Subject: Internet of Things

Page No.....

* Kevin Ashton is an innovator and consumer sensor expert who coined the phrase "the Internet of Things" to describe the network connecting objects in the physical world to the Internet.
* The term IoT, or Internet of Things, refers to collective network of connected devices and the technology that facilitates communication b/w devices & the cloud, as well as b/w the devices themselves.
* Thanks to the advent of inexpensive computer chips and high bandwidth telecommunication, now we have billions of devices connected to the internet.
* This means everyday devices like toothbrushes, vacuums, cars and machines can use sensors to collect data and respond intelligently to users.

* The Internet of Things integrates everyday "things" with the internet. Computer engineers have been adding sensors and processors to everyday objects since the 90s.
* However, progress was initially slow because the chips were big and bulky. Low power computer chips called RFID (radio-frequency identification) tags were first used to track expensive equipment. As computing devices shrank in size, these chips and became smaller, faster & smarter.

Not Imp

* The cost of integrating computing power into small objects has now dropped considerably. For eg; you can add connectivity with Alexa voice services capabilities to MCUs with less than 1 MB embedded RAM, such as for light switches.
* A whole industry has sprung up with a focus on filling our homes, businesses, and offices with IoT devices.

Subject.....

Page No.....

* These small objects can automatically transmit data to and from the Internet. All these "invisible computing devices" and the technology associated with them are collectively referred to as the Internet of Things.

➡ Components :-

* This is A typical IoT system works through the real-time collection & exchange of data. An IoT system has 3 components

i) Smart devices :

* This is a device, like a television, security camera, or exercise equipment that has been given computing capabilities.
* It collects data from its environment, user inputs, or usage patterns and communicates data over the internet to & from its IoT application

ii) IoT application

* An IoT application is a collection of services & software that integrates data received from various IoT devices.
* It uses machine learning or artificial intelligence (AI) technology to analyze this data and make informed decisions.
* These decisions are communicated back to the IoT device and the IoT device then responds intelligently to inputs.

iii) A graphical user interface. (GUI)

* The IoT device or fleet of devices can be managed through a graphical user interface.
* Common examples include a mobile application or website that can be used to register and control smart devices.

Subject..... Page No.....

→ Categories:

The IoT devices can be categorized into 3 main groups:

i) Consumer-connected devices:

- It include Smart TVs, Smart Speakers, wearables & Smart appliances.

ii) Enterprise IoT devices:

- They are edge devices designed for bussinesses.
- In enterprise, Smart sensors help employee with meetings.
- Retailers can use RFID tags to track a business's goods, increasing accuracy.
- ~~It also used for supply chain management~~.

iii) Industrial IoT (IIoT) devices:

- They are ~~used for~~ designed for use in factories or other intustrial enviromants.
- IIoT devices can help with Supply chain management, including inventory management, vendor relationships, etc.

→ Benefits of IoT for Business.

- Businesses use IoT to optimize their Supply chains, manage inventory & improve costumer experience.

Points

i) Accelerate innovation: IoT gives businesses access to advanced analytics that uncover new opportunities

ii) Turn data into insights & actions with AI & ML: Collected data & histrotical trends used to predict future outcomes

iii) Increase security: Continuous monitoring can optimize performance, improve efficiency & reduce safety risks.

iv) Scale differentiated solutions: It can deployed in a customer focused way to increase satisfaction.

Subject..... Page No.....

Examples :-

Let's ~~took~~ Some examples of IoT Systems in use today:-

i) Connected cars :

* There are many ways vehicles, such as cars, can be connected to the ~~Great~~ internet. It can be through smart dashcams, infotainment systems, or even the vehicle's connected gateway.
* They collect data from the accelerators brakes, Speedometer, odometer, wheels and fuel tanks to monitor both driver performance and vehicle health.
* Connected cars have a range of uses :
  - Monitoring rental car fleets to increase fuel efficiency and reduce costs
  - Helping parents track the driving behaviour of their children.
  - Notifying friends & family automatically in case of car crash.
  - Predicting & preventing vehicle maintainance needs.

ii) Connected homes :

* Smart home devices are mainly focused on improving the efficiency and safety of the house, as well as improving home networking.
* Devices like smart outlets monitor electricity usage & smart thermostats provide better temperature control.
* Hydroponic Systems can use IoT sensors to manage the garden while IoT Smoke detector can detect tobacco smoke.
* Home security systems like door locks, security cameras, and water leak detectors can detect and prevent threats and send alerts to homeowners.
* Connected devices for the home can be used for :
  - Automatically turning off devices not being used.

- Rental property management & maintenance.
- Finding misplaced items like keys or wallets.
- Automating daily tasks like vaccuuming, making coffee, etc.

iii) Smart Cities:

✓ * IoT applications have made urban planning & infrastructure maintenance more efficient.
* Govts. are using IoT applications to tackle problems in infrastructure, health & the environment.
✓ * IoT applications can be used for:
- Measuring air quality and radiation levels
- Reducing energy bills with smart lighting systems
- Detecting maintenance needs for critical infrastructures such as streets, bridges, and pipelines.
- Increasing profits through efficient parking management.

iv) Smart buildings.

✓ * Buildings such as college campuses & commercial buildings use IoT applications to drive greater operational efficiencies.
✓ * IoT devices can be use in smart buildings for:
- Reducing energy consumption.
- Lowering maintenance costs
- Utilizing work spaces more efficiently.

➡ IoT Platform

An IoT Platform is a platforms, including software & hardware used to connect manage internet-connected devices and networks controlling them. 4 types:-

(i) IoT connectivity Platform
(ii) IoT device management Plat
(iii) IoT Application Enablement Plat
(iv) IoT Analytics Platforms.

Subject.....

Page No.....

➡ IoT Technologies:

i) Edge computing:

* It refers to the technology used to make smart devices do more than just send or receive data.
* It increases the computing power at the edges of IoT network, reduce communication latency & improve response time.

ii) Cloud computing

* It used for remote data storage & IoT device management to making the data accessible to multiple devices.

iii) Machine learing:

* It refers to software & algorithms used to process data & make real-time decisions.
* These ML algorithms can be deployed in cloud or at edge.

Conclusion : Mainly improve our lives.

* IoT has a wide ranging impact on human life and work.
* It allows machines to do more heavy lifting, take over tedious tasks and make life more healthy, productive & comfortable.
* It is a key driving factor in enabling the development of industrial automation systems.
* ~~The goal behind the IoT is that self report in real-time~~
* The goal behind the IoT is to have devices that self report in real-time, bringing information to the surface more quickly than human intervention.
* IoT creates an ecosystem that connects everything.
* The opportunities are endless in IoT coorld.