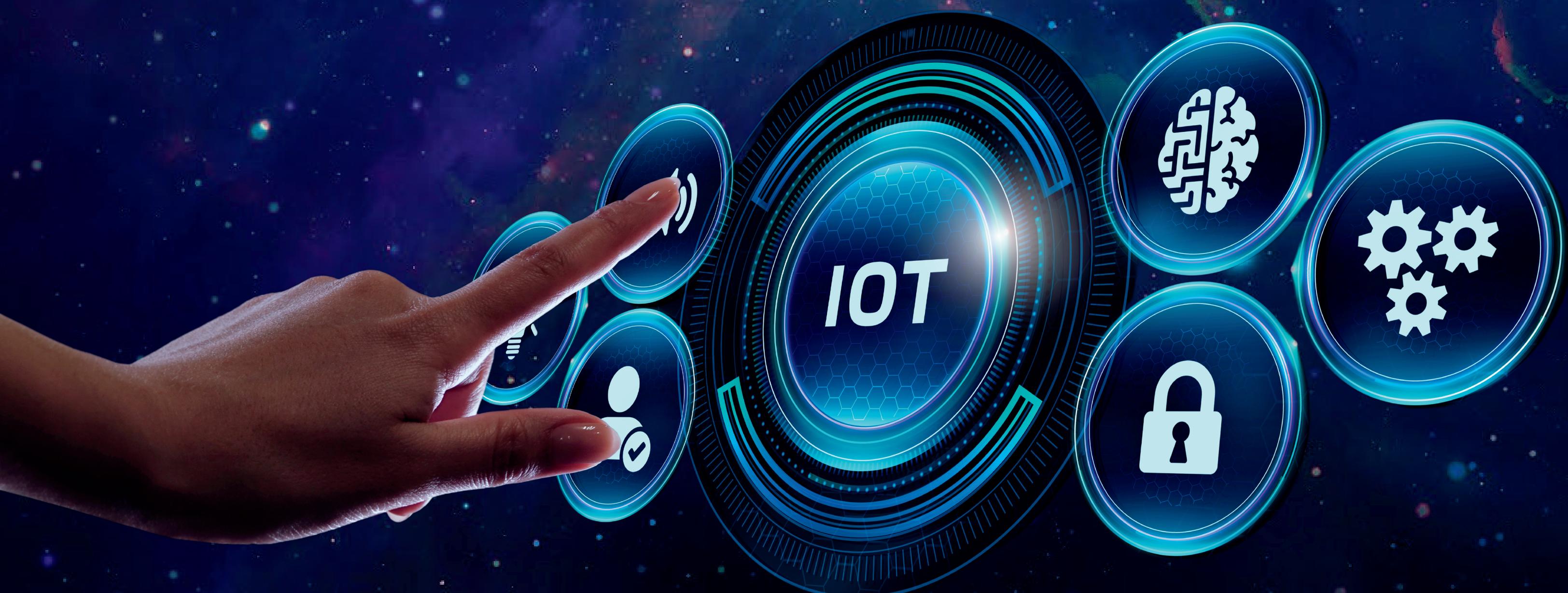


DEPARTMENT  
OF  
ELECTRONICS AND TELECOMMUNICATION

**ABHIVARG**  
VOL 7.1



2022-23

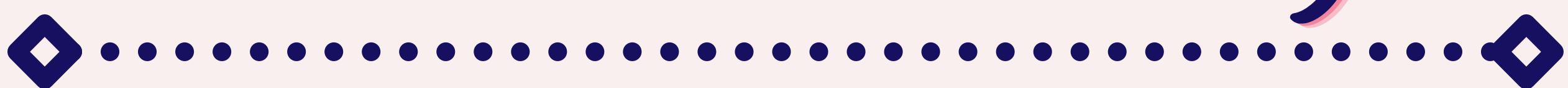
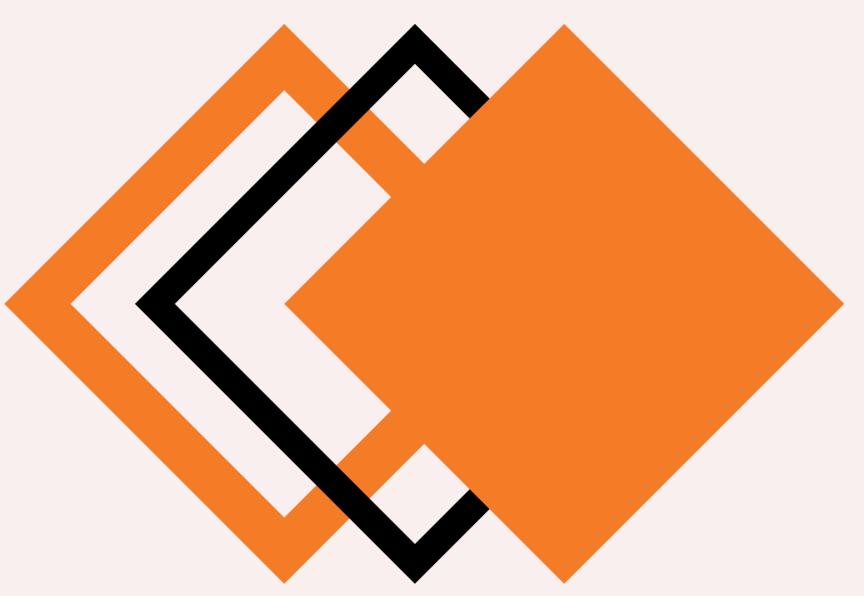
# UNIVERSAL HUMAN INTERACTION

ABHIVARG

VOL 7.1

2022-23

# Dean's Message



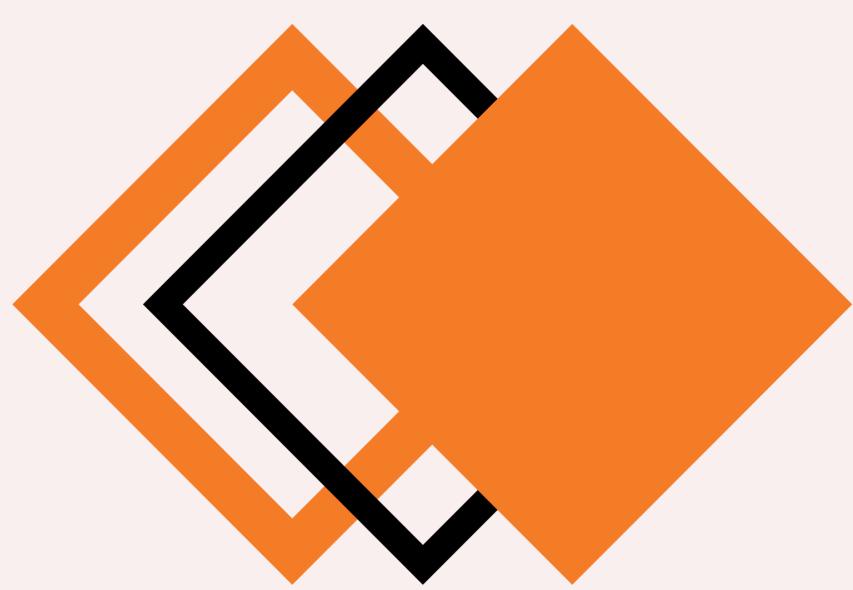
**DR. LOCHAN JOLLY**

Dear Readers,

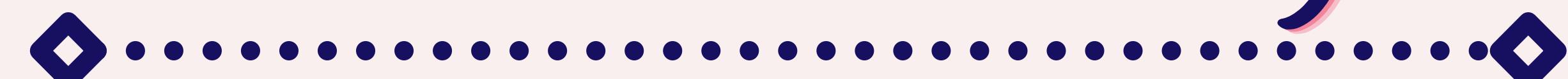
“Opportunity is missed by most people because it’s dressed in overalls and looks like work” -Thomas Edison.

I am ecstatic to see the participation and involvement of students in the overall development. It brings me great joy to see everyone ready to embark their knowledge to everyone.

This magazine has finally released its 7.1 volume, containing total information from the experts of domains such as industry, successful alumni, learning students, teachers of our college and experienced parents. It has helped people to think about many innovative ideas and research on it. Our students come from different walks of life and bring with them high ambitions and dreams to make a difference in the society. We cultivate in them cultural confidence, professional competence, and versatility to become productive citizens of the country. We inspire their creative minds and help them to have an international perspective, be it in education, character building or even in sports & cultural activities. It is our endeavour to constantly evolve curriculum support, so our students stay abreast with the latest updates in this technologically developed world. The mystery of our success is on our belief that a good academic model along with a commitment to providing quality is the cornerstone for the success of higher education institutions. As a learning organization we are focused on continuous improvement – responsive to community needs and making useful contributions to education, knowledge, and the society at large. All efforts from our side and by our students has helped us develop a healthy learning environment which encourages and inculcates cultural and acceptance of differences. The results are overwhelming and motivating us to work for a greater cause.



# Hod's Message

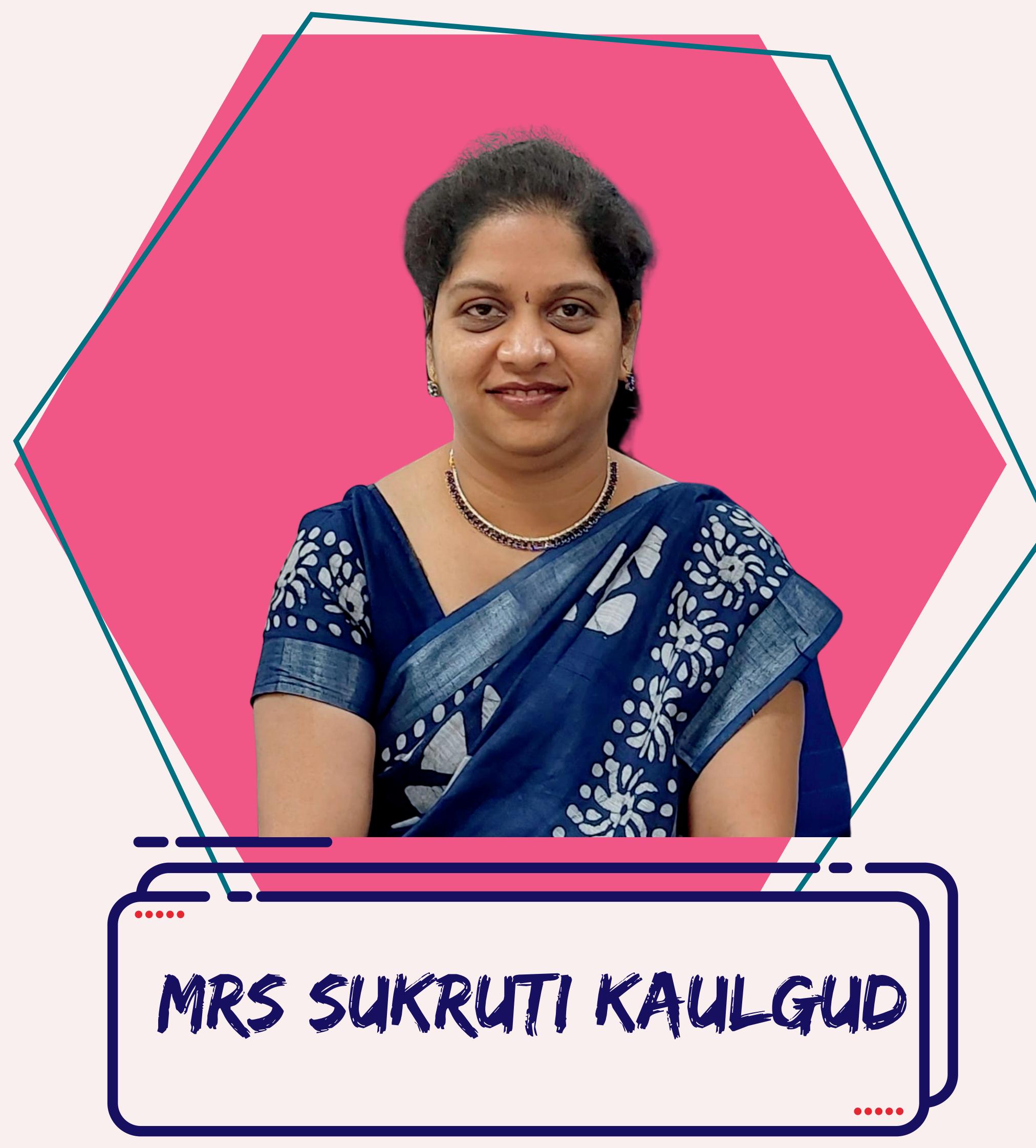
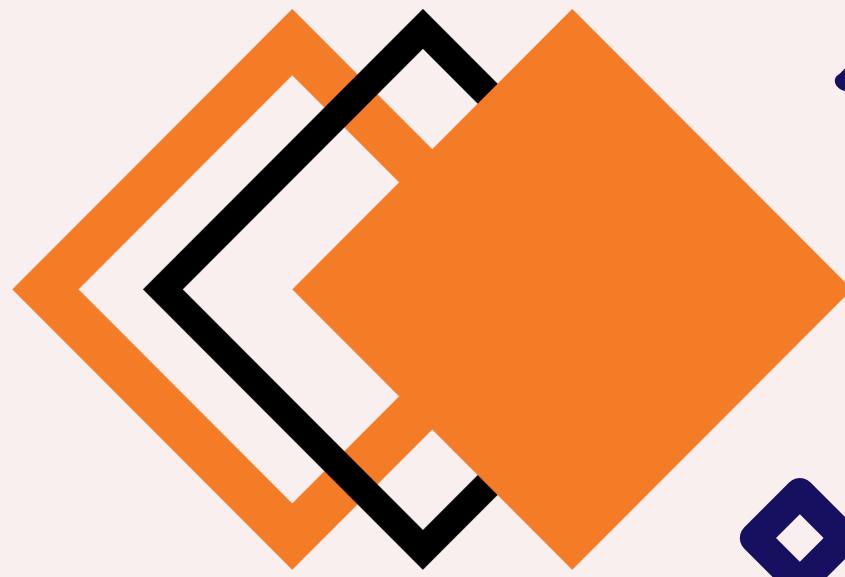


I am proud and happy for our Electronics and Telecommunication Engineering Department as the faculty and students have successfully brought out the 7.1 edition of the technical magazine “ABHIVARG” for the year 2022-23. The most important aspect we could derive from this stupendous effort is that it brings out the various technical and analytical skills of the budding engineers. The theme of this edition of ABHIVARG is “Effects of IOT on emerging technologies”. As the market landscape has evolved rapidly over the last several years, it is critical for businesses to monitor how things are changing and those who can think creatively about evolving technologies happen to be the most successful ones. Keeping an eye on these trends, it can be concluded that coming up with ideas for innovative and game changing ways to use and combine these technologies together isn’t possible without IoT technology I am proud and happy for our Electronics and Telecommunication Engineering Department as the faculty and students have successfully brought out the 7.1 edition of the technical magazine “ABHIVARG” for the year 2022-23.”.

**DR. PAYEL SAHA**

The most important aspect we could derive from this stupendous effort is that it brings out the various technical and analytical skills of the budding engineers. The theme of this edition of ABHIVARG is “Effects of IOT on emerging technologiesAs the market landscape has evolved rapidly over the last several years, it is critical for businesses to monitor how things are changing and those who can think creatively about evolving technologies happen to be the most successful ones. Keeping an eye on these trends, it can be concluded that coming up with ideas for innovative and game changing ways to use and combine these technologies together isn’t possible without IoT technology Industries have shifted away from a monolithic, single-device model in favour of a more modular, microservices approach of connected devices network of devices which is the core of IoT technology. The internet of things helps companies automate processes and reduce labour costs. It makes people's lives and work smarter and gives them better control over their lives. In addition to offering intelligent devices, with IoT technology solutions, businesses see a cost reduction, waste reduction, and improvement in service delivery, making it a practical choice in this changing business environment. IoT device implementation provides the data and insights essential to streamline workflows, visualize usage patterns, automate processes, meet compliance requirements, and gain a competitive advantage in the market. IoT impacts everything from the performance of machines to supply chain to logistics operations. IoT significantly increases productivity: by as much as 0.2% of GDP already, and growing. The potential gains for businesses in developing countries are substantive: enterprises already save 4-5% of costs with relatively low deployment. Governments can encourage further economic growth: the right policies can stimulate IoT adoption by businesses – this can sharpen their countries' business sector competitiveness and result in higher tax revenues.IoT technology has a great deal of potential to advance the manufacturing industry. With arrays of sensors on factory floors, this industry has become more automated than ever before. One of the most important results of the expansion of IoT sensors in manufacturing is that these networks are powering advanced artificial intelligence applications. AI can't provide solutions like predictive maintenance, defect detection, digital twins, and generative design without critical data provided by sensors. The IoT technology market value is expected to rise to \$1.39 trillion by 2026 according to Mordor Intelligence. This incredible growth is likely due to a number of factors like COVID-19 pandemic accelerating the advancement of remote monitoring, smart home devices, and data analysis solutions; Businesses racing to develop better artificial intelligence solutions requiring a network of advanced sensors and edge computers within the scope of IoT. With this theme, I hope the readers gain a lot from the articles.

# Faculty in-charge's Message



While colleges like Thakur College of Engineering and Technology makes students smarter, making things smarter has been one of the pursuits of every industry. Internet of Things (IoT) has been helping make things smarter. Just putting a sensor is not enough, it's about collecting data, analysing it and using them for prediction.

Digital Twins and IoT have caught the fancy of every industry. Factories are getting smarter and operators are moving away from the physical proximity of a machine to a remote command centre. Huge amount of data is analysed on cloud to predict failure well in time for preventive interventions saving tons of money.

Many emerging technologies have IoT at the core. This magazine evaluates some of these trends and helps readers anticipate the impact.

Happy reading.

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# STUDENT ARTICLES



# HOME AUTOMATION: THE WAVE OF THE FUTURE

## 1. Introduction

If you're like most people, you probably think of home automation as something that's still very much in the future. But the truth is, home automation is already here – and it's only going to become more and more common in the years to come.

So what is home automation, exactly? Simply put, it's the process of automating various tasks and functions in your home. This can include things like turning off the lights when you leave a room, controlling the temperature of your home remotely, or even opening and closing your blinds automatically.

## 2. Body

The benefits of home automation are many. For one, it can save you time and effort by automating tasks that you would otherwise have to do manually. It can also help you save money by making your home more energy-efficient. And in some cases, it can even improve your home's security by giving you remote access to things like your locks and security system.

If you're interested in learning more about home automation, then this is the article for you. We'll take a look at some of the most popular home automation products and technologies on the market today, as well as some of the benefits they can offer. So read on, and learn.

Home automation systems can automate tasks like turning lights off and on, locking doors, and adjusting thermostats. Home automation systems make it possible to automate tasks like turning lights off and on, locking doors, and adjusting thermostats. This can save you time and energy, and make your home more secure.



Home automation can save you time and money by making your home more efficient. By automating tasks like turning off the lights when you leave a room or setting the thermostat to a more energy-efficient temperature, you can reduce your energy consumption and save money on your utility bills. In addition, home automation can help you manage your time more effectively by automating tasks like vacuuming the floors or opening the blinds in the morning.

## 3. Conclusion

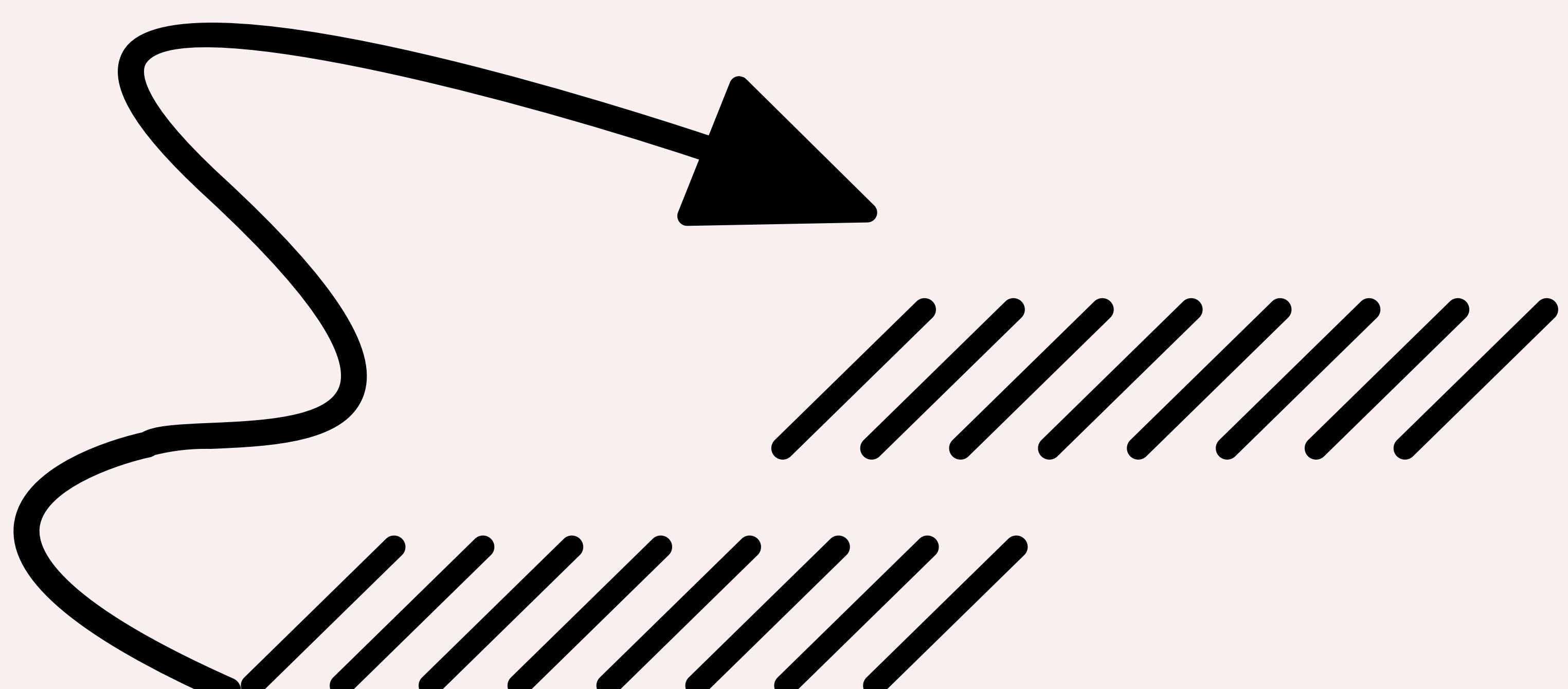
It is clear that there are many benefits to online learning. It is more flexible, can be more affordable, and can provide learners with more control over their learning experience. Additionally, online learning can be more engaging and can lead to better learning outcomes.

Home automation can increase your comfort by allowing you to control

1. Your home's temperature and lighting from your smartphone
2. Adding automation to your home can do more than just give you a little extra convenience
3. it can also make your home more comfortable.
4. If you live in a climate with extreme temperatures, being able to adjust your home's thermostat from your smartphone can be a real lifesaver.
5. No more coming home to a sweltering house in the middle of summer or a freezing one in the dead of winter!



Ratnesh Upadhyay  
TE E&TC B  
Roll No 65



# HOME AUTOMATION

## INTRODUCTION:

The advancements in the field of Internet of things (IoT) has fascinated the world and has provided great opportunities to develop and innovate in small house networks. In this era of digitization and automation, life of human beings has become simpler as almost everything is turning to be automatic, replacing the old manual systems. The term "smart house" was first coined by the American Association of House builders in 1984.

The main attraction of any automated system is reducing human labour, effort, time and errors due to human negligence. The biggest concern about any innovation is its efficiency in satisfying the purpose for which it has been developed. Home automated systems are mainly designed to conserve energy and prevent energy loss as with the increase in population and advancement in modern technology, saving energy is the need of the hour.

## TECHNIQUES:

### 1. ZIGBEE NETWORKS:

Systems based on Zigbee networking topology are considered to be more intelligent compared to other techniques. It creates a home gateway and allows local network devices having their own IP addresses to communicate with external network. This helps to not only control devices locally but also through a remote external network.

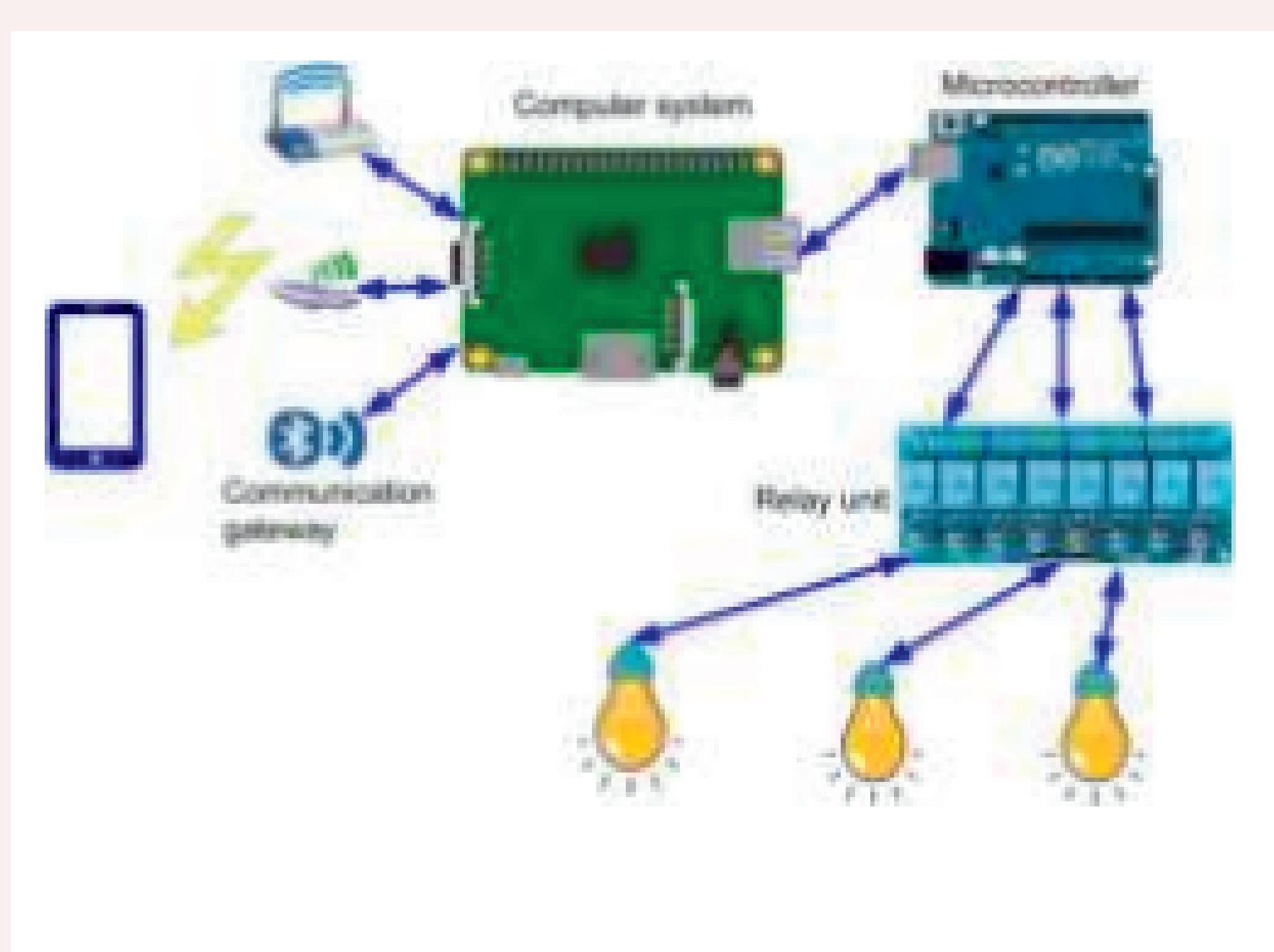


### 2. RADAR TECHNOLOGY:

With the help of radars, RF based wireless remote control systems can control electrical appliances and turn them on/off from any place without even any line of sight around the house. Since RF signal has longer range, the operating area becomes larger. Along with this one more advantage of RF signal is that the transmitter and the receiver need not be in the line of sight for establishing connection. As RF frequency signal is strong, it is more reliable than IR transmission.

### 3. SMART HOME MICROCOMPUTERS:

Microcontrollers are devices used to cater any specific task or operation and are designed for the same. Smart Home Micro-Computers (SHMC) are small-sized computers that are connected to other devices in order to automatize and control the whole smart home system. These microcomputers consist of microcontrollers that facilitate specific tasks to be performed along with incorporation with other circuits. They allow the users make interactive projects and applications.

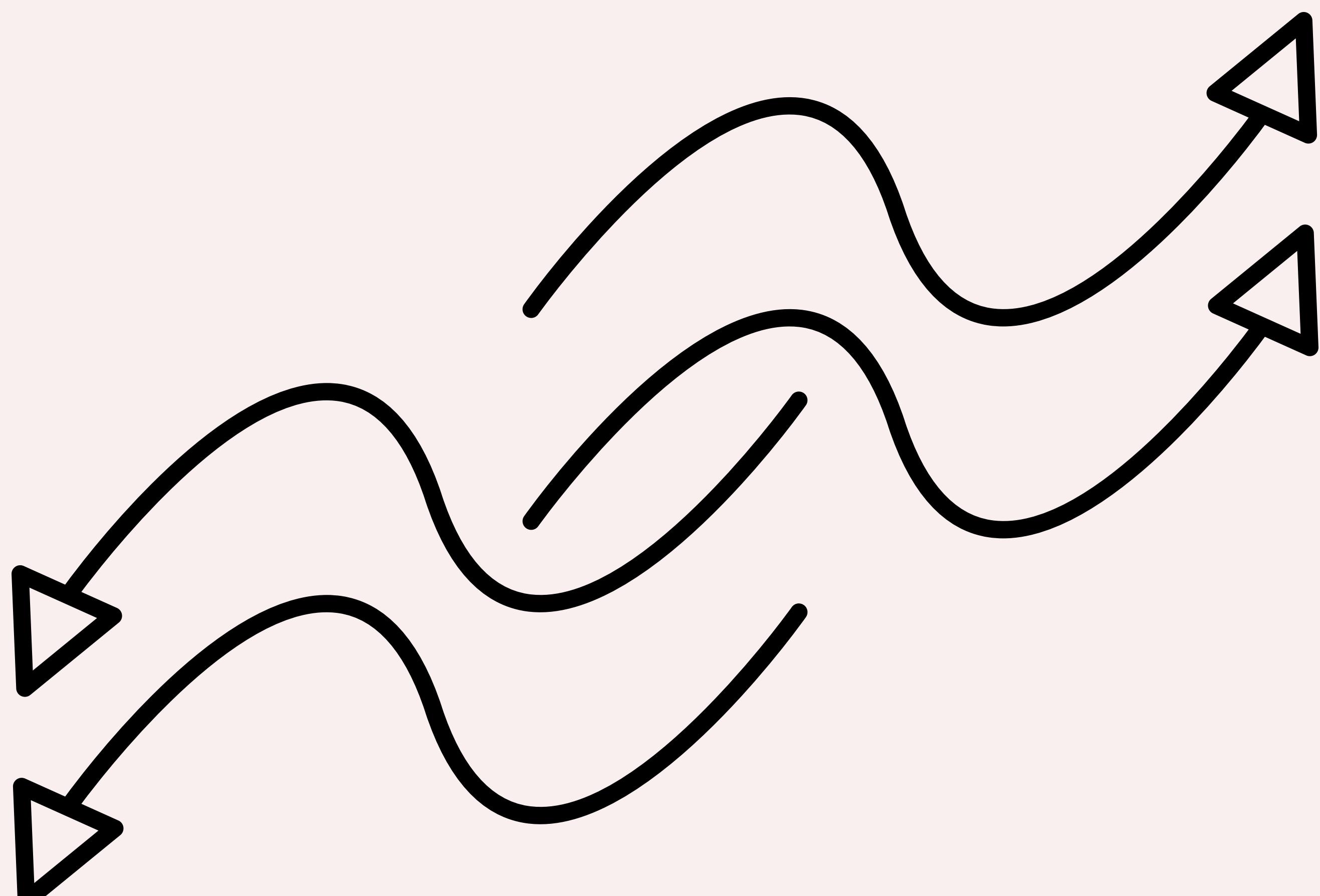


## **CONCLUSION:**

Thus Smart Homes are capable of intelligent energy management as they play a big role in saving energy. Different techniques have been discussed based on which systems can be designed in order to make smart homes. Efficient usage of electricity results in lowering peak load, reducing energy bills and minimizing greenhouse gas emissions which can be easily fostered through introduction of smart homes. Also for its effective integration into real world, bi-directional communication networks need to be given attention. Thus it is high time that we realize the worth of energy conservation and accept smart homes as one such problem solver for the same.

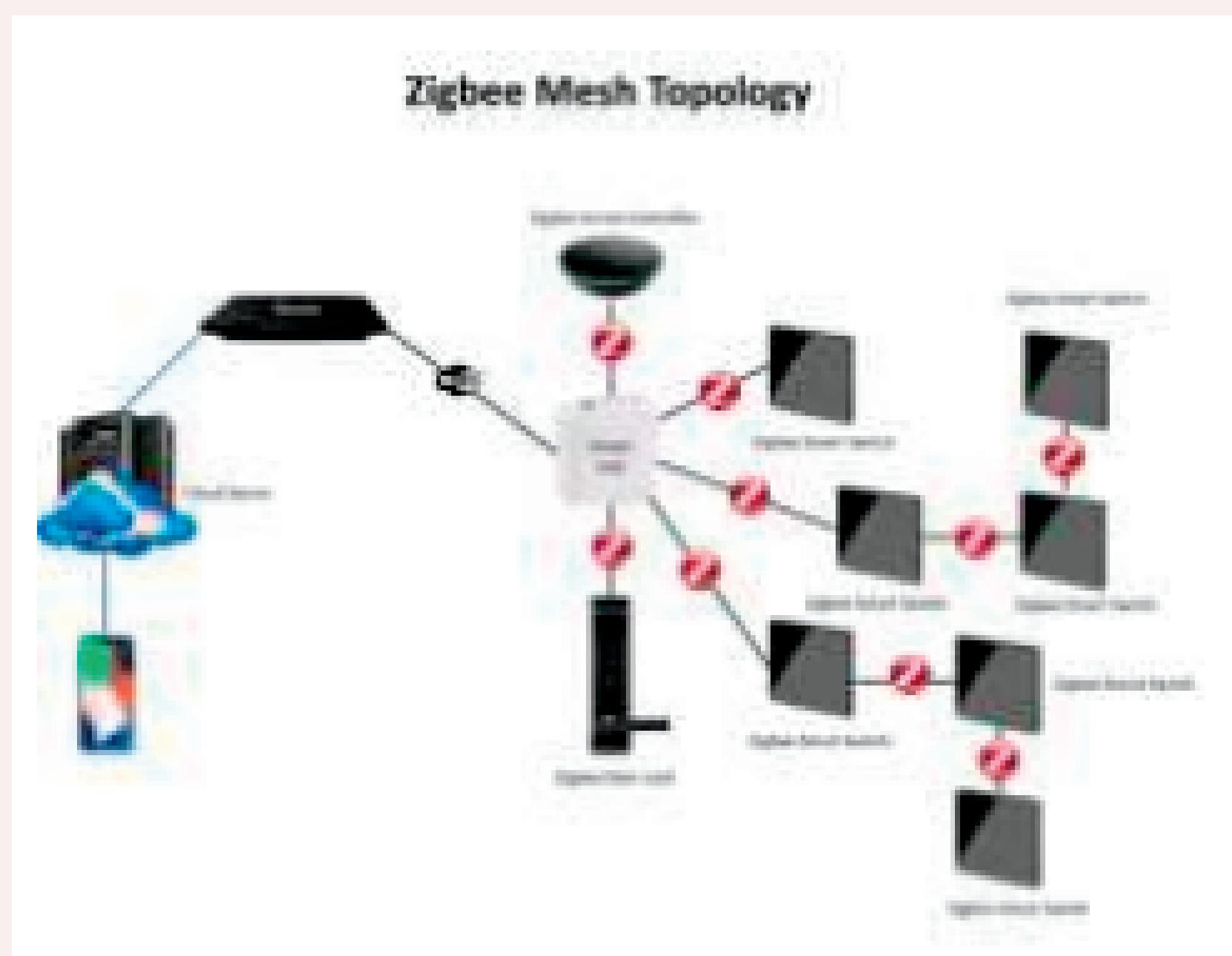


SHREYASH SHARMA  
T.E E&TC B  
Roll No 27



# HOME AUTOMATION

A question arises what would happen if every domestic purpose is fulfilled automatically by its own. There itself Home automation comes into picture which gives you access to control devices in your home from a mobile device anywhere in the world. The term may be used for isolated programmable devices, like smart thermostats and sprinkler systems, but home automation more accurately describes homes in which nearly everything—smart light switches, appliances, smart outlets, heating and cooling systems—hook up to a remotely controllable network. From a home security perspective, this also includes your alarm system, and all of the doors, windows, locks, smoke detectors, surveillance cameras and any other sensors that are linked to it .IoT is the game changer in this field.



# 1. Automation

Automation is, unsurprisingly, one of the two main characteristics of home automation. Automation refers to the ability to program and schedule events for the devices on the network. Once you start to understand the possibilities of home automation scheduling, you can come up with any number of useful and creative solutions to make your life better.

## 2. Remote control

The other main characteristic of cutting-edge home automation is remote monitoring and access. While a limited amount of one-way remote monitoring has been possible for some time, it's only since the rise in smartphones and tablets that we've had the ability to truly connect to our home networks while we're away.

# 3. Home automation components

Ideally, anything that can be connected to a network can be automated and controlled remotely. In the real world (outside of research labs and the homes of the rich and famous), home automation most commonly connects simple binary devices. This includes "on and off" devices such as lights, power outlets and electronic locks, but also devices such as security sensors which have only two states, open and closed. Where home automation becomes truly smart is in the Internet-enabled devices that attach to this network and control it for future perspective. The classic control unit is the home computer, for which many of the earlier home automation systems were designed. Today's home automation systems are more likely to distribute programming and monitoring control between a dedicated device in the home, & also the control panel of a security system, and a user-friendly app interface that can be accessed via an Internet-enabled PC, smartphone or tablet etc. So for a while you may have a smart TV, washing machine, refrigerator, thermostat, coffee maker or any of the other Internet-ready household devices on the market, the end result is usually a separate control scheme for each device.

In the near future, home automation may be standardized to let us truly take advantage of all of these additional possibilities. For the time being, the home security providers that specialize in home automation have focused on the most critical and useful parts of a connected home. At the most initial & basic level, this means the doors and windows and environmental devices (thermostat, smoke detectors, temperature, humidity, fire and carbon dioxide sensors) that keep you safe and comfortable.

#### 4.Energy efficiency

One clear advantage of home automation is the unmatched potential for energy savings, and therefore cost savings at the same time. Your thermostat is already smart in the sense that it uses a temperature threshold to govern the home's heating and cooling system.

We are all busy and home automation may be able to help make things a bit easier for you. Home Automation it will be beneficial in both perspectives & may offer different features that can save your time and money



# EMBEDDED SYSTEMS

Embedded means something that is attached to another thing. An embedded system can be thought of as a computer hardware system having software embedded in it. An embedded system can be an independent system or it can be a part of a large system. An embedded system is a microcontroller or microprocessor based system which is designed to perform a specific task. For example, a fire alarm is an embedded system; it will sense only smoke.

An embedded system has three components –

- It has hardware.
- It has application software.

It has Real Time Operating system (RTOS) that supervises the application software and provide mechanism to let the processor run a process as per scheduling by following a plan to control the latencies. RTOS defines the way the system works. It sets the rules during the execution of application program. A small scale embedded system may not have RTOS.

## Embedded system characteristics

- A single-purpose device: An embedded system often executes a specialised task repeatedly. For instance: A pager always works as a pager.
- All computing systems are subject to design metric limitations, but those for embedded systems may be particularly strict. An implementation's cost, size, power, and performance are all measured by design metrics. It must be compact enough to fit on a single chip, operate quickly enough to process data in real time, and use the least amount of power possible to prolong battery life.

- Reactive and real-time Many embedded systems must continuously respond to changes in their environment and compute specific results instantly. Take a cruise control system in a car as an example; it constantly checks and responds to speed and braking sensors. It must repeatedly calculate accelerations and decelerations in a finite amount of time; if the computation is delayed, the automobile may not be controlled.
- It must be microprocessor-based, either through a microprocessor or a microcontroller.
- It must have a memory because the software on it is often stored in ROM. The PC doesn't require any extra memory.
- In order to link input and output devices, it must have connected peripherals.
- Systems HW-SW: More functionality and flexibility are provided by software. Performance and security are enhanced by hardware.



## Basic Structure of an Embedded System

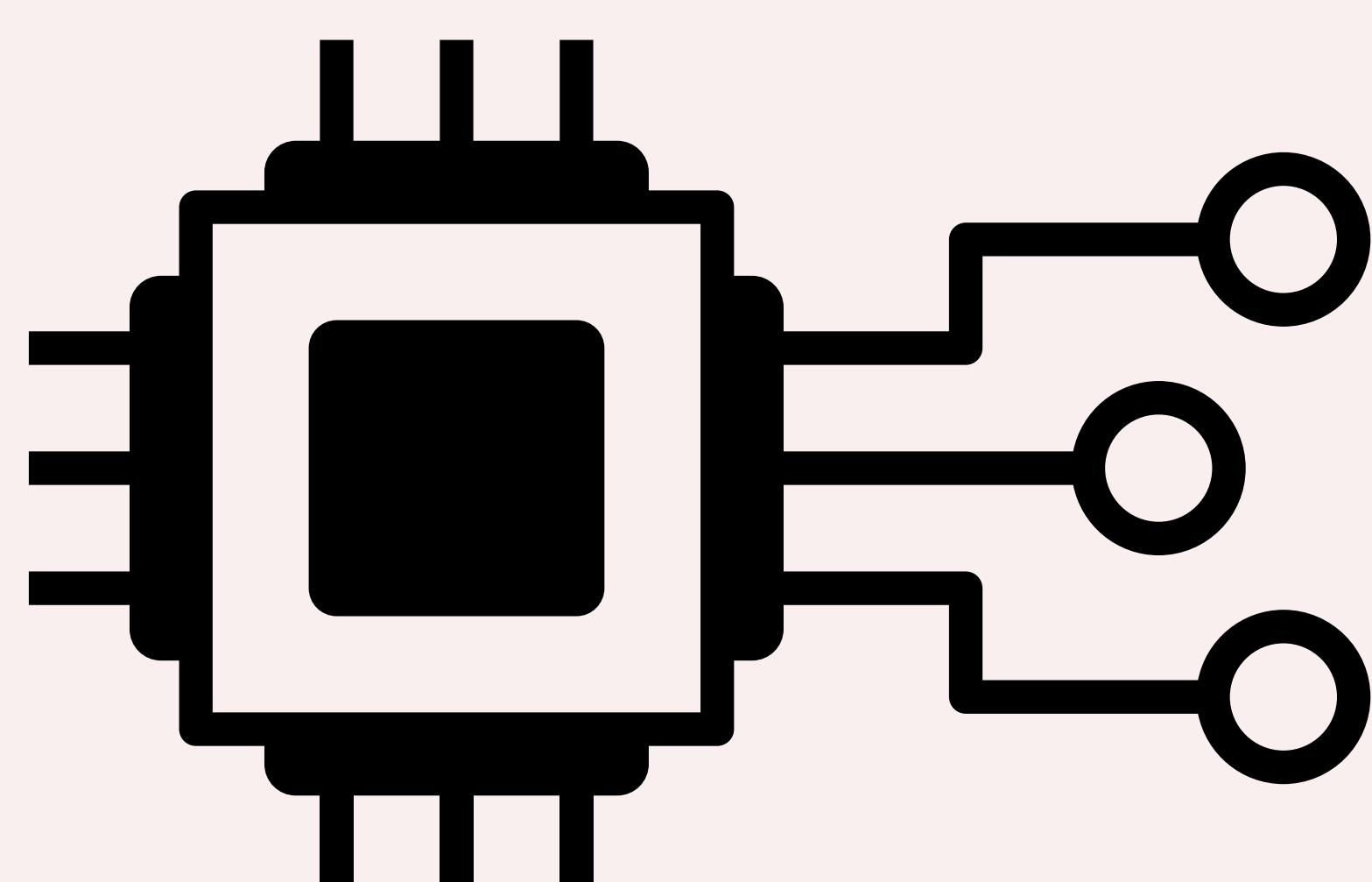
Sensor: It takes a reading of the physical quantity and converts it to an electrical signal that may be read by a viewer or by any electronic device, such as an A2D converter. The detected quantity is stored in memory by a sensor.

A-D Converter -The analogue signal sent by the sensor is transformed into a digital signal via an analog-to-digital converter (A-D converter).

Processors and ASICs - Processors transform data into measurements and outputs, which are then stored in memory.

D-A Converter -Digital-to-analog converters change the digital data provided to processors into analogue data.

Actuator - An actuator saves the permitted output after comparing it to the real (anticipated) output stored in it, which is obtained by the D-A Converter



# MACHINE LEARNING

Machine learning is a subfield of Artificial Intelligence, and it often aims to find patterns in data so that they might be understood by people.

Machine learning differs from traditional algorithmic approaches. In traditional computing, programmers already provide explicitly programmed instructions that are used in writing an algorithm. Functional programming approaches focus on directly specifying the mathematical steps needed to solve a computing problem. Machine learning takes an approach similar to functional programming, but instead of preexisting algorithms, the study of the field is evolving to create hypotheses about decision-making processes. A machine learning algorithm relies on algorithms being used while training a computer to build models based on input data. With this, a machine learning system learns from sample inputs in order to perform decision-making for a computer.

With the use of artificial intelligence (AI), people are a large number of services that allow them to better understand what we as a society know about their distinctiveness. Instantly tag pictures of friends. Automatically or semi-automatically convert images of text into movable type.

"Recommend" music or TV shows that exist in our shared knowledge database. Automated cars that use AI to understand movement affordances, traffic conditions, negotiating hazards and environmental possibilities rely on machine learning to assist us to navigate. AI-driven voice assistants, cameras and screens

Machine learning is constantly improving. If you are working with machine learning methodologies, or analyzing the impact of machine learning, you should keep in mind these considerations:

Machines are not identical to artificial intelligence, and artificial intelligence does not always lend itself to machine learning. ML and AI are related, however. Thinking at a high level, the easiest way to visualize their relationship is to refer to them like concentric circles—AI at the inner rim, ML in the middle, and DL within both. ML also requires writing algorithms to cover all eventualities, simply because it is a phenomenon of continually learning things from education, behavior, language, and examples in general.

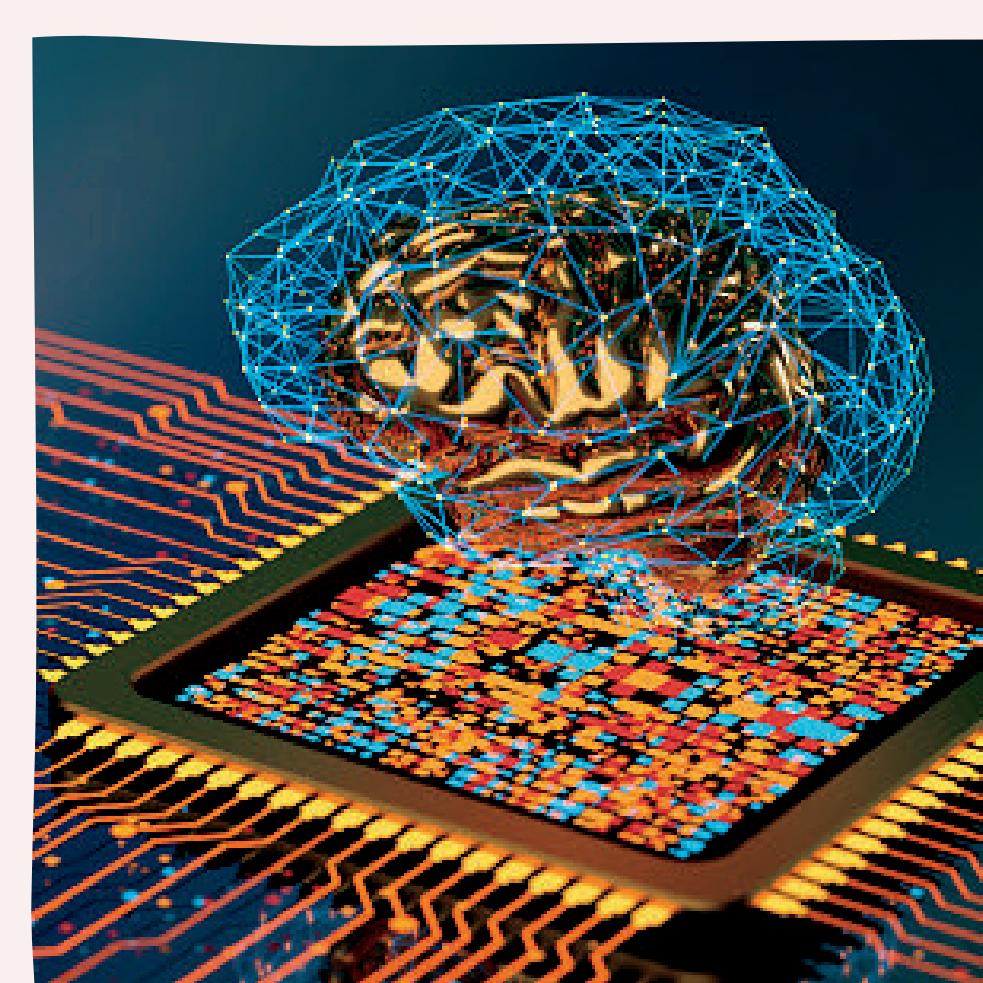
Some machine learning concepts:-

A pattern recognition model that may be applied to both classification and regression is the k-nearest neighbor approach. The k in k-nearest neighbor is a positive integer, usually a small one, and is frequently abbreviated as k-NN. The k closest training examples within a space will be the input for classification or regression.

Our attention will be on k-NN classification. Class membership is the result of this procedure.

This will create a new object and put it in the class that its k closest neighbours share the most of.

The object is put into the class of the single nearest neighbour when k = 1.



Decision trees are frequently used to show or guide decision-making by visually representing decisions. Decision trees are utilised as a predictive model when working with machine learning and data mining. These models link observations about the data to judgments about its intended value. Making a model that can forecast the value of a target depending on input variables is the aim of decision tree learning. In the predictive model, the leaves reflect the conclusions about the goal value of the data while the branches represent the properties of the data that are determined through observation. When a tree is being "learned," the original data is split up into subsets based on an attribute value test, which is then repeated for each of the generated subsets.



**DEEPRAJ SALIAN**  
**T.E E&TC B Roll No 15**

# THE IMPORTANCE OF CYBERSECURITY: WHY YOU CAN'T IGNORE IT ANY LONGER

## 1. Introduction

Nowadays, cyber security is one of the most pressing issues faced by businesses and consumers alike. With the growth of the internet and the increased reliance on computerized systems, the risk of cyber attacks has grown exponentially. Despite this, many businesses and individuals still ignore the importance of cybersecurity and fail to take the necessary steps to protect themselves.

## 2. Body

In this article, we will discuss the importance of cybersecurity and why you can no longer afford to ignore it. We will also provide some tips on how you can improve your cybersecurity posture and protect yourself from potential attacks.

So why is cybersecurity important? There are many reasons, but the most important is that cyber attacks can have a devastating impact on businesses and individuals. They can lead to the loss of sensitive data, the theft of money, and the destruction of property. In some cases, they can even lead to loss of life.

Cyberattacks are also becoming more sophisticated and more targeted. Gone are the days when hackers would simply attack any system they could find. Now, they are much more likely to target specific businesses or individuals in order to steal sensitive data or cause havoc.

This is why it is so important for businesses and individuals to take cybersecurity seriously. By taking some simple steps

The Importance of Cybersecurity: Why You Can't Ignore It Any Longer As the world becomes increasingly digitized, the importance of cybersecurity can no longer be ignored.

With sensitive information being stored and shared online, the risk of data breaches and cyber attacks is higher than ever. While businesses and organizations are the most common targets, individuals are also at risk.



## The Consequences of a Cyberattack

The consequences of a cyberattack can be devastating. A successful cyberattack can result in the loss of sensitive data, financial loss, and even physical damage. In some cases, a cyberattack can even lead to death.

## How to Protect Yourself from Cybercrime

There are a few basic steps you can take to protect yourself from cybercrime:

1. Keep your software and security up to date.
2. Use strong, unique passwords for each account.
3. Don't click on links or attachments from people you don't know.
4. Be careful about what you share online.
5. Use a secure connection when possible.
6. Backup your important data.

## Why Cybersecurity Should be a Top Priority for Everyone

When it comes to cybersecurity, everyone needs to be on board in taking action to protect themselves, their businesses, and their data.

According to a report from IBM, the average cost of a data breach globally is now \$3.86 million. And as data breaches become more common, the cost of each one is only going up.



Ankit Yadav  
TE E&TC B Roll No 67

# HOW EMBEDDED SYSTEMS ARE IMPROVING OUR HEALTH AND SAFETY

## I. INTRODUCTION

In this article we will be discussing how embedded systems are improving our health and safety. We will be looking at how they are being used in various industries and how they are benefiting us. We will also be looking at some of the challenges that come with using embedded systems.

## II. THE BODY

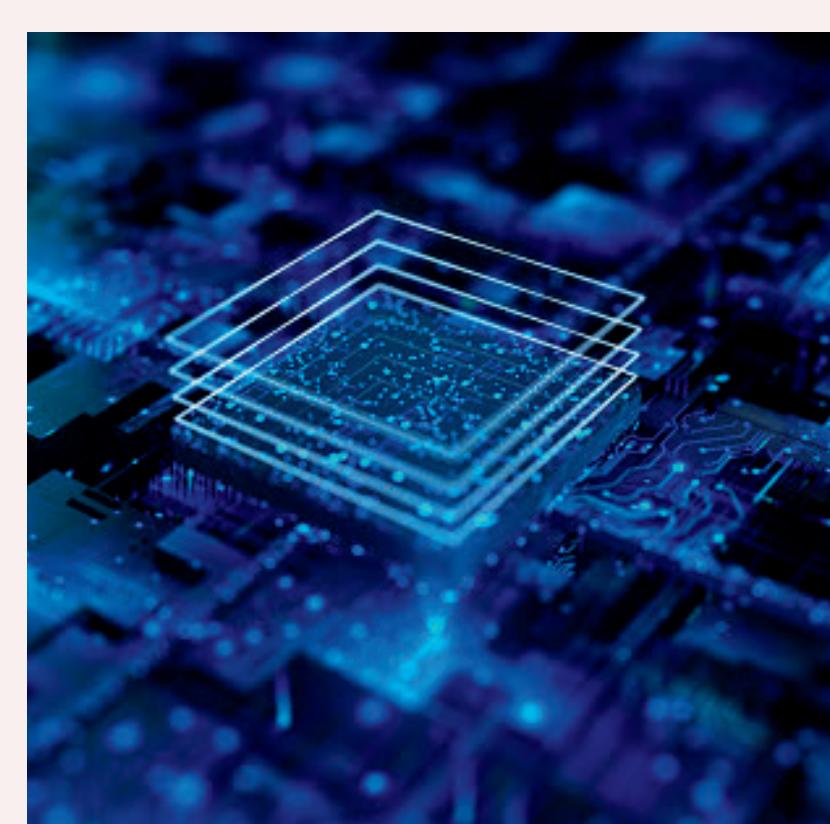
How embedded systems are being used to improve health and safety in our world today ?

There is no one-size- answer to this question, as the ways in which embedded systems are being used to improve health and safety vary depending on the application. However, some common examples include the use of embedded systems to monitor vital signs, to provide early warning of potential health risks, and to aid in the diagnosis and treatment of medical conditions. Embedded systems are playing an increasingly important role in healthcare and safety applications. They are used in a wide range of applications such as medical devices, patient monitoring systems, and security systems. The potential of embedded systems is to improve the quality of life of people with disabilities. Embedded systems have the potential to greatly improve the quality of life of people with disabilities. By providing individuals with disabilities the ability to control their environment and interact with the world around them, embedded systems can help people control their environment and interact with the world around them, embedded systems can help people with disabilities live more independent and fulfil their lives. In addition, embedded systems can help people with disabilities stay connected to the people and things they care about, and can provide them with greater sense of self sufficiency and control.

Here is a picture of application of embedded systems in medical field: Here we can see the various applications powered by embedded systems used in the medical field i.e a vital sign board, an insulin pump system , movement recognition band and so on. Vital sign monitor measures body temperature, pulse rate , respiration rate and blood pressure. Insulin pump systems are small devices that tell how the pancreas work . Movement recognition band tracks the overall movement of pulses etc.

## III. CONCLUSION

On a concluding note, medical professionals are seeking improvements to patient health daily. Monitoring devices are becoming more compact and easy to use. Sensors and pacemakers are getting smarter. The healthcare industry is making strides to improve the accessibility and proactivity of medical equipment.



Aakash Yadav  
TE E&TC B Roll No 55

# BASICS OF IOT

## I. INTRODUCTION

With the recent development of IoT devices has called for a spike in new accurate and resilient sensors. We will provide a general overview of some of the numerous types of sensors that will be driving data collecting within an IoT endeavor. IoT platforms use a variety of sensors to function and give various types of information and data. IoT devices communicate with IoT gateways or other edge devices to exchange sensor data, which can then be forwarded to the cloud for analysis or examined locally. Data may be collected by sensors embedded in clothes or wearable devices attached to the body. Information from multiple sensors can be combined and intercorrelated to draw conclusions about hidden problems; for instance, data from temperature and vibration sensors could be used to identify when a mechanical fault is occurring. The sensors used in these devices are designed to detect, measure, and communicate about a single, real-world variable at a time

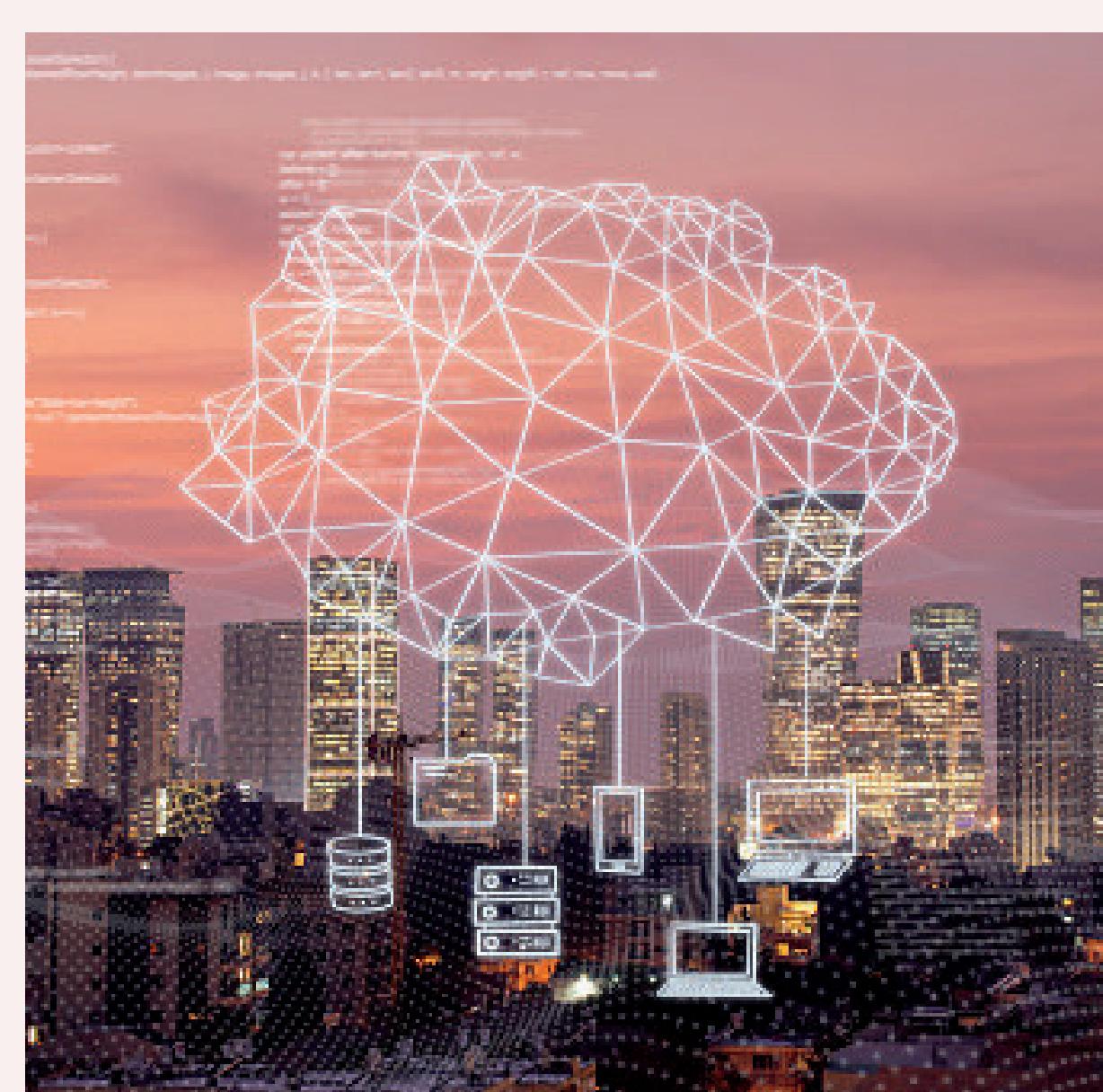
## II. THE BODY

Sensors are devices that sense outside information, replacing it with a signal that humans and machines can discern. In broad terms, sensors are devices that detect and react to changes in the environment.

Motion sensors, or detectors, may be used in security and intrusion-detection systems, but they may also be used for automated management of doors, sinks, air conditioning, heating, or other systems. In the home security space, there are many sensors used in conjunction with wireless video cameras networks, for example, when we want to detect whether the door or windows are in an opening/closing state, and to alert the user if a window or door is left open, we could keep limit switch sensors or we could

actively monitor and measure the temperature, humidity, and lighting in the room, as well as to detect movement if there is a person inside a room to conclude whether a door or window is open through the help of humidity & temperature sensor, a light sensor that detects a change in intensity of light and a motion sensor to detect motion of a person. Smart sensors are built as Internet-of-Things components, converting real-world variables that they are measuring into a stream of digital data to transmit to a gateway. An IoT ecosystem is composed of Web-enabled smart devices that leverage embedded systems, such as CPUs, sensors, and communications hardware, to capture, send, and act upon the data that they receive from the environment. From homes to industrial applications, the proliferation of Internet-of-Things (IoT) systems is growing worldwide in order to intelligently link devices and capture actionable insights, while trying to satisfy increasing consumer demands as well as increase productivity.

Here is an image of an IOT based Home automation System



Here CC3200 is a WIFI model on which all other sensors are connected be it a light sensor that controls the lights of the house or an alarm sensor that raises an alarm. Then there is a motion sensor which detects motion and so on. All these sensors are interconnected with the help of a WIFI sensor.

## CONCLUSION

On a concluding note, IoT is most prevalent among organizations in the manufacturing, transportation, and utility sectors, using sensors and other IoT devices; however, it has also found use cases among organizations within agriculture, infrastructure, and home automation sectors, leading some organizations towards a digital transformation. Sensors emit valuable information, and when they are networked, can share data with other connected devices and management systems. The future of IoT has the potential to be limitless. Advances to the industrial internet will be accelerated through increased network agility, integrated artificial intelligence (AI), and the capacity to deploy, automate, orchestrate and secure diverse use cases at hyperscale



**Siddhant Baliga  
TE E&TC B Roll No 63**

# THE USES OF MACHINE LEARNING IN THE IOT SPACE

## I. INTRODUCTION

Nowadays machine learning has become the latest hip trend in the technical space. But in reality, it was a concept that was introduced by Arthur Samuel and IBM. It is a part of artificial intelligence that is used in data analytics and identifying a pattern in a subject to make decisions and remove human error. Along with IoT, machine learning is aggressively expanding. Small cameras and other IoT components are now conveniently available on smartphones, computers, parking, and traffic management systems, household appliances, and traffic control systems. Worldwide, millions of IoT devices are produced. These devices use the internet to collect a range of machine-stored data, allowing machines to comprehend these data more precisely and use them more effectively. There are many advantages to integrating machine learning with IoT devices such as the Automation of IoT and machine learning algorithms assist obtain different alternative approaches that cut down on waste and reduce inefficiencies. It Brings Supply Chain Visibility. The best support for supply chain management has come from IoT implementation. Critical information like the condition of the goods and real-time data is provided by the IoT sensors used in trucks and shipping containers. The data makes the supply chain more visible. But the IoT and machine learning together provide your organization with more scalability. Machine learning anticipates potential problems using the real-time data produced by IoT devices and alerts users to take appropriate action.

## AUTOMATION OF BUSINESS PROCESSES

IoT and machine learning enables the automation of routine corporate tasks. IoT devices make it easier to access more accurate data, which speeds up

and improves the efficiency of labor. Business process automation (BPA) boosts efficiency for firms by up to 40% with machine learning and the internet of things (IoT). The automation facility streamlines the process and frees up other employees to work on duties that offer value to the firm.

## PROPERLY DISPOSING OF WASTE

By eliminating waste, IoT and machine learning help firms operate more efficiently. IoT sensors give information about resources that aren't helpful for businesses, and this is where machine learning uses algorithms to assess the data.

## AGRICULTURE

Agriculture is regarded as the most fundamental activity performed by humans. Research claims that in order to meet the world's demand, the global food supply must rise by 70% by 2050. Given that there are currently 70 million linked devices and that figure is expected to rise significantly in the upcoming years, the agriculture sector anticipates a quick adoption of machine learning and IoT.

In the modern agricultural era, data produced by the fusion of machine learning and IoT is used to facilitate interactions between farmers and the agricultural process



## CONCLUSION

IoT and machine learning provide organizations the chance to grow to their full potential, and these technologies are also enhancing their productivity and scalability. The corporate landscape is changing due to machine learning and the Internet of Things. Businesses are changing due to machine learning. As a result, it is appropriate to adopt both technologies into your company's operations and to select the finest firm to carry out the Internet of Things and AI & ML services.



# SENSOR TECHNOLOGY

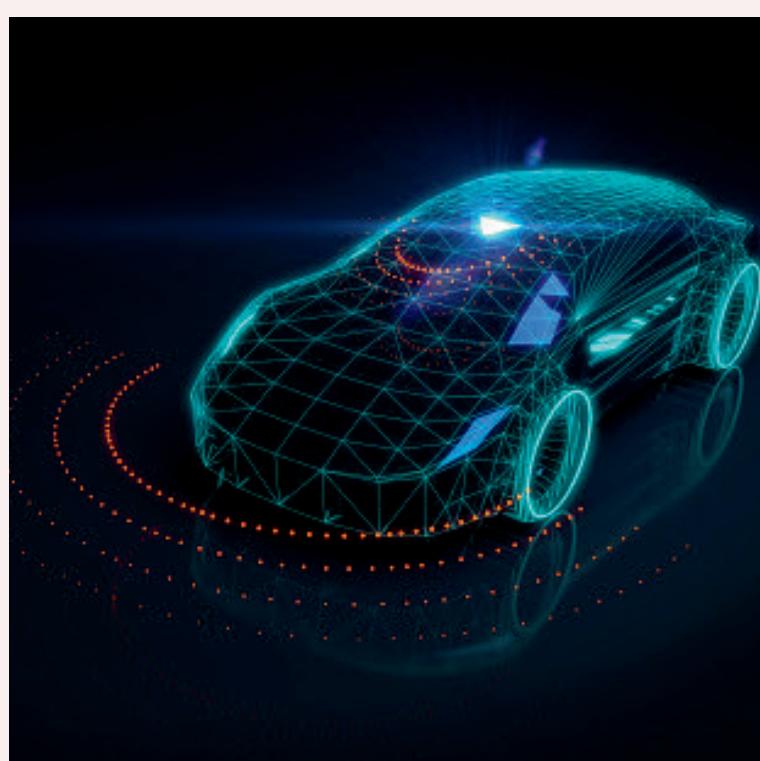
## I. INTRODUCTION

A sensor is a device that produces an output signal to sense a physical phenomenon.

### Different types of light sensors

In the broadest definition, a sensor is a device, module, machine, or subsystem that detects events or changes in its environment and sends the information to other electronics, frequently a computer processor. Sensors are always used with other electronics.

Sensors are used in everyday objects such as touch-sensitive elevator buttons (tactile sensors) and lamps that dim or brighten by touching the base, and in innumerable applications of which most people are never aware. With advances in micromachinery and easy-to-use microcontroller platforms, the uses of sensors have expanded beyond the traditional fields of temperature, pressure, and flow measurement, for example into MARG sensors.



Analog sensors such as potentiometers and force-sensing resistors are still widely used. The applications include manufacturing and machinery, airplanes and aerospace, cars, medicine, robotics, and many other aspects of our day-to-day life. A wide range of other sensors measures the chemical and physical properties of materials, including optical sensors for refractive index measurement, vibrational sensors for fluid viscosity measurement, and electrochemical sensors for monitoring the pH of fluids.

A sensor's sensitivity indicates how much its output changes when the input quantity it measures changes. For instance, if the mercury in a thermometer moves 1 cm when the temperature changes by 1 °C, its sensitivity is 1 cm/°C (it is the slope  $dy/dx$  assuming a linear characteristic). Some sensors can also affect what they measure; for instance, a room-temperature thermometer inserted into a hot cup of liquid cools the liquid while the liquid heats the thermometer. Sensors are usually designed to have a small effect on what is measured; making the sensor smaller often improves this and may introduce other advantages. The technological process allows more and more sensors to be manufactured on a microscopic scale as microsensors using MEMS technology. In most cases, a microsensor reaches a significantly faster measurement time and higher sensitivity compared with microscopic approaches. Due to the increasing demand for rapid, affordable, and reliable information in today's world, disposable sensors—low-cost and easy-to-use devices for short-term monitoring of single-shot measurements—have recently gained growing importance. Using this class of sensors, critical analytical information can be obtained by anyone, anywhere, and at any time, without the need for calibration and worrying about contamination. A suitable sensor obeys the following rules:

1. It is sensitive to the measured property
2. It is insensitive to any other property likely to be encountered in its application, and
3. It does not influence the measured property.

Most sensors have a linear transfer function. The sensitivity is then defined as the ratio between the output signal and the measured property. For example, if a sensor measures temperature and has a voltage output, the sensitivity is constant with the units [V/K]. The sensitivity is the slope of the transfer function. Converting the sensor's electrical output (for example V) to the measured units (for example K) requires dividing the electrical output by the slope (or multiplying by its reciprocal). In addition, an offset is frequently added or subtracted. For example, -40 must be added to the output if 0 V output corresponds to -40 C input.



# CLOUD COMPUTING

## INTRODUCTION:

A distributed computing model that has only lately gained popularity is cloud computing. Even so, it is not a brand-new concept that simply surfaced. L. Kleinrock predicted that computer networks would still be in their infancy in 1969. However, as they develop and become more advanced, "computer utilities"—which will serve individual homes and offices across the nation like the current electric and telephone utilities—will likely proliferate. The utility-based computing paradigm of today was truly revealed in his vision. The invention of grid computing in the middle of the 1990s, which enabled users to access processing power on demand, was one of the major milestones toward this future. It is possible to see how grid computing technology evolved into cloud computing. Eric Schmidt, CEO of Google, popularised the term "cloud computing" first in late 2006. (maybe he coined the term). Thus, even if its foundations date back to certain old concepts, cloud computing has only recently gained popularity from a financial, technological, and social standpoint. From an architectural standpoint, cloud is built on a pre-existing grid-based architecture and utilises grid services in addition to adding some technologies like virtualization and various commercial models.

## CONCEPT:

Computing through service-oriented architectures (SOA), which deliver an integrated and orchestrated suite of functions to an end-user through the composition of both loosely and tightly coupled functions, or services, is a powerful underpinning and enabling concept. Services are frequently network-based. Component-based system engineering, the orchestration of various services through workflows, and virtualization are all related ideas.

## Cloud –Types

Public cloud: Public cloud or external cloud describes cloud computing in the traditional mainstream. Public clouds are run by third parties, and applications from different customers are likely to be mixed together on the cloud's servers, storage systems, and networks. A public cloud provides services to multiple customers.

### Hybrid cloud:

Hybrid clouds combine both public and private cloud models. This is most often seen with the use of storage clouds to support Web 2.0 applications.

### Private cloud:

Private clouds are built for the exclusive use of one client, providing the utmost control over data, security, and quality of service. The company owns the infrastructure and has control over how applications are deployed on it. Private clouds can be built and managed by a company's own IT organization or by a cloud provider.

## WORKING:

The front end and the back end of a cloud computing system are the two divisions that can be made. They communicate with one another across a network, most frequently the Internet. The side that the computer user, or client, sees is called the front end. The "cloud" portion of the system serves as the back end. The "cloud" of computing services is made up of numerous computers, servers, and data storage facilities on the back end.

The system is managed by a central server, which keeps track of client requests and traffic to ensure everything operates well. It adheres to a set of protocols. Most of the work and data storage is done by servers and other remote computers.

## **CONCLUSION:**

A distributed computing model that is just starting to take off is cloud computing. Both the IT business and the social sphere can benefit from virtualization when combined with the utility computing concept. Even while cloud computing is still in its early stages, it is unmistakably gaining ground. Already, companies like Google, Yahoo, and Amazon offer cloud services. With their simplicity of use, availability features, and utility computing architecture, technologies like Google App-Engine, Amazon EC2, and Windows Azure are dominating the industry. The hinges of distributed programming are taken dealt of by the cloud providers, so users don't need to worry about them. Instead of these administrative tasks, they may focus more on work in their particular area of expertise. Additionally, business organisations are expressing a growing desire to use cloud services. Numerous outstanding research questions exist in this area, such as the cloud's security features, moving virtual machines, handling massive amounts of data for analysis, etc. Cloud computing may be successfully used in e-governance and rural development in underdeveloped nations like India. Although, as we've shown, there are certainly major problems that must be resolved before cloud computing can be effectively used for these social reasons. But by thoroughly researching the topic, they can be resolved.



**Viraj Raghuvansh**  
**TE E&TC B Roll No 13**

# CLOUD COMPUTING

## INTRODUCTION:

The world of cloud computing is huge and versatile. Most of you all know what cloud computing is and its uses in the tech industry. Tech giants like Amazon (AWS), Microsoft (Azure), and Google Cloud (GCD) have adopted the cloud ecosystem since the early 2000s. In this article, we will focus more on how applications are deployed and scaled with the help of cloud computing.

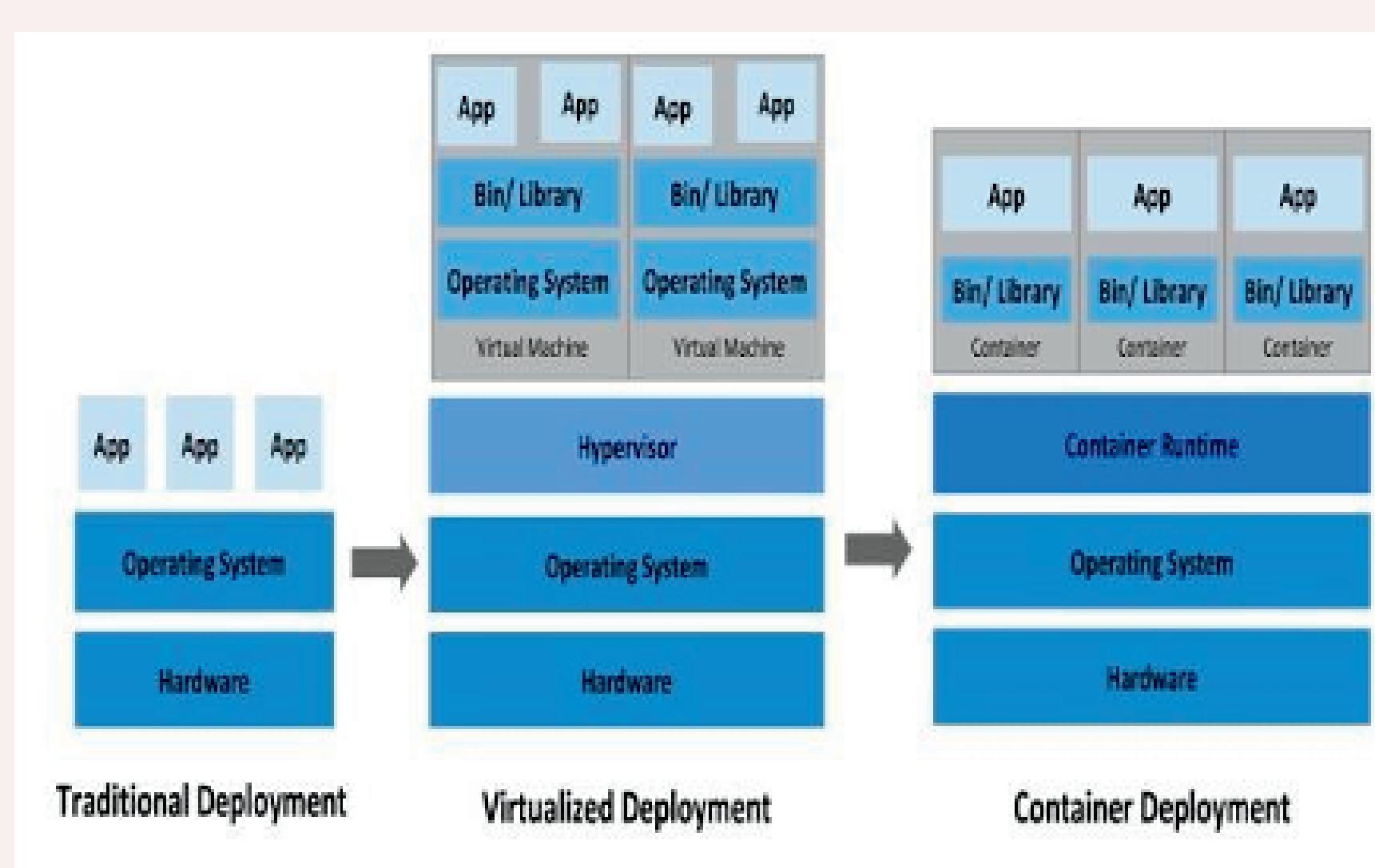
## THE BODY:

Suppose you have an existing mobile or web application and you want to commercialize the same; it is not possible to send the application running locally on your computer. You need to run the same application on a public platform which continuously keeps the server running. In a nutshell, you are buying an external OS to run your application publicly. Earlier, this was known as traditional deployment where users had to buy servers and run their applications on it. Fast track a few years later, came the era of virtualization, where applications could be run on virtual machines given by cloud providers. The only drawback of this was, every VM had its own OS which would be shared by your local system leading to the division of resources. To deal with this, container deployment was introduced. Containers are similar to VMs but have isolation properties to share the OS among applications.

Now consider, you have a huge application running in a single container and the backend, due to some error, stops running. This will lead to the failure of the whole container and the application will stop working. To tackle this situation, there are microservices created which contain multiple containers each running a part of the application. If there are new updates on some services of the application other containers will not be affected. The process of continuously deploying, integrating, and scaling your application via the cloud provider is known as Development Operations of DevOps.



Let's take a real-world example that covers all of these concepts. You created an e-commerce website today with a potential business plan which will increase your visits to the site. To cater to such a huge audience, all services must be up and running. The first step will be to choose a cloud provider (AWS, Azure, GCP, Digital Ocean, etc.), you choose GCP, for instance, and the second step will be to choose the RAM, storage, and type of architecture depending upon the scalability. GCP provides its own clusters (control plane + nodes), buckets (storing static resources for the website), and other services as well.



## **CONCLUSION:**

Once your application is set up, updating and scaling your services is quite simple. There are a lot of courses and free content to increase your knowledge about cloud computing. DevOps or system design engineers are highly paid in this industry.



**Manasi Sanghavi**  
**TE E&TC B - 17**

# MACHINE LEARNING

## INTRODUCTION:

Machine Learning is a branch of the broader field of artificial intelligence that makes use of statistical models to develop predictions. It is often described as a form of predictive modeling or predictive analytics and traditionally, has been defined as the ability of a computer to learn without explicitly being programmed to do so. In basic technical terms, machine learning uses algorithms that take empirical or historical data, analyze it, and generate outputs based on that analysis. In some approaches, the algorithms work with so-called "training data" first and then they learn, predict, and find ways to improve their performance over time.

- In unsupervised learning, the learning algorithm is not given this type of guidance; instead, it works to discover the pattern or structure in the input on its own. Two main types of unsupervised learning are 1) clustering, which involves discovering groups within the dataset that share similar characteristics. 2) density estimation, which involves evaluating the statistical distribution of the data set.



## BODY:

There are three main approaches to machine learning: supervised, unsupervised, and reinforcement learning. There are also hybrid approaches including semi-supervised learning, which can be tailored to the problem a researcher is seeking to solve. Each approach has specific strengths and weaknesses, and some techniques are better suited to particular types of problems than others.

- In supervised learning, the computer is trained on a set of data inputs and outputs, with the goal of learning a general rule that maps the given inputs to the given outputs. Two main types of supervised learning are:
  - 1) classification, which entails the prediction of a class label.
  - 2) regression, which entails the prediction of a numerical value.

Unsupervised learning methods also include visualization with the data and projection, which reduces the dimensions of the data, a form of simplification.

- In reinforcement learning, the computer and algorithms will confront a problem in a dynamic environment and as it works to perform a given goal, it will receive feedback (rewards), which will reinforce its learning and goal-seeking effort. The example of AlphaGo is a case of reinforcement learning; reinforcement learning algorithms include Q-learning, temporal-difference learning, and deep reinforcement learning.

### 3. Application Examples of Machine Learning:

Human traders create mathematical models for algorithmic trading automation that examine financial news and trading activity to identify market trends, including volume, volatility, and potential anomalies. Once the system is up and running, these models will carry out trades in accordance with a set of instructions, enabling activity without direct human engagement.



Amit Yadav  
TE E&TC B Roll No



# **FACULTY ARTICLES**

# FUTURE OF IOT

## I. INTRODUCTION

We all know that The Internet of Things (IoT) refers to a network of connected objects able to collect and exchange data using embedded sensors. Everyone is talking about it, but most commonly seen applications are Smart homes, Smart television, Smartwatch, Smart refrigerators, Smart curtains, Smart shoes, etc. but does it have a future beyond homes. What are the challenges in taking it to other industry applications. Lets first understand that elements that make the IoT work

- 1.Embedded systems with Sensors that run in the device
- 2.Data Networks that carry information to Analytics engines
- 3.Central databases and analytics engines that run on the cloud

**II. THE BODY** IoT will be successful only when these three elements are able to work seamlessly to create one integrated platform. Statista predicts that there will be about 25 billion interconnected devices by the 2030. There are innumerable number of applications of IoT but the success and adoption depend on the below key factors.

1.Physical Security and Cyber Security  
A chain is only as strong as its weakest link which means that every entry point in the IoT network has to be equally strong to prevent unauthorized entry. Once a hacker gains entry they have access to huge amount of data ranging from usage patterns, personal data, business data. Security has to be built by design as an approach for software and hardware development. It should be built from the beginning, and not as a fix after a hacking incident. It should take in account application security, network security, physical security (intrusion detection), Cloud security, data encryption.

2.Speed of Communication between the connected devices.

With analytics engines taking calculated decision and these decisions being conveyed to the devices over the network, the speed of delivering decisions and data acquisition plays a critical role in the success of IoT. The power of 5G connectivity is now available. Applications like remote surgery, connected cars need hyper connectivity with low latency, secure connectivity and interchangeable connectivity over air and wire. 5G offers all of these and will be one of the most important enablers. The good news is that very recently 5G services have been launched in India, opening the doors for innumerable applications

3.Ability of the central analytics engine to run faster and churn out decision in real time. We have all heard about cloud computing, getting data from millions of devices and processing them on cloud computing is a good idea. But this will in turn cause network congestion. Edge computing allows data to be processed near the source through use of smart sensors. AI driven IoT (AIoT) combines the power of Artificial Intelligence. AIoT engines are able to interpret human and machine communication more effectively. These technologies coming together will fuel the growth of Industry 4.0

4.Scalability

We have heard SaaS, PaaS, IaaS, DaaS, we have seen and experienced how easy it is to avail any of these services and how scalable they are. Google Drive is a household name today. Now is the time for IoTaaS. This service will offer APIs to a number of devices and intelligent sensors for a quick deployment of a service enabling a faster go to market, highend scalability, high performance and lesser operational costs.

## 5.Universal Standards:

There is a need for universal standards to communicate with such heterogeneous environment of devices. Although ETSI and IETF communities are working on standards related to IoT and develop standards but still the universal standard for communication is still a research challenge in IoT



**Ms. Rupali Mane**

## III. CONCLUSION

IoT is being adopted in healthcare for patient monitoring, telemedicine. Lifestyle organization make good use of the wearables for monitoring health and wellness parameters. Industry is using IoT for predictive maintenance, remote operations. Application those who predict the natural disasters, Industrial applications that includes simulations, monitoring the performances of varies phenomenon,

Water security monitoring applications, application needed to be designing the smart homes Further applications for agriculture which include smart packing, alerts via text message about the land defect, intakes etc. Including more about future applications: applications for intelligent transport system design like monitoring traffic, law enforcement, controlling the environmental pollution. Some of the future applications also touch areas like applications for smart cities, smart meetings and smart

Automotive industry has big plans on connected cars and driverless cars. Blockchain combined with IoT promises a secure infrastructure with IoT transaction being recorded in Block chain ledgers The list is endless. This list is just a glimpse of the power of IoT and the impact it will have on the future innovations. IoT is here to stay and completely revolutionize Man machine interaction.

Internet of things improves the human life by incorporating the internet and things together. IoT will not only provide the human comfort but also improve the efficiency of the things and make them intelligent. Due to diverse nature of IoT, it will become the most emerging technology in near future.

# ZIGBEE FOR IOT

## INTRODUCTION:

A Wireless network technologies are getting increasingly difficult to standardize as technology advances toward a more connected and "smarter" society. Product selection, setup, and operation, as well as compatibility across devices manufactured by various companies need standardisation. In order for shoppers to feel secure about their purchases, these factors are important to consider. There is still a market for low power, low data rate domains such as monitoring and control despite the fact that Bluetooth and Wi-Fi are well established protocols for the transfer of device-to-device data and the streaming of media. Introducing ZigBee 3.0, ZigBee further solidified its position as a low-power wireless technology leader. As a result of this new ZigBee standard, which builds on the existing ZigBee standard, any ZigBee device, independent of market designation or function, may be wirelessly linked to a single network. ZigBee 3.0 accreditation encourages the interoperability of products from different manufacturers. When ZigBee 3.0 networks are linked to IP domains, devices such as smartphones and tablets may monitor and control ZigBee 3.0 networks across LANs and WANs, including the Internet, enabling the genuine Internet of Things.

Market-specific application profiles are no longer supported by ZigBee 3.0, however there are still a number of devices that can interact with it, and many of them are compatible with the prior application profiles. All devices that communicate with the ZigBee Cluster Library (ZCL) employ clusters, which are the ZCL's smallest interoperable functional unit and which are used by the various device kinds. An extensive set of tools is provided in ZigBee 3.0's ZCL that covers all conceivable cluster types and their related capabilities and all possible configurations.

## BODY:

As part of ZigBee 3.0, there's a "base device" that acts as the foundation for all nodes to function in the same way. The new features of ZigBee 3.0 have resulted in an increase in network security. Depending on the level of security provided, networks may be divided into two categories: Network and link security keys are distributed to nodes as they join this type of centralised network security, which is managed by a coordinator/trust centre.

If you have a router as your basis, there is no central authority or trust centre in distributed security. The network key will be provided by a new ZigBee router node when it joins the network. Whenever a node joins a network, it will employ the network's security mechanisms. Both wireless networks with more than 250 nodes and networks with more than 250 nodes may be supported by ZigBee 3.0. In spite of the dynamic nature of these networks, ZigBee enables orphaned nodes to rejoin the network by way of a new parent, enabling orphaned nodes to rejoin the network after losing their parent. The ZigBee Alliance has created a wireless technology called ZigBee.

ZigBee Mesh networks have the ability to self-heal, thus it's possible for nodes to drop out of the network. Using the ZigBee Light Link 1.0 or Home Automation 1.2 profiles to build your app means it is already compatible with ZigBee 3.0 and doesn't need to be rewritten. The Smart Energy profile, on the other hand, is not only operationally compatible with ZigBee 3.0, but it also incorporates extra security criteria that can only be addressed by the profile itself. In the field, it is possible to upgrade ZigBee devices to ZigBee 3.0 while they are still fully functioning by using ZigBee's OTA update technique. Manufacturers of ZigBee devices are urged to provide an optional over-the-air (OTA) update mechanism.

Version 3.0 has been published by NXP and ZigBee. NXP has demonstrated its long-standing commitment to ZigBee since joining the ZigBee Alliance and contributing to the ZigBee 3.0 working groups, and with ZigBee 3.0, NXP is maintaining that commitment. ZigBee communication has been optimised for the JN51xx series of NXP wireless microcontrollers for more than a decade. All microcontrollers in the JN516x and JN517x families are now ZigBee 3.0 compliant. Free NXP support software is compatible with a broad range of ZigBee Lighting and Occupancy (ZLO) devices, as well as ZCL clusters and Green Power features. The JN516x/7x also comes with example device software that may be used as a basis for future application development.

### III. CONCLUSION

The success of low-power wireless networks and the Internet of Things depends on a wide range of factors, including cost and customer trust. Customers' trust in a product is influenced by many factors, including its security and privacy, as well as how simple it is to use. To get the greatest results, a wide range of gadgets from different vendors must work together. ZigBee 3.0's standard method is the only way to do this across all manufacturers.



**MS. MEGHA GUPTA**  
**Assistant Professor**



**ALUMINI**

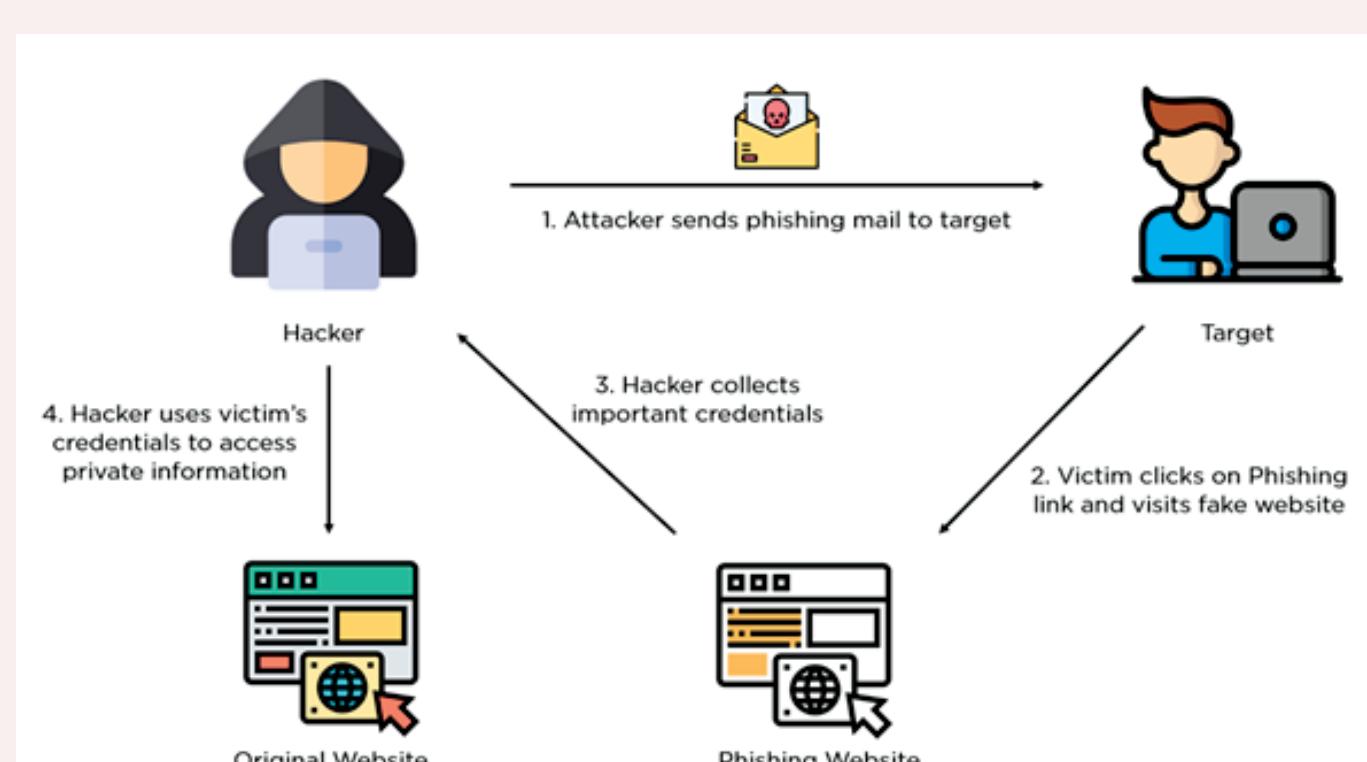
**ARTICLES**

# WHY COMPUTER SECURITY IS IMPORTANT AND HOW TO IMPROVE IT

## I. INTRODUCTION

You cannot secure a system that you don't understand. Computer security threats are constantly changing and evolving to circumvent any measures taken by computer users or organizations. The threats can come from software exploits (e.g., buffer overflow), malware, hackers, and more.

In this article, we'll take a look at the most common ways in which computers are breached through security holes such as phishing attacks, removable media (such as USB drives), passwords and authentication, physical security (through compliance standards such as HIPAA), mobile device security (which includes password management, data encryption, and application controls), working remotely (via virtualized environments like Citrix) and public Wi-Fi (which allows users to connect to unsecured networks). We'll also discuss cloud security issues related to encryption keys, logins, and breaches. Finally, we'll examine social media use in terms of privacy concerns around sharing personal details on social media platforms.



Analog sensors such as potentiometers and force-sensing resistors are still widely used. The applications include manufacturing and machinery, airplanes and aerospace, cars, medicine, robotics, and many other aspects of our day-to-day life. A wide range of other sensors measures the chemical and physical properties of materials, including optical sensors for refractive index measurement, vibrational sensors for fluid viscosity measurement, and electrochemical sensors for monitoring the pH of fluids.

## Phishing Attacks

Phishing is a type of cyberattack that uses email or website spoofing to try to get you to reveal your personal information. You might inadvertently provide this information when you click on a link in an email, or it might be displayed on the page itself. Phishing attacks are often used to gain access to your personal information or account login credentials.

### Removable Media

Removable media is any media that can be removed from the computer system, such as a USB flash drive or external hard drive. This includes removable memory cards, drives, and card readers, such as those built into laptops, desktops, and tablets.

### Passwords and Authentication

Passwords are used to protect access to accounts and resources on networks. Passwords are often combined with other forms of authentication, such as biometrics like fingerprints or facial recognition technology (selfie ID). In addition, passwords can be used together with two-factor authentication (2FA) methods that require two different types of verification before gaining access to an account or resource.

## Working Remotely

In the modern age, where work is done remotely, many employees are required to use their own devices. Unfortunately, this can put them at risk of being compromised by hackers. For example, if an employee's computer is infected with malware while they're logged on to their home network, that malware may not be detected by antivirus software. This could allow a hacker to steal financial information from their bank account or other personal information that might be valuable to criminals.

To prevent this from happening, employees need to have good security practices in place on their computers and mobile devices. The best way to do this is by using strong passwords and regularly updating your software and operating system. You should also make sure that you use a VPN when you're working remotely so that only the data that you transmit will leave your device.

If these practices are followed the chances of a cybersecurity attack greatly reduce.



# INTERNET OF THINGS AND EMERGING TECHNOLOGIES

## I. INTRODUCTION

"If you think that the internet has changed your life, think again. The Internet of Things is about to change it all over again!"

— Brendan O'Brien

When we think of the Internet of Things, we picture an alarm clock that wakes us up and alerts the coffee maker to keep coffee ready for us. We envision our vehicles being connected to our calendar to provide the best routes to avoid traffic. If stuck in traffic, we expect our vehicles to notify the other party that we are running late.

These are the things we have either heard of or read regarding the Internet of Things. Our thoughts are becoming reality with the emergence of technology.

Wireless Sensor Network (WSN) with its omnipresent sensing capabilities has pervaded many aspects of our daily life. When devices connect with each other to share information across the internet and function flawlessly developing a common operating picture. This is called Universal Object Interaction.

The IoT is broadly divided into two parts. The first part includes consumer electronics like smartwatches. The second part includes the collection and analysis of data to enhance the performance of the devices. With the help of data analytics, problems can be foreseen, preventive measures can be taken and a better ecosystem can be created. The IoT ecosystem is very complex comprising a network of devices. With data analytics, these devices are made more intelligent to improve their capability to interact with humans and each other.

## Emerging IoT Technologies:

### IoT Security:

Data leaks are a nightmare for businesses in IoT. Better encrypted communication methods are developed to prevent many possible cyberattacks, impersonating "things" or denial-of-sleep attacks.

### Less Power Consuming IoT networks:

IoT is currently used for short-range networks. But in the near future, these devices will dominate the IoT networks. Wide-Area IoT networks are the need of the hour, combined with low bandwidth, good battery life, low hardware and operating cost, and high connection density.

### IoT Operating Systems:

Currently used Windows and iOS operating systems cannot be used with the internet of things. The reasons are high consumption of power, need for fast processors and lack of real-time response. The development of low power consuming, low-latency, IoT-specific operating systems is in progress

### IoT and 5G:

The benefits of 5G include real-time data processing, reduced latency, network slicing, faster transmission speeds, and broad coverage. There is no doubt that IoT will perform better with reliable network connectivity.

### IoT and AI:

Artificial Intelligence and the Internet of Things can together deliver better solutions. IoT development with artificial intelligence can provide assistance in automation, lower downtime and operation costs and better quality of life.

Industries that can benefit from IoT:

#### Agriculture:

Farmers can make better judgments with the aid of IoT sensors. They will be able to produce more crops of higher and better quality as a result. By using fewer resources like pesticides, water, and electricity, it will also lower costs.

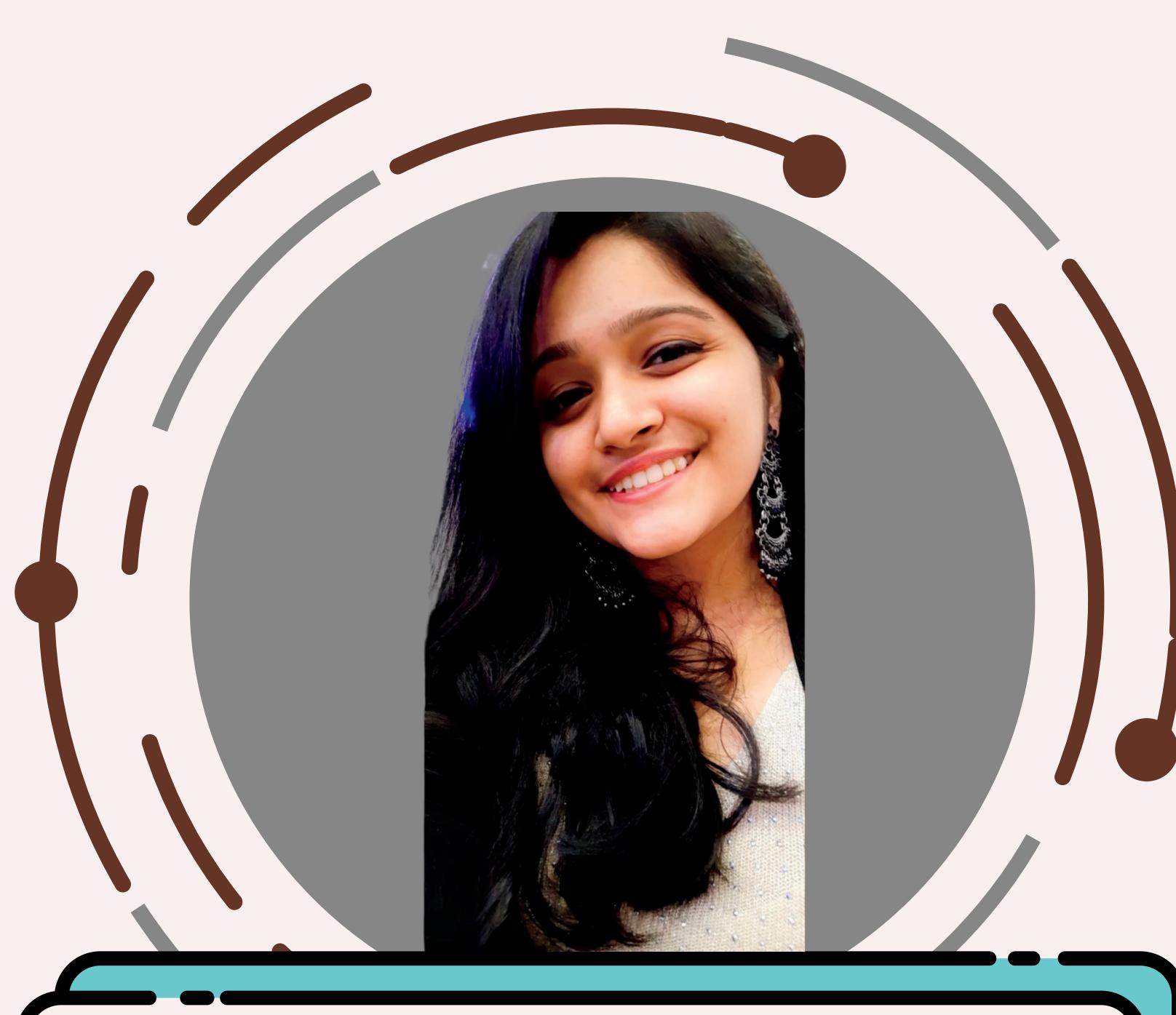
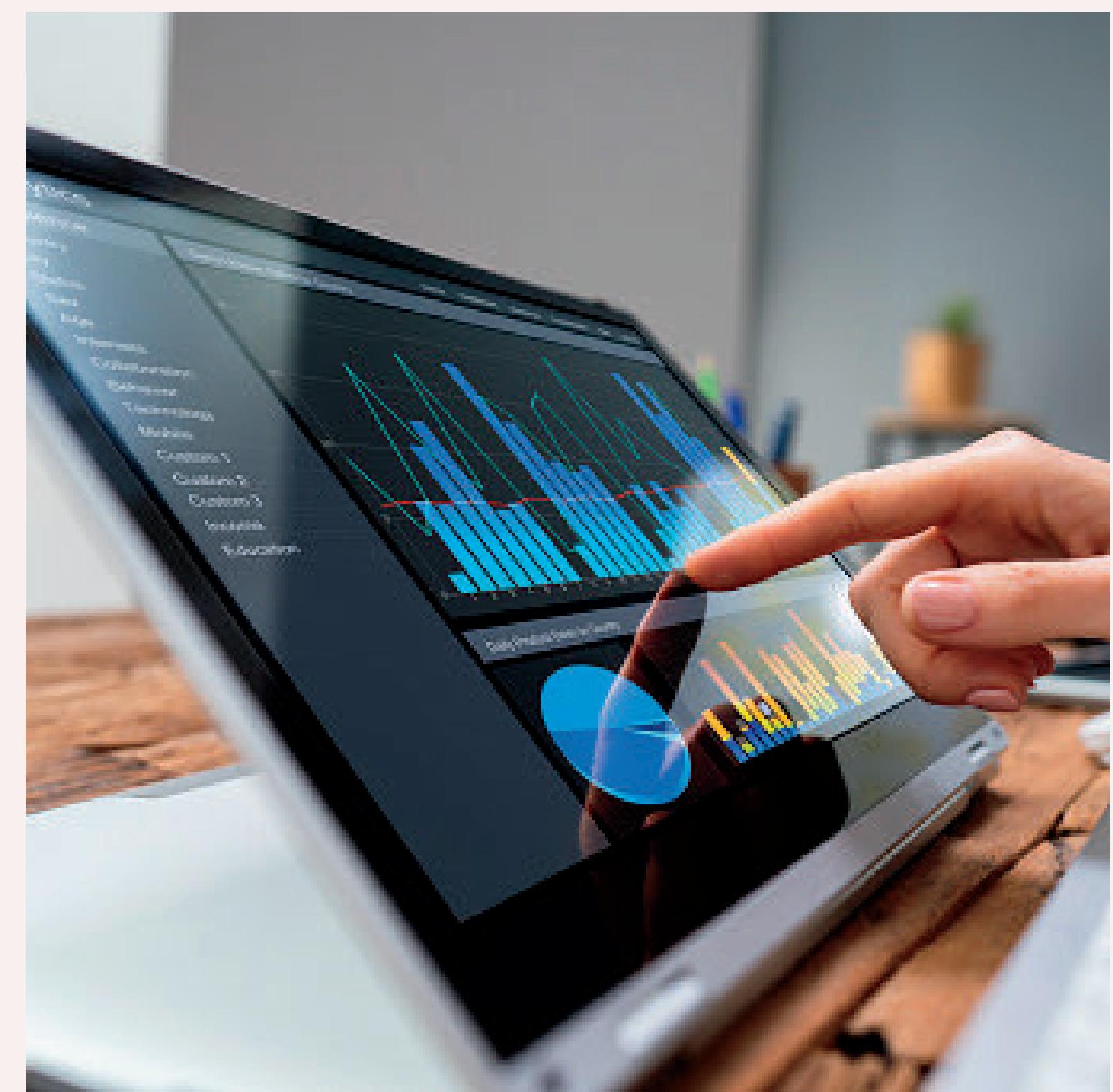
#### Transportation and Logistics:

Vehicles that transport inventory can be rerouted based on the weather, the availability of vehicles, or drivers. The inventory can be built-in with track-and-trace and temperature monitoring and controlling sensors extremely helpful to the food and beverage, floral, and pharmaceutical industries, which frequently carry inventory that is temperature-sensitive.

#### Healthcare:

The healthcare industry has seen a boom in IoT innovation as a result of the recent turn of events. Demand for IoT health applications such as ehealth, digital diagnostic, monitoring systems, etc. has increased dramatically during the Covid-19 crisis, allowing for real-time monitoring and notifying of the patient's health.

In Conclusion, we can say that, if we are ready to accept the security and privacy trade-offs, as the number of connected devices increases, our living and working spaces will be filled with smart gadgets. Some people will be happy about the new smart thing era. Some people will yearn for the time when a chair was just a chair.



**Yashi Chaturvedi**



# INDUSTRY ARTICLES



# EFFECT OF IOT ON EMERGING TECHNOLOGIES.

## I. INTRODUCTION

Today's technology is making our minds smarter to dive deeply into our imagination, to make you feel like a real movie experience where smart homes can unlock doors by scanning your face, monitor 24-7 all chronic diseases, and attend the emergency health issues well before advance.

The Internet of things "IoT" is an ecosystem of digital computing devices, detectors, and a network of sensors designed to connect consumer and industrial things to make them more intelligent, and able to communicate and transfer data to each other in real-time.

The IoT network together with 5G, enables automation of everything you imagine to provide consumers with a better experience, make life easier, and increase effectiveness by automating tasks, improving health, making homes safer, connecting cars on wearables, and saving electricity and water.

The connected cars will sense the physical environment and connect to other vehicles, to make driving safer, more enjoyable, and more productive to provide warning information related to potholes, road curves, pedestrian crossing, dense traffic, and a reduction in accidents.

## II. The Body:

The newly developed IoT sensors can detect a specific kind of tobacco, alcohol, and marijuana smoke. These sensors placed in bike helmets can be paired with smartphone users, to alert your emergency contacts about any bike crash.

The IoT is changing the way many people live at home. People can use connected devices to monitor activity that adjusts the lights, blinds, and temperature, see who rings the doorbell while they are on vacation, alarm clock talks to the coffee maker to start brewing, a smart clock that tracks blood pressure/pulse rate, medical device reports to your doctor, to a wired factory that regulates every step of the manufacturing process.

The IoT is one of the biggest disruptors for companies across industries. The IIOT, Industrial internet of things links machines, sensors, computers, and software to improve information data collection, processing, and data analysis. With this data, they can improve processes, track business performance, predict and prevent problems, monitor production lines, and ultimately create superior ecosystems for new products and services.

IIOT is transforming manufacturing into new ecosystems where sensors can inform factory floor personnel of issues in the system, resulting in fewer equipment failures that slow production. Connected wearable devices help workers with remote site management for tracking inventory and production line interruptions.

IoT in healthcare will provide personalized care to patients from the data collected by the use of wearable connected devices to control blood pressure, stress levels, weight, and even sleep. The smart beds in the hospital will be having sensors placed under mattresses, mats, and toilet seats to monitor general activity levels throughout the day for elderly patients in critical care.



### **III. Conclusion:**

AI is a framework that can execute activities that usually need human intelligence from problem-solving, moral understanding, and even disease detection.

Businesses on AI/ML that have access to a wealth of information will connect with customers more deeply and benefit them with a high-personality experience, whereas blockchain will protect advertising managers and ensure that their marketing ROI is not affected.

The IoT solutions on emerging technologies are becoming a converging point of the digital and physical world getting closer, expanding into new applications and environments.

From the fitness trackers, we wear to the smart appliances we use in our homes to the fleet-management solutions that tell us when our packages will arrive, to the sensors that promote increased energy efficiency.

Their combined effect will radically restructure our personal and professional lives, raise our standards, and make profound changes in business processes that will be used in monitoring soils, Real-time landslides, and natural disasters resulting from climate change.

But the growing IoT network in connected cars, medical devices, clinical equipment, and hospital rooms means more opportunities for hackers – so security threats are a big concern. A simple malware that can infect all IoT devices will be the source responsible for a majority of cyberattacks. This is due to limited intelligence in IoT sensors, network connectivity, legacy systems, outsourced monitoring maintenance, and data privacy concerns.



**Mr. Sunil Kankal**  
**Director**



# PARENTS ARTICLES



# HOME AUTOMATION SYSTEM: THE MODERN PARENTING ASSISTING SYSTEM

## I. INTRODUCTION

As the name suggests Home automation systems provide complete automatic and remote access to the devices and gadgets which are a part of a home ecosystem which is as per the definition but what I feel home automation truly means is to simplify the complex process that earlier used to require more efforts and time now can be achieved our smartphones by simply clicking few buttons.

## II. The Body:

Now as to satisfy the increasing necessity and to fulfill essential family needs both parents are working. In such scenarios, the home automation system is nothing less than a boon. Due to excessive workload, most of the time parents aren't available at home so if the child is alone at home, safety is the major concern now solved by home automation. Not only it provides security but it also helps in assisting in monitoring as well.

Apart from monitoring children, home automation can also help to enhance the home atmosphere whether it is illuminating lights, increasing temperature, or prominent tasks like washing clothes using a washing machine, even watering plants can be done automatically by simply installing a humidity sensor if humidity level of drops to less than the certain level it will automatically either give an alert or you can attach a simple motor operated sprinkler to water the plants. Not only it helps in monitoring toddlers but also grandparents as they are also the one who needs to be taken care of.



## III. Conclusion:

The conclusion includes the key features provided by the home automation systems which are as follows:

1. Security
2. Remote access
3. Adaptive in nature
4. Real-time monitoring
5. Efficiency & Easy to use

These characteristics are the reason that the home automation system can be considered a modern parenting assisting system.



**Mahendra Arjun Vaja  
Associate Consultant**

# EMBEDDED SYSTEM

## What is Embedded system?

An embedded system is a small inexpensive low power computer that is specially designed to perform only a couple of tasks it cannot be used as a general-purpose computer it specifically designed to handle only a few loads. It is usually used with other embedded system devices or with a more powerful computer to support in communication or to handle other low-level tasks.

The main difference between normal computer and embedded systems are that normal computers can process lot of data compared to an embedded system they limited memory and a slower clock speed the embedded systems do not generate as much heat as a normal computer so they usually do not need any cooling as well some embedded systems are designed to work in very harsh conditions like outside where high humidity, heat or electromagnetic radiation can make it hard for a normal computer to work.

Embedded systems usually use Microcontrollers some examples include boards from Arduino like uno, nano, mega etc, but some systems can also contain Microprocessor with dedicated memory chips or with ability to boot from micro-SD cards or USB some examples are Raspberry Pi boards like zero, Model B, Orange Pi etc.

Main difference between a microprocessor and microcontroller are that the microcontroller have their own built in memory, IO controller and communication modules like I2C, UART, USB etc. this is essential because an embedded system must be very small and low cost so that it can be deployed anywhere.

How to program embedded system? embedded systems are not powerful enough to handle programming languages like JAVA, Python or C# so it is usually programmed with languages like Assembly, C or C++ there are also systems powerful enough to handle toned down version of Python called micro python or circuit python boards like Raspberry Pi have enough processing power to run and operating system based on Linux which also helps raspberry pi to run higher level languages other than C or C++ there are many operating system available for Raspberry Pi most common of which is Raspberry Pi OS (formerly known as Raspbian) this kind of setup helps Raspberry Pi to be used as a cheap general-purpose computer.

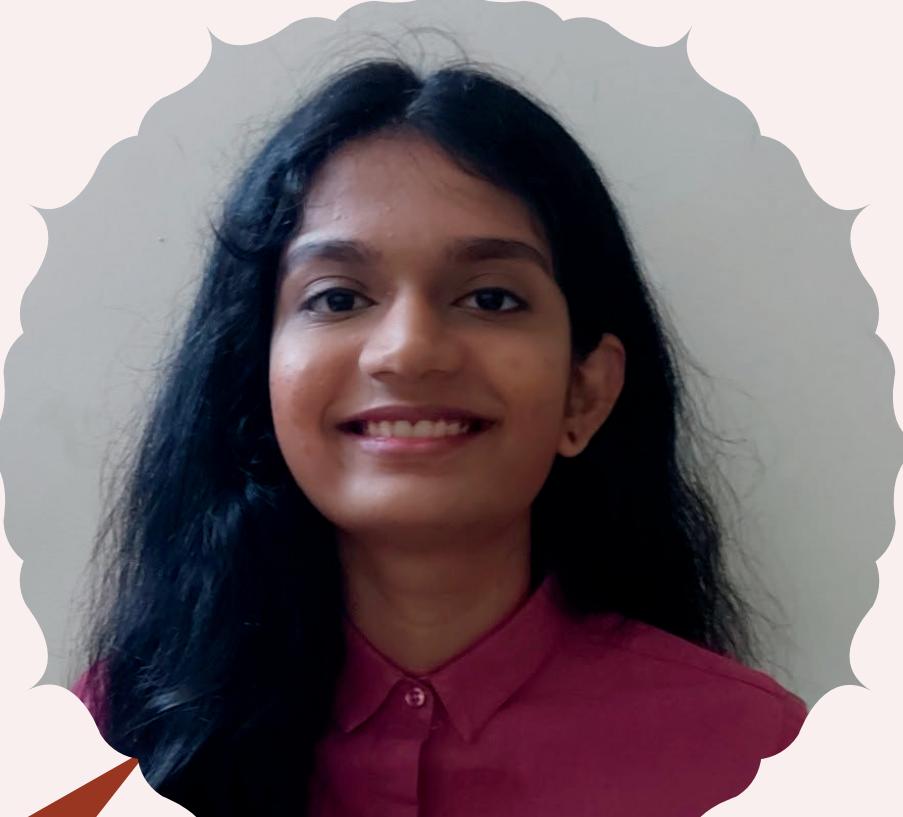


# Abhivarg

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-Team ABHIVARG