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Department of Computer Applications(MCA)

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OpenStack

OpenStack is an open source platform that uses pooled virtual resources to build and manage private and public clouds. The tools that comprise the OpenStack platform, called "projects," handle the core cloud-computing services of compute, networking, storage, identity, and image services. More than a dozen optional projects can also be bundled together to create unique, deployable clouds.

In virtualization, resources such as storage, CPU, and RAM are abstracted from a variety of vendor-specific programs and split by a hypervisor before being distributed as needed. OpenStack uses a consistent set of application programming interfaces (APIs) to abstract those virtual resources 1 step further into discrete pools used to power standard cloud computing tools that administrators and users interact with directly.
Contrary to AWS, OpenStack is an open source cloud platform. It was designed to manage distributed compute, network and storage resources in the data centre and enable on-demand resource provisioning capabilities, providing a similar experience to AWS.

How does OpenStack work?

OpenStack is essentially a series of commands known as scripts. Those scripts are bundled into packages called projects that relay tasks that create cloud environments. In order to create those environments, OpenStack relies on 2 other types of software:

Virtualization that creates a layer of virtual resources abstracted from hardware
A base operating system (OS) that carries out commands given by OpenStack scripts

Think about it like this: OpenStack itself doesn't virtualize resources, but rather uses them to build clouds. OpenStack also doesn't execute commands, but rather relays them to the base OS. All 3 technologies—OpenStack, virtualization, and the base OS—must work together. That interdependency is why so many OpenStack clouds are deployed using Linux®, which was the inspiration behind RackSpace and NASA's decision to release OpenStack as open source software.

What is future scope of openstack as a career and different oppurtunities of openstack in view of job positions. What should I learn for this technlgy?

Needless to say, Cloud computing as whole is getting wide acceptance since last one decade. It has its takers at multiple frontiers, and most of the big technological giants have solutions available and investing heavily to leverage the growing trend be it AWS, Google, Microsoft or RackSpace.

Coming back to OpenStack, its Open Source available freely with Apache 2.0 license and is backed by thousands of big technological companies. Over the years, its popularity has seen a huge surge with wide acceptability and uses. Hundreds of companies are using it to build their private cloud and others are providing services to maintain. So, career wise I would say its one of the best technology to look for in current market scenarios. I have been associated with for roughly 3 and half years, and have seen hundreds of openings with awesome job profile and fat pay cheques. Scouting through LinkedIn, you can find 100s of different job opportunities available in top 500 companies.

One thing for sure cloud computing is there to stay, with that OpenStack has got bright future in at least next 10 years for sure. OpenStack is bundle of different cutting edge products that delivers the best cloud computing experience. So, learning it and getting expertise in couple of projects will not only make you a seasoned cloud professional but also help you develop problem solving skills.

"Forecasting the future of cloud with OpenStack"

Is anyone using OpenStack?

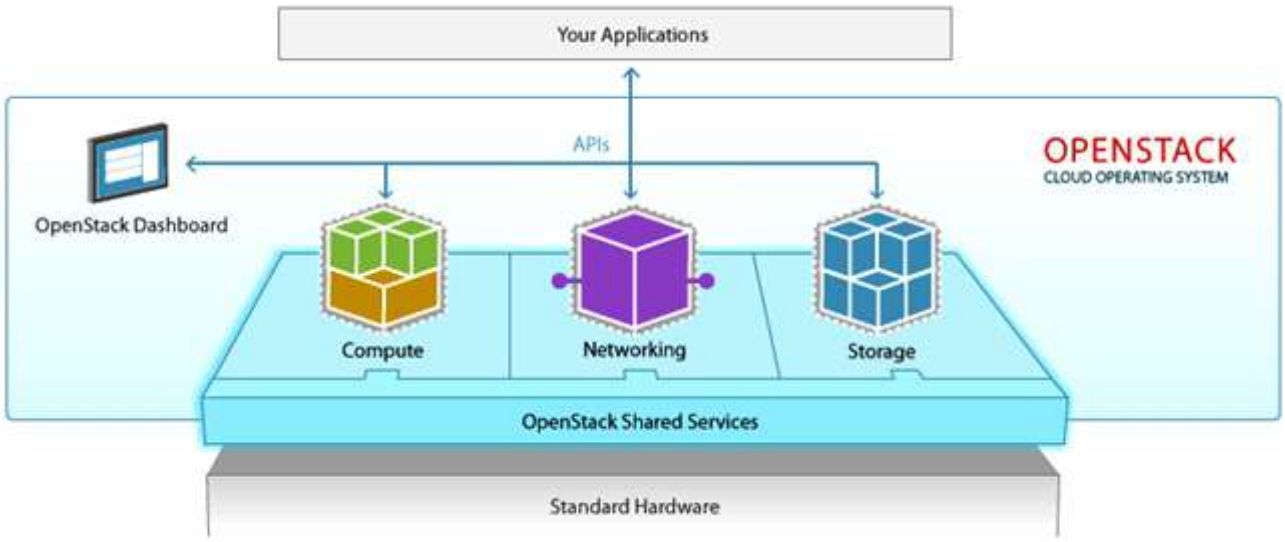
Today, with contributions from **more than 34,000 people at 550 companies**, OpenStack is one of the three most active open source projects, alongside the Linux kernel and the Chromium web browser, according to the group now known as the Open Infrastructure Foundation (OIF).
The companies using OpenStack are most often found in **United States** and in the Information Technology and Services industry.

OpenStack today

Today, OpenStack is used by companies big and small, in deployments of all sizes – ranging from thousands of cores to just a few nodes. OpenStack isn't just about building large clouds, it's ideal for anyone who wants the agility and flexibility of the software-defined infrastructure. At the Open Infrastructure Summit in Denver in 2019, James Penick from Verizon Media talked about the millions of cores they run that are all largely powered and managed by open source technology, including OpenStack. Dr Stefan Bucher from Deutsche Telecom shared that they operate 238,600 cores on OpenStack, adding around 400 servers per week.
At the 2018 OpenStack Summit in Berlin, Oerlikon revealed that they use OpenStack for their Data Center in a Box edge computing product, enabling manufacturers of synthetic yarn to more easily digitalise their data centres using Oerlikon's Plant Operation Center workflow management system. They chose OpenStack over other available options because they needed something that was cost-effective, secure, mature and stable, and could be designed for high availability

OpenStack developer (aka OpenStack engineer)

In the past, this title has been a catch-all for a position where the candidate be responsible for all aspects of an OpenStack deployment (engineering, operations, infrastructure, onboarding, etc.) This candidate would touch almost every aspect of a production cloud — from planning, deploying and even operating the company's production and development clouds. However, as production OpenStack clouds have now scaled to very large enterprise levels and beyond, employers have started to create more specialized positions and distilled the responsibilities f0r the OpenStack Engineer down to a subset of the original scope.



Soft e-skin that communicates with the brain

Although such capability was developed years earlier, the components required at that time to convert digital signals were rigid and unwieldy. This new e-skin is soft as, well, skin. The conversion elements are seamlessly incorporated within the skin, which measures a few tens of nanometers thick.

The development holds promise for more natural interaction between AI-based prosthetic limbs and the brain. It also is a step forward in efforts to construct robots that can "feel" human sensations such as pain, pressure and temperature. This would allow robots working with accident victims, for instance, to better relate to signs of comfort or distress.

"Our dream is to make a whole hand where we have multiple sensors that can sense pressure, strain, temperature and vibration," says Zhenan Bao, a chemical engineering professor at Stanford University, who worked on the project. "Then we will be able to provide a true kind of sensation." The researchers said a key reason people forgo the use of prosthetics is that a lack of sensory feedback feels unnatural and makes them uncomfortable.The e-skin was first tested in the brain cells of rats. The animals twitched their legs when their cortexes were stimulated.

Highlights

- *Researchers at Stanford University have developed a soft and flexible electronic skin (e-skin) that can convert sensations such as heat and pressure into electrical signals. The electrodes are responsible for collecting the signal. The e-skin is soft and stretchable, while also being able to mimic sense of touch and run efficiently at a low voltage.*
- *The e-skin is seamlessly incorporated within the skin and is as thin as tens of nanometres.*
- *The e-skin has been tested in the brain cells of rats, where the animals exhibited leg twitching corresponding to varying levels of pressure.*
- *The goal is to create a hand with multiple sensors that can sense pressure, strain, temperature, and vibration, providing a true sensation.*
- *It aims to enable more natural interaction between AI-based prosthetic limbs and the human brain, addressing the lack of sensory feedback that makes prosthetics uncomfortable and unnatural.*

The extent of twitching corresponded to varying levels of pressure."Electronic skin would eliminate the boundary between the living body and machine components," the researchers said.Their report, "The disappearing boundary between organism and machine," appeared in the journal Science this week. An early challenge was to create a flexible e-skin that could run on low voltage. Early efforts required 30 volts. By creating stretchable field-effect transistors and solid-state synaptic transistors, the team was able to reduce the required voltage and gain greater efficiency.

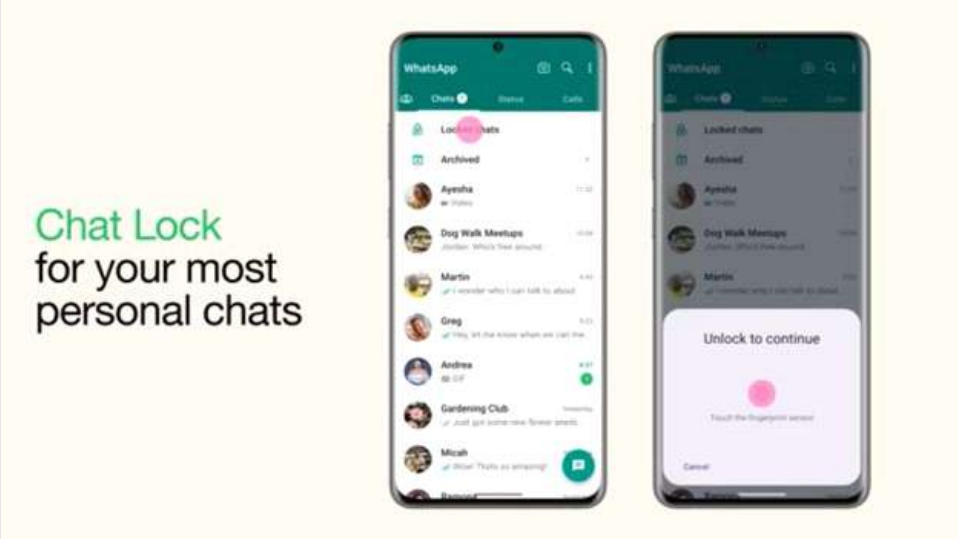
"This new e-skin runs on just 5 volts and can detect stimuli similar to real skin," said Weichen Wang, an author of the paper who has worked on the project for three years. "It provides electrical performance—such as low voltage drive, low power consumption, and moderate circuit integration—comparable to that of poly-silicon transistors."

A related development was announced by scientists at the University of Edinburgh last March.

WhatsApp chat lock, new feature will help you hide private conversations

Highlights

- *WhatsApp's new Chat Lock feature will allow users to store their most intimate conversations behind an added layer of security which can only be accessed via their device password or biometric data*
- *Any new notifications related to these 'locked chats' will also be hidden*



WhatsApp is introducing the new Chat Lock feature to help keep the messages of users 'private and secure'. The new feature will keep the 'intimate conversations' of users behind an added layer of security.

Any new notifications related to these 'locked chats' will also be hidden and users will be required to enter their device password or biometric information such as fingerprint touch or facial recognition.

While announcing the new feature through a blog post, WhatsApp said, “We think this feature will be great for people who have reason to share their phones from time to time with a family member or those moments where someone else is holding your phone at the exact moment an extra special chat arrives."

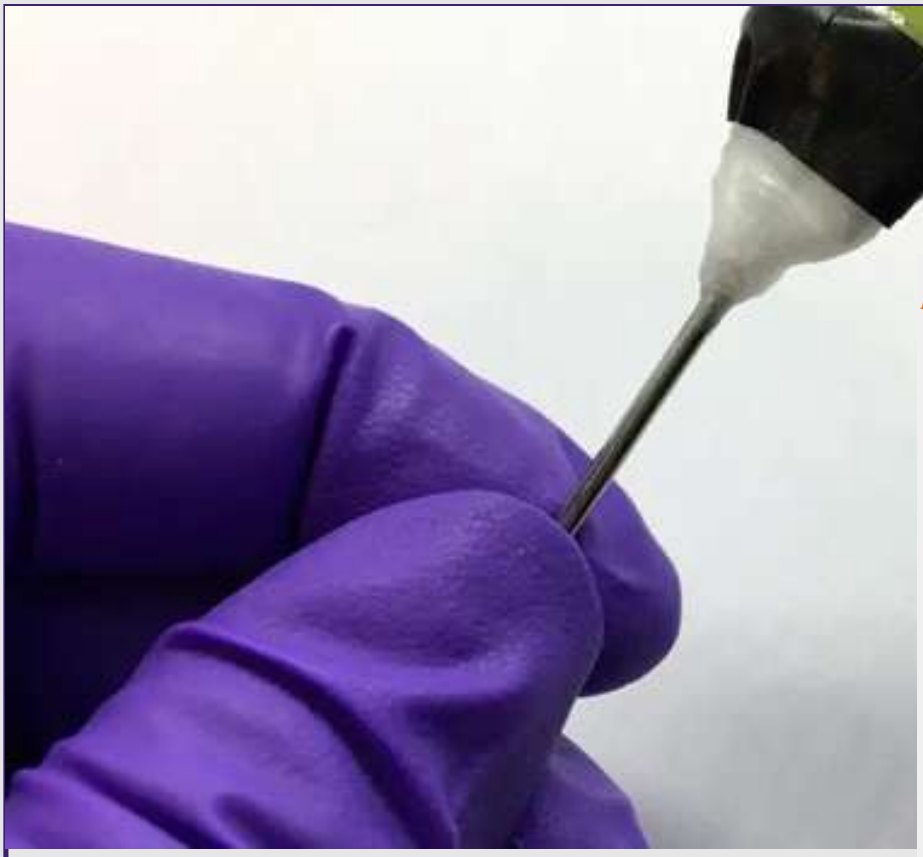
The instant messaging platform also released a video announcing the new feature and showing how it will work.

WhatsApp promises to add more options to Chat Lock in the coming months. New features will include the ability to lock chats on your companion devices and create a custom password for your locked chats that is different from your phone password. The new chat lock feature will be available on both iOS and Android.

How to use lock your Chats on WhatsApp?

1. Tap on the name of the contact or group you want to lock
2. Click on the Chat Lock option under the Contact details page
3. Choose if you want to lock your chat using biometric details or your password.
4. Enter your phone password or biometric details and your personal conversations will be locked.

Earlier on May 3, WhatsApp had announced updates to its polls feature. The company now allows users to create single-vote polls, search for polls in their chats and receive notifications people vote on their polls. WhatsApp had also announced the ability to share images and documents with captions.



Highlights

- *University of Cambridge Scientists Develop Solar-Powered "Artificial Leaf" to Convert CO2 and Water into Liquid Fuels*
- *Breakthrough Technology Converts Carbon Dioxide and Water into Ethanol and Propanol Using Sunlight*
- *"Artificial Leaves" Offer a Practical Pathway to a Sustainable, Zero-Carbon Emission Future*
- *Solar-Powered Technology Produces Net Zero Carbon Emission Fuels for Cars' Engines*
- *Ethanol and Propanol Generated from "Artificial Leaves" Enable High Energy Density and Renewable Fuel Sources*

Solar powered “Artificial Leaf” produces clean car-ready liquid fuels from sunlight

University of Cambridge scientists have developed an 'artificial leaf' that, powered by sunlight, converts CO2 and water into ethanol and propanol. This innovation eliminates the intermediary step of producing syngas, making the technology more practical and paving the way for a sustainable, zero-carbon emission future.

Researchers have developed a solar-powered technology that converts carbon dioxide and water into liquid fuels that can be added directly to a car's engine as drop-in fuel.

The researchers, from the University of Cambridge, harnessed the power of photosynthesis to convert CO2, water, and sunlight into multicarbon fuels ethanol and propanol in a single step. These fuels have a high energy density and can be easily stored or transported.

Unlike fossil fuels, these solar fuels produce net zero carbon emissions and completely renewable, and unlike most bioethanol, they do not divert any agricultural land away from food production.

While the technology is still at laboratory scale, the researchers say their 'artificial leaves' are an important step in the transition away from a fossil fuel-based economy. The results are reported in the journal Nature Energy.

Bioethanol is touted as a cleaner alternative to petrol, since it is made from plants instead of fossil fuels. Most cars and trucks on the road today run on petrol containing up to 10% ethanol (E10 fuel). The United States is the world's largest bioethanol producer: according to the U.S. Department of Agriculture, almost 45% of all corn grown in the US is used for ethanol production.

“Biofuels like ethanol are a controversial technology, not least because they take up agricultural land that could be used to grow food instead,” said Professor Erwin Reisner, who led the research.

For several years, Reisner's research group, based in the Yusuf Hamied Department of Chemistry, has been developing sustainable, zero-carbon fuels inspired by photosynthesis the process by which plants convert sunlight into food using artificial leaves.

To date, these artificial leaves have only been able to make simple chemicals, such as syngas, a mixture of hydrogen and carbon monoxide that is used to produce fuels, pharmaceuticals, plastics, and fertilizers. But to make the technology more practical, it would need to be able to produce more complex chemicals directly in a single solar-powered step.

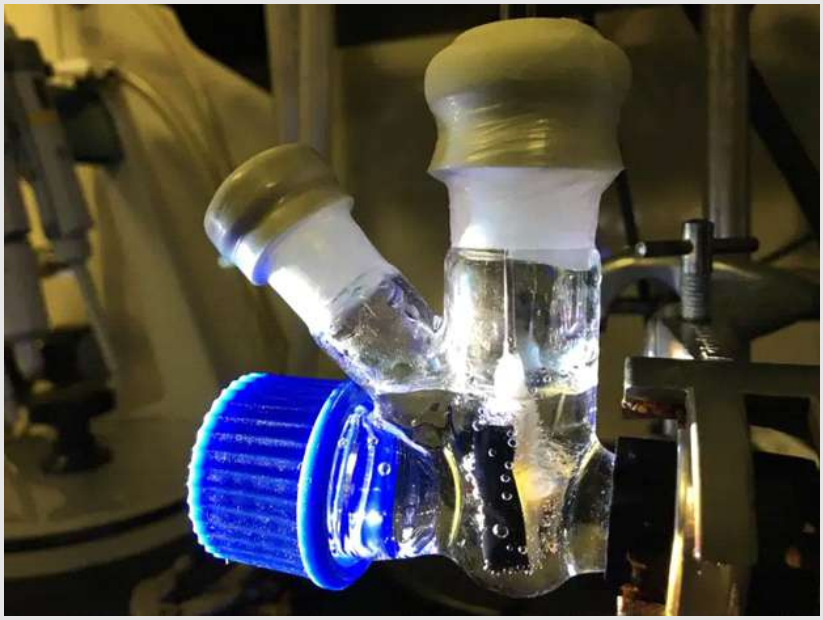
Now, the artificial leaf can directly produce clean ethanol and propanol without the need for the intermediary step of producing syngas.

The researchers developed a copper and palladium-based catalyst. The catalyst was optimized in a way that allowed the artificial leaf to produce more complex chemicals, specifically the multicarbon alcohols ethanol, and n-propanol. Both alcohols are high energy density fuels that can be easily transported and stored.

Other scientists have been able to produce similar chemicals using electrical power, but this is the first time that such complex chemicals have been produced with an artificial leaf using only the energy from the Sun.
“Shining sunlight on the artificial leaves and getting liquid fuel from carbon dioxide and water is an amazing bit of chemistry,” said Dr Motiar Rahaman, the paper's first author. “Normally, when you try to convert CO2 into another chemical product using an artificial leaf device, you almost always get carbon monoxide or syngas, but here, we've been able to produce a practical liquid fuel just using the power of the Sun. It's an exciting advance that opens up whole new avenues in our work.”

At present, the device is a proof of concept and shows only modest efficiency. The researchers are working to optimize the light absorbers so that they can better absorb sunlight and optimizing the catalyst so it can convert more sunlight into fuel. Further work will also be required to make the device scalable so that it can produce large volumes of fuel.

“Even though there's still work to be done, we've shown what these artificial leaves are capable of doing,” said Reisner. “It's important to show that we can go beyond the simplest molecules and make things that are directly useful as we transition away from fossil fuels.”



A photoreactor with an artificial leaf working under solar irradiation

New machine learning model spots rare minerals on Earth and other planets

Scientists have invented a machine learning model that can predict the locations of minerals on Earth, and even other planets, by taking advantage of patterns in mineral associations.

Shaunna Morrison, Anirudh Prabhu, and their colleagues successfully engineered a tool for finding occurrences of specific minerals relying on individual experience, along with some luck.

To do this, they used data from the Mineral Evolution Database, which includes 295,583 mineral localities of 5,478 mineral species, to predict previously unknown mineral occurrences based on association rules. The researchers tried out their model on the Tecopa basin in the Mojave Desert.

The machine learning model was also able to pinpoint the locations of geologically important minerals, including uraninite alteration, rutherfordine, andersonite, schröckingerite, bayleyite, and zippeite.

It also identified promising areas for critical rare earth elements and lithium minerals, including monazite-(Ce), allanite-(Ce), and spodumene

A powerful predictive tool

Now, the scientists hope their invention will be a powerful predictive tool for mineralogists, petrologists, economic geologists, and planetary scientists, according to Phys.org

The mineral deposits found through this process will serve to both better understand the history of our planet and to extract for use in technologies like rechargeable batteries.

Highlights

- *A rare mineral contains one or more rare elements as major metal constituents. Rare-earth minerals are usually found in association with alkaline to peralkaline.*
- *Scientists have developed a machine learning model that predicts mineral locations on Earth and other planets by analysing patterns in mineral associations.*
- *The model successfully identified previously unknown mineral occurrences and pinpointed the locations of geologically important minerals in the Tecopa basin.*
- *It also identified promising areas for critical rare earth elements and lithium minerals, with potential applications in technologies.*

In January of 2023, Europe's biggest deposit of rare earth metals, measuring over one million metric tons, was found in Sweden. The country's state mining company, LKAB, found vast amounts of rare earth metals in Kiruna, northern Sweden, known for its iron ore mines.

“This is the largest known deposit of rare earth elements in our part of the world, and it could become a significant building block for producing the critical raw materials that are absolutely crucial to enable the green transition. We face a supply problem. Without mines, there can be no electric vehicles," Jan Mostrom, President and Group CEO of LKAB, said at the time in a statement. The paper is published in the journal *PNAS Nexus*.

The locations of minerals and mineral-forming environments, despite being of great scientific importance and economic interest, are often difficult to predict due to the complex nature of natural systems. In this work, we embrace the complexity and inherent “messiness” of our planet's intertwined geological, chemical, and biological systems by employing machine learning to characterize patterns embedded in the multidimensionality of mineral occurrence and associations. These patterns are a product of, and therefore offer insight into, the Earth's dynamic evolutionary history. Mineral association analysis quantifies high-dimensional multi correlations in mineral localities across the globe, enabling the identification of previously unknown mineral occurrences, as well as mineral assemblages and their associated paragenetic modes.

In this study, predicted

(i) The previously unknown mineral inventory of the Mars analogue site, Tecopa Basin,

(ii)New locations of uranium minerals, particularly those important to understanding the oxidation–hydration history of uraninite

(iii) New deposits of critical minerals, specifically rare earth element (REE)- and Li-bearing phases

(iv) Changes in mineralization and mineral associations through deep time, including a discussion of possible biases in mineralogical data and sampling; furthermore,

(v) We have tested and confirmed several of these mineral occurrence predictions in nature, thereby providing ground truth of the predictive method. Mineral association analysis is a predictive method that will enhance our understanding of mineralization and mineralizing environments on Earth, across our solar system, and through deep time.

Study finds that automated window shades can save 25% of energy costs

A new study from the Illinois Institute of Technology has found that automated insulating window shades can significantly cut energy consumption by up to one quarter. That, they found, is more than enough to recoup the installation cost within three to five years.

The study, funded by ComEd, was conducted at Willis Tower and provided a critical case study on how simple measures like this can significantly improve buildings' energy efficiency.

In climates similar to Chicago, buildings typically use 30-40 percent of their energy on temperature regulation.

To this end, assistant Professor of Architectural Engineering, Mohammad Heidarinejad, led a research team that studied the effectiveness of window shades in reducing energy consumption. The team found that insulating window shades can significantly decrease energy usage during heating and cooling seasons when connected to an automated control system.

“If you're designing a new building, you have a lot of freedom to look at new technologies that save on energy consumption, but for existing buildings, you have limited options,” explained Heidarinejad.

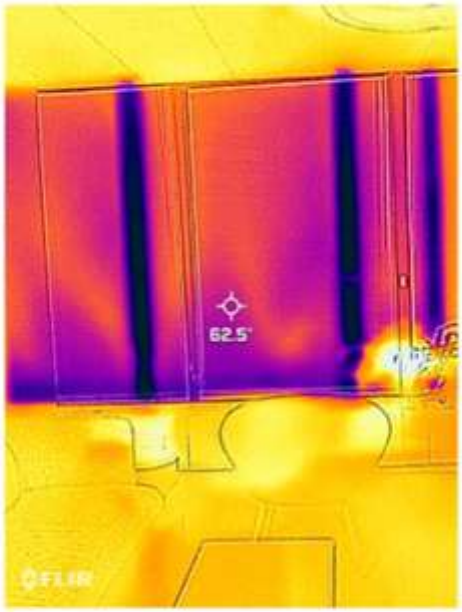
During a ten-month research period, the study was carried out in partnership with Parata Solutions LLC and Amati's Controls at the Equity Office in Willis Tower. The building has single-paned windows and a high window-to-wall ratio (i.e., a large amount of glazing). The study tested three different control strategies for Parata's patented insulating shades. These included fully manual control, a predefined schedule, and a sensor-based system considering outdoor conditions and room occupancy.

Infrared image showing the temperature of the window with (left) and without (right) insulating shades.

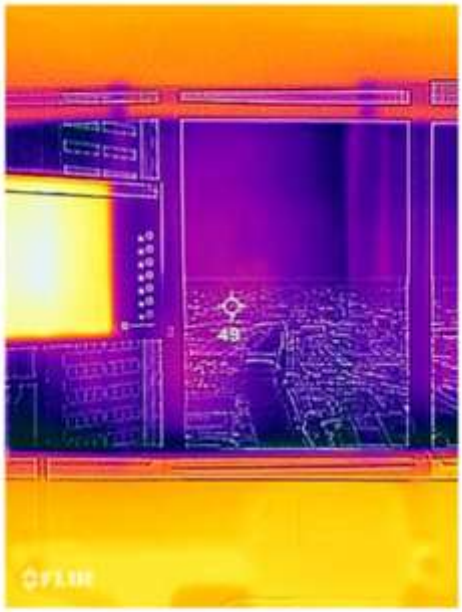
The remarkable results revealed a 25% reduction in energy consumption for both heating and cooling seasons by implementing motorized shades.

Highlights

- *Automated window shades offer consumers an affordable way to improve any home's energy efficiency, privacy, and security.*
- *A study from the Illinois Institute of Technology found that automated insulating window shades can reduce energy consumption by up to 25% in buildings, exceeding installation costs' recoupment within three to five years.*
- *The study conducted at Willis Tower demonstrated how simple measures like window shades can significantly improve buildings' energy efficiency.*
- *The research team tested different control strategies for motorized shades and achieved a 25% reduction in energy consumption for heating and cooling seasons, with positive feedback from 80% of office users.*



With Shades

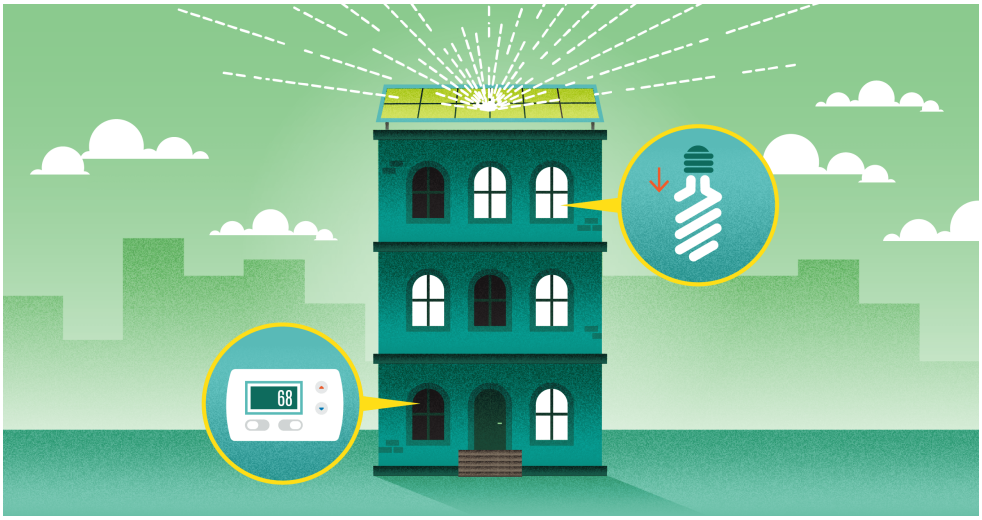


Without Shades

Additionally, 80% of office users preferred the new shades over the old blinds, a significant positive response. “Working with Mohammad Heidarinejad and his team at Illinois Institute of Technology was a game changer for our company,” said Christopher Nurre, CEO of Parata Solutions LLC, who praised the collaboration with Illinois Tech. “Their rigorous field measurements helped confirm the efficacy of our shade system to drastically reduce energy use while offering a solution that occupants and building owners prefer over the incumbent,” he added.

Additional research is now being planned to analyze the efficacy of these ground breaking window shades in various scenarios, including structures utilizing natural gas, diverse weather conditions, and windows oriented in different directions.

“In addition to the exciting findings of energy savings and payback period, this project served as a perfect example of the type of industry-relevant research we enjoy—combining field measurements and computer simulations to evaluate a unique strategy to save energy in one of the most famous buildings in the world,” added Brent Stephens, a co-principal investigator on the project and the Arthur W. Hill Endowed Chair in Sustainability.



Meet 'DarkBERT:' South Korea's Dark Web AI could combat cybercrime

Highlights

- *South Korean researchers have developed DarkBERT, an AI language model trained exclusively on the Dark Web, to combat cybercrime and shed light on illegal activities.*
- *The Dark Web is a hidden section of the internet known for illegal activities and anonymity. DarkBERT was connected to the Tor network and outperformed other language models in understanding Dark Web content.*
- *DarkBERT has potential applications in cybersecurity, such as identifying ransomware websites and monitoring illegal information exchange on dark web forums. The study is available on arxiv.org.*

A team of South Korean researchers has taken the unprecedented step of developing and training artificial intelligence (AI) on the so-called “Dark Web”. The Dark Web trained AI, called DarkBERT, was unleashed to trawl and index what it could find to help shed light on ways to combat cybercrime.

The “Dark Web”is a section of the internet that remains hidden and cannot be accessed through standard web browsers. This part of the web is notorious for its anonymous websites and marketplaces that facilitate illegal activities, such as drug and weapon trading, stolen data sales, and a haven for cybercriminals.

The 'Dark Web' employs complex systems that mask the IP address of its users, making it difficult to trace the websites they have visited. Accessing this web section requires specialized software, the most popular of which is Tor (The Onion Router). Tor is used by approximately 2.5 million individuals every day.

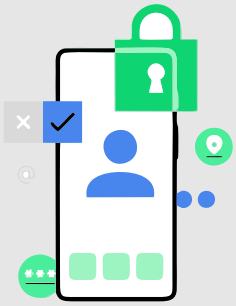
With the rise of natural language processing programs like ChatGPT, such technology is increasingly used as a new kind of cybercrime. By developing an AI that can fight fire with fire, the researchers wanted to discover how large language models (LLM) could help.

To this end, the researchers have published a paper titled "DarkBERT: A Language Model for the Dark Side of the Internet" on their findings. They connected their model to the Tor network and collected raw data to create a database. However, the paper has yet to be peer-reviewed.

According to the team, their LLM was far better at making sense of the dark web than other models that were trained to complete similar tasks, including RoBERTa, which Facebook researchers designed back in 2019 to "predict intentionally hidden sections of text within otherwise unannotated language examples," according to an official description. "Our evaluation results show that DarkBERT-based classification model outperforms that of known pre-trained language models," the researchers wrote in their paper.

According to the team, DarkBERT has the potential to be employed for diverse cybersecurity purposes, including identifying websites that vend ransomware or release confidential data. Additionally, it can scour through the numerous dark web forums updated daily and keep an eye on any illegal information exchange.

Google will start phasing out third-party cookies



Highlights

- *Third-party cookies are files that are created by websites and used by advertisers to track browsing activity of users across different websites and show them more targeted ads.*
- *In March report by Adobe, 75% of marketing professionals worldwide still rely heavily on third-party cookies. At 82%, the reliance is even higher in India.*

Google has announced that it will start phasing out third party cookies for 1% of Chrome users from the first quarter of 2024. In the second phase, which will begin in the second half of 2024, Google will disable third-party cookies for all Chrome users.

In addition to disabling third-party cookies, Google is also developing new privacy-preserving application programming interfaces (APIs) that will allow developers to test the effectiveness of ads without tracking users across different websites.

These APIs will be available to all Chrome users starting in July 2023, said Anthony Chavez, VP, Privacy Sandbox at Google.

Third-party cookies are files that are created by websites and used by advertisers to track browsing activity of users across different websites and show them more targeted ads. However, the practice has drawn a lot of backlash from privacy advocates and regulators in several countries, forcing Google to explore less intrusive ways to help advertisers show personalized ads.

Apple's Safari was the first mainstream browser to disable third-party cookies in 2020. Since then, Apple has rolled out several new privacy features that prevent apps from tracking users without their consent.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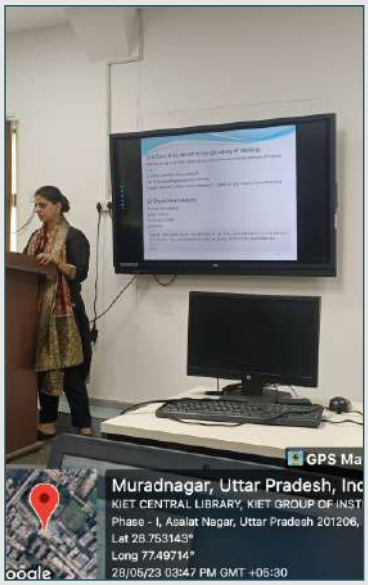
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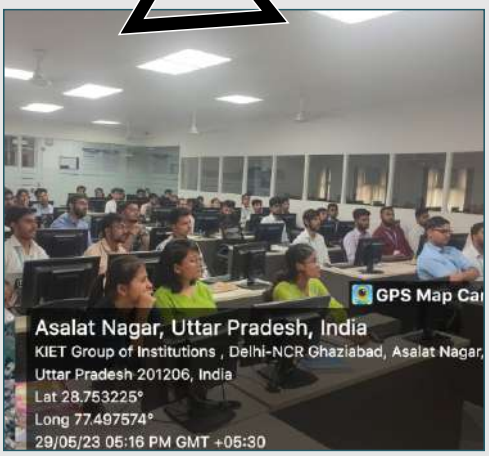
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