All India Shri Shivaji Memorial Society's

Institute Of Information Technology

Department Of Information Technology

Presents...

ASPIRE

Annual Technical Magazine

2017.....

Designed By:

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DEPARTMENT OF INFORMATION TECHNOLOGY

Welcome to the Department of Information Technology.

As we all know, this is an era of Information Technology, and almost every one of us uses some kind of gadgets which invariably leverages the benefits of Information Technology. The advent of Information Technology has revolutionized the way we live. Moreover Internet and mobile wireless technology are the boons of Information Technology. So, the department strives hard to groom our students with this cutting edge technology, thereby instilling high valued ethics and morals. The department prepares them to take up the challenges of ever changing dynamic IT industry.

To fulfill the vision and mission of Information Technology Department towards imparting quality education to our students we conduct various activities like expert lectures, seminar and workshop and industrial visit to make teaching process effective. We provide a platform to our students to participate in many extracurricular activities through various technical, non technical contests for their overall personality development.

All India Shri Shivaji Memorial Society's

Institute of Information Technology

Department of Information Technology

Vision

To equip students with core and state of the art Information Technology.

Mission

Imparting knowledge of Information Technology and teaching its application through innovative practices and to instill high morale, ethics, lifelong learning skills, concern for the society and environment.

Program Education Objectives(PEOs)

i. To prepare graduates to solve multifaceted and complex problems in IT industries.
ii. To inculcate core professional skills with latest information technology to prepare graduates for employment and higher studies.
iii. To develop cross domain competences that prepares graduates for lifelong learning in diverse career paths.
iv. To make gradates aware of their social responsibilities toward environment and society.

Program Specific Outcomes (PSOs)

1. Graduates will be able to demonstrate database, networking and programming technologies.

2. Graduates will be able to apply core professional state of the art Information Technology.

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Program Outcomes (POs)

Graduates will be able to

PO1. Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems. **[Engineering knowledge]**

PO2. Identify, formulate, research literature, and analyse complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences. **[Problem analysis]**

PO3. Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations. **[Design/development of solutions]**

PO4. Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions. **[Conduct investigations of complex problems]**

PO5. Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations. **[Modern tool usage]**

PO6. Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice. **[The engineer and society]**

PO7. Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development. **[Environment and sustainability]**

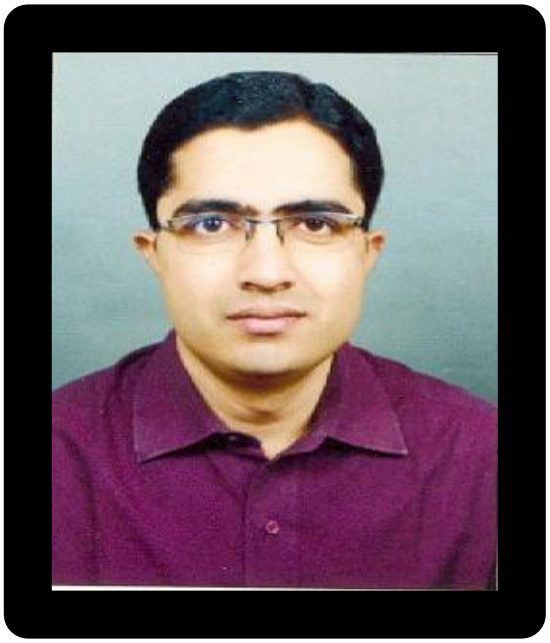
PO8. Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice. **[Ethics]**

PO9. Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings. **[Individual and team work]**

PO10. Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions. **[Communication]**

PO11. Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments. **[Project management and finance]**

PO12. Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change. **[Life-long learning]**



Message from HOD

It gives me an immense pleasure and pride that Department of Information Technology is publishing 5th annual technical magazine "**ASPIRE-2017"**. It is a presentation of student's hidden talent and caliber. In today's fast growing era, presentation skills in terms of writing are certainly essential. "**ASPIRE-2017"** is the golden platform for and by our students for gathering, sharing and presenting creative ideas which leads towards their all over development.

This technical magazine is a collection of technical papers, articles etc. which will be the hub for the students and readers to broadcast and enhance their knowledge.

Finally I express my sincere gratitude and thanks to Shri Malojiraje Chhatrapati -Hon. Secretary All India Shri Shivaji Memorial Society and Dr. P. B. Mane-Principal AISSMS IOIT for their valuable guidance and support.

I thank the chief editor Prof. Mrs. R. Y. Totare and her team of staff and student editors for providing students the area for creative thoughts and knowledge expansion.

Prof. Pritesh A. Patil
HOD-IT Department
AISSMS IOIT, Pune

Message from EDITOR

Its gives me immense pleasure as our Information Technology Department present to our dear readers the 4th annual technical magazine “ASPIRE 2017”.

“ASPIRE 2017” providing a technical platform to the students to express their innovative ideas, hidden talent and writing skills.

Technology is the branch of knowledge that deals with the creation and use of technical means and their interrelation with life, society, and the environment,drawing upon such subjects as industrial arts, engineering, applied science,and pure science.

Technical section of this magazine elaborates various latest technologies like future of cloud computing ,drone technology,neuromorphic computing and many more.

I am very thankful to the principal “Dr.P.B.Mane” sir for giving me the opportunity to work as the editor of magazine. I must thank our Head of Department “Prof.P.A.Patil “for his continuous encouragement and guidance.

Special thank to the entire enthusiastic participants as without their contribution this magazine would not have been possible. There is equal contribution of student editor team to make this difficult task possible.I am sure you will enjoy reading the interesting articles in the magazine.

Mrs.Reshma Yogesh
Totare
Chief Editor and Magazine coordinator
Assistant Professor
Department Of Information Technology

EDITORIAL TEAM

Technical Magazine Team Member:

Atul B. Shetty
Yogesh R. Gaikwad
Saurabh M. Talathi
Shailendra Singh

MESSAGE FROM EDITORIAL TEAM

It gives us immense joy and satisfaction to finally introduce our very own departmental technical magazine “ASPIRE 2017”.Just like the Gods churned the ocean of the milk to extract the nectar, we have tried to churn out creativity from this mess of technology. A lot of effort has gone into making of this magazine. We hope you enjoy reading the magazine.

The best thing about this magazine is that it represents the creative side of IT students to a fair degree-something that we think we all need to connect with.

So this time we have made an attempt to bring out the talent concealed within our student community.

This magazine includes articles such as drone technology, terahertz transmitter, future storage devices, dream linking, hologram display and many more latest technologies.

We hope you enjoy reading this magazine as we have enjoyed making it.

Any suggestions or criticism on this magazine would be most welcome.

Email Id:ioit.tech.mag2017@gmail.com

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Drone As a Service

Drone-as-a-service (DaaS) is just one of the new business models likely to emerge from the surging popularity of the small, unmanned flying machines.

Over the past two years, drones have come seemingly from out of nowhere to become a major new tool for organizations that need to manage far-flung assets. The global revenue market for drones is expected to hit $6 billion in 2017—up 34% from last year—and reach $11.2 billion by 2020.

Far from being the domain of hobbyists and voyeurs, drones are now finding practical applications in many business and government applications. State governments use them to inspect hard-to-reach infrastructure like bridges, dams, and highway overpasses. Drones can fly over treacherous terrain to

check on machinery in remote locations. They also can be used for aerial security reconnaissance of events where crowds gather, making them an important tool in the battle against terrorism.

“Any time the safety of a person comes into play, there’s a place for drones,” said Mike Stone, product manager for Infor EAM, in a presentation at In forum 2017.

All of which means that drones are poised to take on increasing importance in helping enterprises manage their assets. Not surprisingly, Infor is there with Drone Enterprise Asset Management Solution (DEAMS), a service born of a partnership with Drone Aviation Corp. that incorporates data from flying objects into the records companies maintain on their valuable but often difficult-to-access equipment and infrastructure. DEAMS is so innovative, it’s been selected as a finalist in the Software & Information Industry Association’s prestigious ODCiE awards.

“With the advent of drones and the Internet of things, strategies for traditional asset management are being radically changed,” said Javier Buzzalino, Infor senior vice president of development.

Falling costs

Plus, drones are way cool. Commercial units cost up to $40,000, but prices are expected to come down rapidly with volume, Arthur said. There are three types of drones: helicopter, multi-rotor, and fixed-wing, of which the first two are the most popular in commercial environments because of their ability to hover.

While drones are often depicted as being free-floating devices, the reality is that battery-powered drones have limited commercial value because they can only stay aloft for about 20 minutes without a recharge. More practical are tethered drones, which get power from the ground via a cable. Because they don't need a battery, these units can fly higher, faster, and longer. In fact, they can technically fly forever. They're also less likely to get lost. "Tethered drones are like an elevator: You go up and you go down," Stone said. "Untethered drones can get away from you."

The U.S. Federal Aviation Administration helped nudge drone adoption along last summer when it relaxed rules to encourage business adoption. Prospective pilots now need only complete only a classroom test to earn a license. That's good, because there will be a need for 420,000 new drone pilots by 2021, Arthur said. Restrictions have also been eased on where and how the mini-copters can be used, and rules that inhibit technology innovation have also been relaxed.

One reason the FAA is backing down on its initially cautious stance about drones is because the benefits are so compelling. Cash-strapped government agencies that may be tempted to skip road and bridge inspections because of cost can now fit those important public safety measures into their budgets. The same goes for commercial entities such as energy companies, which can dispatch drones to remote locations like floating oil rigs for a tiny fraction of the cost of sending human inspectors.

Which doesn't mean drones are perfect. Because they're limited to video inspection, they can never duplicate the thoroughness of a human expert. Drones also create questions about how to store and manage the massive amounts of data they generate, including altitude, speed, weather conditions, and location. "If your sensor is taking a reading every second, that's 86,000 readings a day," Stone said.

Video files are large, difficult to classify and expensive to download in real time. "You'll have to think about how to incorporate that data into your information management strategies," Stone said.

Expect Infor to help. Drones are expected to join smart sensors as an essential tool in achieving the goal of identifying and preventing equipment failures before they happen. Buzzalino called predictive maintenance "the Holy Grail of asset management."

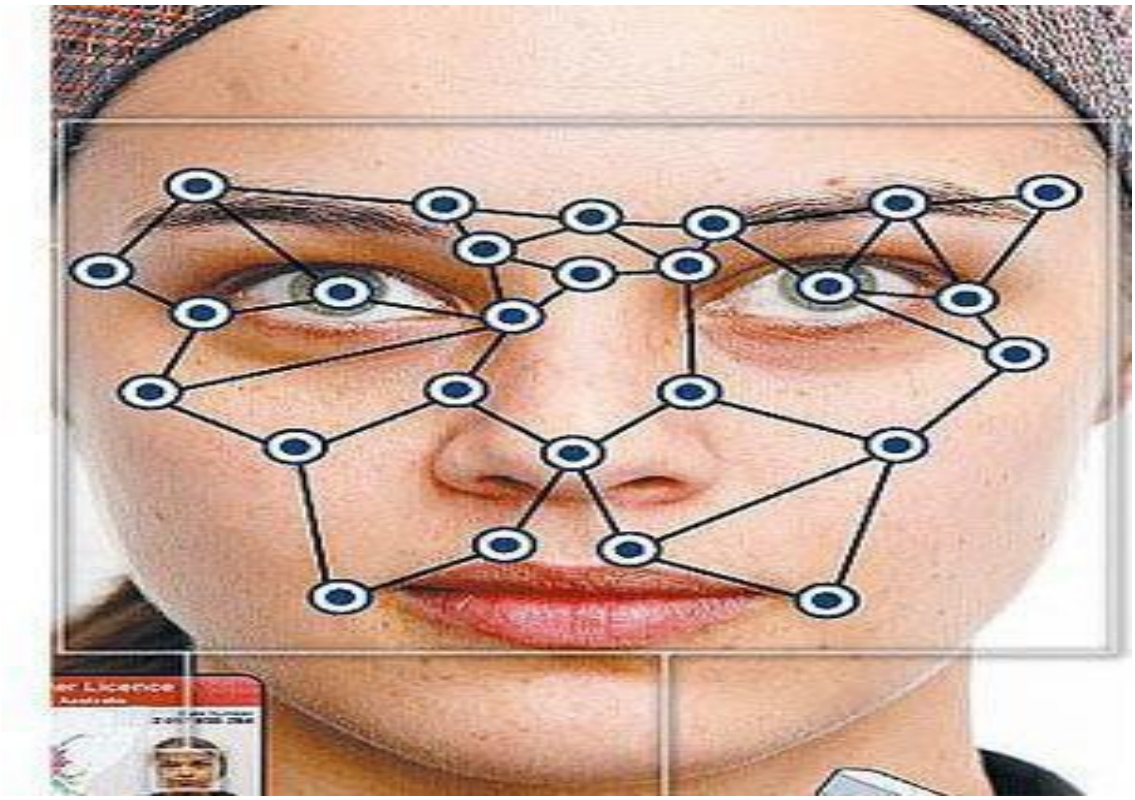
One thing is sure: For organizations that manage assets that are difficult or dangerous to reach, drones are now a practical solution. "A robust commercial drone ecosystem has emerged and will continue to thrive," Stone said.

- Kartik Damania (BE - IT)
Cultural Secretary

BE IT

Face Recognition

Face, the foremost distinguishing feature of human body, making you the 'unique you', not only gives you an individual identity, but can also save you from security breaches and fraud transactions, can take care of your personal data, and prevent your PC, wireless network from plausible security threats!! Unlike the world of *facebook*, where you can wear different face every day, here it is the uniqueness of your face that makes all the difference.



The fast track technology has brought the world at your finger tips, be it anything, it is not more than a click away. The easier life is getting day by day, the more complex it is becoming to escape from the traps intended to crack and get access to your private data. The growth of e-commerce wholly depends on the integrity of transaction. The reason why a big percentage of people are still hesitant to employ e-commerce is the increasing cases of fraudulent fund transfer, loss of privacy and misuse of identity. End-to-end trust is must for its success. The ubiquitous methods of user id and password combinations, access cards are no longer free from security threats.

Such scenario demands an infallible solution, the one that cannot be hacked, shared or stolen and that solution is present with us, as an innate gift of nature, the human biological characteristics.

'*Biometrics*' is the study of measurable biological characteristics. It consists of several authentication techniques based on unique physical characteristics such as face, fingerprints, iris, hand geometry, retina, veins, and voice. '***Face recognition***' is a computer based security system capable of automatically verifying or identifying a person. It is one of the various techniques under Biometrics. Biometrics identifies or verifies a person based on individual's physical characteristics by matching the real time patterns against the enrolled ones.

The quest of human minds to excel and explore the breathtaking possibilities that technology can meet, encouraged scientists in mid 1960s to teach computers to distinguish between faces. In its initial stage, the technique was semi automated. It required an administrator to calculate the

distance and ratios of various features of face (eyes, nose, ears and mouth) from a reference point and compare it with the images in database. Later in 1970s, Goldstein, Harmon and Lesk tried to automate the process by using various specific subjective markers such as lip thickness, hair colour. Early approaches were cumbersome, as they required manual computations. However, it was in 1988, when Kirby and Sirovich used a standard linear algebra technique, 'Principle Component analysis' that reduced the computation to less than a hundred values to code a normalized face image and in 1991, scientists finally succeeded in developing real time automated **face recognition system**.

When you face a security check based on face recognition, a computer takes your picture and after a few moments, it declares you either verified or a suspect. Let us look into the inside story, which is a sequence of complex computations.

The process of recognition starts with Face detection, followed by normalization and extraction which leads to the final recognition.

FACE DETECTION:
Detecting a face, an effortless task for humans, requires vigilant efforts on part of a computer. It has to decide whether a pixel in an image is part of a face or not. It needs to detect faces in an image which may have a non uniform background, variations in lightning conditions and facial expressions, thus making the task a complex one. The task is comparatively easy in images with a uniform background, frontal photographs and identical poses, as in any typical mug shot or a passport photograph.

Normalization:

The detected facial images can be cropped to obtain normalized images called canonical images. In a canonical face image, the size and position of the face are normalized approximately to the predefined values and the background region is minimized. Also, the image must be standardized in terms of size, pose, illumination, etc., relative to the images in the gallery or reference database. For this purpose, it is necessary to locate the facial landmarks accurately and failing to do so can make the whole recognition task unsuccessful. Recognition can only succeed if the probe image and the gallery images are the same in terms of pose orientation, rotation, scale, size, etc and normalization is meant to achieve this goal.

Extraction & Recognition:

A normalized image can be processed further for feature extraction and recognition. Here, the images are converted to a mathematical representation, called biometric template or biometric reference, to store them into the database. These image database, then serves for verification and identification of probe images. This transformation of image data to mathematical representation is achieved through algorithms. Many Facial recognition algorithms have been developed to get simplified mathematical form, to carry out the task of recognition. The way the algorithms transform or translate the image data which is in form of grayscale pixels to the mathematical representation of features, differentiate them from one another. To retain maximum information in the transformation process and thus create a distinct biometric template is crucial for successful recognition. Failing to which, may cause problems like generation of *biometric doubles* i.e. the biometric templates from different individuals become insufficiently distinctive.

- Rohit Singh (TE - IT)

KEEPING MOORE'S LAW ALIVE: NEUROMORPHIC COMPUTING

Remember when cell phone had keypads, you can call, text, maybe play snakes and had a 6 Megabytes of memory, which was actually a small miracle that time. Then they got faster and faster and in about every two years you probably upgraded your phone. This incremental trend where technology gets faster and cheaper in every 18 months or so, hinges on one key trend known as Moore's Law. This law is not really a law but a prediction made by Co-founder of Intel, Gordon Moore in 1965.This prediction has driven companies to make better chips since then. A single chip today can contain over billions of transistor and each one of them is about 14 nanometer in size, smaller than most human viruses. Due to the incremental nature of Moore's law, we are fast approaching certain fundamental limits of physics and it has become harder to maintain the trend. It is more of wish now that the world is trying to keep true because of its driving nature of doubling our compute capability. So, to power the next wave of electronics there are a few promising options in work. One of them is Quantum computing, which has been in the lime light for quite some time now. The other is the Neuromorphic Computing. These are computer chips which are modeled after our own brains. They are basically capable of learning and remembering all at a time at very fast rate.

So, how does this work? Let's start with our brain. Our brain has Billions of neurons, each of which forms a connection with other neurons. These are called synaptic connections. The synaptic activities take place using Ion channels, which transfers charged atoms of sodium, potassium, and others from one neuron to other. Neuromorphic chip copy this model by relying on densely connected web of transmitters which mimics the activity of Ion channels. Each chip has a network of cores which has input and output and each core is connected to the other forming a web of cores. Because of this connectivity neuromorphic chips are able to integrate Computation, memory, and communication all together forming an entirely new computation design. Standard Chip today is based on a Von-Neumann architecture where processor and memory are separate and data moves between them. This makes computation easier but not efficient since the rate of data processed by the processor is much more than the rate of data flow from the memory to the processor. However, neuromorphic chip completely changes this by connecting processing and memory together inside the cores(neurons) which are connected to each other, communicating and learning together.

The hope is that these Neuromorphic chip may convert the computers from a general purpose calculators to a machine which can learn from its experience and then make decisions. We leap to a future where computers can not only crunch data at a neck break speed but also process sensory data in real time. Some future applications of the neuromorphic machines are drones detecting the change in environment, battle field robots which can make decisions in real time to tackle a situation and car driving you to the ice-cream parlor when you are dumped. We don't have a sophisticated machine with 'brain-like' processing yet but they're on the horizon. So get ready for a whole new meaning of the term "Brain power".

- Anurag Yadav (TE - IT)

The 5 Programming Languages that Built the Internet

The internet couldn't possibly run without someone somewhere writing some code, but in internet history, there are a few particular languages that provided the foundation upon which the web we know today is built.

Lisp

This language is actually not widely used on the internet, but is responsible for building the internet in many ways. Invented by John McCarthy in the late 1950s, Lisp, despite its odd name, tied together the research community that helped create the internet. Lisp offered some modern features for the first time, such as conditionals. But what was really mind-blowing about Lisp was that it made no distinction between code and data. Lisp could treat code as data and data as code. Lisp makes it possible to extend the language in ways that its designers never intended, giving rise to the term "programmable programming language."

Lisp became the lingua franca of the artificial intelligence community, the community that DARPA called on to build what eventually became the internet in the late 1960s.

C

The single most influential programming language today might be C. Invented at Bell Labs in the '70s, it was one of the first high-level programming languages to have an operating system written in it. And that operating system just happens to be UNIX. Because it was written in C, it was possible to move UNIX to different platforms. Rewriting UNIX in C was a major breakthrough. Previously operating systems were written in assembly language, as they had to be really close to the hardware. C, on the other hand, was a higher-level language but was still close enough to the hardware to write an operating system in. This made UNIX one of the first portable operating systems. A C program could be compiled to run on different operating systems, but since most of the early C programmers also happened to be UNIX programmers, they tended to assume that their programs would be run under UNIX and developed their code accordingly. Because it was relatively easy to port UNIX to other computers, lots of people did so.

Perl

Perl isn't as talked-about as it was in the '90s, but it is still a major part of the internet. In fact, it owes its popularity to the internet. Perl was invented in the late '80s by Larry Wall when he was working for NASA's Jet Propulsion Laboratory, as recounted in a book called "Programming Perl." Wall needed a configuration management system to talk to several UNIX computers on opposite coasts. None of the existing UNIX tools could do the job, so he took the lazy route and invented a whole new programming language. Wall, as recounted, released it in 1987 over Usenet and it attracted an instant community of developers across the growing internet. When the web took off, Perl found a niche as one of the languages of choice for developing dynamic web pages. Syntactically, it resembled C, but was implemented at an even higher level, without the need to

manually manage memory. This meant that developers could write, test and debug programs quickly. Perl is very flexible, leading to some ugly code. Its combination of ugliness and usefulness has given it the moniker of "the duct tape of the internet."

PHP

Speaking of PHP, this language has dethroned Perl as one of the major building blocks of modern dynamic web pages. Like Perl, it has a reputation for letting people write ugly code, yet it still runs a lot of websites that people use every day, including Facebook. It was created in 1994 by Rasmus Lerdorf. The reason that it's become so popular is that PHP code can be embedded right into a web page. This means you don't have to put your PHP script in a separate program and generate HTML code using Perl or C. This makes it very easy for people who already know HTML to learn PHP and add interactivity to their pages. It's also easy to integrate PHP with a SQL server such as MySQL.

SQL

SQL stands for Structured Query Language. It's a way to form queries for relational databases. Although invented by Edgar F. Codd, in the 1970s, SQL and the relational database took a while to become popular. Oracle first popularized relational databases, then MySQL made it a must-have technology for building websites. The relational model provided a simple and efficient way to manage large amounts of data.

You can create a good web app or service in any language, but you can't go wrong picking one of the languages that have influenced the way the web has developed.

- Pragya Kumari (TE - IT)

Dream Linking

Pretty soon not even your dreams may be private anymore. Japanese scientists have learned how to interpret what you're dreaming about by measuring your brain activity while you sleep. This data can then be plugged into an algorithm that reconstructs your dream so that it can be played back for you when you're awake, according to the journal Science.

In other words, scientists have invented a sort of dream-reading machine. Before long, you may never have to worry about forgetting what you dreamed about ever again. You'll be able to simply play your dreams back after you wake up in the morning.

The remarkable breakthrough makes use of a fairly straightforward idea: that when we visualize certain types of objects in our minds, our brains generate consistent neural patterns that can then be correlated with what is being visualized. For instance, when you imagine a chair, your brain fires in a pattern that occurs whenever a chair is visualized. An algorithm can then be used to tie the data from a brain scan to the appropriate correlated images. And voilà! Your dream can be reconstructed.

Using pillows with conducting fibres in the fabric, it will be possible to see monitor electrical activity from the brain.

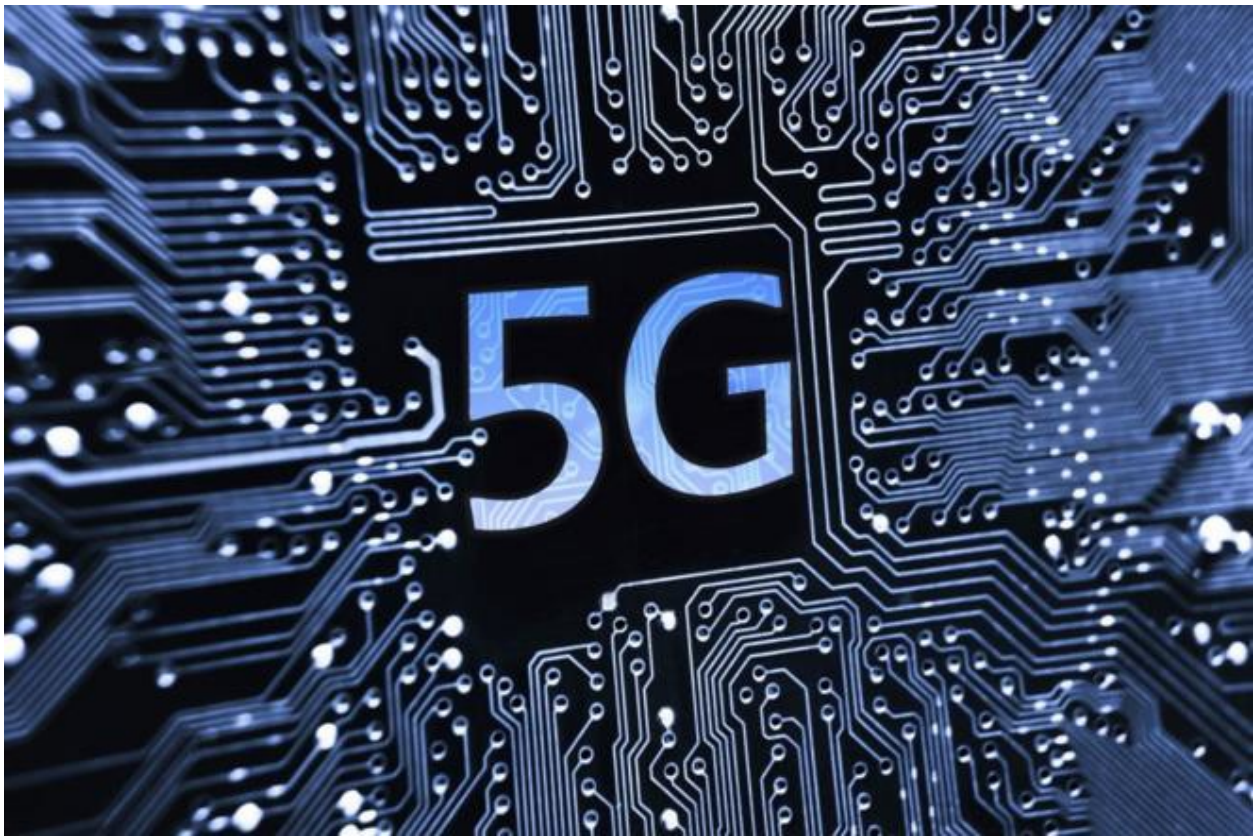
This will not only show when someone is dreaming, but recent developments indicate that we'll also be able to tell what they are dreaming about.

It is also possible (with prior agreement presumably, and when both people are in a dream state at the same time) for two people to share dreams.

One could try to steer a friend's dream in the same direction, so that they could effectively share a dream, and may even be able to interact in it.

- Atul Shetty(TE.IT)

Terahertz Transmitter



TOKYO: Researchers have developed a terahertz (THz) transmitter capable of transmitting digital data at a rate 10 times or more faster than that offered by the fifth-generation mobile networks (5G) expected to appear around 2020.

The terahertz transmitter could make it possible for the whole content on a DVD (digital versatile disk) to be transferred in a fraction of a second, according to the research scheduled to be presented at the International Solid-State Circuits Conference (ISSCC) 2017 being held from February 5-9 in San Francisco, California.

The terahertz band is a new and vast frequency resource expected to be used for future ultrahigh-speed wireless communications.

"This year, we developed a transmitter with 10 times higher transmission po

"Terahertz could offer ultrahigh-speed links to satellites as well, which can only be wireless. That could, in turn, significantly boost in-flight network connection speeds, for example. Other possible

applications include fast download from contents servers to mobile devices and ultrafast wireless links between base stations," said one of the researchers Minoru Fujishima, Professor at Hiroshima University in Japan.

The research group has developed a transmitter that achieves a communication speed of 105 gigabits per second using the frequency range from 290 gigahertz (GHz) to 315 GHz.

This range of frequencies are currently unallocated but fall within the frequency range from 275 GHz to 450 GHz, whose usage is to be discussed at the World Radio communication Conference (WRC) 2019 under the International Telecommunication Union Radiocommunication Section (ITU-R).

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Last year, the group demonstrated that the speed of a wireless link in the 300-GHz band could be greatly enhanced by using quadrature amplitude modulation (QAM).

This year, they showed six times higher per-channel data rate, exceeding 100 gigabits per second for the first time as an integrated-circuit-based transmitter.

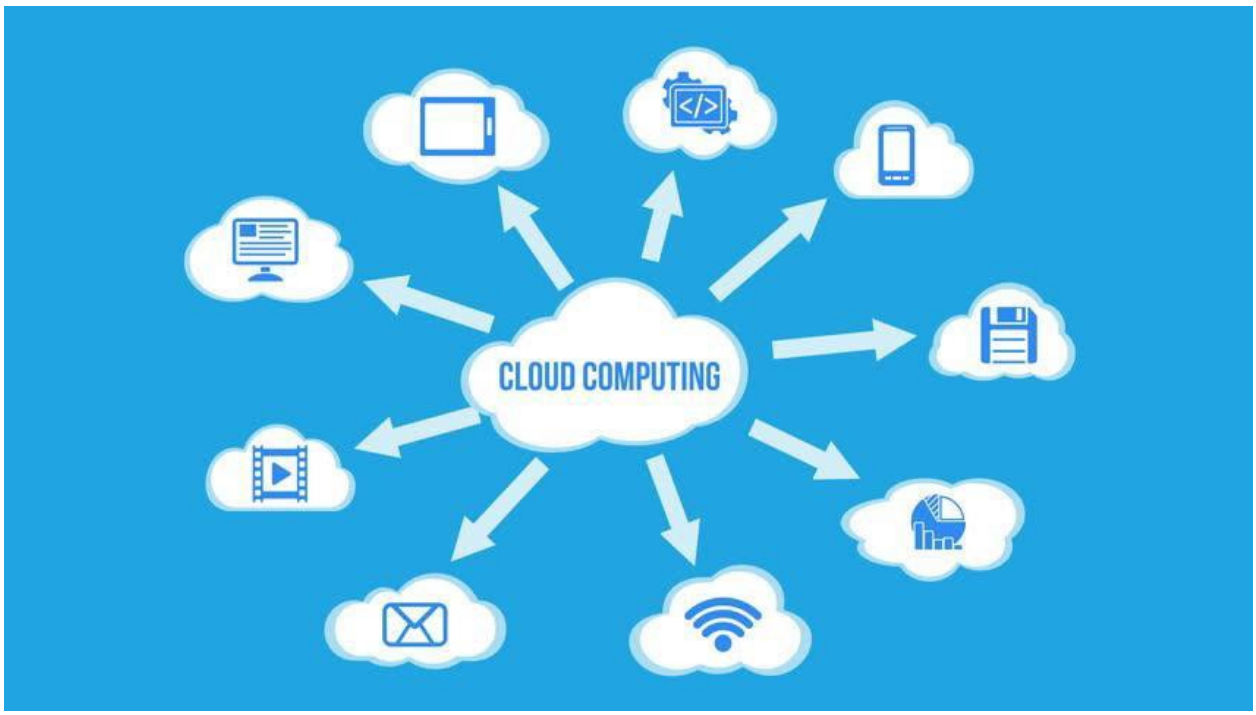
wer than the previous versions. This made the per-channel data rate above 100 Gbit/s at 300 GHz possible," Fujishima said.

"We usually talk about wireless data rates in megabits per second or gigabits per second. But we are now approaching terabits per second using a plain simple single communication channel," Fujishima added.

The research group from Hiroshima University, Japan's National Institute of Information and Communications Technology, and Panasonic Corporation plans to further develop 300-GHz ultrahigh-speed wireless circuits.

- Shailendra Singh(TE.IT)

Cloud Computing



The term”cloud computing" is a recent buzzword in the IT world. Cloud computing is aimed at providing IT as a service to the cloud users on-demand basis with greater exibility, availability, reliability and scalability with utility computing model. This new paradigm of computing has an immense potential in it to be used in the field of e-governance and in rural development perspective in developing countries like India.

Introduction

Cloud computing is a recently developing paradigm of distributed computing. Though it is not a new idea that emerged just recently. In 1969 [16] L. Kleinrock anticipated, As of now, computer networks are still in their infancy. But as they grow up and become more sophisticated, we will probably see the spread of 'computer utilities' which, like present electric and telephone utilities. His vision was the true indication of today's utility based computing paradigm. One of the giant steps towards this world was taken in mid 1990s when grid computing was first coined to allow consumers to obtain computing power on demand. The origin of cloud computing can be seen as an evolution of grid computing technologies. From the architectural point of view cloud is naturally build on an existing grid based architecture and uses the grid services and adds some technologies like virtualization and some business models. In brief cloud is essentially a bunch of commodity computers networked

together in same or different geographical locations, operating together to serve a number of customers with different need and workload on demand basis with the help of virtualization. Cloud services are provided to the cloud users as utility services like water, electricity, telephone using pay-as-you-use business model. These utility services are generally described as XaaS (X as a Service) where X can be Software or Platform or Infrastructure etc. Cloud users use these services provided by the cloud providers and build their applications in the internet and thus deliver them to their end users. So the cloud users don't have to worry about installing, maintaining hardware and software needed. And they also can afford these services as they have to pay as much they use. So the cloud users can reduce their expenditure and effort in the field of IT using cloud services instead of establishing IT infrastructure themselves. Cloud computing is used to help social issues such as e-commerce.

Advantages of using Cloud

The advantages for using cloud services can be of technical, architectural, business etc .

1. Cloud Providers' point of view

(a) Most of the data center today are underutilized. They are mostly 15% utilized. These data centers need spare capacity just to cope with the huge spikes that sometimes get in the server usage. Large companies having those data centers can easily rent those computing power to other organizations and get pro_t out of it and also make the resources needed for running data center (like power) utilized properly.

(b) Companies having large data centers have already deployed the resources and to provide cloud services they would need very little investment and the cost would be incremental.

2. Cloud Users' point of view

(a) Cloud users need not to take care about the hardware and software they use and also they don't have to be worried about maintenance. The users are no longer tied to some one traditional system.

(b) Virtualization technology gives the illusion to the users that they are having all the resources available.

(c) Cloud users can use the resources on demand basis and pay as much as they use. So the users can plan well for reducing their usage to minimize their expenditure.

(d) Scalability is one of the major advantages to cloud users. Scalability is provided dynamically to the users. Users get as much resources as they need. Thus this model perfectly fits in the management of rare spikes in the demand.

- Ansh Agarwal (SE - IT)

Hologram dashboard

BMW i Inside Future concept makes the dashboard a tactile hologram.

BMW is taking things in a different direction with its i Inside Future concept. While the concept is steeped in a future where autonomous cars are the norm, it has little to do with the technology that will make these cars go. Instead, this “sculpture,” as BMW is calling it, deals entirely with what our car interiors could look like once we make the jump to fully autonomous car.

In fact, there’s hardly any exterior to speak of in this sculpture, leaving the focus fully on the interior layout and BMW’s HoloActive Touch system. HoloActive Touch will serve as the interface for passengers in these autonomous cars, and in BMW’s own words, it “fuses the advantages of the BMW Head-Up Display, BMW gesture control and intuitive touchscreen functionality with revolutionary technology.”

The system uses mirrors to project what appear to be holograms above a display embedded in the center console. A set of cameras will track your finger movements as you “interact” with HoloActive Touch, even though you aren’t actually touching anything.

When the cameras detect that you’ve made contact with an item in the virtual display, an ultrasound source will confirm your selection by providing some tactile feedback. It’s a crazy interface system that seems pretty futuristic in its execution, but it’s only one part of this i Inside Future concept. If you can peel yourself away from HoloActive Touch in-car controls, you’ll find that the rest of the sculpture provides an interesting vision for the future of car interiors.

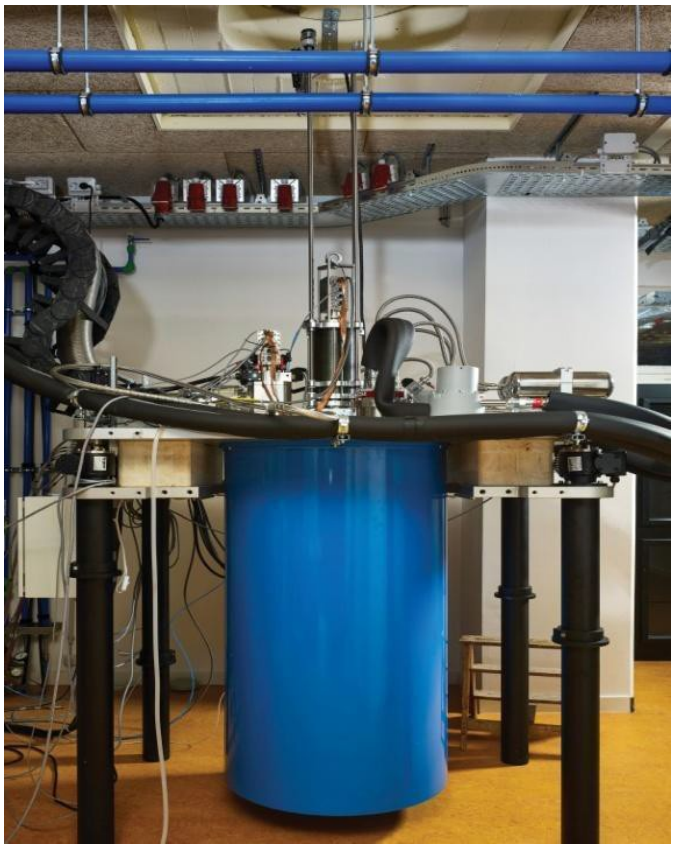
- Yogesh Gaikwad (TE - IT)

Practical Quantum Computers

Advances at Google, Intel, and several research groups indicate that computers with previously unimaginable power are finally within reach.

One of the labs at QuTech, a Dutch research institute, is responsible for some of the world's most advanced work on quantum computing, but it looks like an HVAC testing facility. Tucked away in a quiet corner of the applied sciences building at Delft University of Technology, the space is devoid of people. Buzzing with resonant waves as if occupied by a swarm of electric katydids, it is cluttered by tangles of insulated tubes, wires, and control hardware erupting from big blue cylinders on three and four legs.

Inside the blue cylinders—essentially supercharged refrigerators—spooky quantum-mechanical things are happening where nanowires, semiconductors, and superconductors meet at just a hair above absolute zero. It's here, down at the limits of physics, that solid materials give rise to so-called quasiparticles, whose unusual behavior gives them the potential to serve as the key components of quantum computers. And this lab in particular has taken big steps toward finally bringing those computers to fruition. In a few years they could rewrite encryption, materials science, pharmaceutical research, and artificial intelligence.



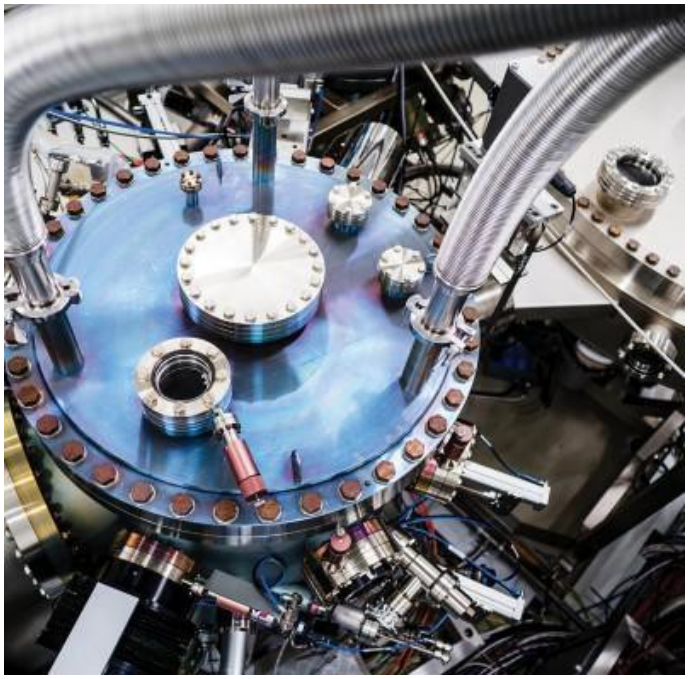
This blue refrigerator gets down to just above absolute zero, making quantum experiments possible on tiny chips deep inside it. In subsequent photos are scenes from the Delft lab where the experiments are prepared.

People have long wrestled with this problem in efforts to build quantum computers, which could make it possible to solve problems so complex they exceed the reach of today's best computers. But now Kouwenhoven and his colleagues believe the qubits they are creating could eventually be inherently protected—as stable as knots in a rope. Such stability would allow researchers to scale up quantum computers by substantially reducing the computational power required for error correction.

What Is a Quantum Computer?

At the heart of quantum computing is the quantum bit, or qubit, a basic unit of information

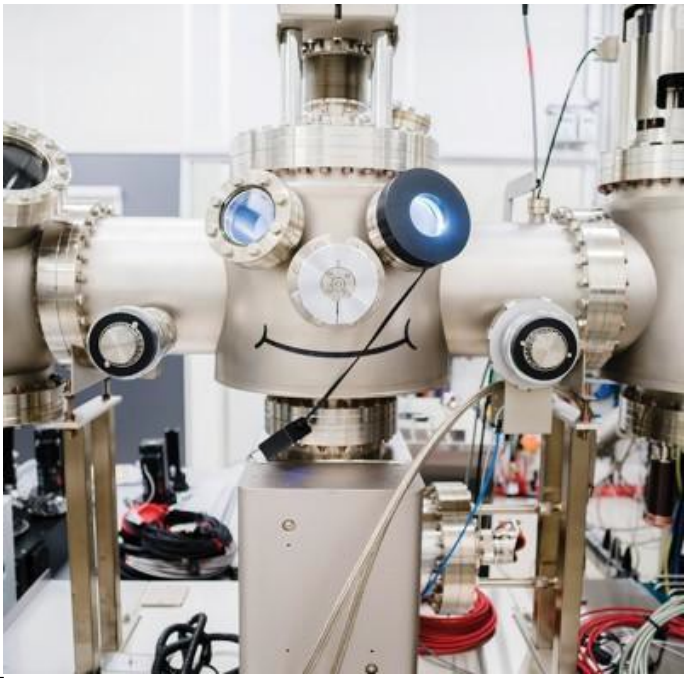
analogous to the 0s and 1s represented by transistors in your computer. Qubits have much more power than classical bits because of two unique properties: they can represent both 1 and 0 at the same time, and they can affect other qubits via a phenomenon known as quantum entanglement.



That lets quantum computers take shortcuts to the right answers in certain types of calculations.

Quantum computers will be particularly suited to factoring large numbers (making it easy to crack many of today's encryption techniques and probably providing uncrackable replacements), solving complex optimization problems, and executing machine-learning algorithms. And there will be applications nobody has yet envisioned.

Soon, however, we might have a better idea of what they can do. Until now, researchers have built fully programmable five-qubit computers and more fragile 10- to 20-qubit test systems. Neither kind of machine is capable of much. But the head of Google's quantum computing effort, Harmut Neven, says his team is on target to build a 49-qubit system by as soon as a year from now. The target of around 50 qubits isn't an arbitrary one. It's a threshold, known as quantum supremacy, beyond which no classical supercomputer would be capable of handling the exponential growth in memory and communications bandwidth needed to simulate its quantum counterpart. In other words, the top supercomputer systems can currently do all the same things that five- to 20-qubit quantum computers can, but at around 50 qubits this becomes physically impossible.



- Omkar Vichare (TE I.T.)

Future storage device

If someone from the future–two decades or two centuries from now–traveled back in time to today,

they'd probably chuckle at our use of hard drives and USB sticks, the way we now wonder how we ever

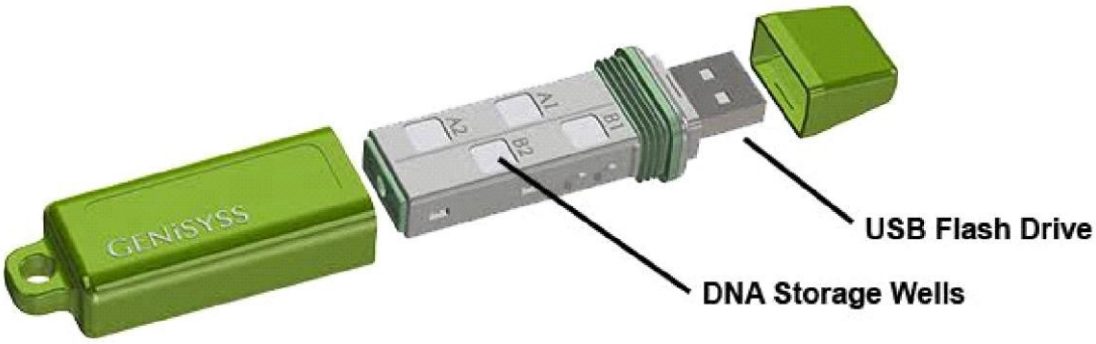
survived with floppy disks and Zip drives.

Inventors and researchers continue to push the envelope when it comes to capacity, performance, and

the physical size of our storage media. Today, Backblaze stores 150 petabytes of customer data in its

data centers, but in the future, they'll likely be able to store an almost incomprehensible amount

data–zettabytes



DNA:

Perhaps the strangest new storage technology of the future is DNA. Yes, the molecule that stores

biological information could be used to store other kinds of data. Harvard researchers in 2012 were able

to encode DNA with digital information, including a 53,400-word book in HTML, eleven JPEG images,

and one JavaScript program. DNA offers incredible storage density, 2.2 petabytes per gram, which

means that a DNA hard drive about the size of a teaspoon could fit all of the world's data on it–every

song ever composed, book ever written, video ever shared. Besides the space savings, DNA is ideal for

long-term storage: While you're lucky if your hard drive lasts four years and optical disks are susceptible

to heat and humidity

DNA takes a long time to read and write to and, as you might imagine, the technology is still too expensive to be usable now. According to New Scientist, in one recent study the cost to encode 83 kilobytes was £1000 (about $1,500 US dollars). Still, scientists are encoding information into artificial DNA and adding it to bacteria. DNA could be the ultimate eternal drive one day.

DNA STORAGE DATA READING AND WRITING:

Light makes write for DNA information storage device

In an effort to make data storage more cost-effective, a group of researchers from National Tsing Hua

University in Taiwan and the Karlsruhe Institute of Technology in Germany have created a DNA-based

memory device that is "write-once- read-many- times" (WORM), and that uses ultraviolet (UV) light to

make it possible to encode information. The device, described in a paper accepted to the AIP's Applied

Physics Letters, consists of a thin film of salmon DNA that has been embedded with silver nanoparticles

and then sandwiched between two electrodes. Shining UV light on the system enables a light-triggered

synthesis process that causes the silver atoms to cluster into nano-sized particles, and readies the

system for data encoding. In some cases, using DNA may be less expensive to process into memory

devices than using traditional, inorganic materials like silicon, the researchers say.

At first, when no voltage or low voltage is applied through the electrodes to the UV-irradiated DNA, only

a low current is able to pass through the composite; this corresponds to the "off" state of the device.

But the UV irradiation makes the composite unable to hold charge under a high electric field, so when

the applied voltage exceeds a certain threshold, an increased amount of charge is able to pass through.

This higher state of conductivity corresponds to the "on" state of the device.

The team found that this change from low conductivity ("off") to high conductivity ("on") was

irreversible: once the system had been turned on, it stayed on, no matter what voltage the team applied

to the system. And once information is written, the device appears to retain that information

indefinitely: the researchers report that the material's conductivity did not change significantly during

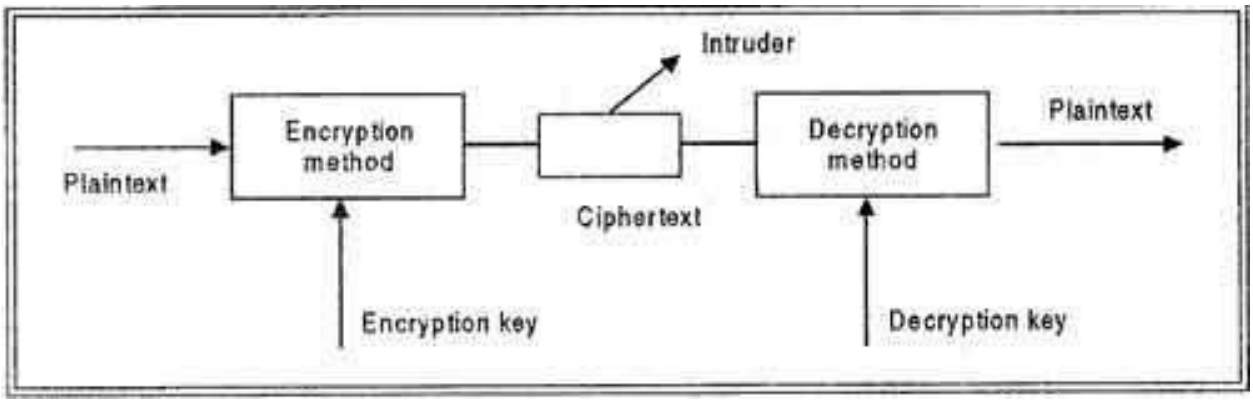
nearly 30 hours of tracking. The authors hope the technique will be useful in the design of optical

storage devices and suggest that it may have plasmonic applications as well.

- Saurabh Talathi (TE - IT)

ENCRYPTING STORAGE IN SMALL FORM FACTORS

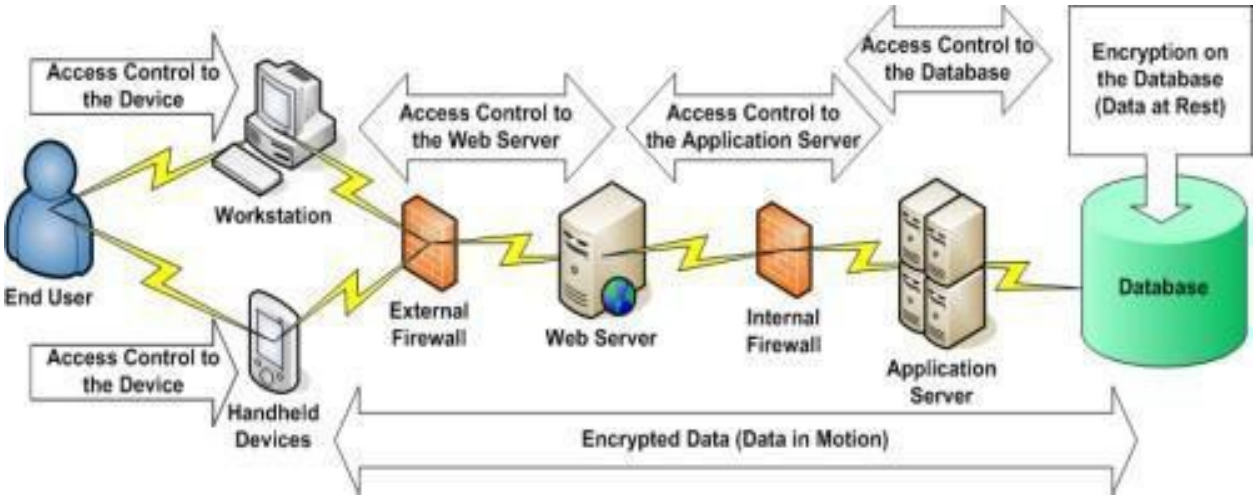
Self-encrypting storage devices are becoming increasingly popular in embedded systems. Whether employed in the commercial space to prevent end users from modifying manufacturer-installed software and policy (e.g., mobile-phone "rooting") or used in government systems to secure sensitive data against sophisticated adversaries, the threats and general threat-mitigation mechanisms remain the same.



The primary use for encrypted storage – whether implemented in software, firmware, or hardware – is to satisfy security requirements concerning “data at rest”; that is, requirements for protecting data while it resides in non-volatile storage. While it may seem obvious that encrypting data while it is at rest will satisfy the letter of the requirement, caution is nonetheless warranted regarding the handling of cryptographic keys .Increasingly, computation in military systems is moving to mobile devices. If such mobile devices are tied to data sources via cabling or wireless networking, then their flexibility or battery life suffers. As a result, mobile devices commonly store (or cache) any data necessary for their operation locally. A second common motivation for small-form-factor storage relates to system sanitization: To more easily sanitize sensitive data from complex systems, it is frequently helpful to isolate the storage and usage of such data in a removable module. Since such a module is often carried away with the operator as part of standard operating procedure, a pocket-sized form factor is a convenient choice.

At its most abstract level, encryption is an invertible means to replace a meaningful message with one that is meaningless. There are two general ways this is accomplished: Symmetric ciphers define a bijection (one-to-one mapping) between the space of meaningful messages (plaintexts) and the space of meaningless ones (ciphertexts). In contrast, asymmetric ciphers compute a mathematical identity in two or more distinct steps, such that “encryption” moves to an intermediate result (cipher text), and “decryption” completes the identity, returning to the original value (plaintext).If the underlying mathematical primitive (i.e., bijective or identity-in-use) is well-known or predictable, then any- one can recover the plaintext for a given cipher text. This is where the keys enter: Successful cryptosystems select the mathematical primitive to be used – from a very large pool of

possible primitives – using the key. AES-256 is a shorthand way to represent 2 256 different block-sized lookup tables, where the key selects which one to use. Without the key, a malicious user cannot practically determine the underlying mathematical primitive. The critical observation is that encryption alleviates concerns about revealing the plaintext. It does, however, generate a new concern: protecting the key against exposure. Attempting to protect the key via encryption would yield an infinite recursion. Therefore, encryption offers a transformation of the data-confidentiality problem, not a solution. The task of protecting arbitrary data is transformed into the task of protecting a key with a fixed form.



Self-encrypting storage devices must secure cryptographic keys without the aid of cryptography. The need to manage the cryptographic keys is the fundamental engineering challenge in producing secure systems that leverage self-encrypting storage.

- By Vishaka Mandge (SE-IT)

Google's Project Jacquard: Wearable Technology for Normal People

The project is inspired by the Jacquard weave, a fabric in which the design is incorporated into the weave instead of being printed on it. In designing these smart jackets, a special conductive thread was used, which is compatible with existing looms. Coupled with a small Bluetooth controller running on a standard watch battery, this connected weave allows the jackets to pair with other gadgets and enable interactivity.

Releasing this spring, the first of these is the *Commuter* line which was designed for urban cyclists who are always on the move. You can tap, swipe or hold the cuff of the sleeve to answer or block phone calls, access voice-delivered navigation or change music tracks — all of the necessary wizardry coming from a thin flexible strap around the cuff.

Ivan Poupyrev, who heads the Jacquard team at ATAP, says that this interactive fabric is a "platform", adding that Google would be making the APIs — code packages — that will allow developers to customise the jackets functions. He adds, "Wearables to date have just been able to do one thing, in our case the garment does what you want it to do." Users have complete control over what their gestures would mean to the jacket; Using an accompanying app, they can essentially program the interface to have preferred functions.

It isn't just the addition of a few lengths of conductive yarn and touch gestures that make Project Jacquard so exciting. The vision that Google and Levi's had was to make a jacket that feels like any other, one that was fashionable and durable; a piece of technology that wasn't "precious

The weave is durable enough for regular use; you can throw it on a chair when taking it off, or even put it in the washing machine. “The real news is that we’ve made wearables that you can throw in the washing machine, and that still have functional technology afterwards,” explains Dillinger. The only thing one would need to remove is the cuff strap.

- Komal Dhing (TE - IT)

OVERCLOCKING

OVERVIEW:

Overclocking as the name goes over-clock i.e increasing clock speed of a particular component. Basically clock speed or clock rate is no.of cycles that component can perform each second. Overclocking is one of the most effective optimisation techniques that is nowadays used which is better than third party softwares. It is mostly used by gamers,high end video editors and by geeks who want to get maximum performance from their system. Overclocking can be done to CPU'S ,GPU'S and also monitors can be overclocked to a certain extent. Technically any component that uses a timer (or clock) to synchronize its internal operations can be overclocked.

CONSIDERATIONS:

There are a lot of factors which we need to consider while we think of overclocking for eg. Cooling, power supply,voltage control etc.

For CPU: All the CPU's in the market can be overclocked to some extent but there are series available in market which are made specially for overclocking for eg. INTEL's K series which can be overclocked to a greater extent than normal CPU's so that considerable difference is seen in performance and here comes the main game i.e factors for eg. When we overclock a cpu from 2.7 GHz to 3GHz i.e it has increased its clock speed i.e no of cycles per second by several MHz so ultimately temperature also increases so it should be taken care that it remains below its safe temperature i.e below the temperature it gets damaged or can cause several issues here we also need to change voltage and power supply accordingly. There are various softwares available in market for smooth overclocking like MSI overdrive,CPU-z,Riva tuner etc or it can be overclocked from bios settings as well.

For GPU: Similarly for GPU excellent cooling and voltage control is must i.e we need a good PSU as well as good cooling unit because if a GPU hits a particular temperature it may just simply turn off and may also get damaged . Similarly like CPU's GPU's also have special oc(overclock) edition which is meant for smooth overclocking. Software such as MSI Afterburner can be really useful for overclocking GPU.

Similarly Monitor overclocking is slightly challenging; it is fairly easy as long as the instructions, warnings, and requirements are read, though. Overclocking by CRU's(custom resolution utility) This one is one of the older methods, and may not be compatible with all GPUs or integrated Intel graphics. It does, however, seem to work very well with AMD graphics. Or we can also use simply Nvidia's control panel or for AMD radeon settings for AMD GPU's .Just like overclocking a processor, all of this is done at your own risk. You *should* be able to experiment without blowing up your PC monitor, but there are never any guarantees . So be careful with your gear. Also bear in mind that the connection to your monitor from the PC could have an effect, as does the resolution. You might be able to overclock at 720p, for example, but not at 1080p.

Advantages of overclocking:

1)Higher **performance** in games, en-/decoding, video editing and system tasks at no additional expense, but with increased electrical consumption and thermal output.

2)It can be **cheaper** to purchase a lower performance component and overclock it to the clock rate of a more expensive component.

3)Extending the useful life of older equipment.

Disadvantages of overclocking:

1)Higher clock rates and voltages increase **power consumption**, also increasing **electricity cost** and **heat production**.

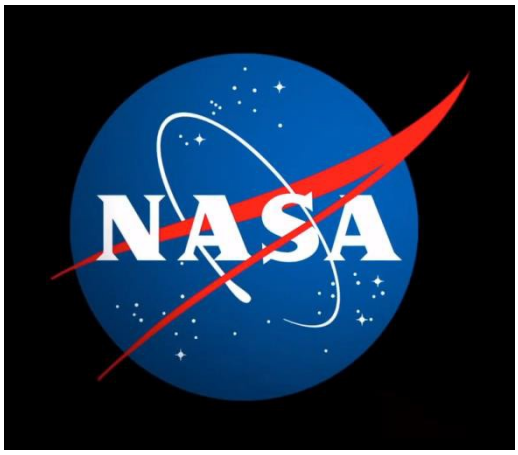
2)Fan **noise**: High-performance fans running at maximum speed used for the required degree of cooling of an overclocked machine can be noisy, some producing 50 db or more of noise.

3)The **lifespan** of semiconductor components may be reduced by increased voltages and heat

4)Warranties may be voided by overclocking.

- Dhanesh Lunkad (SE-IT)

SOFTWARES SIGNIFICANTLY SHINING AT NASA



"Worldview" satellite imagery browsing and downloading tool

Worldview is a software tool designed for interactively browsing and downloading imagery from NASA's Earth observing satellites. Building upon a set of open source mapping and user interface libraries, it provides an environment to visually discover interesting phenomena as observed by NASA.

(This replaces NTR#47891) Radiometric Calibration of UAVSAR Images

UAVSAR backscatter data contain both geometric and radiometric distortions due to underlying topography and the radar viewing geometry. Currently, backscatter variation due to topography is the single largest error source when estimating biomass over steep or hilly terrain.

3D GRAPE/AL v3: Three-Dimensional Grids About Anything By Poisson Equations

The new version (3.0) suite of the 3D GRAPE/AL software advances the state-of-the art in structured volume grid generation through the implementation of a new matching point block-to block boundary condition on adjacent faces of two blocks that no other volume grid generator has.

A Web-based Interface for Command and Control of Network Sensors

This software has been developed to be generic enough to be deployed on different types of sensor networks (not just volcano monitoring) with minimal changes and time investments.Summary: Provides for the visualization and control of a network of sensors through a web browser interface. A Web-based Search Service to Support Imaging Spectrometer Instrument Operations.

Just as web search involves more than matching phrases, spectral search is more challenging than simply matching the shape of the spectrum. The background substrate and illumination changes can cause the same signature to appear very different across scenes.

Aerosol and surface parameter retrievals for multi angle multiband spectrometer

This software uses novel technologies for highly accurate spectro-polarimetric imaging and physically-based dehazing from space.

An Algorithm for Estimating the Wavefront to be Measured by a Phase Retrieval Camera from an Image Captured by a Shack-Hatmann Camera

Phase retrieval (PR) and Shack-Hartmann Sensor (SHS) are the two preferred methods of image-based wavefront sensing widely used in various optical testbeds, adaptive optical systems, as well as ground- and space-based telescopes.

Analysis Software for Cosmic Microwave Background Research

This is a suite of analysis tools for cosmic microwave background research. It currently consists of an implementation of the pure C_\ell cosmic microwave background power spectrum estimator. It also includes an implementation of the mode-mixing matrix calculation.

"NASA Glenn Research Center: The Early Years" for iPad

Photographic gallery type application containing imagery and descriptions from the GRC image archive. Photos and data cover the period from 1941-1979. The software has been compiled and bundled as an iOS app for the iPad and intended for release through the Apple App Store.

Apparatus for Evaluating Software Decision Logic (ADEPT)

The ADEPT design tool integrates a graphical user interface with an automation decision-logic application. The software generates testable prototypes for traditional usability evaluations. Exportable products can be added to the base architecture.

Automated Evaluation Software (AES) Web Application

AES allows source evaluation boards to enter, modify, and rate vendor proposals against a request for proposal (RFP). Created using modern Java enterprise technologies, the tool provides Microsoft output and dynamic report generation. The user interface is compatible with both Internet Explorer.

Gold Standard Test Set (GSTS)

The GSTS ground support equipment verifies that a command, control, communications, and intelligence (C3I) system complies with the interoperability standards for radio links and Ethernet interfaces. The technology, which does not check content, has been used to verify the interoperability.

Hazards Analysis Management Tool (HAMT)

HAMT uses a single software tool to increase the efficiency and effectiveness of hazard analyses. Composed of a Microsoft Access front-end (that contains the user interface) paired with a Microsoft Access back end (that stores analysis data), the software can be used to enter, edit, and report.

ICAROUS' Communication and Decision Making Software Modules

The communication module of ICAROUS enables data transfer between ICAROUS and other off board entities, e.g., ground stations, other air traffic, via the open source MAVLink protocol.

Jet Propulsion Laboratory (JPL) Stereo Vision Software Suite (JPLV)

JPLV provides a set of libraries and utilities for basic robotic vision, including stereo ranging and camera calibration. Primarily intended for vision system users rather than vision system developers, the suite hides most implementation details behind a high-level application user interface.

Lidar Based Hazard Relative Navigation Algorithm for Safe Lunar Landing

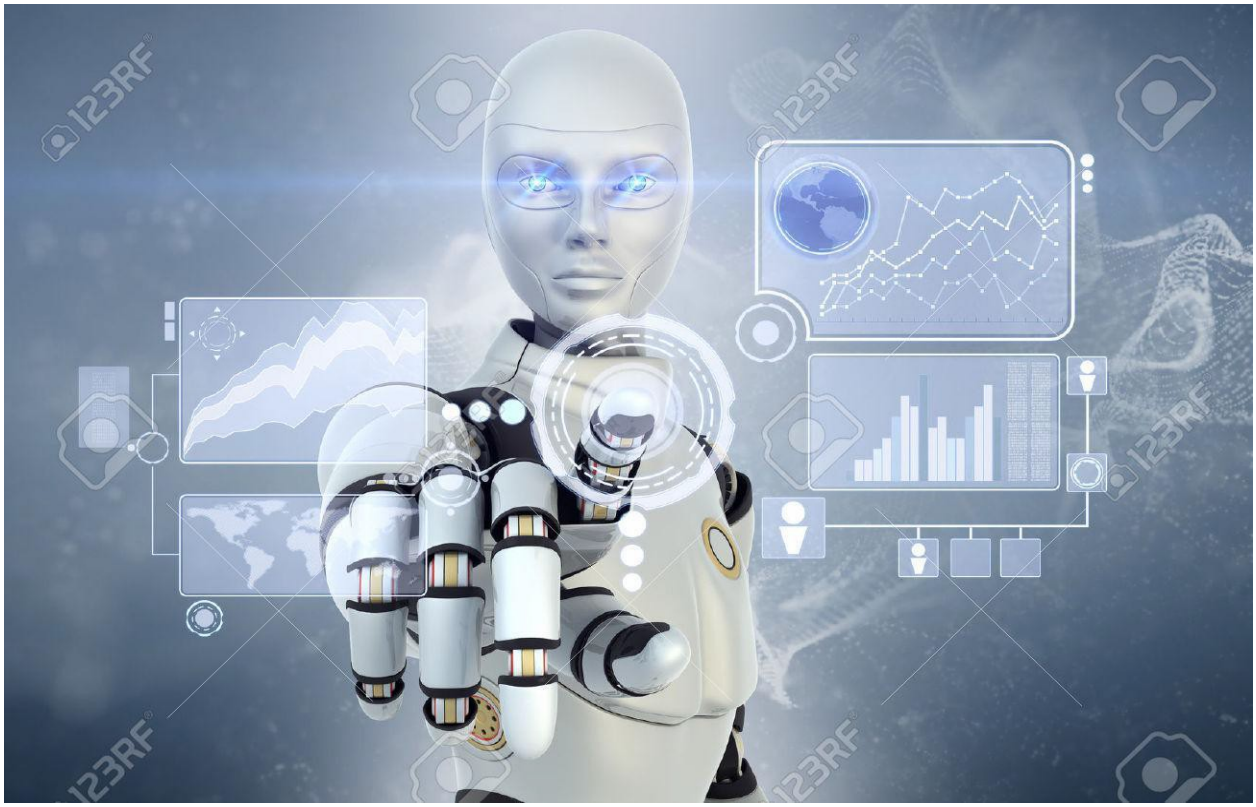
The purpose of HRN is to provide measurements to the Navigation Filter so that it can limit errors on the position estimate after hazards have been detected. The hazards are detected by processing a hazard digital elevation map (HDEM). The HRN process takes lidar images as the spacecraft.

Linked Autonomous Interplanetary Satellite Orbit Navigation (LiAISON) Between a Satellite in a Lunar Halo Orbit and a Geosynchronous Earth Orbiter

The technology being described involves the collection of satellite-to-satellite tracking data between a satellite near the Moon (e.g., a halo orbit about either the lunar L1 or L2 points) and a satellite in GEO orbit. The measurements may be 1-way if both satellites have accurate clocks.

- Sweety Samanta (TE - IT)

Artificial Intelligence



Artificial intelligence (AI, also machine intelligence, MI) is intelligence exhibited by machines, rather than humans or other animals (*natural intelligence*, *NI*). In computer science, the field of AI research defines itself as the study of "intelligent agents": any device that perceives its environment and takes actions that maximize its chance of success at some goal. Colloquially, the term "artificial intelligence" is applied when a machine mimics "cognitive" functions that humans associate with other human minds, such as "learning" and "problem solving".

The scope of AI is disputed: as machines become increasingly capable, task considered as requiring "intelligence" are often removed from the definition, a phenomenon known as the AI effect, leading to the quip "AI is whatever hasn't been done yet". For instance, optical character recognition is frequently excluded from "artificial intelligence", having become a routine technology. Capabilities generally classified as AI, as of 2017, include successfully understanding human speech, competing at a high level in strategic game systems (such as chess and Go), autonomous cars, intelligent routing in content delivery networks, military simulations, and interpreting complex data.

AI research is divided into subfields that focus on specific problems, approaches, the use of a particular tool, or towards satisfying particular applications.

The central problems (or goals) of AI research include reasoning, knowledge, planning, learning, natural language processing(communication), perception and the ability to move and manipulate objects. General intelligence is among the field's long-term goals. Approaches include statistical methods, computational intelligence, and traditional symbolic AI. Many tools are used in AI, including versions of search and mathematical optimization, logic, methods based on probability and economics. The AI field draws upon computer science, mathematics, psychology, linguistics, philosophy, neuroscience, artificial psychology and many others.

The field was founded on the claim that human intelligence "can be so precisely described that a machine can be made to simulate it". This raises philosophical arguments about the nature of the mind and the ethics of creating artificial beings endowed with human-like intelligence, issues which have been explored by myth, fiction and philosophy since antiquity. Some people also consider AI a danger to humanity if it progresses unabatedly. Attempts to create artificial intelligence have experienced many setbacks, including the ALPAC report of 1966, the abandonment of perceptrons in 1970, the Lighthill Report of 1973, the second AI winter 1987–1993 and the collapse of the Lisp machine market in 1987.

In the twenty-first century, AI techniques, both hard (using a symbolic approach) and soft (sub-symbolic), have experienced a resurgence following concurrent advances in computer power, sizes of training sets, and theoretical understanding, and AI techniques have become an essential part of the technology industry, helping to solve many challenging problems in computer science. Recent advancements in AI, and specifically in machine learning, have contributed to the growth of Autonomous Things such as drones and self-driving cars, becoming the main driver of innovation in the automotive industry.

Artificial intelligence has many applications in today's society. More specifically, it is Weak AI, the form of AI where programs are developed to perform specific tasks, that is being utilized for a wide range of activities including medical diagnosis, electronic trading, robot control, and remote sensing. AI has been used to develop and advance numerous fields and industries, including finance, healthcare, education, transportation, and more.

Typical problems to which AI methods are applied

- Optical character recognition
- Handwriting recognition
- Speech recognition
- Face recognition
- Artificial creativity
- Computer vision, Virtual reality and Image processing
- Diagnosis (artificial intelligence)
- Game theory and Strategic planning
- Game artificial intelligence and Computer game bot
- Natural language processing, Translation and Chatterbots
- Nonlinear control and Robotics

Other fields in which AI methods are implemented

- Artificial life
- Automated reasoning
- Automation
- Biologically inspired computing
- Concept mining
- Data mining
- Knowledge representation
- Semantic Web
- E-mail spam filtering
- Robotics
    - Behavior-based robotics
    - Cognitive
    - Cybernetics

- Developmental robotics (Epigenetic)
- Evolutionary robotics
- Hybrid intelligent system
- Intelligent agent
- Intelligent control
- Litigation

Let's discuss some of these:-

Game Playing:-

You can buy machines that can play master level chess for a few hundred dollars. There is some AI in them, but they play well against people mainly through brute force computation--looking at hundreds of thousands of positions. To beat a world champion by brute force and known reliable heuristics requires being able to look at 200 million positions per second.

Speech Recognition:-

In the 1990s, computer speech recognition reached a practical level for limited purposes. Thus United Airlines has replaced its keyboard tree for flight information by a system using speech recognition of flight numbers and city names. It is quite convenient.

Understanding Natural Language:-

Just getting a sequence of words into a computer is not enough. Parsing sentences is not enough either. The computer has to be provided with an understanding of the domain the text is about, and this is presently possible only for very limited domains.

Expert Systems:-

A "knowledge engineer" interviews experts in a certain domain and tries to embody their knowledge in a computer program for carrying out some task. How well this works depends on whether the intellectual mechanisms required for the task are within the present state of AI. When this turned out not to be so, there were many disappointing results.

One of the first expert systems was MYCIN in 1974, which diagnosed bacterial infections of the blood and suggested treatments. It did better than medical students or practicing doctors, provided its limitations were observed. Namely, its ontology included bacteria, symptoms, and treatments and did not include patients, doctors, hospitals, death, recovery, and events occurring in time. Its interactions depended on a single patient being considered. Since the experts consulted by the knowledge engineers knew about patients, doctors, death, recovery, etc., it is clear that the knowledge engineers forced what the experts told them into a predetermined framework. In the present state of AI, this has to be true. The usefulness of current expert systems depends on their users having common sense.

- Shivani Pacharne TE (IT)

THE IMPORTANCE OF CYBER SECURITY

We all live in a world which is networked together, from internet banking to government infrastructure, and thus, network protection is no longer an optional extra. Cyber-attack is now an international concern, as high-profile breaches have given many concerns that hacks and other security attacks could endanger the global economy.

A cyber-attack is a deliberate exploitation of computer systems, technology-dependant enterprises and networks. Cyber-attackers use malicious code and software to alter computer code, logic, or data, resulting in disruptive consequences that can compromise data and lead to cyber-crimes such as information and identity theft or system infiltration.

In 2015, it was reported by computer security group Veracode, that defending the UK against cyber-attacks and repairing the damage done by hackers who penetrate security systems costs businesses £34 billion per year.

In August 2015, the personal attack of 2.4 million Carphone Warehouse customers, including bank details and encrypted card digits, was affected by a data breach. Similarly, in December 2015, it emerged that in the previous June, the personal details of 656,723 customers of high street pub chain JD Wetherspoon were revealed, and the data was available for sale on the dark web.

By far the biggest, and most recent data breach however, happened in October 2015 when almost 157,000 TalkTalk customers had their personal data hacked into. 15,656 customers had their bank account numbers and sort codes leaked, resulting in bank accounts being hacked. As a result, the telecoms company lost 101,000 customers and suffered a cost of £60 million.

Given that cybercrime is worryingly regular, it is no surprise that governments and businesses are seeking elevated cyber defence strategies. In 2014, the European Network and Information Security Agency held a cyber security exercise involving 29 countries and over 200 organisations. The test simulated more than 2,000 cyber incidents including website defacements, access to sensitive information and attacks on critical infrastructure, with software and hardware failures judged the most damaging security threats.

There are two broad categories of cybercrime, breaches in data security and sabotage. Data security breaches refers to the theft of personal data, intellectual property or trade secrets, for example, whereas sabotage usually culminates in service attacks. These attacks flood web services with bogus messages, as well as more conventional efforts to disable systems and infrastructure.

Commercial losses, public relations issues, disruption of operations and the possibility of extortion aside, cyber-attacks may also impose companies to regulatory action, negligence claims, the inability to meet contractual obligations and a damaging loss of trust amongst customers and suppliers.

Cyber-crime is unlikely to slow down, despite government efforts and input from specialists. Its growth is being driven by the expanding number of services available online, and the increasing evolution of online criminals who are engaged in a continuous game with security experts.

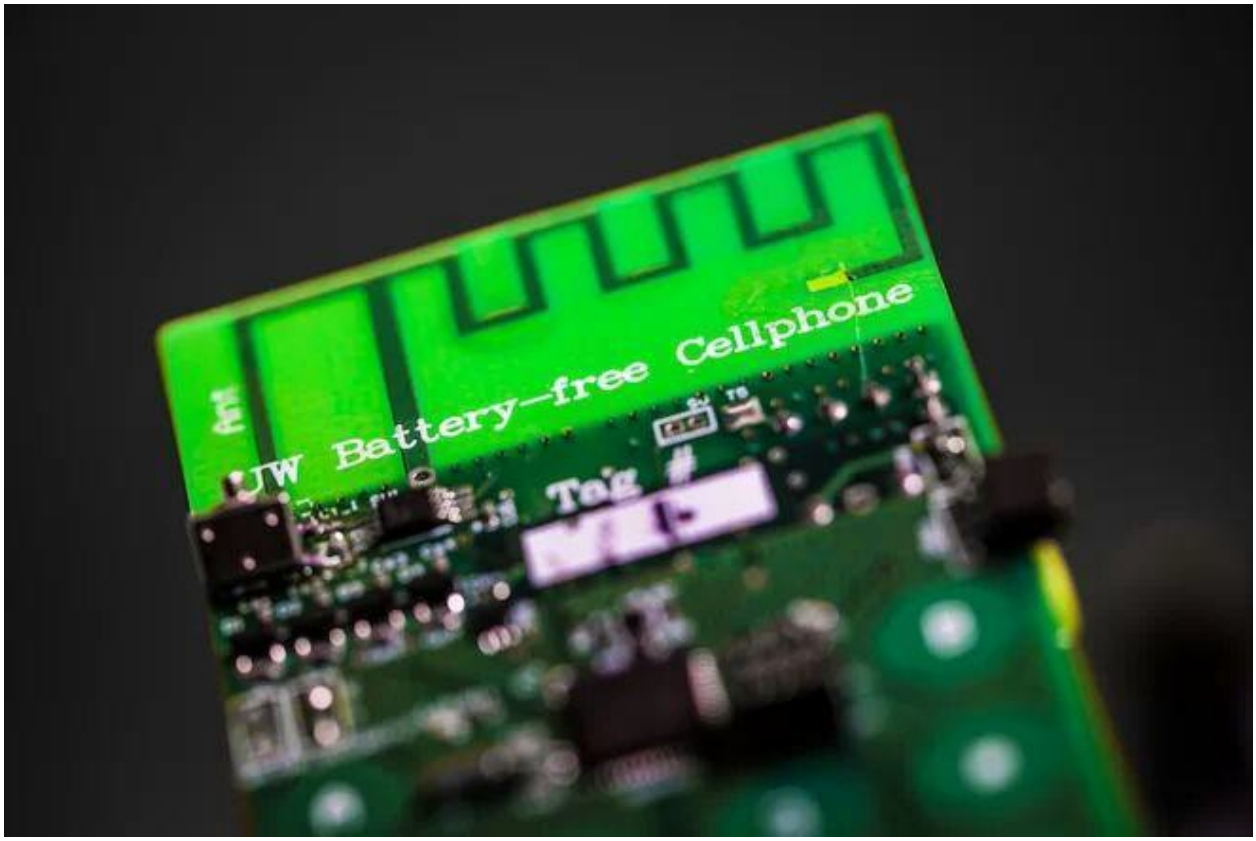
With constant technical innovation, new dangers are constantly coming to the surface. For example, the migration of data to third-party cloud providers has created an epicentre of data and therefore, more opportunities to misappropriate critical information from a single target. Similarly, mobile phones are now targets, expanding the opportunities to penetrate security measures.

M2M (machine-to-machine) is used globally. This development of the Internet of Things, which enables communication between machines, is said to be responsible for a boost in information misuse. With much of the world's controlling services and critical infrastructure already depending on M2M, protecting the network that controls and carries these services is imperative, especially since decision marketing is often done without human involvement.

Cyber security should be thorough and seamless, regardless or business size or organisational standing. Computer networks will forever be the target of criminals, and it can be argued that the danger of cyber-security breaches will only increase in the future as networks continue to expand. Having the right level of preparation and specialist assistance is vital to minimise and control damage, and recover from a cyber breach and its consequences. Online hacking was not always done for a negative cause. Organisations used it for many productive things, which gave birth to the term - ‘Ethical Hacking’. Similarly, Offline Hacking can also prove to be a great boon for us if it is done ethically. Let’s hope that it stays ethical.

- Kirti Choudhary (TE-IT)

This New Cell Phone Uses Such Little Power It Doesn't Need a Battery



The newly developed battery free cell phone can send and receive calls using only a few microwatts of power.

Imagine being out and about, only to realize that your phone's battery life is running dangerously low and there's nowhere nearby to charge it. Now imagine how liberating it could feel to not have to worry about that. A new cell phone prototype could one day provide such relief because it doesn't need a battery at all, according to a new study.

The phone, a voice call only device, is by no means the best cell on the block the calls crackle and the phone only works within a stone's throw of a computer that serves as a sort of cell tower. But how does the device work without a battery?

The cellphone requires such little power only a few microwatts rather than the 100 microwatts a smartphone uses for voice calls that the power it does need can be collected from the environment, according to the researchers.

A tiny photodiode, smaller than an adult's pinky nail, collects ambient light while a radio frequency harvester makes it possible to use energy sent out wirelessly from a homemade cell tower, called a base station.

To make even such a simple-sounding phone one that doesn't draw on a battery required the phone's developers, a team of researchers from the University of Washington, to overcome a hurdle inherent in other battery-free devices.

The trick others have used to enable devices to work without a battery is to alternate periods of activity with periods of energy collection. That is, the devices would switch off periodically, which, while practical enough for a camera or a temperature sensor, would be maddening for a phone.

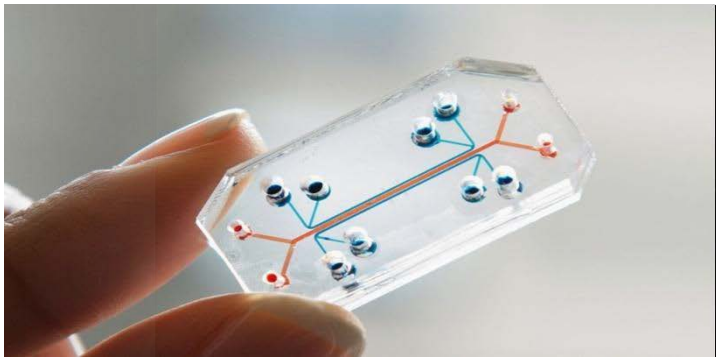
To keep their phone working continuously, the researchers chose perhaps a counterintuitive approach " to go analog". The battery-free cellphone incorporates a technology called analog backscatter, a way to absorb or reflect a signal that requires less power than generating a signal, in the same way using a mirror to reflect the light from a flashlight takes less power than generating the light in the first place.

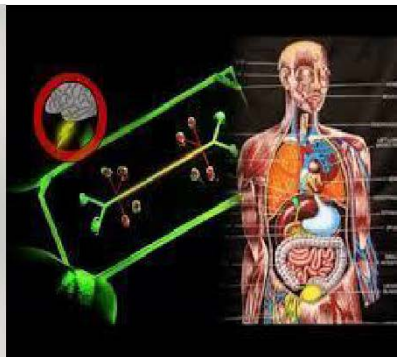
"By doing the signals in an analog way, we actually got the power consumption so low that you never have to turn off your phone," Vamsi Talla, one of the phone's designers and a computer science and engineering research associate at the University of Washington, told that the power-heavy work of converting analog signals into digital ones is then outsourced to the in-lab base station.

"It's the first type of their system in the world that demonstrates that you are actually able to make a phone call with just a microwatt power consumption.

- Diksha Kadam (TE - IT)

ORGANS ON CHIP





From years, man has been using animals in order to test pharmaceutical products on animals.The effects of this technique was found to be temporarily satisfying but in the long run,they came to the conclusion that,some products and chemicals that are reacting harmlessly on animals without any side-effects,on the other hand caused high rate of failure when used by humans.This was the situation that made the scientist to think about an alternative that is less harmful to animals as well as humans and that provides a way to make pharmaceutical testing more accurate.

Wyss Institute researchers and a multidisciplinary team of collaborators have engineered microchips that recapitulate the microarchitecture and functions of living human organs, including the lung, intestine, kidney, skin, bone marrow and blood-brain barrier. These microchips, called *'organs-on-chips'*, offer a potential alternative to traditional animal testing. Each individual organ-on-chip is composed of a clear flexible polymer about the size of a computer memory stick that contains hollow microfluidic channels lined by living human cells interfaced with a human endothelial cell-lined artificial vasculature, and mechanical forces can be applied to mimic the physical microenvironment of living organs, including breathing motions in lung and peristalsis-like deformations in the intestine. Because the micro devices are translucent, they provide a window into the inner workings of human organs.

Organs on chip has the ability to host and combine the different cell and tissue types making up human organs, organs-on-chips present an ideal microenvironment to mimic human-specific pathophysiology and enable molecular and cellular scale analysis and identification of new therapeutic targets within an organ-level context in vitro. This technology has paved way for recreating therapeutically relevant interfaces like the blood-brain-barrier, which has been engineered from human stem cells with a novel differentiation method to investigate drug pharmacokinetics and facilitate discovery of new therapeutics.

In another example, researchers are given the means to culture living micro-biome for extended times in direct contact with living human intestinal cells to enable insights into how these microbes influence health and disease or the modeling of infections with clinically relevant viruses to identify viral strategies and vulnerabilities. They also open up new possibilities to investigate how environmental factors like cigarette smoke affect tissue health and physiology in individual patients as shown in a smoking machine that precisely mimics human smoking behavior and its impact on human lung airway functions.

To mimic the interconnectedness of organs within humans, organ on chip technology has also helped to developed an automated instrument to link multiple organs-on-chips together by their common vascular channels. This instrument, designed to mimic whole-body physiology, controls fluid flow and cell viability while permitting real-time observation of the cultured tissues and the ability to analyze complex interconnected biochemical and physiological responses across ten different organs. This holistic “human body-on-a-chip” approach will be used to rapidly assess systemic responses to new drug candidates, providing higher-level information on their safety and efficacy.

Organ on chip is a great innovation that brings, engineering and the field of pharmacy together, the result that will positively impact the human life, also that of animals.

- Pooja Suvarnakhandi (BE - IT)

Virtual Retinal Display

A machine consists of many sub systems working together to perform a certain task. The information from the electronic devices are retrieved from the machine subsystems as binary code. All this information is presented in a user readable format through a display device. The display technology has seen a rapid growth in the past few decades from the old CRT (Cathode Ray Tube) displays to the presently in demand LCD (Liquid Crystal Display) and LED (Light Emitting Diode) displays. The LCDs and LEDs consists of two dimensional arrays of individual display units (pixels) whose number to size of display determines the clarity of the display (resolution). These display units which we encounter on a daily basis (LCDs and LEDs) are pixel based display systems where these individual pixels form an image by combining individual colors. The colors are formed by different intensities of the primary colors RGB (Red, Green and Blue) or CMYK (Cyan, Magenta, Yellow and Black) combinations. But these technologies have a poor reputation when it comes to image quality, weight and power consumption when they need to be considered for application in wearable technology.

This is where the emerging concept of Virtual Retinal Display comes into picture. It diminishes the gap between the screen and the retina to a zero by directly throwing light on the retina which is just like how we view the world around us. It was developed at the Human Interface Technology Laboratory (HIT Lab) in the University of Washington by Dr. Thomas A. Furness III. The VRD technology can produce images by scanning low power laser light directly onto the retina which will create high contrast, high resolution and bright images. This is especially designed to offer more interactive and immersive experience in Virtual Reality and Augmented Reality technologies. It provides a wide field of view with absolutely no background disturbance. In this article we will discuss the aspects and features of the VRD and some products which have released recently in the market like the Glyph by Avegant

The VRD technology uses scanned light beams projected directly onto the retina. A small spot on the

retina is focused on which the whole image is casted in the form of a raster image (array of color spaces but different from pixels). The production costs to develop the laser and optical systems will be inexpensive when mass produced. The VRD system consists of low cost light sources, optics and controllers.The combined assembly should be small enough to fit on a spectacle frame.

2**CONSTRUCTION**

The basic system of the VRD consists of six parts;

1. Video Source
2. Control and Drive Electronics
3. Photon Source
4. Modulation devices
5. Horizontal and Vertical Beam Scanning
6. Delivery Optics

3**WORKING**

The video signals are received by the VRD system from a graphics processing unit or a video camera. This information is used to modulate low power photon emitting sources like gas lasers, laser diodes or light emitting diodes in the colors of red, green and blue.

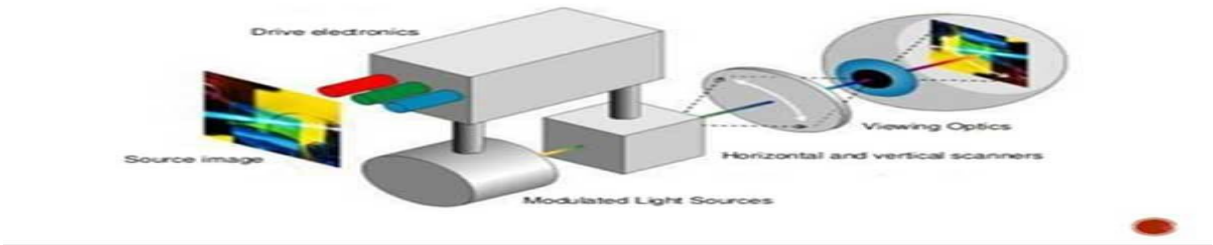
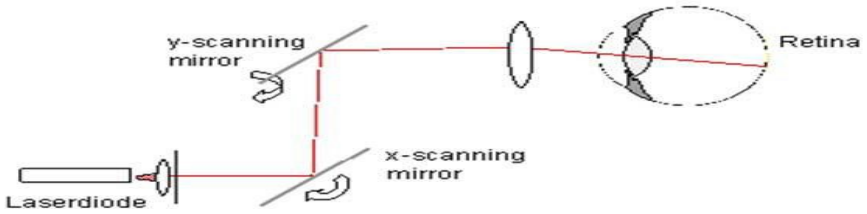


Figure 2Block diagram of the functioning of VRD

The combined light is passed through a single mode optical fiber. This strand carries the light to the main sub system of the VRD, the Mechanical Resonance Scanner (MRS). It consists of a polished mirror on a mount measuring 2cmx1cmx1cm. The mirror is oscillated by a magnetic field generated by coils which are present on the system mount. It oscillates at a frequency of 15 KHz and an angular range of 12 degrees. The movement of the mirror on the MRS produces a scanned light in the horizontal direction. This scanned light is passed through a mirror galvanometer which is a second set of MRS arranged in a different configuration to allow the vertical light scanning. The combination of vertical and horizontal light scan produces a two dimensional raster which is cast onto the focused spot on the retina.The scanned image can be sent through a mirror/combiner to superimpose the image onto to the real world view for the case of augmented reality.



Another important strength is that the scanned light from the VRD is directly collected by the brain in the form of electric signal generated by the photoreceptors and tries to make sense of the image. Here, the human brain is providing computing power to the VRD and therefore reduces flickering as seen on CRT screens. Each unit of scanned image is projected on the retina for a short time (about 40 nanoseconds). Furthermore, it produces bright images sufficient for outdoor viewing along with a wide field of view while consuming energy in the scale of Nano watts.

- Deepak Mandal (TE - IT)

FUTURE USER INTERFACE

When we talk about user interface (UI) in computing, we're referring to how a computer program or system represents itself to its user, usually via graphics, text and sound. We're all familiar with the typical Windows and Apple operating system where we interact with icons on our desktop with our mouse cursors. Prior to that, we had the old-school text-based command-line prompt.

The shift from text to graphics was a major leap initiated by founder of Apple, Steve Jobs, with his hallmark Macintosh operating system in 1984. In recent years, we've also witnessed innovated UI that involved the use of touch (e.g. smartphones), voice (e.g. Siri) and even gestures (e.g. Microsoft Kinect). They're, however, pretty much in their primary stages of development.

Nevertheless, they give us a clue as to how the next revolution of UI may be. Curious? Here are 8 key features of what next-generation UI may going to be like:

1. Gesture Interfaces

The 2002 sci-fi movie, Minority Report portrayed a future where interactions with computer systems are primarily through the use of gestures. Wearing a pair of futuristic gloves, Tom Cruise, the protagonist, is seen performing various gestures with his hands to manipulate images, videos, datasheets on his computer system.

A decade ago, it might seem a little far-fetched to have such a user-interface where spatial motions are detected so seamlessly. Today, with the advent of motion-sensing devices like Wii Remote in 2006, Kinect and PlayStation Move in 2010, user interfaces of the future might just be heading in

that direction.

In gesture recognition, the input comes in the form of hand or any other bodily motion to perform computing tasks, which to date are still input via device, touch screen or voice. The addition of the z-axis to our existing two-dimensional UI will undoubtedly improve the human-computer interaction experience. Just imagine how many more functions can be mapped to our body movements.

Well, here's a demo video of g-speak, a prototype of the computer interface seen in Minority Report, designed by John Underkoffler who was actually the film's science advisor. Watch how he navigate through thousands of photos in a 3D-plane through his hand gestures and collaborate with fellow 'hand-gesturers' on team tasks. Excited? Underkoffler believes that such UI will be commercially available within the next five years.

2. Brain-Computer Interface

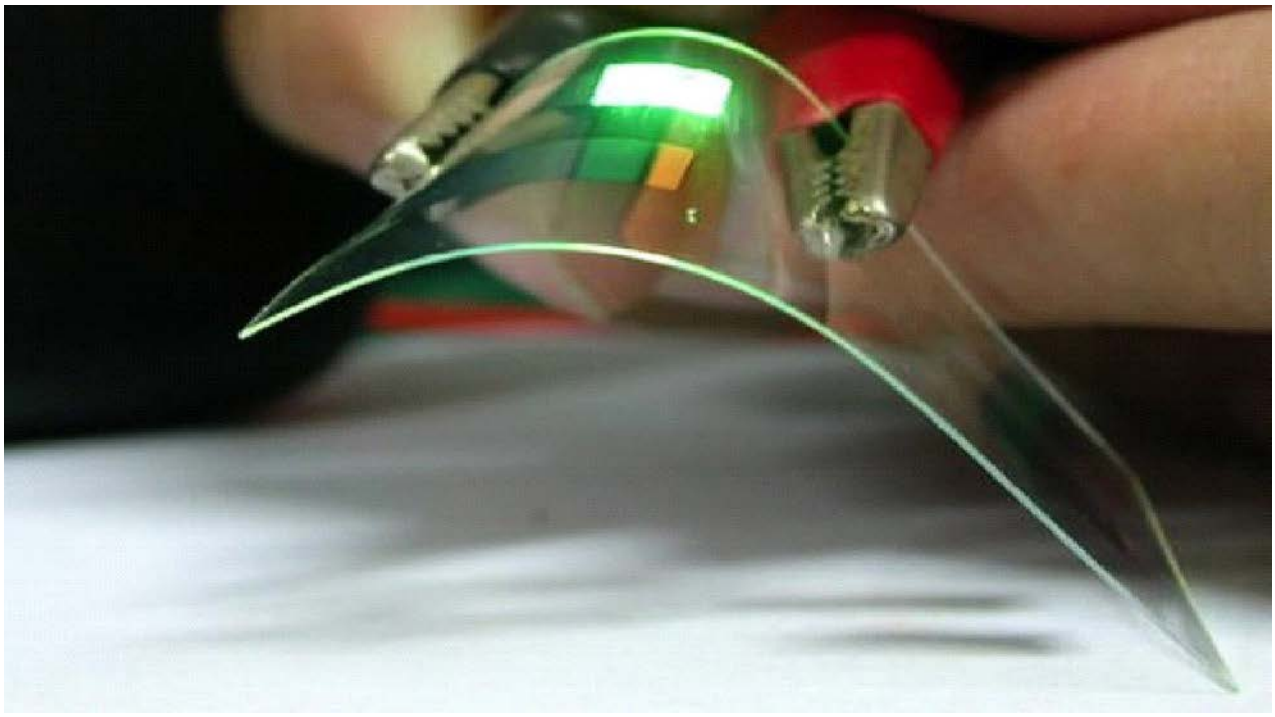
Our brain generates all kinds of electrical signals with our thoughts, so much so that each specific thought has its own brainwave pattern. These unique electrical signals can be mapped to carry out specific commands so that thinking the thought can actually carry out the set command.

In a EPOC neuroheadset created by Tan Le, the co-founder and president of Emotiv Lifescience, users have to don a futuristic headset that detects their brainwaves generated by their thoughts.

As you can see from this demo video, the command executed by thought is pretty primitive (i.e. pulling the cube towards the user) and yet the detection seems to be facing some difficulties. It looks like this UI may take awhile to be adequately developed.

In any case, envision a (distant) future where one could operate computer systems with thoughts alone. From the concept of a 'smart home' where one could turn lights on or off without having to step out of your bed in the morning, to the idea of immersing yourself in an ultimate gaming experience that response to your mood (via brainwaves), the potential for such an awesome UI is practically limitless.

3. Flexible OLED display



If touchscreens on smartphones are rigid and still not responsive enough to your commands, then you might probably be first in line to try out flexible OLED (organic light-emitting diode) displays. The OLED is an organic semiconductor which can still display light even when rolled or stretched. Stick it on a plastic bendable substrate and you have a brand new and less rigid smartphone screen.

Furthermore, these new screens can be twisted, bent or folded to interact with the computing system within. Bend the phone to zoom in and out, twist a corner to turn the volume up, twist the other corner to turn it down, twist both sides to scroll through photos and more.

Such flexible UI enables us to naturally interact with the smartphone even when our hands are too preoccupied to use touchscreen. This could well be the answer to the sensitivity (or lack there of) of smartphone screens towards gloved fingers or when fingers are too big to reach the right buttons. With this UI, all you need to do is squeeze the phone with your palm to pick up a call

- Reshma Ganjure(TE IT)

5G TECHNOLOGY

INTRODUCTION- If you take a stroll outside today, you'll see a lot of people with mobile phones, phablets or tablets in their hands calls, using the internet to catch up on the news, watch videos, or interacting with others via Facebook, Tumblr or Twitter includig you. In doing so, we all are using a mobile data network. Many of these applications particularly video consume a lot of bandwidth, so telecommunications companies across the world always try to talk about upgrading to the latest generation of mobile data to help speed things up.As we approach 2020 it is likely that there will be more than 50 billion connected devices worldwide and The Internet of Things will no longer be something we think about but will be all around us. Everything from home appliances to our cars will be connected to the network, and 5G is being designed and built with this in mind.5G is not just a mobile technology, its ubiquitous access to high & low data rate services.The technology is still a long way from becoming a reality, but it has the potential to completely change the way we interact with wireless devices, from the smartphones in our pockets to the cars we drive.

Not only will more devices be connected to the 5G network than we've ever imagined, but the network will do everything better than 4G. This includes providing the capability and capacity for high resolution video streaming such as ultra-high definition 4K video. Privacy and security are also key considerations, so 5G will include extra capabilities to ensure that customer information is protected and our devices are harder to hack.

Battery life is essential aspect of our mobile connectivity. The target for 5G networks is handsets, phablets, tablets and other devices with five times the battery life of existing 4G devices. Imagine not having to recharge for a couple of days or being able to watch a couple of movies without having to find a power outlet to plug into.

FEATURES OF 5G TECHNOLOGY-

1.The advanced billing interfaces of 5G technology makes it more attractive and effective.

2.5G technology will be also providing subscriber supervision tools for fast action.

3.The high quality services of 5G technology based on Policy to avoid error.

4.5G technology will be providing large broadcasting of data in Gigabit which supporting almost 65,000 connections.

5.5G technology offer transporter class gateway with unparalleled consistency.

6.The traffic statistics by 5G technology makes it more accurate.

7.Through remote management offered by 5G technology a user can get better and fast solution.

8.The remote diagnostics is also a great feature of 5G technology.

9.The 5G technology will be providing up to 25 Mbps connectivity speed.

SPECIFICATIONS - Although the standards bodies have not yet defined the parameters needed to meet a 5G performance level yet, other organizations have set their own aims, that may eventually influence the final specifications.

Typical parameters for a 5G standard may include:

PARAMETER	**SUGGESTED PERFORMANCE**
Network capacity	10 000 times current network
Peak data rate	10 Gbps
Cell edge data rate	100 Mbps
Latency	< 1 ms

What will 5G allow us to do that we can't right now with 4G? To provide a little more context around how much faster 5G speeds will be compared to 4G, let's go back to the video example I mentioned at the beginning. According to Huawei, 5G will allow us to download an eight gigabyte HD movie in six seconds versus the seven minutes it would take over 4G or more than an hour on 3G.

But 5G is much more than just faster data speeds on our mobile devices. It also opens the door to a lot of different consumer and industrial applications and uses, some of which seem unbelievable now because they're so futuristic.

For example, Ulrich Dropmann, head of industry environment networks at Nokia, gave a scenario where we might be cruising in our driverless car when, unbeknownst to us, a crash has just occurred up the road. With 5G, sensors placed along the road would be able to instantly relay that information back to our car (this is where having low latency is important), so it could brake earlier

and avoid another accident.At MWC (MWC is an annual event in Barcelona where the wireless industry comes together to show off the latest devices and technologies.), Ericsson showed how 5G could be used to control heavy machinery from a remote location. Inside the booth, attendees strapped on an Oculus Rift headset and were able to remotely control one of two real diggers to move dirt either outside the conference hall or one thousands of miles away in Sweden.

CHALLENGES FOR 5G-

·*Standardization*- One of the big challenges facing 5G is standardization. There are already multiple groups working to come up with standards around interoperability, backward compatibility with older technologies (4G, 3G), and making sure the network will be future-proof. While many companies agree that a global standard is needed, whether they'll be able to come together and agree on one is another story.

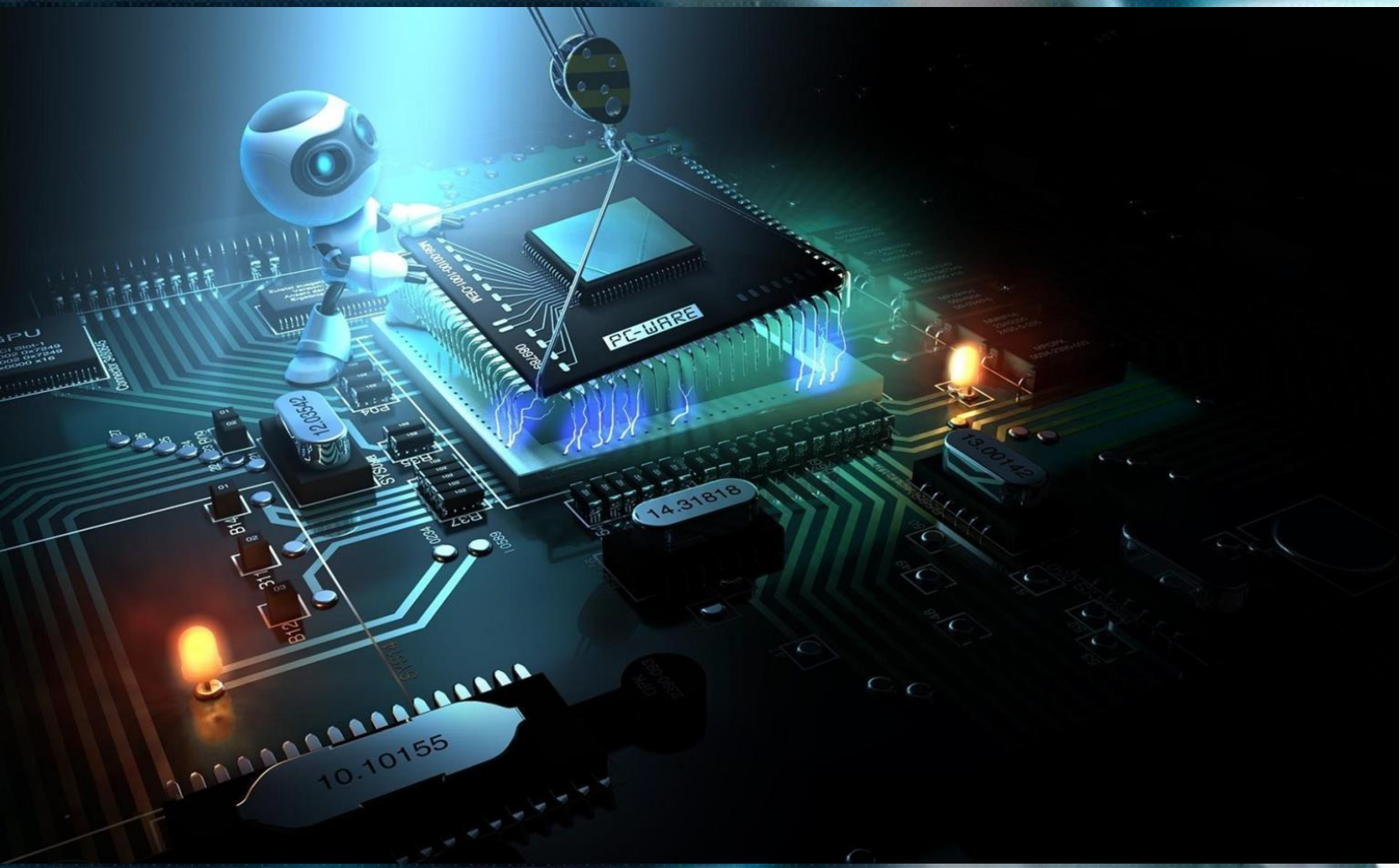
· *Infrastructure* - Building the infrastructure for 5G is also a huge task, with issues around spectrum and installing new antennas. 5G is likely going to rely, at least in part, on higher-frequency bands. There is more space in those airwaves available, but at such high frequencies, signals can't travel nearly as far as they can over the frequencies used for 4G, resulting in a poor connection.

One major enabler for 5G will be the release of frequency spectrum and this need to be managed on a global scale to ensure commonality and also the reduction of interference between services, especially those operating globally. This process is managed under the auspices of the International Telecommunications Union, ITU.Obstacles like buildings and trees and even bad weather can also cause interference, according to Nokia's Dropmann. To offset that, carriers will need to install more base stations to ensure better coverage, and use antenna technologies like MIMO (multiple-input and multiple-output).

- Deepika Kunwar (TE-IT)

The best way to predict future is to INVENT IT.

--Alan Kay



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