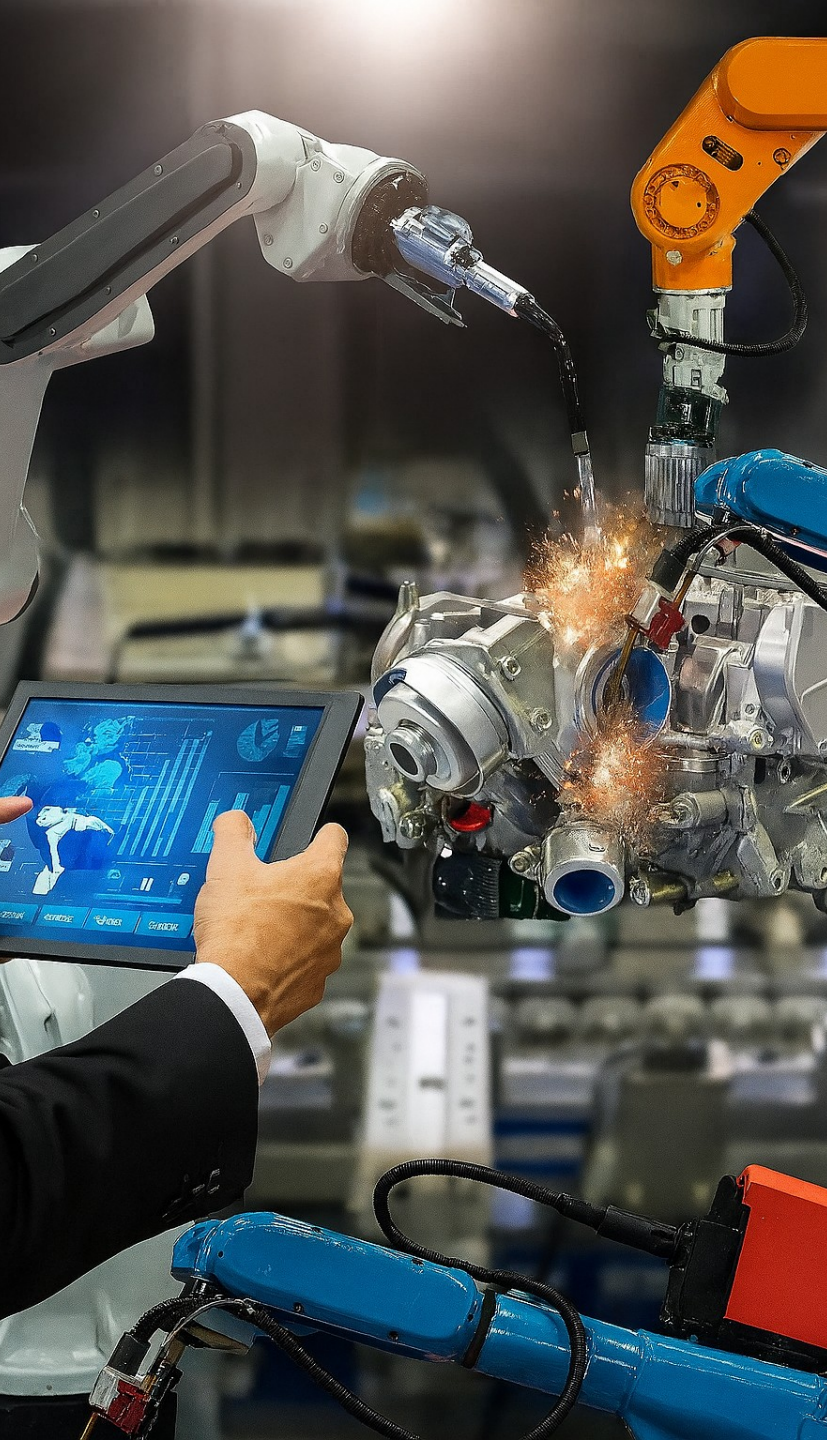
Industrial IoT

Module 1: Introduction to Industrial IoT

India



Industrial Internet of Things

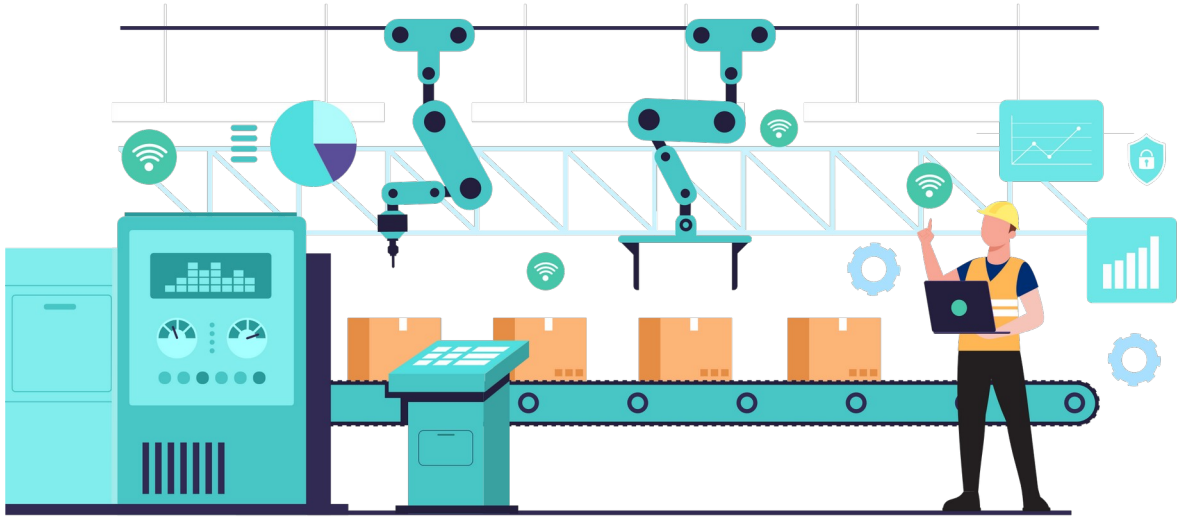
Introduction to IoT & IIoT

Understanding How IoT and IIoT Enable Smart Operations

Duration: 30 Minutes

Learning Objective

- Understand what is Internet of Things (IoT)
- Explore how IoT works, including how devices connect and exchange data.
- Understand what Industrial IoT (IIoT) is and how it differs from consumer IoT.
- Evaluate how IIoT has evolved over time and its key technology drivers.
- Explain how IIoT works in real industrial environments.
- Analyze practical case studies and success stories to see IIoT in action.



Internet of Things

Internet: Network

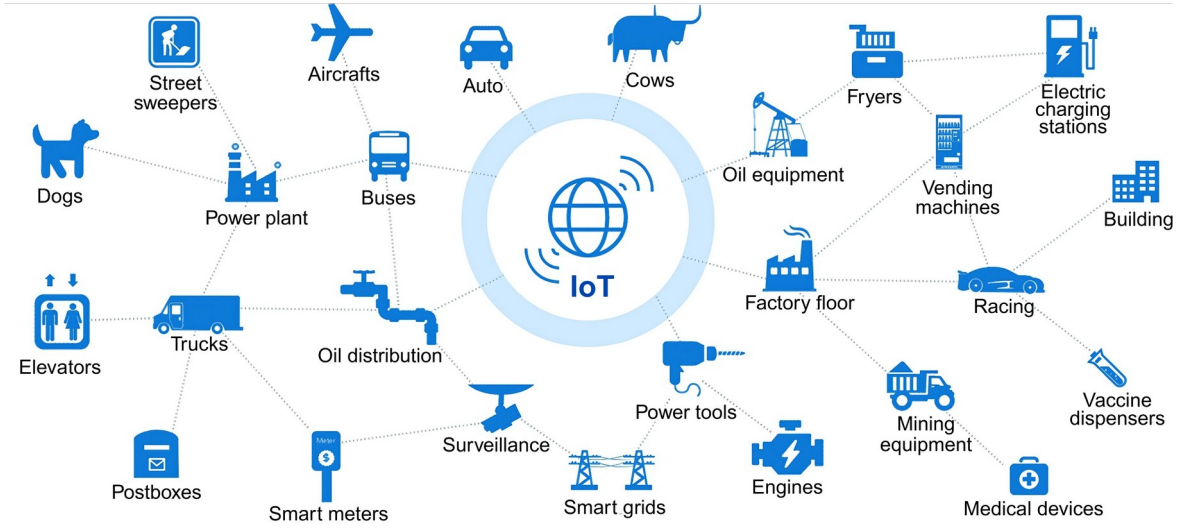
- An **“Internet”** means a network that connects devices.
- This network can use wired connections (such as Ethernet cables) or wireless technologies (like Wi-Fi, Bluetooth, or 5G).
- The network allows devices to communicate, share information, and work together.

- **Example:**
  - **Bluetooth** enables a cell phone to connect to wireless headphones to listen to music, or to transfer files between two phones.

Things: Physical Devices

- A **“thing”** could be any physical device like a water bottle with a sensor, a home appliance such as a TV, refrigerator, or smart bulb, or any machine in a factory that can collect and share data.

- **Examples:**
  - **A sprinkler system** can be connected with soil sensors that measure humidity.
  - When the soil is dry, the sprinkler turns on automatically to water the garden.



What is Internet of Things?

- The Internet of Things (IoT) is a network of physical devices embedded with sensors, software, and connectivity that enables them to connect and exchange data with other devices and systems over the internet.

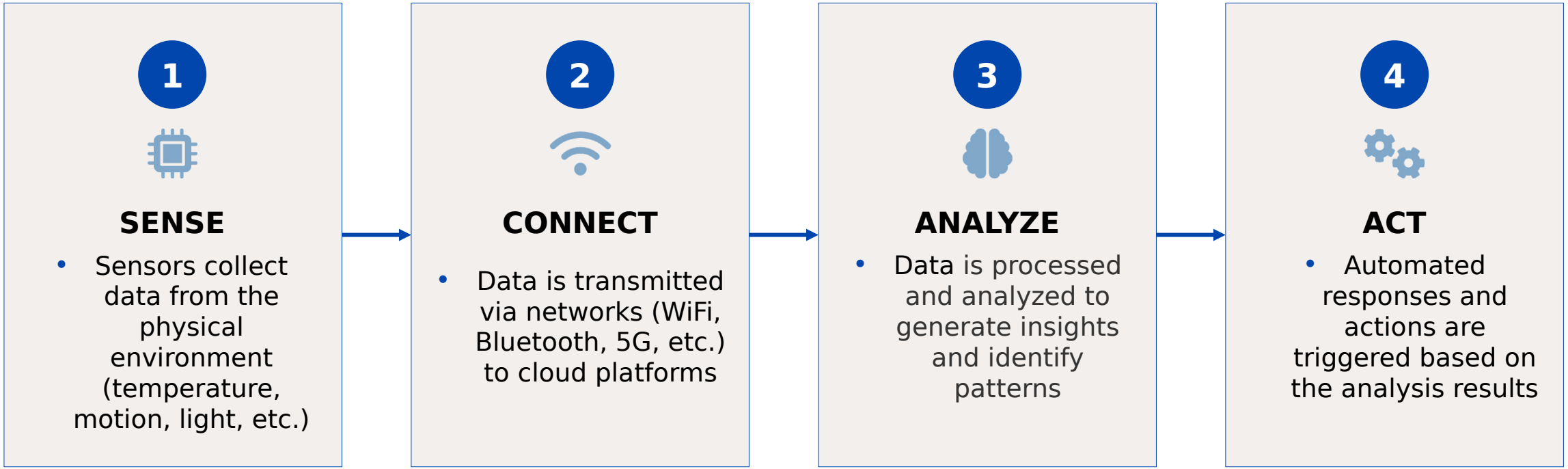
Internet + Things = Internet of Things

Source link: link

- **Example:**
  - A smart home uses IoT when devices like thermostats, lights, and security cameras are connected through the internet.
  - They can share information and be controlled remotely, making the home more efficient, safe, and convenient.

How IoT Works

- Sense → Connect → Analyze → Act
- The Internet of Things operates through a four-step process that enables devices to collect, transmit, process, and act on data without human intervention.



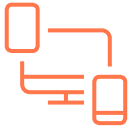
Industrial Internet of Things

Industrial Network +

- A wired or wireless system, using protocols like OPC UA, MQTT, or Profibus, that connects industrial devices to share data.

Industrial Devices =

- A physical machine or equipment like a CNC machine, robot, or sensor used in factories.



Industrial IoT

- A secure ecosystem where industrial devices are connected through a network to exchange data and improve operations

What is IIoT?
Connected Machines in Industry

- The Industrial Internet of Things (IIoT) is an ecosystem where industrial machines, equipment, and sensors are connected through secure networks so they can collect, share, and analyze machine data.
- This helps factories, plants, and other industrial sites automate processes, monitor operations in real time, and improve productivity, safety, and efficiency

- **Example:**
  - Bosch smart factory, machines, conveyor systems, and sensors are connected to share real-time data about production.
  - This helps monitor equipment conditions, detect problems early, and keep the production line running smoothly and efficiently.

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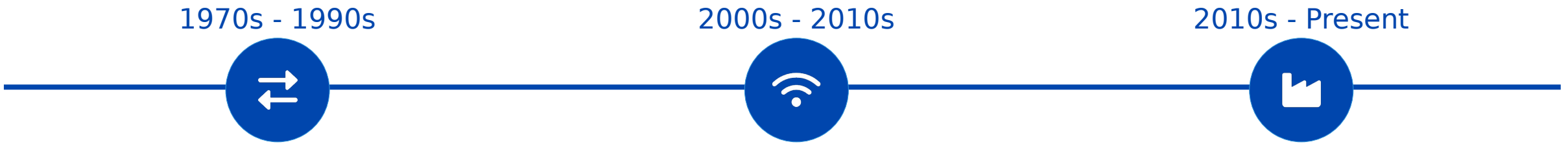
Evolution: M2M → IoT → IIoT

How Industry Connectivity Has Evolved

- The journey from basic machine connections to intelligent industrial systems represents a significant evolution in connectivity technology.



1970s - 1990s

Machine-to-Machine (M2M)

- Basic connectivity between machines
  - Point-to-point connections
  - Telemetry & SCADA systems
  - Limited intelligence

2000s - 2010s

Internet of Things (IoT)

- Smart connectivity with internet integration
  - IP-based networks
  - Cloud computing
  - Consumer applications

2010s - Present

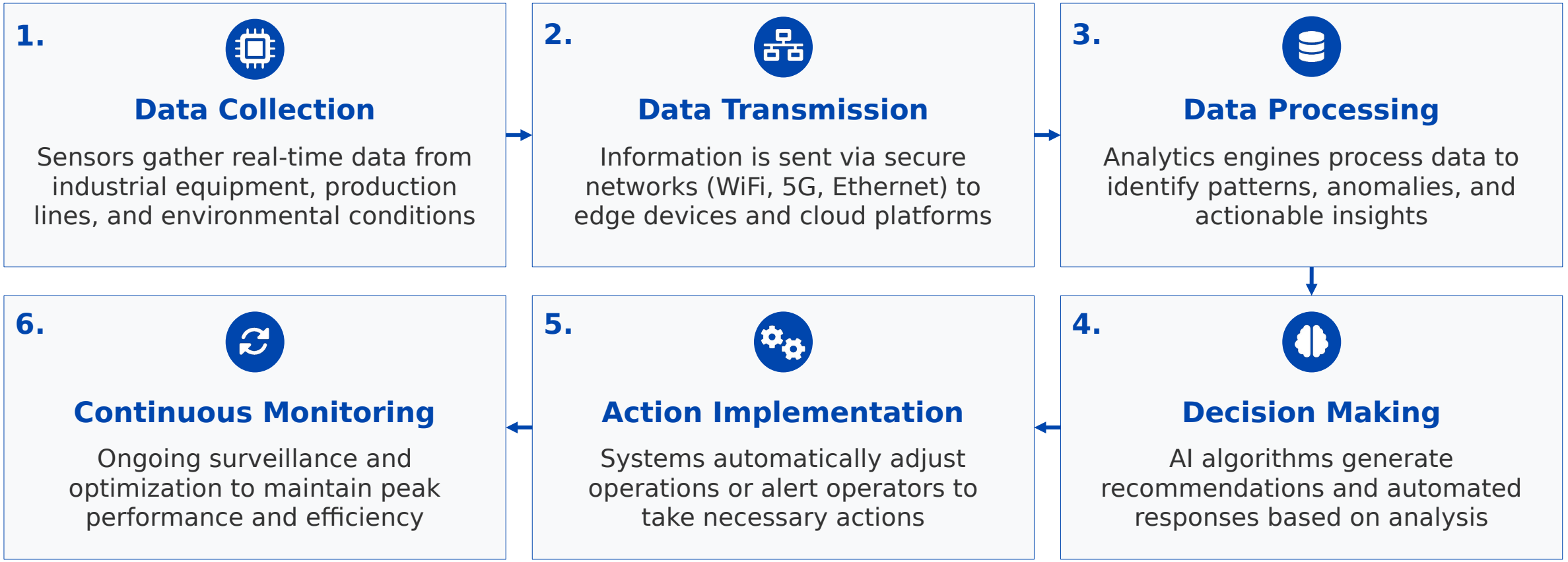
Industrial IoT (IIoT)

- Enterprise-grade connectivity and intelligence
  - Advanced analytics
  - Edge computing
  - Industrial transformation

How IIoT Works - Workflow

The Industrial IoT Process Flow

- The IIoT workflow represents a continuous cycle of data collection, transmission, analysis, and action that enables smart manufacturing and industrial optimization.



Key Differences between Consumer IoT and IIoT

Aspect	Consumer IoT	Industrial IoT (IIoT)
Purpose	Convenience and entertainment	Efficiency, productivity, safety, quality
Reliability	Moderate requirements	Mission-critical, high precision
Security	Basic standard protection	Enhanced, multi-layered security
Scale	Small scale, individual or home use	Enterprise-level, plant-wide or across supply chains
Data Volume	Low to moderate data	Large, continuous real-time data streams
Response Time	Some delay acceptable	Instant or near real-time response needed

How IIOT drive Industry4.0

- IIoT connects machines, sensors, and devices on the factory floor.
- Machines on the factory floor have sensors and IP-enabled devices that can communicate and exchange data with each other through a secure IIoT ecosystem.
- The data helps companies see what’s happening, fix problems before they grow, and keep things running smoothly.
- With IIoT, factories become smarter, more flexible, and more efficient — which is what Industry 4.0 is all about.

Industry 1.0
Mechanization and the introduction of steam and water power

Industry 2.0
Mass production assembly lines using electrical power

Industry 3.0
Automated production, computers, IT-systems and robotics

Industry 4.0
The Smart Factory. Autonomous systems, IoT, machine learning

Summary

- IoT is an ecosystem where devices connect, communicate, and securely share data to make everyday tasks smarter and more efficient.
- It works by sensing information, connecting devices, analyzing data, and acting on insights automatically.
- IIoT takes these same principles into industrial environments, connecting machines and sensors to improve safety, efficiency, and decision-making.

Thank you

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