

## EMERGING TECHNOLOGIES (I)

### Topic: Artificial Intelligence (AI) & Internet of Things (IoT)

Emerging technologies are new, modern tools and innovations that are rapidly changing how we live, work, and learn. In our digital world, **Artificial Intelligence (AI)** and the **Internet of Things (IoT)** are two of the most important pillars driving this change.

#### 1. Artificial Intelligence (AI)

##### What is AI?

Artificial Intelligence is a branch of computer science that aims to build smart machines capable of performing tasks that typically require human intelligence. Instead of just following a strict set of pre-written rules, AI systems can learn from data, recognize patterns, and make decisions.

##### Core Capabilities of AI:

- **Learning:** Improving performance over time by analyzing past data.
- **Reasoning:** Using logic to solve problems or make predictions.
- **Perception:** Understanding sensory inputs (like seeing images or hearing speech).
- **Natural Language Processing (NLP):** Understanding and responding to human language (e.g., Siri, ChatGPT).

##### Common Examples in Daily Life:

- **Virtual Assistants:** Such as Siri, Alexa, or Google Assistant.
- **Recommendation Systems:** The engines that suggest videos on YouTube or products on Amazon based on what you have watched or bought before.
- **Facial Recognition:** Used to unlock smartphones securely.
- **Automated Translation:** Tools that translate text from one language to another instantly.

#### 2. Internet of Things (IoT)

##### What is IoT?

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

Simply put, it turns everyday objects into "smart" objects by giving them an internet connection.

##### How an IoT System Works:

1. **Sensors:** These collect data from the environment (e.g., temperature, motion, or light).

2. **Connectivity:** The data is sent over a network (Wi-Fi, Bluetooth, or Cellular) to a central location.
3. **Data Processing:** The information is analyzed (often in the cloud).
4. **Action:** The device performs an action based on that data (e.g., turning off the lights if the room is empty).

**Common Examples:**

- **Smart Homes:** Smart bulbs you can turn on with your phone, or smart thermostats that adjust room temperature.
- **Wearable Tech:** Fitness trackers (like Fitbits or smartwatches) that monitor your heart rate and share that data with your phone.
- **Smart Agriculture:** Sensors in farms that monitor soil moisture levels to automatically trigger irrigation systems.

**3. The Convergence: AI + IoT (AIoT)**

When you combine AI with IoT, you get the **Artificial Intelligence of Things (AIoT)**.

- **IoT** acts as the *nervous system*, gathering data from the environment.
- **AI** acts as the *brain*, analyzing that data and making "intelligent" decisions without needing a human to press a button every time.

**Example:** In a smart factory, IoT sensors detect when a machine is vibrating too much (an early sign of damage), and the AI automatically shuts it down or alerts maintenance before it breaks completely.

**Summary Comparison Table**

Feature	Artificial Intelligence (AI)	Internet of Things (IoT)
Primary Goal	To simulate human intelligence	To connect physical objects
Main Function	Think, learn, and analyze	Connect, collect, and share
Role	The "Brain"	The "Sensory Network"

<b>Feature</b>	<b>Artificial Intelligence (AI)</b>	<b>Internet of Things (IoT)</b>
<b>Example</b>	ChatGPT, Google Search	Smartwatches, Smart Fridge

## SENSOR AND AUTOMATION

**Sensor** and **Automation** are closely related ideas used in everyday technology. Here's a simple way to understand them:

### ◆ What is a Sensor?

A **sensor** is a device that **detects or measures something** in the environment and sends that information to a system.

**Simple examples:**

- A **temperature sensor** checks how hot or cold something is.
- A **motion sensor** detects movement.
- A **light sensor** detects brightness.

👉 Think of a sensor like your **eyes or skin** — it “feels” or “sees” something and reports it.

### ◆ What is Automation?

**Automation** means using technology to **perform tasks automatically without human effort**, based on certain conditions.

👉 It's like giving a machine instructions:

“If something happens, do this.”

### ◆ How They Work Together (Easy Example)

#### 💡 Automatic Street Light

- The **sensor** (light sensor) detects if it's dark outside.
- The **automation system** decides what to do.

👉 Rule:

If it is dark → Turn ON the light

If it is bright → Turn OFF the light

✔ You don't need to switch it manually — it happens automatically.

### ◆ Another Simple Example

#### Automatic Water Tank System

- A **water level sensor** checks how full the tank is.
- The system uses **automation** to control the pump.

#### Rule:

- If tank is empty → Pump ON
  - If tank is full → Pump OFF
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### ◆ In One Line

- **Sensor = detects changes**
- **Automation = acts on those changes**

### Quick Check for Students

1. **Critical Thinking:** If you have a device that measures the temperature of a classroom and turns on an air conditioner automatically, which technology is responsible for the sensing/connecting, and which is responsible for the decision-making?
2. **Discussion:** How can AI and IoT be used to improve security in your local community (e.g., Iwalere CDA projects)?
3. **Vocabulary:** Define *Sensors* and *Automation* in your own words.