processes, making them more efficient which in turn makes the workforce more produc- -tive. With more streamlined and autom- -ated processes, you can get more done faster with fewer resources and less chance of human error.

- New business models :- IOT is being used to create new business models through autom- -ation and new services offerings. The way businesses are being operated is changing for the better with the inclusion of the IOT ecosystem.

- Improved business insights and customer exp- -erience :- the speed at which the IOT ecosys- -tem functions allows you to get real-time data, analytics and insights that can be used to improve operations, product and service offerings and this, in turn, impacts the customer experience.

Technology Drivers :- A group of technologies doing similar things brought under an umbrella coining word internet of thing
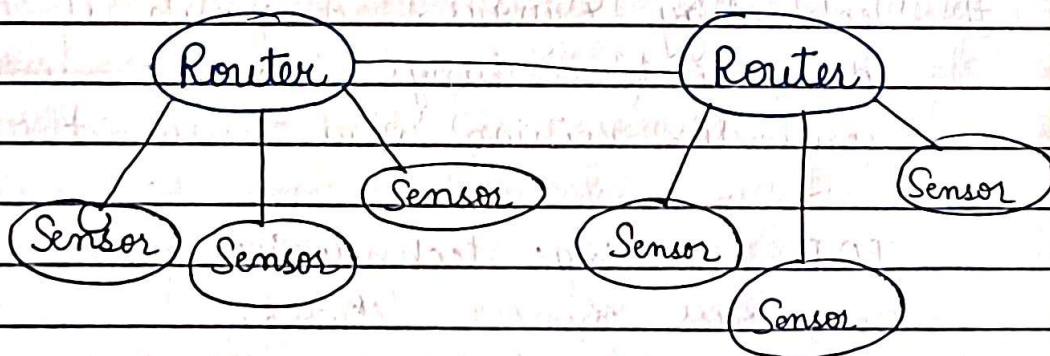
IOT enabling technologies are :-
1. Wireless Sensor Network
2. Cloud Computing
3. Big Data Analytics
4. Communication Protocols
5. Embedded System

1) **Wireless Sensor Network (WSN) :-** A WSN comprises distributed durces with sensors which are used to monitor the environment and physical conditions. A wireless sensor network consists of end nodes, routers and coordinators. End nodes have several sensors attached to them where the data is passed to a coordinator with the help of routers. The coordinator also act as the gateway that connects WSN to the Internet

- Ability of cheap and efficient sensors for every need.

- A wireless sensor network consist of end nodes routers and coordinators.

- End nodes have several sensors attach to them where the data is passed to the coordinator with the help of routers.

- The coordinator also acts as gateway that connected WSM to Internet.

eg →

2) **Cloud Computing :-** It provides us the means by which we can access applications as utilities over the internet. Cloud means something which is present in remote location

With cloud computing, users can access any resources from anywhere like databases, webservers, storage, any device and any software over the internet.

Characteristics :- 1) Broad network access

2) On demand self-services

3) Rapid scalability

4) Measured service

5) Pay-per-use

- Latest development is cloud computing provides remote storage and data sharing.
- Cloud computing makes accessibility of data from anywhere, any devices, any time in reality.

3) **Big Data Analytics** :- It refers to the method of studying massive volumes of data or big data. Collection of data whose volume, velocity or variety is simply too massive and tough to store, control, process and examine the data using traditional databases.

Big data is gathered from a variety of sources including social network videos, digital images, sensors and sales transaction records.

Several steps involved in analyzing big data —

1) Data cleaning   3) Processing

2) Munging   4) Visualization

eg → · Bank transaction

· Data generated by IOT systems for location and tracking of vehicles.

· E-commerce and in Big-basket

· Health and fitness data generated by IOT system such as a fitness bands.

It refers to the strategy of analysing large volumes of data or big data.
It gathered from variety of sources including videos, images, sensors, social network.

4) <u>Communication Protocols</u> :- They are the backbone of IOT systems and enable network connectivity and linking to applications. Communication protocols allow devices to exchange data over the network. Multiple protocols often describe different aspects of a single communication. A group of protocols designed to work together is known as a protocol suite; when implemented in software they are a protocol stack.

They are used in 1) Data encoding
2) Addressing schemes.

5) <u>Embedded Systems</u> :-
It is a combination of hardware and software used to perform special tasks. It include microcontroller and microprocessor memory, networking units (ethernet wi-fi adapters), input output units (display keyword etc) and storage devices (flash memory).
It collects the data and sends it to the internet.

Embedded systems used in Examples :-
1) Digital camera
2) DVD player, music player
3) Industrial robots
4) Wireless Routers etc.

 # Business Drivers :- • Low Operational Cost
• Business process efficient and control.
• Technology used has better optimisation.

① Information Technology Optimisation and modernisation
② Business Process Efficiency
③ Operation Optimization & Control.
④ Better Customer Service. & Support.
⑤ Lower Operational Cost.

Business drivers are the key factors that motivate companies to invest in IoT technologies. These drivers can vary depending on the industry, but some common ones include:

1) Operational Efficiency :-

• **Automation and Process Optimization:** IoT enables automation of routine tasks and optimization of processes, reducing human error and improving efficiency.
• **Predictive Maintenance:** IOT sensors can predict equipment failures before they occur, reducing downtime and maintenance costs.
• **Energy Management:** IoT devices help in monitoring and reducing energy consumption, leading to cost savings.

2) Cost Reduction :-

• **Resource Optimization:** IOT can help in better

utilization of resources such as raw materials, labor and energy, leading to cost savings.
• Supply Chain Management:- Real-time Tracking and monitoring of goods through IOT can reduce logistics and inventory cost.

3) Enhanced Customer Experience :-

• Personalization: IOT devices can collect data on customer preferences, enabling businesses to offer personalized products and services.
• Real-Time Support: IOT allows for real-time monitoring of customer issues, enabling faster response times and better services.

4) New Revenue Streams :-

• Product as a Service: IOT enables the shift from selling products to offering them as a service (eg, smart home devices that come with a subscription service).
• Data Monetization: The data collected from IOT devices can be analyzed and sold to 3rd parties or used to develop new services.

5) Innovation and Competitive Advantage :-

• New Product Development: IOT opens up possibilities for new products and services, allowing companies to differentiate themselves in the market

• Enhanced R&D: IOT data can inform research and development, leading to faster innovation cycles

6) Regulatory Compliance and Safety:-

• Monitoring and Reporting: IOT devices can help businesses comply with regulations by providing real-time monitoring and automated reporting.

• Workplace Safety: IOT can be used to monitor hazardous conditions and ensure safety compliance in the workplace.

7) Scalability and Flexibility:

• Ecosystem Expansion: IOT allows businesses to scale their operations by connecting more devices and expanding their ecosystems.

• Agility: IoT enables businesses to be more responsive to market changes and customer demands by providing real-time data and insights.

Trends & implication :- The IOT continues to evolve, driven by technological advancements, increasing adoption across industries, and growing consumer demand. Key trends in IOT, along with their implications, include: