows the nodal coordinates (r, z) at every node. This data had been input into the coding language for the output. The nodes with the r and z are shown in the table. 'r' is the radial distance of each node from the central axis (Y-axis) and z is depth of each node from the base (X-axis). Room temperature is assume as 27°C.

IV. RESULT AND DISCUSSION

In the substrate material distribution of temperature, which may cause deformation and change in property of material, versus radial distance for various composition of NiCrAl and $MgZrO_3$ are plotted in Fig. 2. All of the temperature curves are nearly parallel with each other but their temperature value is different. The minimum temperature value is 418.89, 418.86, 418.82, 418.72, 418.10, 417.68°C, for the radius of 0, 3.5, 5, 7, 12, 15 mm respectively, for the composition of 100% MgZrO3 which is suitable for us. At the bond coat surface, distribution of temperature versus radial distance for various compositions of NiCrAl and MgZrO3 are plotted in Fig. 3. All the temperature curves are parallel and especially close to each other for other composition of NiCrAl and MgZrO3 except 100% MgZrO3 but their temperature values are different. The minimum temperature value is 419.83, 419.61, 418.75°C at the radius of 0, 7, 15 mm respectively for 100% MgZro3 which is best from temperature point of view.

At the TBC, distribution of temperature versus radial distance for various compositions of NiCrAl and MgZrO3 are plotted in Fig. 4. All the temperature lines are parallel to each other but their temperature values are different.

Generally temperature below TBC should be high to get high efficiency and according to our analysis our best suited material is 100% MgZrO3 which have temperature of 508.88, 508.44, 514.22°C at the radius of 0, 7, 15 mm respectively for 100%MgZrO3 which is far more than 30% NiCrAl+70% MgZrO3.

The variation of the maximum temperature with the composition on substrate, bond coat and TBC surfaces are shown in Fig. 5. From temperature point of view it is clear that as the composition of MgZrO3 increases the temperature at TBC increases continuously and became maximum at 100% MgZrO3 and if we talk about substrate and bond coat then the temperature continuously decreases and became minimum at 100% MgZrO3 which is desirable. The reason behind increased temperature at TBC, decreased temperature at substrate and bond coat is its lower thermal conductivity.

At the substrate, distributions of radial stress, which may cause spalling of the coating, versus radial distance are plotted in Fig. 6. All the radial stress curves are similar in nature having different values. The stress value for 100% $MgZrO_3$ is 362.70, 362.31, 361.40, 359.76, 360.81, 359.89 MPa at the radial distance of 0, 3.5, 5, 7, 12, 15 mm respectively.

At the bond coat surface, distributions of radial stress, which may cause spalling of the coating, versus radial distance are plotted in Fig. 7. For 100% MgZrO3 the radial stress value is showing unfavorable result because after 7mm radial distance the stress value is far more than the other stresses gained by some different composition. Hence 30% NiCrAl+70% MgZrO3 showing better result than others having stress value 377.098, 379.65 and 380.56 MPa for radial distance of 0, 7 and 15 mm respectively.

At the TBC, distributions of radial stress, which may cause surface cracks in the coating, versus radial distance are plotted in Fig. 8. For 100% MgZrO3 the radial stress is very high due to higher temperature at TBC. Hence 30% NiCrAl+70% MgZrO3 showing better result than others having stress value 390.23, 385.16 and 388.52 MPa for radial distance of 0, 7 and 15 mm respectively.

The variation of the maximum radial stress distribution with the composition on substrate, bond coat and TBC surfaces are shown in Fig. 12. It is clear from the figure that as we increase the composition of MgZrO3 the value of radial stress is continuously increasing at TBC and decreasing at substrate layer. Hence for 30% NiCrAl+70% MgZrO3, whose stress value is at moderate level in all layer, is showing better result than others. The variation of the maximum axial stress distribution with radial distance on substrate, bond coat and TBC surfaces are shown in Fig. 9, Fig. 10 and Fig. 11 whose values are different but nature is similar to radial stress distribution.

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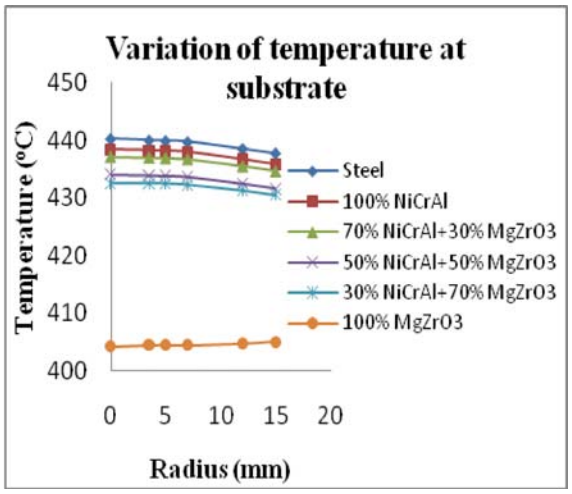


Fig. 2. Variation of temperature at substrate

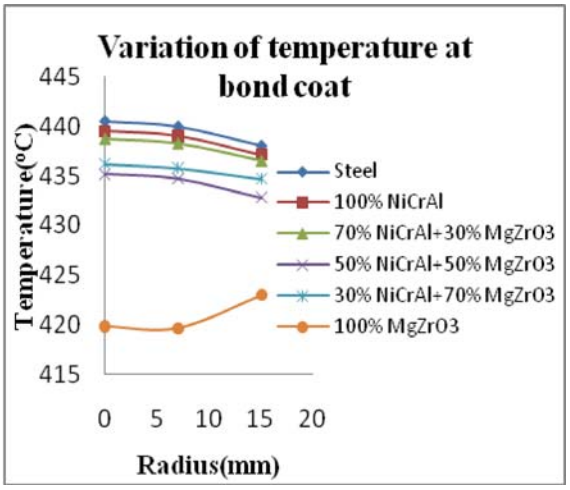
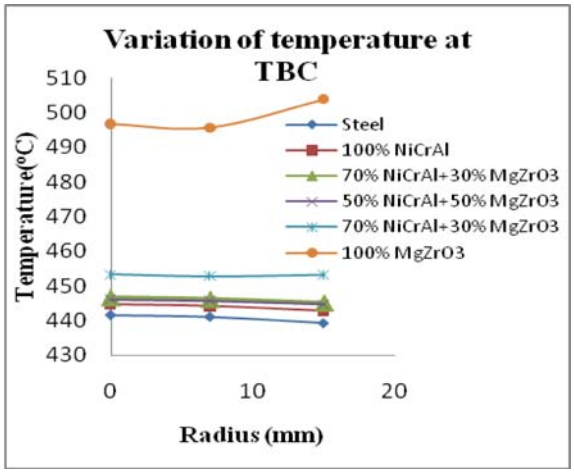


Fig. 3. Variation of temperature at Bond Coat



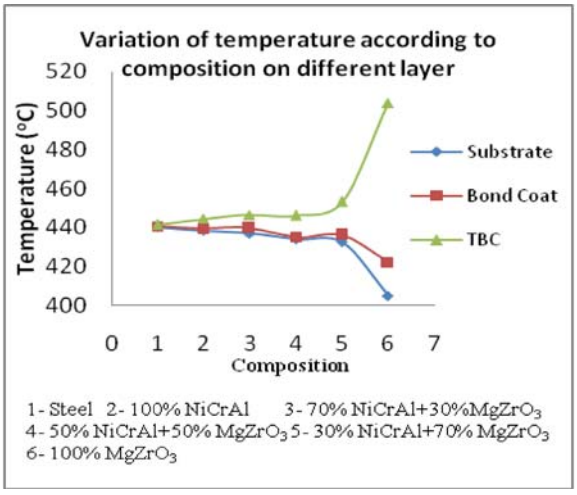


Fig. 4. Variation of temperature according to..Composition on different layer

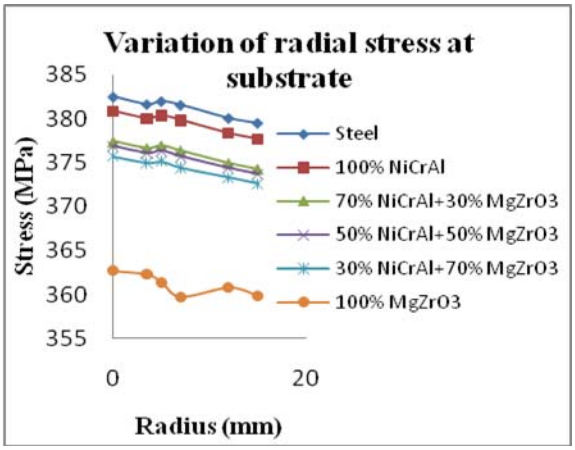
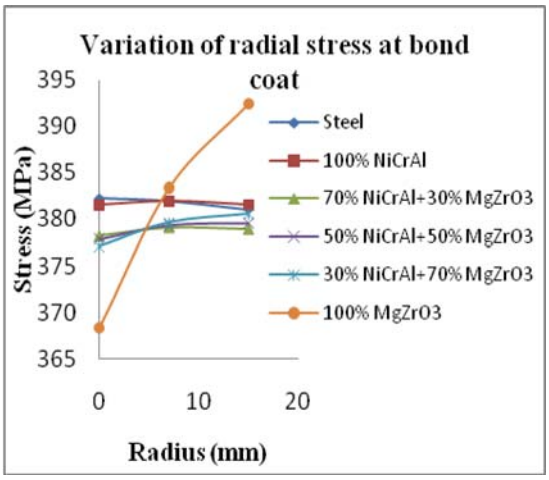


Fig. 5. Variation of radial stress at substrate



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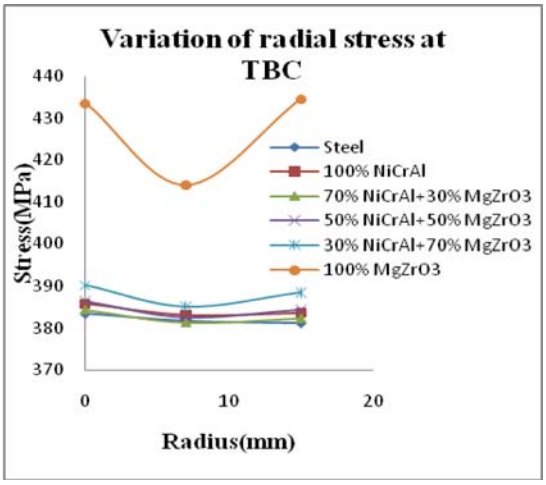

Fig. 6. Variation of radial stress at TBC

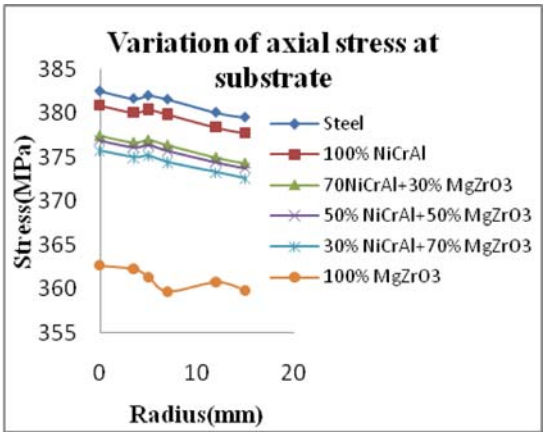

Fig. 7. Variation of axial stress at substrate

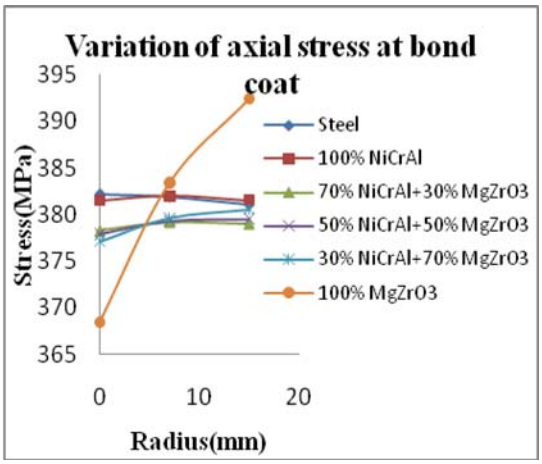

Fig. 8. Variation of axial stress at bond coat

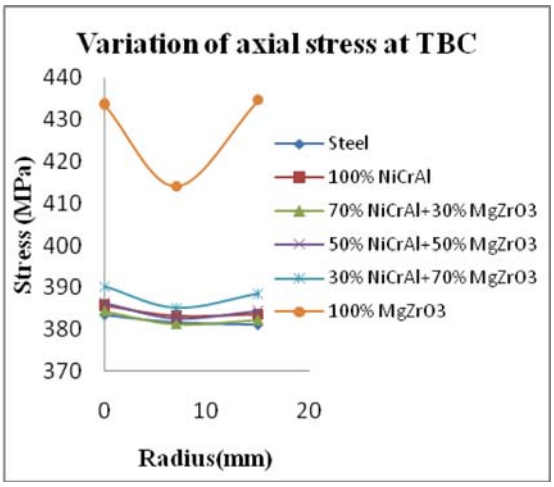

Fig. 9. Variation of axial stress at TBC

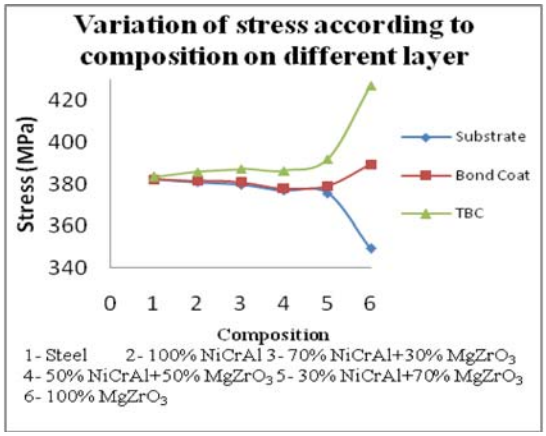

Fig. 10. Variation of stress according to composition .on different layer

TABLE I. VARIATION OF THERMAL CONDUCTIVITY WITH NODAL COORDINATES

Thermal conductivity (W/m^0K)	**Composition**
79	All Cases
79	uncoated steel valve
16.1	for 100% NiCrAl
16.1	for 30% MgZrO3+70% NiCrAl
10.4	
16.1	for 50% MgZrO3+50% NiCrAl
7.3	
16.1	for 70% MgZrO3+30% NiCrAl
4.6	
16.1	100%MgZrO3
0.8	

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TABLE II. BOUNDARY CONDITION ON DIFFERENT CROSS SECTION

Parameter	Heat Transfer Coefficient (w/m^2 k)	Temperature (^oC)
FRESH AIR SIDE	23	25
BUSH SIDE	1745	80
EXHAUST GAS SIDE	1775	290
VALVE SEAT SIDE	2325	300
COMBUSTION SIDE	290	1000

V. CONCLUSIONS

Conclusions which we found from above discussion are listed below:-

- From the temperature distribution curves, it is clear that temperature at the TBC is maximum and minimum at substrate for 100% MgZrO3. Hence, from the temperature distribution it can be concluded that 100% MgZrO3 composition is best and second best composition is 30% NiCrAl +70% MgZrO3.
- From the radial stress distribution curve it is clear the value of stress is increases as we move radially outward direction because material is lesser in this portion. So it is clear that, 100% MgZrO3 is not suitable and radial stress for 30% NiCrAl+ 70% MgZrO3 is lesser at substrate hence from this case it can be concluded that 30% NiCrAl+70% MgZrO3 is best.
- From isotherm curves it is clear that as the percentage of MgZrO3 increases, heat transfer rate decreases for 100% MgZrO3, it is minimum and temperature at the TBC is maximum i.e. 510 OC. From all above conclusions, we can easily conclude that 30%NiCrAl+70%MgZrO3 is the composition which is feasible and can be selected for coating. It gives best result.

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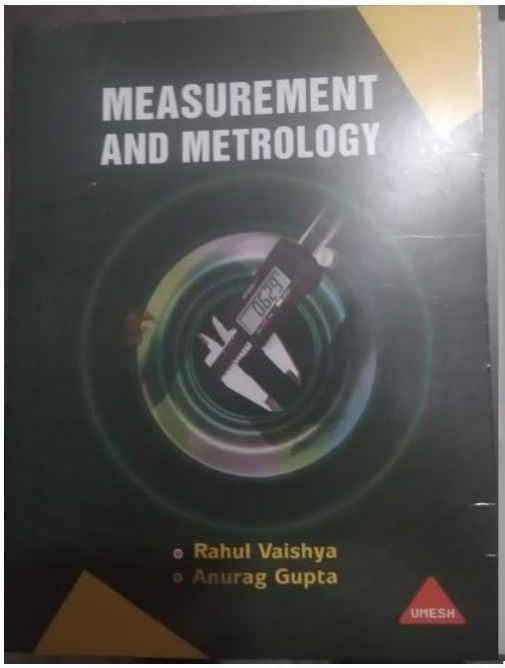
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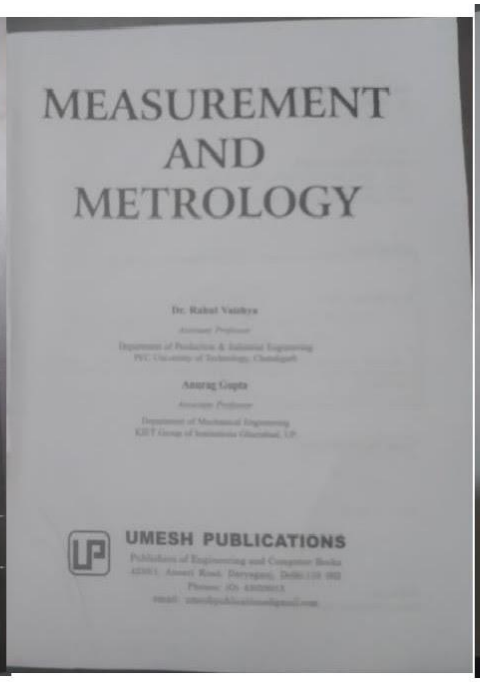
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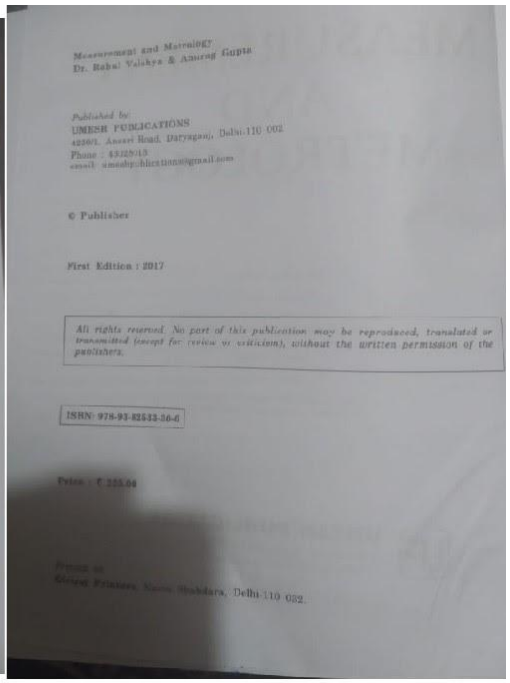
Measurement and Metrology
Dr. Rahul Vaishya & Anurag Gupta
Published by:
UMESH PUBLICATIONS
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First Edition : 2017
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ISBN: 978-93-82533-36-6

International Conference on Frontiers of Science and Technology (ICFST-17)

January 06-07, 2017

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An Attempt to Enhance the Yield Output of a Novel Solar Desalination System

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Abstract:
Potable water shortage is being increased day by day due to rapid growth of population, industrialization and excessive use of pesticides and fertilizers. Desalination using solar energy could a better solution to this global problem. Solar stills are used to produce potable water particularly in remote arid areas. Distillate output through solar still is affected by the many climatic as well as design parameters; one of them is temperature of condensing cover. Lowering its temperature causes higher condensation rate due to larger difference between water surface temperature and cover temperature. Experiments have been conducted on a novel design of solar still. A single slope single basin solar still is modified by incorporating additional condensing surface. This additional condensing surface when covered with wet cotton cloth, condensation on inner surface of this cover was accelerated. Average 16.5 % higher yield was achieved during February month.

Key words:
Solar desalination, Novel still, cotton cloth, Condensing Cover

1. INTRODUCTION

Water and energy are two inseparable elements, which are very vital for human civilization [1]. The growth of a country is sustainable when its population is supplied with clean and safe potable water. World is faced by the twin challenges of growing populations, depleting limited water reserves and a drying up of freshwater sources due to changing precipitation patterns and increased temperatures from climate change [2]. Around 97% of the water in the world is in the ocean, approximately 2% is stored as ice in polar region and only 1% is fresh water available for the need of the plants, animals and human life [3]. With population growth and development of industry and agriculture, water shortage has become a major problem in most of the countries [4]. The World Health Organization prescribes a Total Dissolved Solids (TDS) limit in water of 1000 parts per million for safe drinking [5].

Distillation is one of the appropriate methods for supplying safe water. Many sources of energy can be used for distillation of water such as fossil fuels, renewable and non-renewable sources and electricity [6]. Desalination systems require energy for the separation of salt and water. Solar desalination systems are systems that utilize the solar energy (radiation coming from sun) for the separation of water, salt and bacteria. Classification of solar desalination varies depending on way of energy supply and techniques. The most common type of solar desalination system is the solar still [7].

Many investigations are being carried out throughout the world since long to enhance the productivity of the solar still. Yield output of a still is dependent upon its design features and climatic conditions. Eltawil and Omara [8] increased the productivity of a single slope solar still by using a flat plate solar collector, perforated tubes, spraying unit, solar air collector and external condenser. Salah et al. [9] used different types of absorbing materials to enhance the yields of solar stills. Boubekri & Chaker [10] proposed internal and external reflectors on single slope solar still to increase the rate of solar radiation falling on the cover and found increase in overall productivity by 72.8% in the winter. Kumar & Bai [11] applied water cooling system for side walls to enhance condensation and found efficiency to be 30%. Khalifa [12] investigated cover tilt angle as most crucial parameter affecting the performance of still. He proposed relationship between latitude and cover tilt angle for various seasons.

Working of basin type solar sill is based upon natural hydrological cycle and green house effect. Solar still is a closed basin with transparent cover. Brackish (salty and contaminated) water is fed into the still and the solar radiations entering into still through transparent top cover is entrapped within still and raises the temperature of water contained in it due to green house effect. At its corresponding vapor pressure, water from surface evaporates and leaves all contaminants and microbes behind in the basin. These vapors stick to inner side of condensing cover. This process is called as internal heat transfer. Due to temperature difference between cover and atmosphere, these vapors release their heat too atmosphere and get condense. Resulting purified water tickles down along the inclined

cover and collected in a jar through a channel. This process is called external heat transfer. This type of still is of passive type. In active type solar still, water if preheated in a flat plate collector for faster evaporation.

2. SYSTEM DESCRIPTION

A modified active solar still with secondary condensing surface (Fig.1) was designed, fabricated and installed in Ghaziabad, India (Latitude 28° 40' N) [13]. Modified still was so designed that keeping the dimensions of basin area containing water as well as condensing cover area same, an additional condensing surface was incorporated. The body of the solar still was made up of fiber reinforced plastic (FRP) with 4 mm thickness. The base dimensions of basin were 1.3 x1 m^2 and water was stored in 1x1 m^2 area only. The inclination of the main condensing cover (1x1.16 m^2) was 30° with horizontal (facing south direction) which is approximately equal to the latitude of Ghaziabad. The inclination of the secondary condensing cover (1x 0.67 m^2) was 60° and facing north direction. Both the condensing covers were made up of plane glass of 4 mm thickness. The inner bottom and the side inner surfaces of the solar still were painted black just to increase the absorption of solar radiation. Solar still was mounted on an iron stand, 0.5 m high. Collection of yield from both the covers of still was carried into separate channels provided at lower sides of covers and taken out through flexible pipes into two different measuring jars.

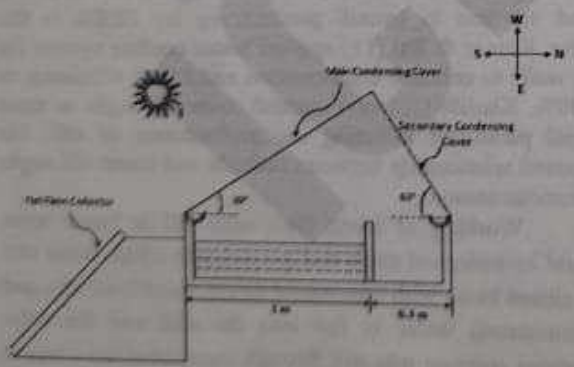


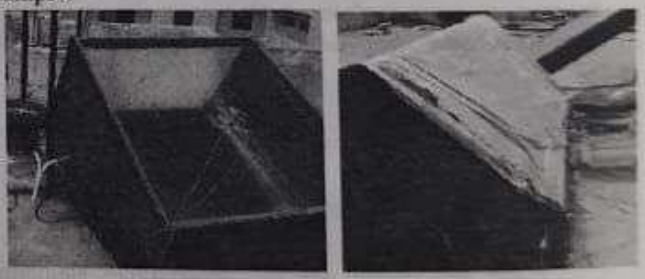
Fig 1. Schematic diagram of the experimental set-up

To provide additional heat energy, still was coupled with a flat plate collector (natural convection mode). The body of the collector was made up of GI sheet having ten parallel tubes of aluminum with 8 mm internal diameter and 1 mm thickness each. The inclination of flat plate collector was also 30° from horizontal, facing towards south. The base of collector was insulated with glass wool sheet of 20 mm thickness.

Solarimeter (0–1000 W/m2, ±3% error) was used to measure solar radiation intensity, Anemometer (0.4–30 m/s, ±2%) was used to measure wind velocity, Thermocouples (0–100 °C, ±1% error) were used to measure temperatures at different points in the still, Thermometer (0–100 °C, ±0.5% error) was used to measure atmospheric temperature and Measuring jars (0–2000 ml, ±2% error) were used to measure yield volume. Proper uncertainty analysis was done to compensate the errors in measurement.

3. METHODOLOGY ADOPTED

The yield (distillate production) is directly proportional to the temperature difference between water surface and condensing cover. So the north facing condensing cover was cooled by covering it through wet cotton cloth. This cloth was kept wet by sprinkling water on it at every two hours. Experiments were conducted in the month of February, a winter season in the northern India. Secondary condensing cover was kept uncovered (fig 2.a) on odd days of the month (1^{st}, 3^{rd}, 5^{th} etc.) and covered with wet cotton cloth (fig 2.b) on the even days (2^{nd}, 4^{th}, 6^{th} etc.). Observations of 28 days were recorded. Here the comparative observations for two consecutive days (3^{rd} and 4^{th} days) are shown as sample.



(a) (b)

Fig 2. (a) Still when secondary cover is bare
(b) still when secondary cover is covered with wet cotton cloth

4. RESULTS AND DISCUSSION

Fig 3 shows the atmospheric temperature during the whole day starting at 6:00 in the morning till the 10:00 in the night. Minimum temperature of 9.1 °C and maximum 24.5 °C were recorded on 3^{rd} day while minimum of 8.9 °C and maximum 25.7 °C were recorded on 4^{th} day. Fig 4 indicates the temperature of water in the still on the two consecutive days. On the 3^{rd} day, when the secondary cover is not covered with wet cotton cloth, solar radiations are also coming in to basin through this cover also. But on the 4^{th} day, the secondary cover was covered with wet cotton cloth, so the solar radiations were not coming into the still through

this cover. Total radiations entering into still are higher on 3rd day, that's why a little higher temperature of water was achieved on the same day (max 51.9 °C) in comparison with next day (max 48.3 °C).

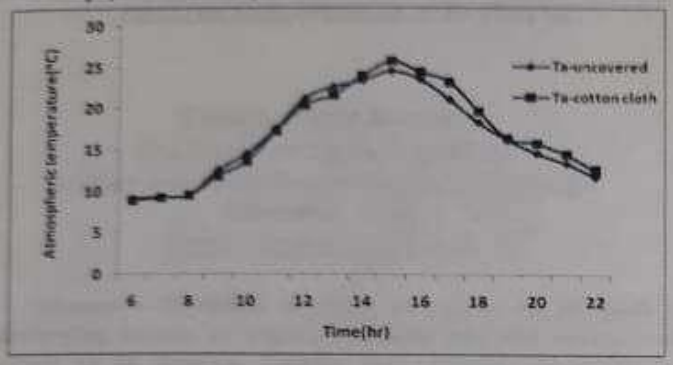


Fig 3. Variation of atmospheric temperature on the two consecutive days

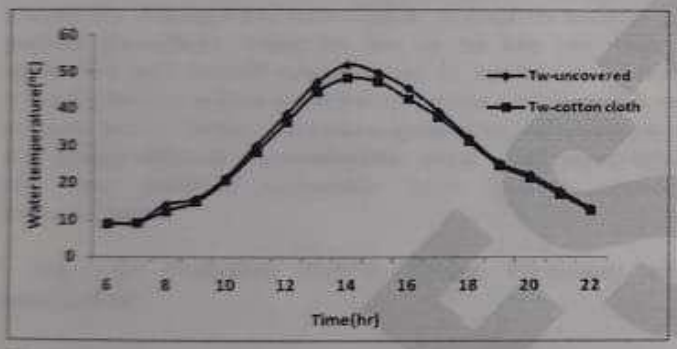


Fig 4. Variation of water temperature in the still on the two consecutive days

Fig 5 shows the distillate output through south facing cover on the two consecutive days. Total 930 ml yield was obtained on the 3rd day while 870 ml yield was produced on the 4th day. A little higher yield was achieved when secondary cover was not covered due to a higher energy available and a little higher water temperature (as discussed earlier). Relatively 6.45 % lower yield was attained when the secondary cover was covered.

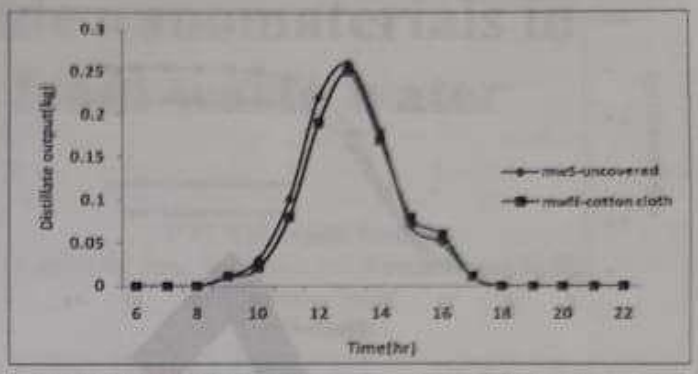


Fig 5. Variation of distillate output through south facing cover on the two consecutive days

Fig 6 shows the distillate output through north facing secondary cover on the two consecutive days. There is a big difference in the yield output on the two days. In the mid day, difference in the yield is quite noticeable. Total 770 ml yield was obtained on the 3rd day while 1130 ml yield was produced on the 4th day. It is noticeable that 46.7% higher yield was achieved when this cover was covered with wet cotton cloth. This is due to higher temperature difference between water and condensing cover. Water in the cotton cloth extracted latent heat of evaporation from its surroundings as well as from condensing cover. Due to this reason, secondary cover's temperature lowered down.

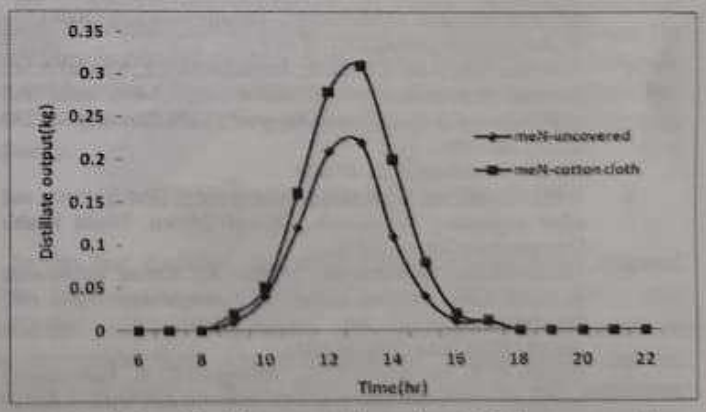


Fig 6. Variation of distillate output through north facing cover on the two consecutive days

Fig 7 shows the cumulative yield through south facing secondary cover on the two consecutive days. Distillate output was 1700 ml and 2000 ml on the 3rd and 4th day respectively. 17.64 % higher yield was obtained due to covering with wet cloth.

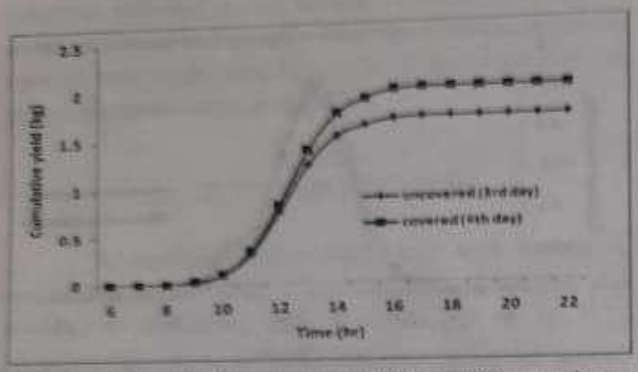


Fig 7. Cumulative distillate output through both the covers on the two consecutive days

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