CHAPTER THREE

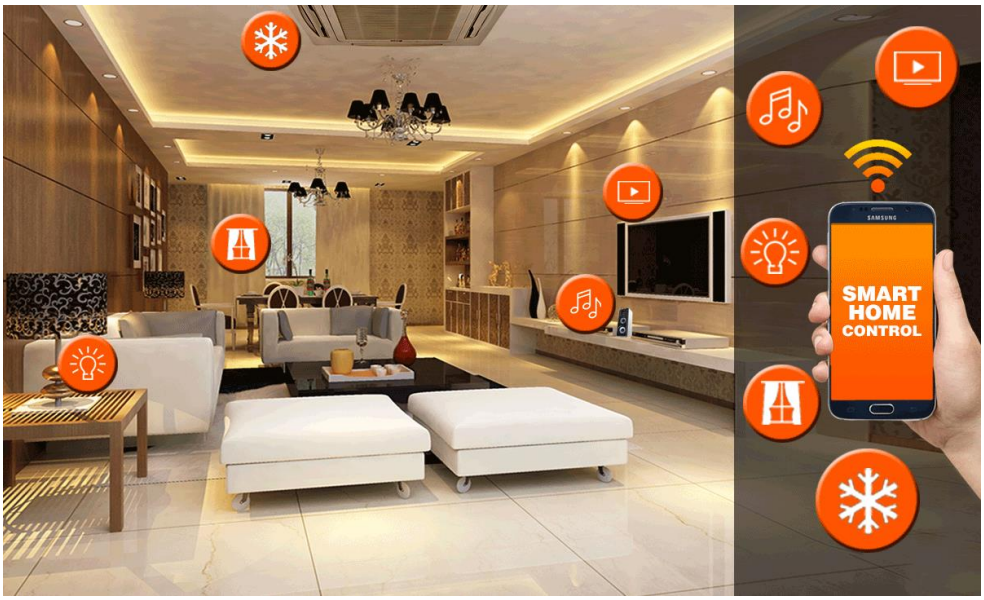
Internet of Things

Applications.

Examples of IOT in Real Life

1. Home Automation

Home automation is one of the best examples of IoT. Smart homes or IoT-based home automation systems are becoming popular day by day. In a smart home, consumer electronic gadgets such as lights, fans, air-conditioners, etc. can be connected to each other via the internet. This interconnection enables the user to operate these devices from a distance. A smart home is capable of lighting control, energy management, expansion, and remote access. Currently, this application of IoT is not utilized at a large scale because the installation cost is too high, which makes it difficult for a majority of people to afford it. However, home automation holds quite a promising future.

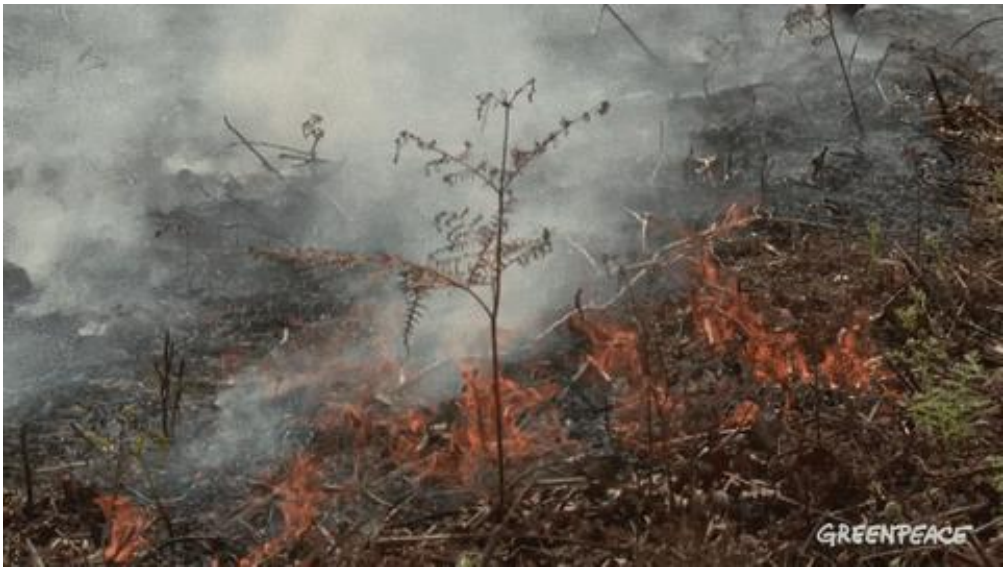


2. Wearable Health Monitors

Wearable health monitors are both captivating and useful. They include smart clothes, smart wristwear, and medical wearables that provide us with high-quality health services. They are designed to track activities such as pulse rate, step count, heart rate, etc. This data is recorded and can be sent to the doctors for detailed fitness analysis. These IoT based smart wearable devices are influencing our lifestyles a lot. Apart from performing these basic operations, they can also raise an alarm and send an alert in case of a medical emergency such as an asthma attack, seizures, etc.

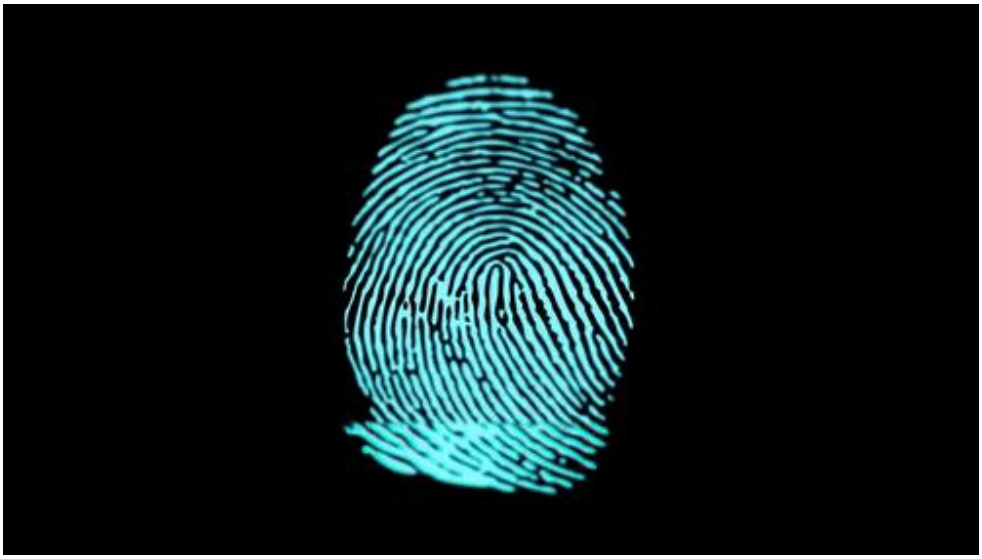
3. Disaster Management

IoT helps in the prediction and management of natural disasters. For instance, take the example of forest fires. To avoid the chaos and destruction caused by a forest fire, various sensors can be installed around the boundaries of the forests. These sensors continuously monitor the temperature and carbon content in the region. A detailed report is regularly sent to a common monitoring hub. In case of a forest fire, an alert is sent to the control room, police station, and fire brigade. Therefore, IoT helps in staying prepared and respond swiftly in case of emergency.



4. Biometric Security Systems

A lot of security agencies make use of biometric systems to mark daily attendance, allow access to the authorized personnel only, and other related services. Advanced security, data communication, and minimized human intervention are some of the features of IoT being utilized in this sector. Biometric technology makes use of fingerprint, voice, eye, and face recognition. The reliability of IoT based security systems is higher than the manual or automated approach. The devices used in biometric security systems are interlinked to each other and possess the ability to dump the data after every usage to the host computer. This scanned data is stored for future use, and the useful information is retrieved as per requirement.



5. Smart Cars

IoT can be used to connect cars with each other in order to exchange information like location, speed, and dynamics. An estimate shows that by 2020, there will be 24 billion connected cars in the world. We use IoT in our daily life without even realizing its presence. For example, while finding the shortest route, while driving semi-automatic smart cars, etc. IoT is also used in vehicle repair and maintenance. It does not only remind the customer about the regular servicing date but also assists the consumer in repair and maintenance by providing proper guidance. On the basis of features provided, the communication technique of connected vehicle technology is classified into two broad categories:

- *Vehicle-to-infrastructure (V2I)*

It allows the smart car to run a diagnostic check and provide a detailed analysis report to the user. It is also used to find out the shortest route and to locate the empty parking spot.

- *2. Vehicle-to-vehicle (V2V)*

V2V communication of smart cars makes use of high-speed data transfer and high-bandwidth. It lets the car to perform hefty tasks such as avoiding collisions, clipping unnecessary traffic, etc.

6. Process Automation

In the manufacturing industry, performing reoccurring tasks, such as label wrapping, packaging, etc., manually is difficult and is prone to human errors; therefore, automation comes into play. For instance, take the example of a cold drink manufacturing industry. Here, manufacturing machines and conveyor belts are required to be interconnected in order to share information, status, and data. This interconnection is IoT dependent. The status of the manufactured product and the machine health report is sent to the manufacturer at regular intervals in order to identify the faults in advance. An IoT equipped industry is advantageous as it elevates the production speed and maintains the uniform quality of the product throughout the production. It also helps to make the workplace more efficient and safe by reducing human error.

7. Farming

Due to climate change and water crisis, farmers go through a lot of troubles such as crop flattening, soil erosion, drought, etc. These problems can be easily suppressed by using IoT based farming system. For example, the IoT based irrigation system makes use of a number of sensors to monitor the moisture content of the soil. If the moisture level drops below a certain range, it automatically turns on the irrigation pump. Other than this, IoT also helps farmers to examine soil health. Before planning to farm a new batch of crops, a farmer needs to recover the soil nutrients. The IoT enriched software allows the user or the farmer to select the best nutrient restoring crops. It also helps in sensing the requirement of fertilizer and numerous other farming needs.

Why is IOT important?

The internet of things helps people live and work smarter, as well as gain complete control over their lives. In addition to offering smart devices to automate homes, IOT is essential to business. IOT provides businesses with a real-time look into how their systems really work, delivering insights into everything from the performance of machines to supply chain and logistics operations.

IOT enables companies to automate processes and reduce labor costs. It also cuts down on waste and improves service delivery, making it less expensive to manufacture and deliver goods, as well as offering transparency into customer transactions.

As such, IOT is one of the most important technologies of everyday life, and it will continue to pick up steam as more businesses realize the potential of connected devices to keep them competitive.

What are the pros and cons of IOT?

Some of the advantages of IOT include the following:

- ability to access information from anywhere at any time on any device;
- improved communication between connected electronic devices;
- transferring data packets over a connected network saving time and money; and
- automating tasks helping to improve the quality of a business's services and reducing the need for human intervention.

Some disadvantages of IOT include the following:

- As the number of connected devices increases and more information is shared between devices, the potential that a hacker could steal confidential information also increases.
- Enterprises may eventually have to deal with massive numbers -- maybe even millions -- of IOT devices, and collecting and managing the data from all those devices will be challenging.
- If there's a bug in the system, it's likely that every connected device will become corrupted.
- Since there's no international standard of compatibility for IOT, it's difficult for devices from different manufacturers to communicate with each other.

Consumer and enterprise IOT applications

There are numerous real-world applications of the internet of things, ranging from consumer IOT and enterprise IOT to manufacturing and industrial IOT (IIoT). IOT applications span numerous verticals, including automotive, telecom and energy.

In the consumer segment, for example, smart homes that are equipped with smart thermostats, smart appliances and connected heating, lighting and electronic devices can be controlled remotely via computers and smartphones.

Wearable devices with sensors and software can collect and analyze user data, sending messages to other technologies about the users with the aim of making users' lives easier and more comfortable. Wearable devices are also used for public safety -- for example, improving first responders' response times during emergencies by providing optimized routes to a location or by tracking construction workers' or firefighters' vital signs at life-threatening sites.

In healthcare, IOT offers many benefits, including the ability to monitor patients more closely using an analysis of the data that's generated. Hospitals often use IOT systems to complete tasks such as inventory management for both pharmaceuticals and medical instruments.

Smart buildings can, for instance, reduce energy costs using sensors that detect how many occupants are in a room. The temperature can adjust automatically -- for example, turning the air conditioner on if sensors detect a conference room is full or turning the heat down if everyone in the office has gone home.

In agriculture, IOT-based smart farming systems can help monitor, for instance, light, temperature, humidity and soil moisture of crop fields using connected sensors. IOT is also instrumental in automating irrigation systems.

In a smart city, IOT sensors and deployments, such as smart streetlights and smart meters, can help alleviate traffic, conserve energy, monitor and address environmental concerns, and improve sanitation.

IoT security and privacy issues

The internet of things connects billions of devices to the internet and involves the use of billions of data points, all of which need to be secured. Due to its expanded attack surface, IOT security and IOT privacy are cited as major concerns.

In 2016, one of the most notorious recent IOT attacks was Mirai, a botnet that infiltrated domain name server provider Dyn and took down many websites for an extended period of time in one of the biggest distributed denial-of-service (DDoS) attacks ever seen. Attackers gained access to the network by exploiting poorly secured IoT devices.

Because IoT devices are closely connected, all a hacker has to do is exploit one vulnerability to manipulate all the data, rendering it unusable. Manufacturers that don't update their devices regularly -- or at all -- leave them vulnerable to cybercriminals.

Additionally, connected devices often ask users to input their personal information, including names, ages, addresses, phone numbers and even social media accounts -- information that's invaluable to hackers.

Hackers aren't the only threat to the internet of things; privacy is another major concern for IoT users. For instance, companies that make and distribute consumer IoT devices could use those devices to obtain and sell users' personal data.

Beyond leaking personal data, IoT poses a risk to critical infrastructure, including electricity, transportation and inancial services.

Overview

- Understand the varied applications of the Internet of Things (IoT)
- Includes detailed study about smart homes, connected devices & many other work areas

Do you know what separates humans from other living beings?

Curiosity. Humans are curious. We question a lot. We are the ones who challenge the status quo of existing rules and strive to build/produce something better. Such curiosity & efforts have promised us a life where electronic devices & machines will probably become our best friend.

Yes, you read it correctly the vision to make machines smart enough to reduce human labour to almost nil. The idea of inter-connected devices where the devices are smart enough to share information with us, to cloud based applications and to each other (device to device).

Smart devices or “Connected devices ” as they are commonly called, are designed in such a way that they capture and utilize every bit of data which you share or use in everyday life. And these devices will use this data to interact with you on daily basis and complete tasks.