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NOIDA INSTITUTE OF ENGINEERING & TECHNOLOGY, GREATER NOIDA

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October, 2018

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ELECTRONICA

NEED OF SOCIETY

DEPARTMENT OF ELECTRONICS & COMMUNICATION ENGINEERING

NANOTECHNOLOGY IN ELECTRONICS

The Rise of IOT Hacking

WHAT IS Electronic pill

Augmented Reality as the Future of the Field Service Industry

NOIDA INSTITUTE OF ENGINEERING AND TECHNOLOGY GREATER NOIDA
Department of Electronics & Communication Engineering
(Accredited by NAAC & NBA)
Approved by AICTE and Affiliated to Dr. A.P.J. Abdul Kalam Tech. University, UP

OCTOBER, 2018

VISION

To prepare the students for global competence, with core knowledge in electronics and communication engineering having focus on research to meet the needs of industry and society.

MISSION

M1:To become dynamic and vigorous knowledge hub with an exposure to state of art technologies for connecting world.

M2:To provide in-depth knowledge of Electronics and Communication Engineering ensuring the effective teaching learning process.

M3:To train students to take up innovative projects in group with sustainable and inclusive technology relevant to the industry and social needs.

M4:To empower students to become skilled and ethical entrepreneurs.

M5:To promote and adapt professional development in a perpetual demanding environment and nurture the best minds for the future.

PSOs

PSO 1- To apply the knowledge of mathematics, science and electronics & communication engineering to work effectively in the industry based on same or related area.

PSO 2- To use their skills to work in modern electronics & communication engineering tolls, software and equipments to design solutions for complex problems in the related field that meet the specified needs of the society.

PSO 3- To function effectively as an individual and as a member or leader of a team by qualifying through examinations like GATE, IES, PSUs, TOEFL, GMAT and GRE etc.

PEOs

PEO-1 To have excellent scientific and engineering breadth so as to comprehend, analyze, design and solve real- life problems using state-of-the-art technology.

PEO-2 To lead a successful career in industries or to pursue higher studies or to understand entrepreneurial endeavors.

PEO-3 To effectively bridge the gap between industry and academics through effective communication skill, professional attitude and a desire to learn.

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FROM THE DESK OF THE MANAGING DIRECTOR

"Work is Worship"

*Dr. Om Prakash Agarwal (Managing Director)*Success is not a one-shot process. It is the result of a continuous improvement after each failure. The fear of failure needs to be captured in order for a person to learn from his failure too. It is an invaluable opportunity to rectify errors and move forward. Failure in working for a good cause is better than success in working for a wrong cause.

Over the years now, NIET has built quite a special position in the private higher education sector. With its distinctive culture, it provides a clear student-centered environment in which to explore existing technical knowledge, and gain new learning at the leading edges of technology development.

Our unique educational system ensures that you gain not just depth and breadth in your chosen area of specialization, but also a holistic set of skills that will equip you to face the real world. At every stage there will be opportunities to expand your boundaries, platforms for collaboration and learning, and recognitions for those who strive to excel. Thus, I would like each one of you to join NIET and aspire as global leaders and a successful human being.

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ADDITIONAL MANAGING DIRECTOR

"Education is the most powerful weapon which you can use to change the world" - Nelson Mandela

Dr. Neema Agarwal

In the course of last 20 years many technical & management institutes have sprung up all over the country. Graduates passing out every year are highly optimistic, that technical courses ensure a rewarding career.

The economic, corporate and social environments are undergoing radical changes. To survive, manage and excel in this dynamically changing atmosphere; it demands engagement of professionals who are well informed, competent, courageous and versatile.

Beyond the academics, the curriculum at NIET is strongly linked with several recent themes like latest technologies needed by organizations, soft skills, communication, among others. Our approach has resulted in programs of study relevant to the leadership trends and challenges of tomorrow. Classroom learning is made interesting by highly qualified and experienced faculty through interactions, presentations, role plays, case studies and out bound learning programs. This is further reinforced by practical learning through Industrial visits and summer training. Students regularly undergo personality development and grooming sessions that leads to both extrinsic and intrinsic confidence boosting and prepares them for the corporate world.

We appreciate your interest and want you to know that we are here to bring you a leading edge technical education.

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FROM THE DESK OF EXECUTIVE VICE PRESIDENT

Mr. Raman Batra

This new generation is an interesting one. Most of them are born in a world where technology has always been at the forefront. These students rely on Google, texting, social media and Wi-Fi, and they view email - not letter writing - as a formal form of communication.

NIET has been helping students write their own stories since its inception. Committed to providing the best jobs by creating life-changing educational opportunities and collaborative learning environments, we have stayed at the forefront of innovation in higher education, providing the tools our students need to make them industry ready from day one and make an impact in the world.

NIET has a Pyramid Finishing School, which provides training to the students according to the industry requirements giving the individual student a 360 degree in employability skills. The Institute has also made tie-ups with MNCs like Microsoft, Oracle, KPMG, ICICI Direct, Prometric and Pearson. These tie-ups not only promise to enhance student employability by manifold, but also take the lead in encouraging 'innovative' learning like never before. Taking the league forward, we have established various innovation labs to provide students hands-on experience in various modern-day technologies.

I, thus, invite you to join our movement to create Corporate Citizens who become role models, wherever they go, for developing their professional career. I promise you a challenging academic experience, with an international flavor, which will truly transform your lives.

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MESSAGE FROM DIRECTOR

Welcome you to the Noida Institute of Engineering & Technology, Gr. Noida. Ever Since its inception in 2001 our endeavor at NIET has been to provide excellent quality of education and training to young minds aspiring to become engineers, managers, pharmacists and technocrats.

In order to achieve this goal we have established an infrastructure that compares with the best in the world. Our faculty members are highly talented and qualified. Additionally, we invite the finest minds from the industry and academia as guest lecturers. With the help of a very supportive staff we ensure a healthy learning atmosphere for our students.

We motivate our students to dream big and guarantee that we inculcate the right spirit and the necessary talent to realize their objective. We also continuously strive to instill ethical values in our wards so that they become responsible citizens of tomorrow.

NIET has always stood for quality and excellence and we make every effort to constantly assess and improve ourselves. These efforts have been recognized, appreciated and awarded by prestigious educational bodies both in India and abroad.

I wish you the very best as you choose to become a part of this exciting and vibrant learning community.

Dr. Ajay Kumar

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MESSAGE FROM THE HOD

It is a matter of great pride for the department of ECE that ***Electronica*** is getting wide response from the student's community. The editors of ***Electronica*** wish to ignite their readers to dream for the highest order of technical advancements in the area of Electronics and Communication Engineering.

I acknowledge the contributions made by the authors and the hard work of the Editorial Board members who managed against all odds and obstacles to bring out the magazine. This magazine has proved its worth by inspiring many students and faculty members to write articles for the benefit of students at large. I look forward to hearing from the readers. Their feedback and contribution of articles for future issues is greatly desired.

Dr. V K Pandey

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OCTOBER, 2018

Manish Kumar
Assistant Professor
EC

Electronic Pill, One Step Ahead in Healthcare Technology

With the ever-growing susceptibility of masses to diseases in this era of modernization, an affordable and easily-available health infrastructure system is the need of the hour. However, with an almost collapsed state of the government-run healthcare system (long wait times, lack of equipment and doctors) and expensive private hospitals, people are eagerly looking towards electronics-based healthcare solutions.

Electronics is already playing a huge role in different areas, such as communication, entertainment, security, sports and education. It is an exciting time for medical technology, and making smart use of modern digital innovations may bring revolution in the healthcare industry. Technological progress in terms of combining information and function from various electronic devices for personal medical treatments, based on individual conditions, presents an enormous opportunity for an improved, accessible and affordable healthcare system.

The concept related to such developments is the emergence of an electronic pill. Human body is a sensitive system, and sometimes doctors are unable to detect a disease in time and it becomes too late to cure it. Use of an electronic pill helps to easily detect diseases, and this can help take prompt action against them.

Electronic pill

Although the idea of an electronic pill has been around for long, researchers are now bringing this technology to reality. The challenge has been to construct and deploy a device using advanced but available components and production techniques.

Electronic pill technology makes use of different components/parts such as drug reservoir, delivery pump, electronic microcontroller (MCU), wireless communication and sensors. These elements have to be combined in a way so as to preserve small size, reliable manufacturing and a safety profile fit for medical use. The device containing these parts is built as a small, pill-shaped capsule, which is swallowed and passed through the gastro-intestinal tract.

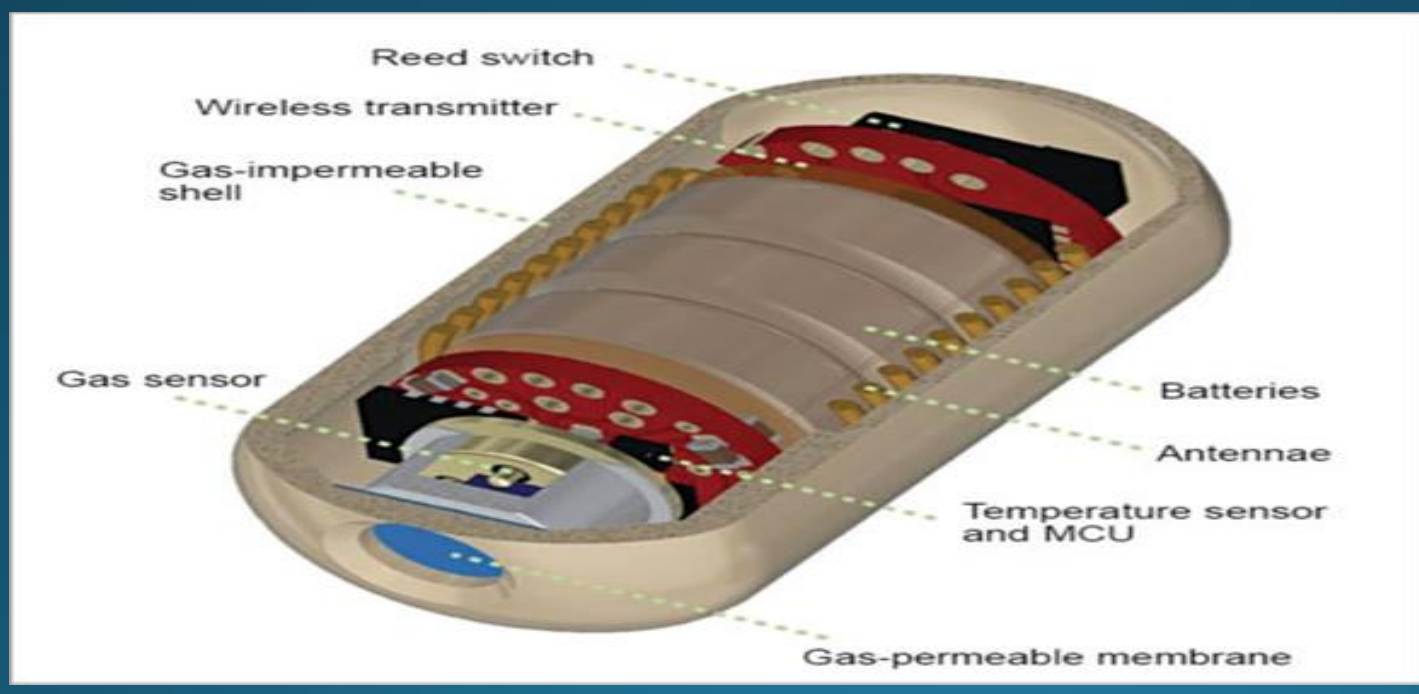
After many years of research and development, wireless devices enclosed in capsules that can be swallowed are now hitting the market. Use of an electronic pill will free users from invasive methods such as catheters, endoscopic instruments or radioisotopes for collecting information about the digestive tract. Drug delivery using an electronic pill will also be controlled with onboard electronics, enabling precise and adaptable delivery patterns, which are not yet possible by other means.

An electronic pill has multichannel sensors that will prove to be an important tool for healthcare technology towards in-depth and detailed investigation of diseases. In addition, its uses range from drug delivery to reaching specific regions of the human body to target different types of cancer, stimulate damaged tissues, track gastric problems and measure biomarkers.

To carry out these functions, the pill is powered by an edible battery and equipped with appropriate sensors. It is important to assure that the materials used to make an edible battery are not toxic to humans, as this can cause significant complications if it gets into the digestive tract.

An electronic pill contains sensors or tiny cameras that collect information as it travels through the gastrointestinal tract before being excreted from the body a day or two later. The capsule takes measurements of the local pH and temperature inside the body.

This electronic invention transmits information such as acidity, pressure and temperature levels, or images of the esophagus and intestines to the doctor's computer for analysis. Electronic pills are also being used to measure muscle contraction, ease of passage and other factors of the body to reveal information that was unavailable in the past. An electronic pill has a 16mm diameter, 55mm length and 5gm weight, and can be swallowed. It is covered by a chemically-resistant polyether-terketone (PEEK) coating. As soon as the pill moves through the gastrointestinal track, it starts to detect diseases and abnormalities. The pill can easily reach areas such as small and large intestines, and deliver real-time information to an external system. Data collected is then displayed on a monitor.



Electronic pill structure (www.kerosi.com)

Specifications of the electronic pill

An electronic pill consists of four microelectronic sensors. The first sensor consists of a silicon diode attached to the substrate, fabricated on two silicon chips located at the front end of the capsule. It is used to identify body temperature. Use of a silicon-integrated circuit makes this sensor useful, and it comes at a very low cost.

The second is ion-sensitive field-effect transistor (ISFET), which is used for measuring ion concentration in solutions. The third is direct-contact gold electrode (DCGE), which helps measure conductivity. Conductivity is measured by determining the content of water and salt absorption, and the breakdown of organic compounds into charged colloids and bile secretion. Three-electrode electrochemical cell (TEEC) is the fourth sensor. It is used to calculate the rate of dissolved oxygen, and identify the activity of aerobic bacteria in the small and large intestines.

All these sensors are controlled by an application-specific integrated circuit (ASIC). All other components of the electronic pill, namely, 10-bit analogue-to-digital convertor (ADC), digital-to-analogue convertor (DAC), relaxation oscillator circuit (OSC) and digital signal processing circuit are connected to the ASIC consisting of analogue signal conditioning.

The circuit is powered by two SR48 silver-oxide (Ag2O) batteries having 35 hours working capacity. Supply voltage is about 3.1V with power consumption of 15.5mW. pH and oxygen sensors are enclosed in separate 8nL electrolyte chambers containing a 0.1KOH solution retained in a 0.2 per cent calcium alginate gel. The two sensors are covered by a 12μm thick film made of teflon and nafion, respectively. These are protected by a 15μm thick dialysis membrane of polycarbonate. All data is collected by the ASIC. A radio transmitter transmits data to the base station for the doctor to identify the problem.

Advantages

There are many advantages of using electronic pills, such as:

• **Localized drug delivery**

Smaller doses of drugs result in fewer complications from the drugs' movement through the bloodstream. This means that side effects of the drugs are minimized and their therapeutic value maximized. Effect of the drugs is expected to take place quicker, because it delivers the medicine at the specific location of the disease.

• **Instant response**

An electronic pill is equipped with microprocessors, batteries, antennae and other components that make it possible for medical staff to get real-time alerts about the patient's reaction to a particular drug. At this moment, if the doctor observes any irregularity, certain commands can be sent to halt the delivery of the drug.

Disadvantages

Electronic pills have some significant drawbacks that can limit their widespread applications. Some such limitations are:

• **Exorbitant price**

Electronic pills at the moment are products of significant investments in research and development. These are not available for commercial consumption in many countries. With advances in research and development in various components involving printing and nanotechnology, it is expected that the cost of production will reduce in the times to come.

• Limited applications

Because it is still a relatively new technology, applications are still restricted to certain areas. For example, electronic pills cannot be used to detect radiation abnormalities and carry out radiation treatment. Electronic pills for kids are especially difficult to produce because of the sensitive issues involved with their digestion.

Future outlook

Innovative digital devices making smart use of personalized data will bring about a revolution in healthcare technology. While there are many difficulties and barriers to their adoption, these excuses can no longer stop us from embracing technologies that could have a positive impact on our lives.

At the laboratory level, it has been confirmed that electronic pills that employ a body's natural electrolytes can be produced, strengthening their biodegradability towards disintegration after the aim has been met.

The invention of the transistor has led to radiometry capsules with simple circuits for the detection of diseases and abnormalities by internal study of the gastrointestinal tract even in restricted areas where use of traditional endoscopy was not permitted. However, these capsules could not be used effectively, as these transmit only from a single channel, have large components, and suffer from poor reliability, low sensitivity and short lifetimes. These were later tested using laboratory-type sensors such as glass pH electrodes, resistance thermometers and so on.

In the next few years, we can expect working prototypes of these ideas available with the use of novel materials for batteries. Currently, lithium is being used, but researchers envisage a switch to sodium. This is to provide humanity with easily-accessible, safe, reliable and cost-effective healthcare.

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Augmented Reality as the Future of the Field Service Industry

Pratik Raj
EC

A Recent study by Salesforce.com reports that 92% of service executives indicated they need to transform their service models to keep up with consumer needs. According to Aberdeen Group, best in Class field service organizations are 72% more likely than their peers to utilize visual collaboration tools (e.g., AR/VR). It is only a matter of time before other companies follow suit. End-customers have begun to expect this type of service experience. Indeed, 84% of millennial customers have used a self-service portal for customer service. The immersive nature of AR/VR apps makes it the ultimate self-service experience.

Customer demand is obviously a critical factor driving the proliferation of AR/VR applications in the field service industry.

Fuelling the demand for AR/VR technology is the fact that it is both relevant and effective within a broad array of industry segments and use cases as a result, the use of collaboration tools like AR will become the standard by which customers evaluate and measure field service performance. Fuelling the demand for AR/VR technology is the fact that it is both relevant and effective within a broad array of industry segments and use cases.

Indeed, it is difficult to find any technology segments where AR/VR does not have practical value. In fact, any technology that is comprised of electronic, electro-mechanical (e.g., pneumatic, hydraulic, etc.) or electrical components can benefit from AR/VR enabled service and support.

Another factor driving demand is the fact that early adopters are achieving measurable results from the deployment of AR/VR pilot projects.

The technology industry, of which field service is a subset, is already considered to be the biggest economic driver of AR in the coming years, we are likely to see an exponential growth of AR in the field service industry. In fact, the technology industry, of which field service is a subset, is already considered to be the biggest economic driver of AR. Furthermore, industry forecasters anticipate that expenditures on AR technology will exceed $100 million by 2020.

While we are likely to see new developments in AR/VR feature functionality, this technology will be deployed in one of two environments:

1. In support of an existing installed base equipment
2. Embedded in the design of new products

This will completely change the paradigm of service support and break down barriers to finding and hiring talent, which in turn will continue to facilitate the use of freelance technicians. Regardless of future possibilities, these potential developments should not stop FSOs (Field Service Organization) from investing in AR and reaping the benefits today.

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Prateek Goel
EC

The Rise of IOT Hacking: New Dangers, New Solutions – Biometrics

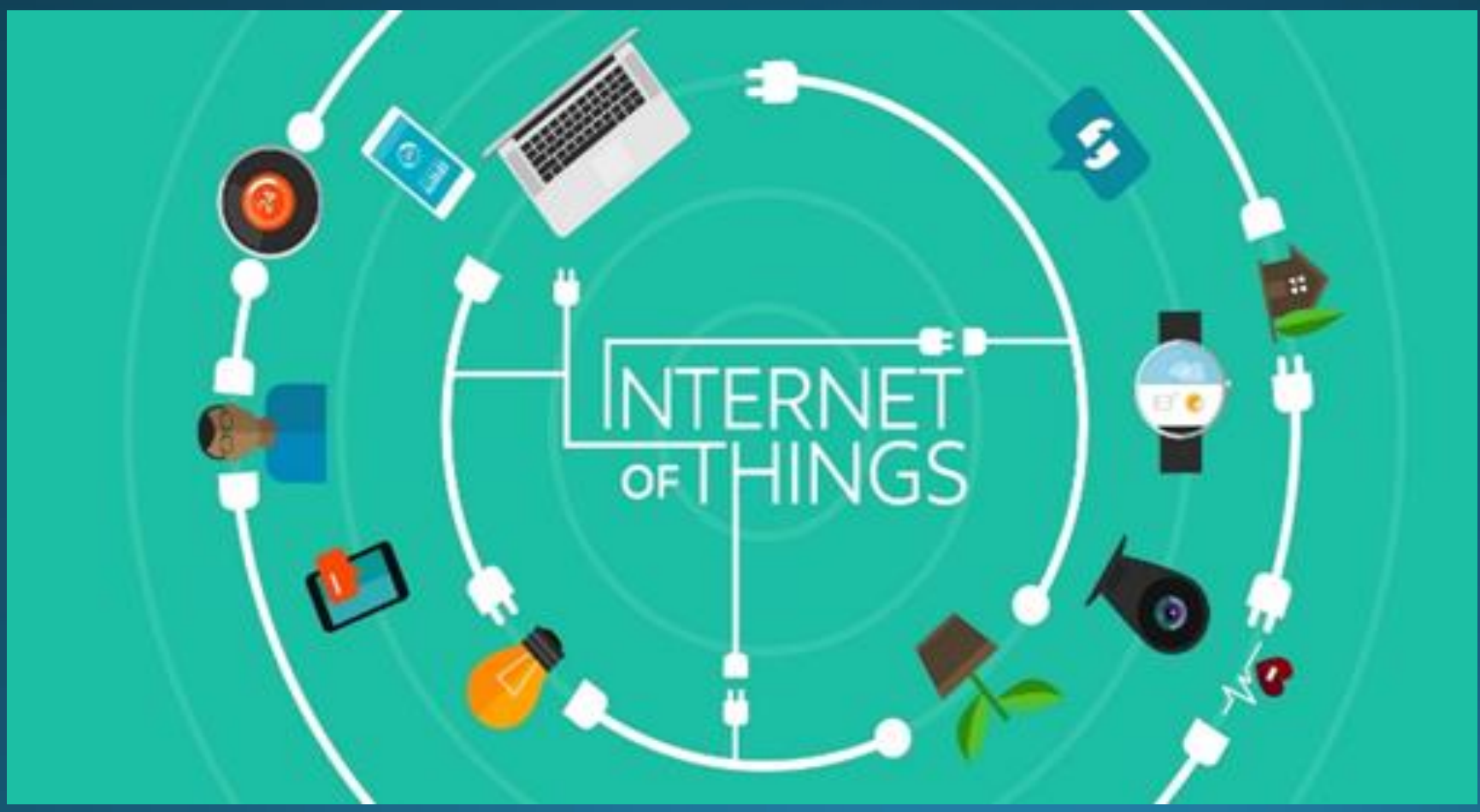
Imagine a future where every device you own and every object surrounding you will be connected to the Internet. The Internet of Things (IoT), is defined as "the complete computerization of everything in our life and autonomously interacting with each other". According to The Globe and Mail, by 2020 there will be 21 billion data-spouting devices connected to the Internet, comparing to 6.4 billion this year. This is because IoT seems to meet the needs of customers, who have long been waiting for devices used to make lives as simple as possible.

However, with the transition to everything being connected to the Internet, it comes with the potential threat of cyber-attack. In details, vulnerabilities presenting in the IoT have long been a concern for cyber security experts and are now reaching the public which is purchasing the devices. At a recent Cyber Tech conference, some analysts expressed that the IoT is the perfect target for a cyber-attack and also emphasized that the more devices become computerized, the more things can be hacked and compromised.

Taking the case of Mirai malware in October this year to be an example, PC World has announced that the source code for a trojan program that infected hundreds of thousands of IOT devices and used them to launch distributed denial-of-service (DDOS) attacks has been published online, paving the way for more such botnets. As a result, around 493,000 IoT devices have been affected by this malware, according to Level 3 Communications. In other words, although the IOT has the potential to create numerous benefits for businesses and consumers in terms of big data and new levels of automation, it also creates new vectors for cyber-attacks.

According to HP report, when personal information including a user's name, address, and date of birth, health information and even credit card numbers is shared with these mobile apps, the privacy concern is increased. That's true for mobile apps in general, but because personal data is often being spread out across a greater number of devices in the IOT, there is higher risk of that information leaking out. The explanation that IOT becomes vulnerable to cyber attacks is attributed to the same reasons that any Internet connected system would be vulnerable to attack: outdated software, weak passwords, incorrect configurations, and/or malware infection.

Therefore, these issues lead to the need to integrate sophisticated technology such as biometric with IOT devices. In details, biometric IOT systems have ability to provide accuracy and security that brings numerous benefits. Apparently personal traits scanned by biometrics are difficult to lose, forget or copy. For this reason, it is considered to be safer and more secure than other traditional IOT devices. Currently fingerprint currently dominates the mainstream biometric modality of many IOT systems but as biometric technology has evolved, many end users are choosing biometric readers such as palm vein, face and iris recognition as their procedure of choice due to the inherent benefits that are included such as lower lase acceptance and false rejection rates.



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Nishant Ahlawat
EC

Industrial Automation

Automation is the technology by which a process or procedure is performed with minimal human assistance or the technology which reduces the human effort is automation.

Industrial automation is the use of control systems, such as computers or robots, and information technologies for handling different processes and machineries in industry to replace a human being. It is the second step beyond mechanization in the scope of industrialization. Some examples of industrial automation are numerically controlled machines, paper mills, steel rolling mills, industrial robots, etc.

Types of automation industry tools:

*Supervisory Control and Data Acquisition (SCADA)
*Programmable Logic Controller (PLC)
*Human Machine Interface (HMI)
*Artificial Neural Network (ANN)
*Distributed Control System (DCS)
*Robotics

These tools in industrial automation systems can create a great impact on various facts of the manufacturing process. They help to reduce lead time while producing higher product quality.

These automaton industrial tools are being effectively used for monitoring social media campaigns.

*What is Industrial Automation in Manufacturing?

Industrial automation in manufacturing is the use of “intelligent” machines in factories so that manufacturing processes can be carried out with minimal human intervention. It involves the application of various control systems to enable operating equipment to carry out on their own, with little human intervention, tasks that require speed, endurance and precision.

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Industrial automation can be achieved by several different means, including mechanical, electrical, electronic, hydraulic, pneumatic, and computers. Usually, two or more of these means are used in combination. Today's state-of-the-art factories, ships, and airplanes combine all of these techniques.

The main benefits of manufacturing automation include leaner operation processes that require less energy, less material, and reduced labour waste. These can lead to improvements in quality, accuracy, and precision. The downsides include high costs of R&D and installation of equipment.

*What is the Current State of Industrial Automation in Manufacturing?

Industrial automation robotics. Although "lights-out" manufacturing, a concept in which the lights can be switched off leaving everything to the robots, is still a dream, remarkable progress has been made since the 1980s. Many repetitive and high precision work in large factories, such as in car assembly lines, have been taken over by industrial robots.

Today's industrial robots have high computing capabilities, vastly improved vision systems, and increasing operational degrees of freedom. However, they are limited to operating in highly structured environments and, to a large extent, still need to be controlled by humans. They are also too specialized and inflexible for the use of small and medium industries. Therefore, they can essentially be considered tools of long production runs and large manufacturers.

With the rapid development and proliferation of microcomputer and software technologies, automation in manufacturing is almost totally dependent on the capabilities of computers and software to automate, optimize and integrate the various components of the manufacturing system. Due to this dependence, automation in manufacturing is called computer integrated manufacturing.

*What is the Future of Industrial Automation?

Although industrial automation in manufacturing is not without its detractors (such as an unsubstantiated claim that it will lead to mass unemployment), its future looks very bright. Industrial robots of the future will be multi-functional so that the same machine can be put to several different uses. They will have many capabilities associated with human workers, such as the ability to make decisions and to work autonomously. They will also have self-diagnostic and predictive maintenance capabilities.

Thanks to industrial automation of manufacturing, the factory of the future will be more efficient in the utilization of energy, raw material and human resources. Also, contrary to popular belief, the experience so far has shown that automation will not cause mass unemployment. On the contrary, the mass use of robots will create more jobs. Humans and robots will work together to create a more efficient and productive workspace.

*Conclusion:

Industrial automation has recently found more and more acceptance from various industries because of its huge benefits, such as, increased productivity, quality and safety at low costs.

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NANOTECHNOLOGY IN ELECTRONICS

Priyanshu Yadav
EC

Nanotechnology refers to the constructing and engineering of the functional systems at very micro level or we can say that at atomic level.
Nanotechnology is continually playing vital role to improve the capability of electronic products. The technology also made the devices very light making the product easy to carry or to move at the same time it has reduced the power consumption. Some consumer products which are using nanotechnology:

- Computer Hardware
- Display Devices
- Mobile & Communication products
- Audio Products
- Camera & Films

Advantages of using Nanotechnology in Electronics:

- Increasing the density of memory chips.
- Decreasing the weight and thickness of the screens.
- **Nanolithography** (Nanolithography is a branch of nanotechnology and the name of the process for imprinting, writing or etching patterns in a microscopic level in order to create incredibly small structures) is used for fabrication of chips.
- Reducing the size of transistors used in integrated circuits.
- Reducing power consumption.

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Prakhar Srivastava
EC

Advanced Technology : OLED

An organic light-emitting diode (OLED or Organic LED), also known as an organic EL (organic electroluminescent) diode, is a light-emitting diode (LED) in which the emissive electroluminescent layer is a film of organic compound that emits light in response to an electric current. This organic layer is situated between two electrodes; typically, at least one of these electrodes is transparent.

OLEDs are used to create digital displays in devices such as television screens, computer monitors, portable systems such as smartphones, handheld game consoles and PDAs. A major area of research is the development of white OLED devices for use in solid-state lighting applications.
There are two main families of OLED: those based on small molecules and those employing polymers. Adding mobile ions to an OLED creates a light-emitting electrochemical cell (LEC) which has a slightly different mode of operation. An OLED display can be driven with a passive-matrix (PMOLED) or active-matrix (AMOLED) control scheme.

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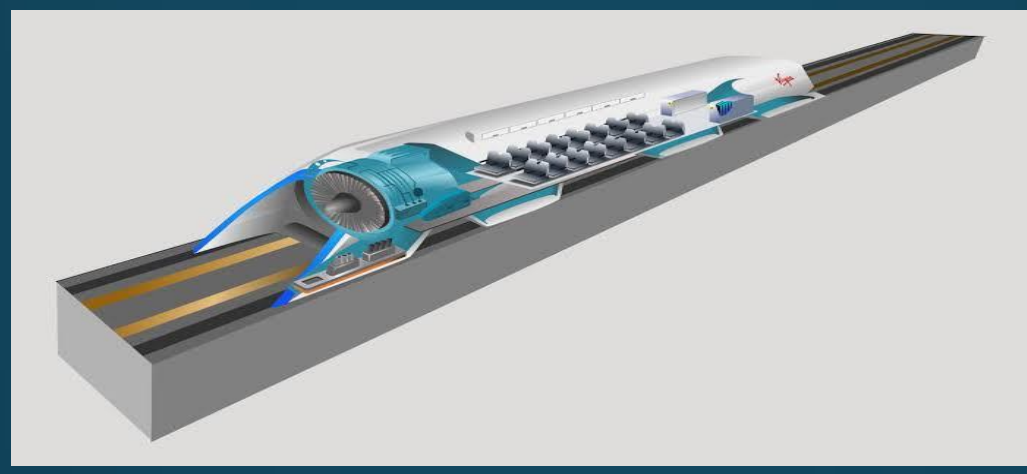
OCTOBER, 2018

HYPERLOOP



Hard to believe but the precursor of what we know today as the “Hyperloop” the idea of transporting goods and passengers through low-pressure pneumatic tubes dates back to the 18th century. It bounced back into the limelight in 2013, thanks to the Alpha paper published by Elon Musk. Christened ‘Hyperloop’, Musk’s concept involved transporting people and goods in a capsule that, driven by linear induction accelerators, hurtled at close to supersonic speeds through a nearly vacuum less cylindrical tube.

Today, the march towards commercializing this 4th dimension of travel is in top gear thanks to Musk and Space X making the Hyperloop an open source concept. Over 10 companies are actively developing their Hyperloop capabilities, building prototypes, and conducting tests. While most are based in the US, companies from Canada, Spain, Netherlands, Poland, and India are also in the fray.

India's hyperloop dream moved one step closer to reality with the Maharashtra government has approved the Virgin Hyperloop-DP World (VHO-DPW) consortium as the "original project proponent" of the proposed hyperloop track between Mumbai and Pune. Maharashtra will create the first hyperloop transportation system in the world and a global hyperloop supply chain starting from Pune.

Kajal Sharma
EC

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Priyanshu Singh
EC

Neuralink

Neuralink Corporation is an American neurotechnology company founded by Elon Musk and others, developing implantable brain–machine interfaces. The company's headquarters are in San Francisco; it was started in 2016 and was first publicly reported in March 2017. Since its founding, the company has hired several high-profile neuroscientists from various universities.

By July 2019, it had received $158 million in funding (of which $100 million was from Musk) and was employing a staff of 90 employees. At that time, Neuralink announced that it was working on a "sewing machine-like" device capable of implanting very thin threads into the brain, demonstrated a system that read information from a lab rat via 1500 electrodes and anticipated to start experiments with humans in 2020.

What will Neuralink do?

Elon Musk's Neuralink is building tech to control computers with your mind. It's building a device that'll let you control computers and phones with your brain. As per Bloomberg's report, right now it can 'read' a rat's mind with the help of tiny electrodes implanted into the animal's neurons and synapses.

How does Neuralink work?

Musk has created a company called Neuralink, which is working on putting brain-computer interfaces (BCIs) into our skulls. Your BCI will likely be much more than just a way for you to control whatever streaming service you use. It could even replace your television, streaming content straight into your brain.

What is the point of Neuralink?

Neuralink, the Musk company aims at implanting technology into the human head and allowing paralyzed people the opportunity to control phones or computers purely with their brains. ... In those holes, Neuralink would implant thousands of electrodes in so-called "threads" that would interact with brain functions.

Who owns your brain data?

When it comes to private data, some of Silicon Valley's biggest tech companies don't have the best track record. Would Neuralink have access to your brain waves and any information that makes you unique if you're using their neurological device? Could they sell that information to third parties? Is there any way to make sure your data stays local or would all of these devices need to connect to a cloud server. All of this raises some fundamental concerns about your most private thoughts — and governments might have to step in with regulations quickly to prevent this technology from being abused.

What happens if The Link stops working?

Musk said the Link could initially be installed by a custom-built robot under a local anesthetic. That sounds relatively simple (for brain surgery) — but if your brain implant stops working, do you need another round of surgery to replace it? Will that surgery cost extra? If the cost is prohibitive, someone might be stuck with a faulty link in their brain until they can afford to pay for a new one.

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