



UNIT -4

IOT TECHNOLOGIES, STANDARDS AND TOOLS



FUNDAMENTAL CHARACTERISTICS OF IOT

- **1. CONNECTIVITY**
- CONNECTIVITY IS AN IMPORTANT REQUIREMENT OF THE IOT INFRASTRUCTURE. THINGS OF IOT SHOULD BE CONNECTED TO THE IOT INFRASTRUCTURE. ANYONE, ANYWHERE, ANYTIME CAN CONNECT, THIS SHOULD BE GUARANTEED AT ALL TIMES. FOR EXAMPLE, THE CONNECTION BETWEEN PEOPLE THROUGH INTERNET DEVICES LIKE MOBILE PHONES, AND OTHER GADGETS, ALSO A CONNECTION BETWEEN INTERNET DEVICES SUCH AS ROUTERS, GATEWAYS, SENSORS, ETC



2. INTELLIGENCE AND IDENTITY

THE EXTRACTION OF KNOWLEDGE FROM THE GENERATED DATA IS VERY IMPORTANT. FOR EXAMPLE, A SENSOR GENERATES DATA, BUT THAT DATA WILL ONLY BE USEFUL IF IT IS INTERPRETED PROPERLY. EACH IOT DEVICE HAS A UNIQUE IDENTITY. THIS IDENTIFICATION IS HELPFUL IN TRACKING THE EQUIPMENT AND AT TIMES FOR QUERYING ITS STATUS.

3. SCALABILITY

THE NUMBER OF ELEMENTS CONNECTED TO THE IOT ZONE IS INCREASING DAY BY DAY. HENCE, AN IOT SETUP SHOULD BE CAPABLE OF HANDLING THE MASSIVE EXPANSION. THE DATA GENERATED AS AN OUTCOME IS ENORMOUS, AND IT SHOULD BE HANDLED APPROPRIATELY.



4. DYNAMIC AND SELF-ADAPTING (COMPLEXITY)

IOT DEVICES SHOULD DYNAMICALLY ADAPT THEMSELVES TO CHANGING CONTEXTS AND SCENARIOS. ASSUME A CAMERA MEANT FOR SURVEILLANCE. IT SHOULD BE ADAPTABLE TO WORK IN DIFFERENT CONDITIONS AND DIFFERENT LIGHT SITUATIONS (MORNING, AFTERNOON, AND NIGHT).

5. ARCHITECTURE

IOT ARCHITECTURE CANNOT BE HOMOGENEOUS IN NATURE. IT SHOULD BE HYBRID, SUPPORTING DIFFERENT MANUFACTURERS ' PRODUCTS TO FUNCTION IN THE IOT NETWORK. IOT IS NOT OWNED BY ANYONE ENGINEERING BRANCH. IOT IS A REALITY WHEN MULTIPLE DOMAINS COME TOGETHER.



6. Safety

There is a danger of the sensitive personal details of the users getting compromised when all his/her devices are connected to the internet. This can cause a loss to the user. Hence, data security is the major challenge. Besides, the equipment involved is huge. IoT networks may also be at risk. Therefore, equipment safety is also critical.

7. Self Configuring

This is one of the most important characteristics of IoT. IoT devices are able to upgrade their software in accordance with requirements with a minimum of user participation. Additionally, they can set up the network, allowing for the addition of new devices to an already-existing network.



8. INTEROPERABILITY

- IOT DEVICES USE STANDARDIZED PROTOCOLS AND TECHNOLOGIES TO ENSURE THEY CAN COMMUNICATE WITH EACH OTHER AND OTHER SYSTEMS. INTEROPERABILITY IS ONE OF THE KEY CHARACTERISTICS OF THE INTERNET OF THINGS (IOT). IT REFERS TO THE ABILITY OF DIFFERENT IOT DEVICES AND SYSTEMS TO COMMUNICATE AND EXCHANGE DATA WITH EACH OTHER, REGARDLESS OF THE UNDERLYING TECHNOLOGY OR MANUFACTURER.
- INTEROPERABILITY IS CRITICAL FOR THE SUCCESS OF IOT, AS IT ENABLES DIFFERENT DEVICES AND SYSTEMS TO WORK TOGETHER SEAMLESSLY AND PROVIDES A SEAMLESS USER EXPERIENCE. WITHOUT INTEROPERABILITY, IOT SYSTEMS WOULD BE LIMITED TO INDIVIDUAL SILOS OF DATA AND DEVICES, MAKING IT DIFFICULT TO SHARE INFORMATION AND CREATE NEW SERVICES AND APPLICATIONS.



9. Embedded Sensors and Actuators

Embedded sensors and actuators are critical components of the Internet of Things (IoT). They allow IoT devices to interact with their environment and collect and transmit data.

Sensors are devices that can detect changes in the environment, such as temperature, light, sound, or movement. In IoT systems, sensors are embedded into devices, allowing them to collect data about the environment.

Actuators are devices that can interact with the environment, such as turning on lights, opening or closing doors, or controlling the speed of a motor. In IoT systems, actuators are embedded into devices, allowing them to perform actions based on data collected by sensors.

Together, sensors and actuators allow IoT devices to collect data about the environment, process that data, and take action based on the results. This makes it possible to automate a wide range of processes and tasks, such as home automation, energy management, and predictive maintenance.



10. Autonomous operation

Autonomous operation refers to the ability of IoT devices and systems to operate independently and make decisions without human intervention. This is a crucial characteristic of the Internet of Things (IoT) and enables a wide range of new applications and services.

In IoT systems, devices and systems are equipped with [sensors, actuators](#), and processing power, allowing them to collect and process data about the environment, make decisions based on that data, and take action accordingly.