Introduction to IoT(Internet of Things)

Name : Divesh Jadhwani
Institution : Pimpri Chinchwad University

What is IoT?

The Internet of Things (IoT) refers to the network of physical objects ("things") embedded with sensors, software, and other technologies to connect and exchange data with other devices and systems over the Internet.

Real-Life Example: Think of a smart fridge that can notify you on your phone when you're out of milk or order groceries automatically.

IoT in Everyday Life

Home Automation: Smart thermostats, smart lights, smart security systems (e.g., Nest, Philips Hue, Ring).

Healthcare: Wearable devices like fitness trackers (e.g., Fitbit) that monitor your health in real time.

Transportation: Smart cars with internet connectivity (e.g., Tesla), real-time traffic updates. Real-Life Example:

Imagine your smart car talks to your smart home and sets the room temperature before you arrive.

Impacts of IoT
on Everyday Life

Access Remotely
IoT enables us to access and control devices from a remote area, making it easy & convenient

Process Monitoring
Monitoring processes of businesses that manufacture goods can help increase efficiency and lower costs

Accurate Prediction
IoT can predict natural disasters in real time, by analyzing previous records in databases

Data communication
Sharing of data between devices, especially for businesses and workplaces, is possible due to IoT

Characteristics of IoT

Connectivity: Devices communicate through the internet.

Sensing: Devices collect data from the environment (e.g., temperature, humidity).

Data: Large amounts of data are collected and processed for insights.

Intelligence: Some IoT systems use AI to make decisions.

Action: Devices can trigger actions based on data (e.g., turning on the AC).

Real-Life Example: A smart water sprinkler system uses sensors to detect soil moisture levels and waters your garden only when needed.

Overview of IoT Architectures

IoT architecture defines the structure and flow of information between IoT devices and the cloud.

Three-Layer Architecture:
Perception Layer: The "sensing" layer where data is collected.

Network Layer: The "communication" layer where data is transmitted.

Application Layer: The "action" layer where data is processed for decision-making.

Perception Layer - Collecting Data

This layer includes devices that gather data from the environment. Sensors in IoT play a key role here.

Real-Life Example: In a smart home, sensors detect motion to turn lights on when entering a room.

These sensors belong to the perception layer.

Network Layer - Communicating Data

This layer transmits data collected by sensors to a central hub or cloud. It includes technologies like Wi-Fi, Bluetooth, and 4G/5G.

Real-Life Example: Your smartwatch uses Bluetooth to send heart rate data to your smartphone.

Application Layer - Using Data

This layer processes data and decides how to act. It includes applications like health monitoring
apps and smart home controllers.

Real-Life Example: A health app processes data from your smartwatch to track steps and suggest fitness goals.

Real-Life Example: Smart City

Smart Traffic Systems: Traffic lights use sensors to detect cars and adjust signals.

Smart Waste Management: Sensors notify when bins need emptying.

Smart Lighting: Streetlights adjust based on time or presence of pedestrians.

Explanation: These systems use IoT to make cities more efficient.

Evolution of IoT

Pre-IoT Era: Early connected devices were limited to specific use cases.

Modern IoT: Almost anything can be connected to the internet. Real-Life

Example: The first internet-connected toaster was created in 1990.

Today, we have smart kitchens where everything from the stove to the fridge is connected.

Enabling Technologies in IoT

Sensors: Collect data. Connectivity: Technologies like Wi-Fi, Bluetooth, Zigbee.

Cloud Computing: Stores and processes data.

**Artificial Intelligence (AI)**: Analyzes data to make decisions.

Real-Life Example: A smart thermostat uses sensors and AI to learn your temperature preferences.

About Things in IoT

"**Things**" are physical objects embedded with technology to interact with their environment.

Examples: Smart home devices, wearables.

Real-Life Example: In Manufacturing, 'things' include machines , sensors for efficient production management.
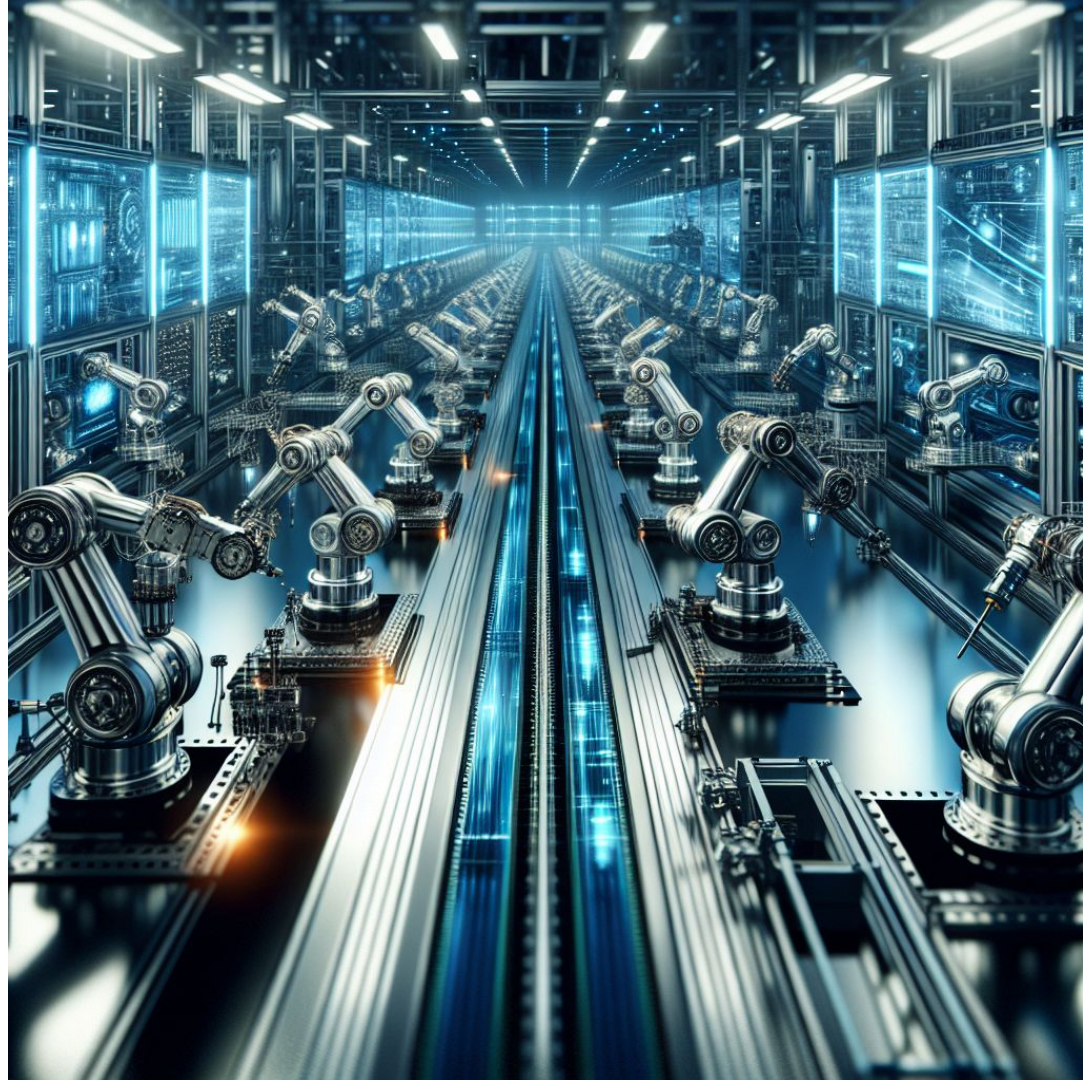
Introduction of IoT

The slide provide a brief overview about IoT

a system of interrelated computing devices, mechanical and digital machines given unique ility to transfer data over a network without requiring human-to-human or human-to-

INTERNET OF THINGS

Identifiers in IoT

Identifiers are unique codes that distinguish one IoT device from another.

Real-Life Example: In a smart home, each device has a unique identifier, so the system knows which device to control.

The Internet in IoT

The internet is the backbone of IoT, enabling device communication.

Without internet connectivity, IoT would be limited to local operations.

Real-Life Example: A smart security camera streams footage to your phone, allowing remote monitoring.

IoT Frameworks

IoT frameworks provide protocols and tools for developers.

Popular Frameworks: AWS IoT, Google Cloud IoT, Microsoft Azure IoT.

Real-Life Example: AWS IoT helps connect devices to the cloud.

Introduction to M2M (Machine to Machine)

M2M communication is when machines talk without human intervention.

It's a key component of IoT.

Real-Life Example: In a smart factory, machines communicate to automate processes.

Conclusion

IoT connects everyday objects to the internet, involves layers of architecture, and transforms industries like smart homes and healthcare.

Preview of Next Lecture: Explore sensor networks and IoT development boards like Arduino.
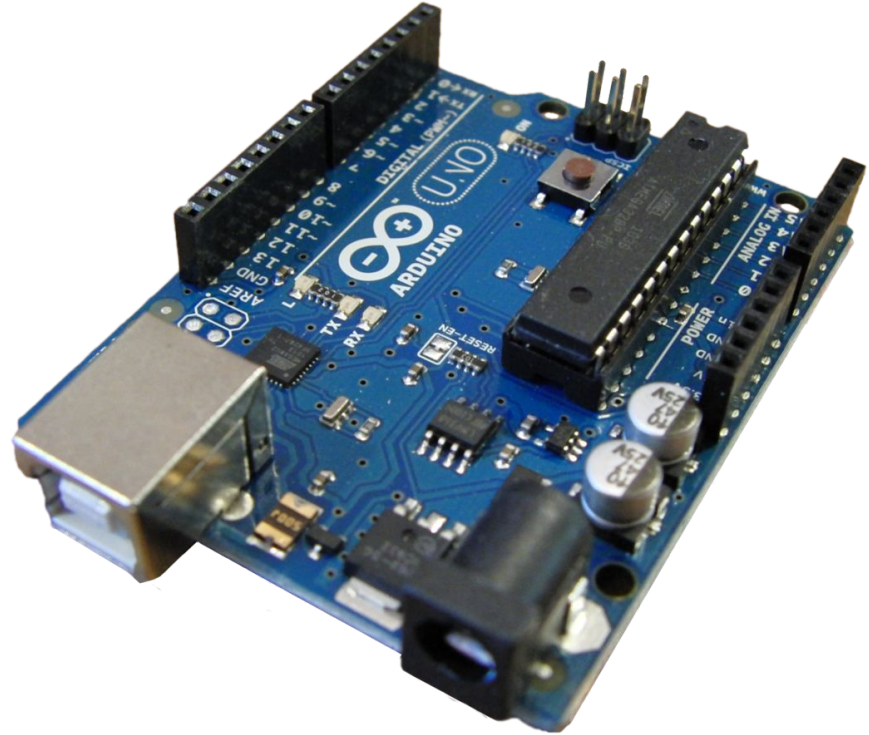
THANKYOU

Questions & Discussion