
Internet of things
IOT
प्रगत संगणन विकास केंद्र
CENTRE FOR DEVELOPMENT OF ADVANCED COMPUTING
सी डैक
CDAC
॥ ज्ञानादेव तु कैवल्यम्॥

Devise A Methodology For Conducting VAPT on IoT Devices & Network

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- History of IoT
- What is IoT
- How IoT works
- Which component are use for IoT
- Ecosystem
- Layer in IoT

INTRODUCTION

- Internet of Things (IoT) is a network in which physical objects with Internet connectivity can interact and exchange information with other intelligent devices.
- The term "Internet of Things" or IoT was first coined by *Kevin Ashton* in 1999.
- These IoT devices are lightweight, battery-operated and deployed in dense environments, making them constrained in terms of power and memory.
- These objects can be anything from household appliances and wearable devices to industrial machines and vehicles.
- However, as they communicate with other devices, these IoT devices generate a large amount of data, which causes a variety of network issues.

HISTORY OF IOT

1989
The first IoT device is created

1993
The first online webcam is used at Cambridge

1994
Steve Mann creates WearCam

1999
Kevin Ashton coins the term Internet of Things

2008
The number of connected devices overtakes the number of people in the world and IoT is 'born'

2007
First iPhone is launched

2005
UN publishes its first report on the Internet of Things

2000
LG announces the first smart refrigerator

2009
The original Fitbit activity tracker is released

2011
IIoT comes into being

2014
Seoul becomes the world's first smart city

2015
IoT goes Mobile with smartphones

2022
World Economic Forum names IoT as one of the three most impactful technological advancements

2021
More than 10 billion active IoT devices active

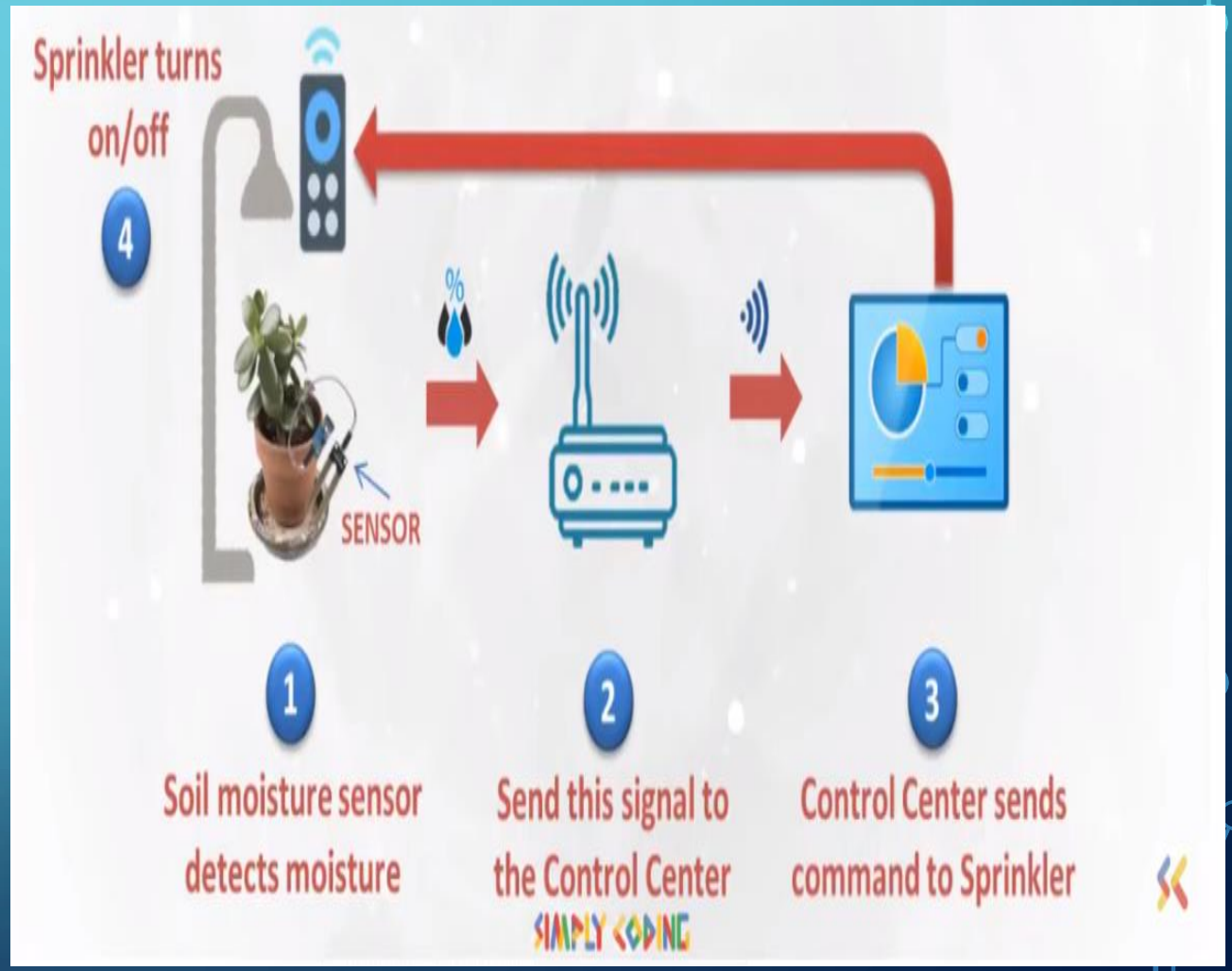
2020
The number of IoT device connections increased more than 50% of the active connected devices

2016
AWS IoT core is launched

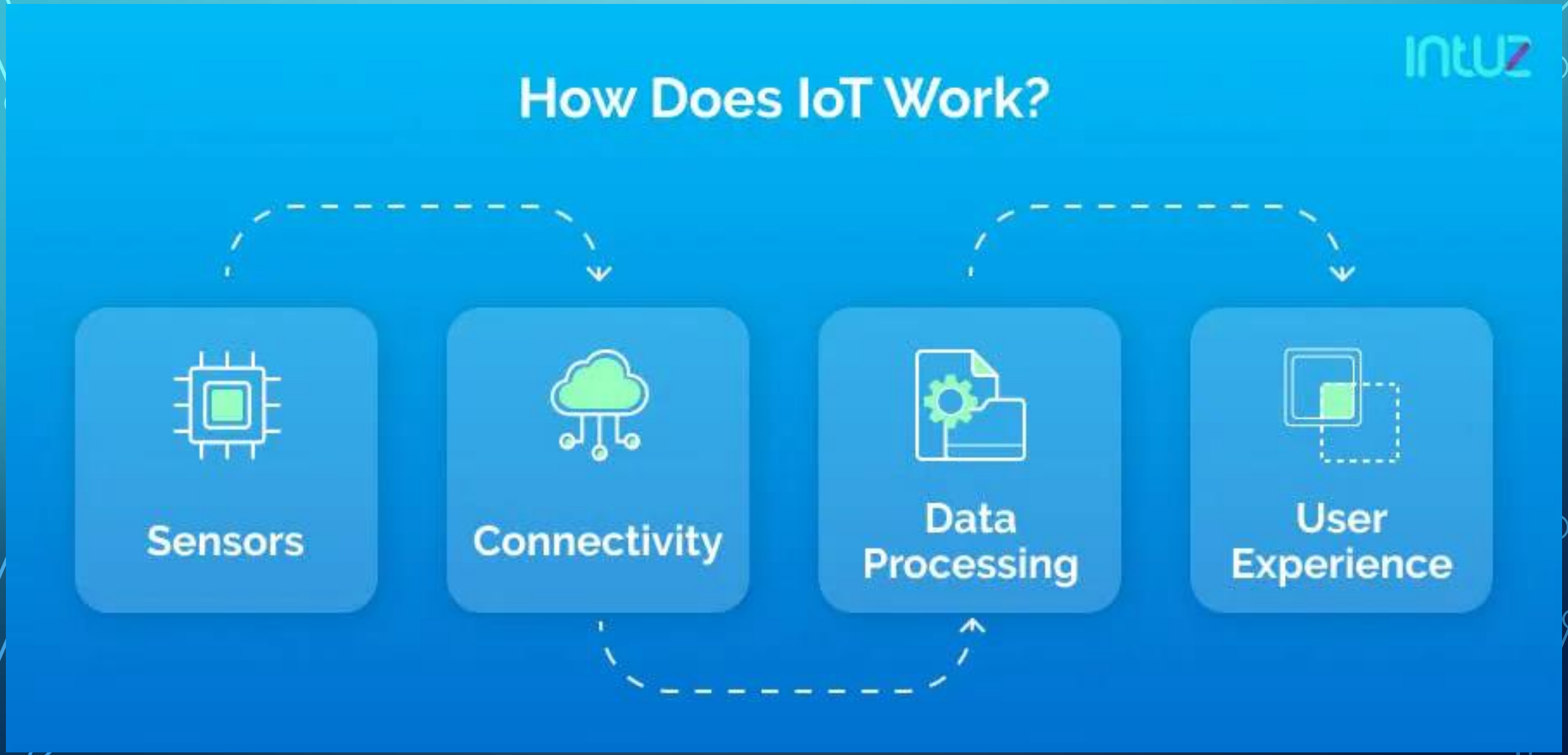
BYTEBEAM

DEFINITION OF IOT

- Internet of Things is a concept where everyday objects are connected to the internet and can communicate with each other or with us.
- These objects, equipped with sensor and software can collect and exchange data, making them smart and capable of automated actions or remote control.



WORKING OF IOT



Smart Devices:

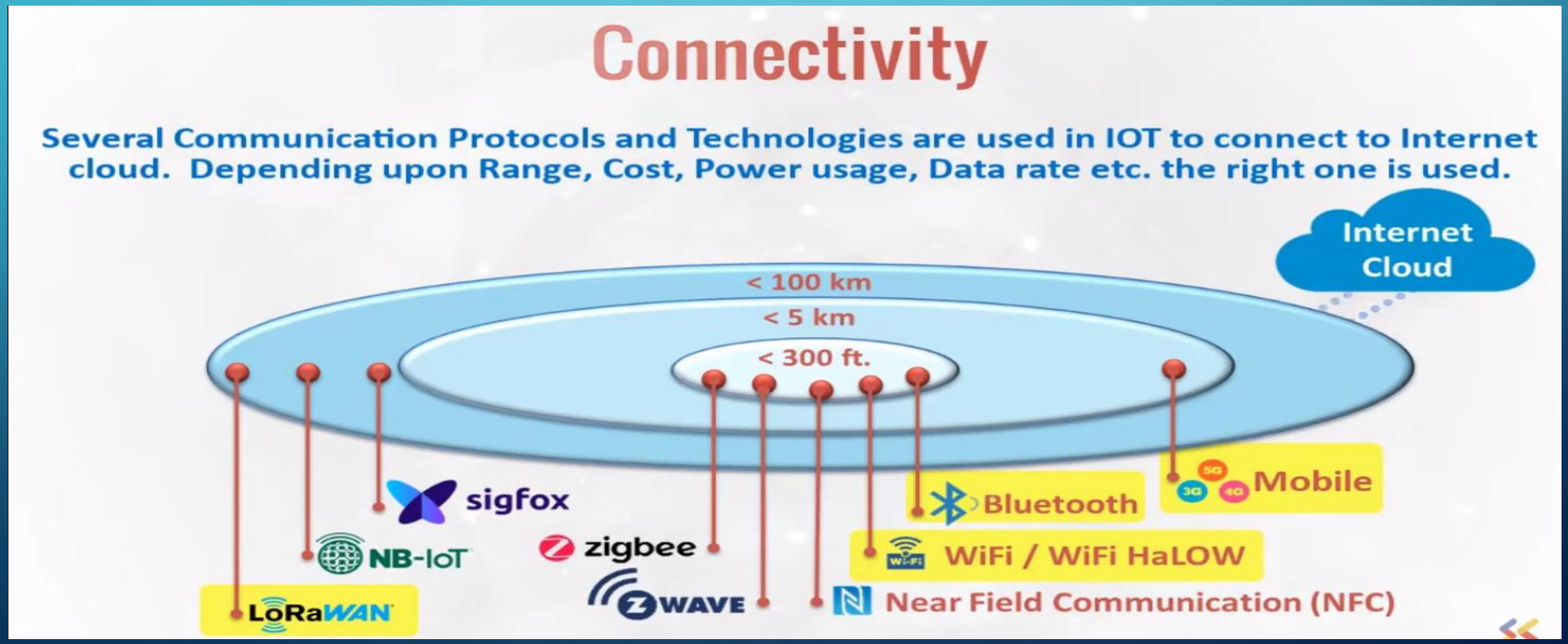
1 Sensor Integration: These sensors enable devices to perceive and gather information about their surroundings.

2 Connectivity: Connectivity enables devices to share data, receive commands, and participate in collaborative actions.

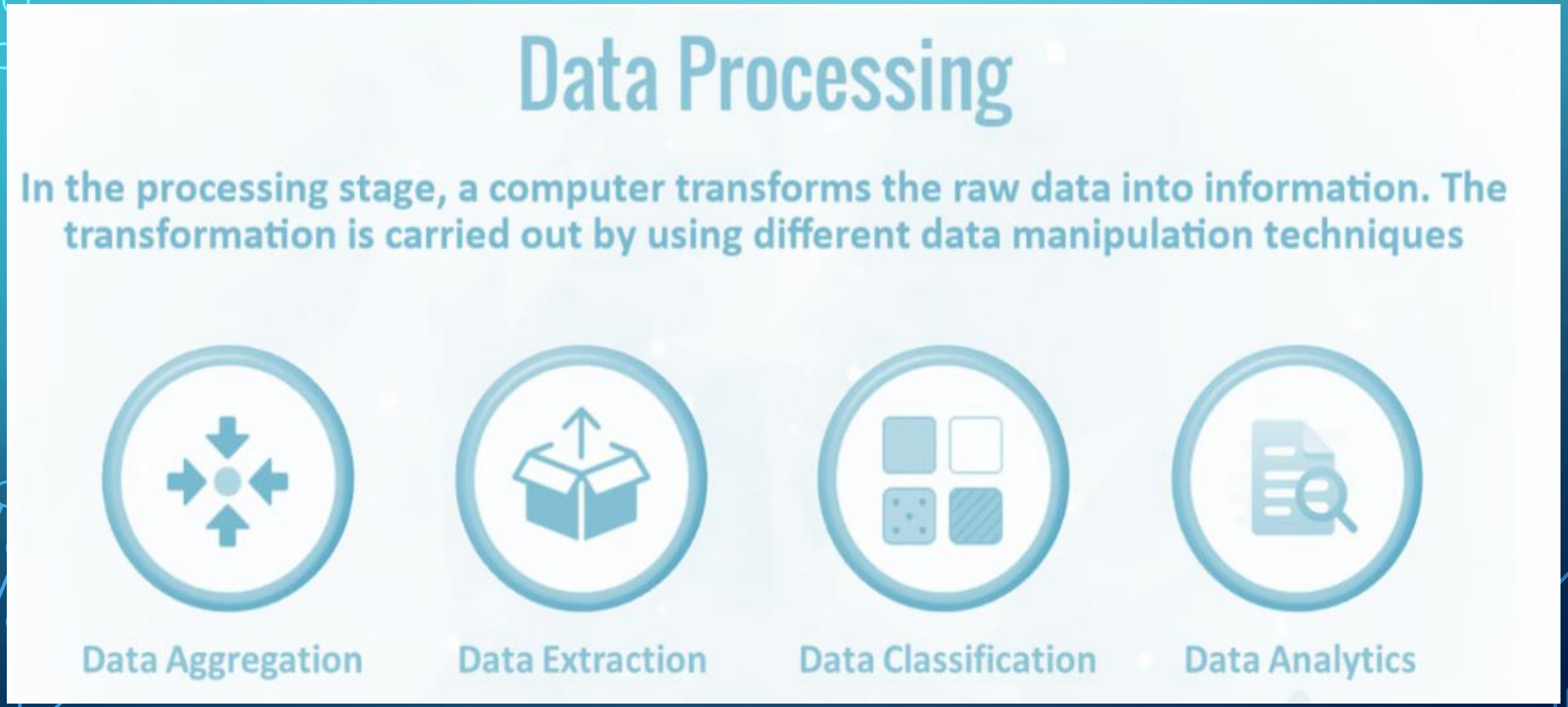
3 Actuators and Control Mechanisms: Actuators allow devices to perform physical actions based on the data they receive. For instance, a smart thermostat can adjust the temperature, and smart locks can control access.

2.Connectivity:

- Smart devices are designed with built-in connectivity features. They use wireless technologies like *Wi-Fi, Bluetooth, Zigbee, or cellular networks* to communicate with other devices and the broader IoT infrastructure.
- Connectivity enables devices to share data, receive commands, and participate in collaborative actions.



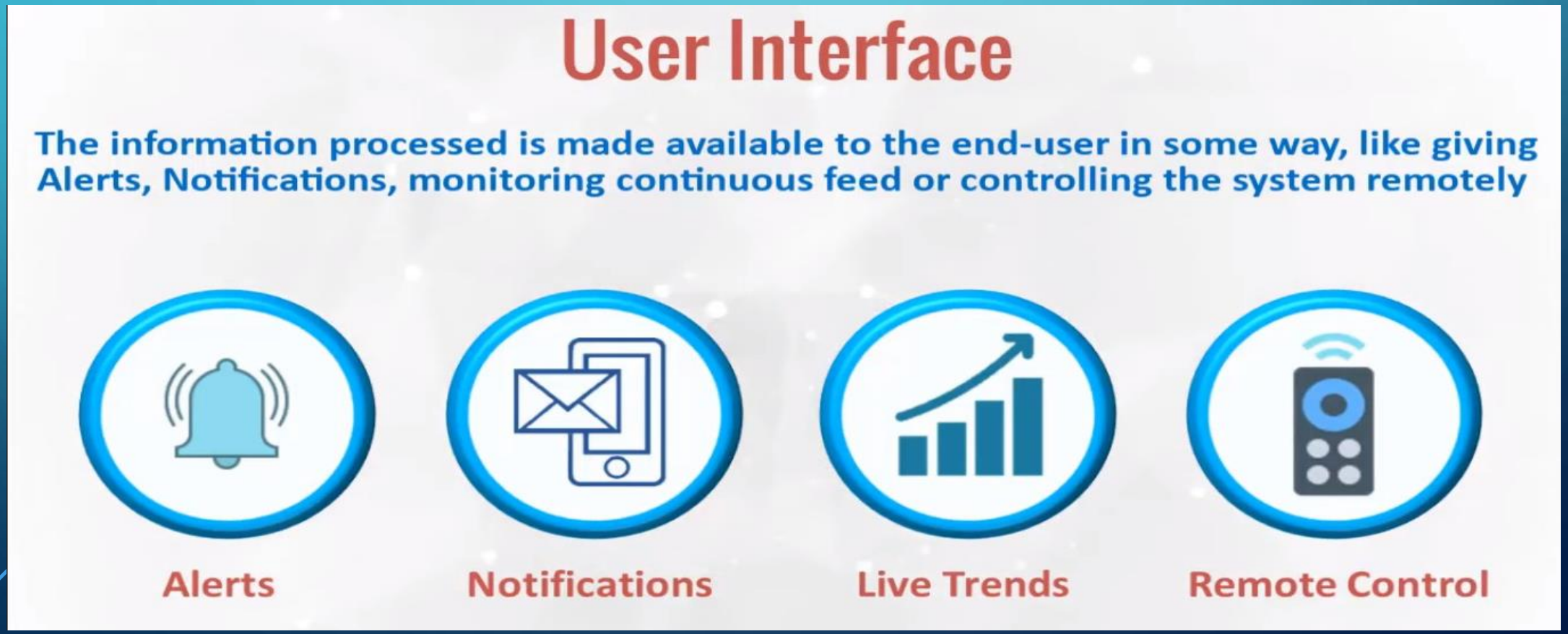
3. **Data Processing and Analysis :** Data generated by smart devices is sent to IoT applications for processing and analysis.



- **User Interface:**

Web and Mobile Applications:

- The user interface serves as a bridge between users and the IoT ecosystem.
- Users can monitor the status of connected devices, receive notifications, and interact with the IoT system through a user-friendly interface.



- **Remote Control and Monitoring:**

  1. The user interface allows users to remotely control smart devices. For example, users can adjust the temperature, turn lights on or off, or lock doors using a mobile app.

  2. Real-time monitoring enables users to stay informed about the status of their IoT devices and receive alerts or notifications when certain events occur.

- **Customization and Personalization:**

  1. Many IoT applications provide customization options, allowing users to tailor settings according to their preferences.

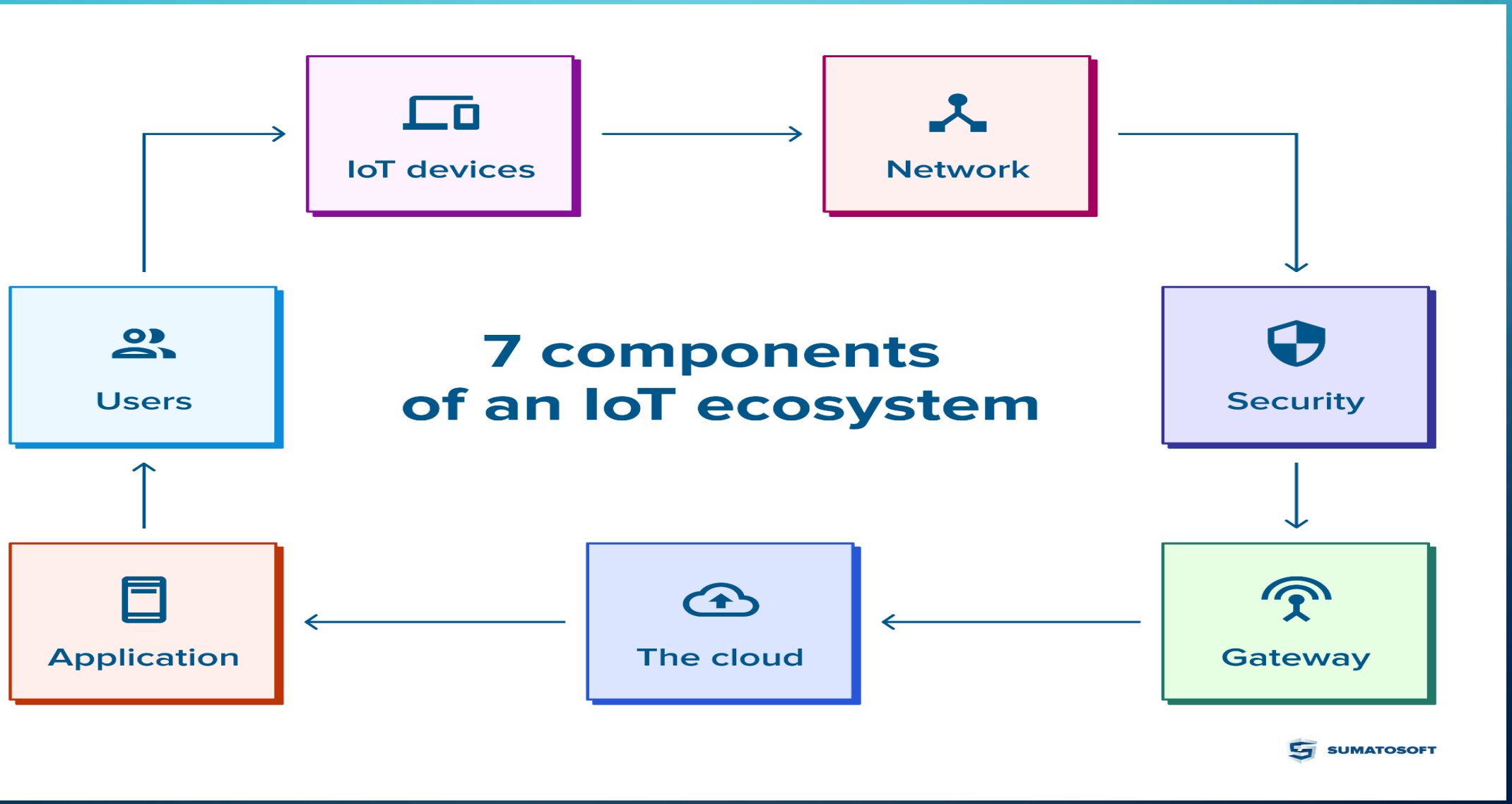
  2. Personalization features enhance the user experience and make the IoT ecosystem more adaptable to individual needs.

- **Security Features:**

  1. Security is a critical aspect of the user interface. Users may set up authentication mechanisms, manage access permissions, and receive security alerts.

  2. The user interface provides a platform for users to implement security measures and ensure the confidentiality and integrity of their IoT system.

ECO SYSTEM OF IOT AND ITS COMPONENT



CONNECTIVITY

- It is transfer to the cloud, to transfer the data that devices need to medium that connect to between device and cloud

Wireless standard	Transmission range
1. Bluetooth	1 to 100 M
2. Zigbee	15 to 150 M
3. Lora	10 KM
4. Wi-fi	100 M

BENEFITS OF IOT ECOSYSTEM

- **Increased Efficiency** – IoT devices and sensors can automate and streamline many processes, reducing the need for human intervention and improving efficiency. For example, in industrial settings, IoT can help optimize production lines, reduce downtime, and improve supply chain management.
- **Improved Safety and Security** – IoT can enhance safety and security in a variety of settings. For instance, in the healthcare industry, IoT can be used for remote patient monitoring, ensuring that patients receive timely care. In the home, IoT devices can provide enhanced security through surveillance cameras, door locks, and alarms.

- **Enhanced Customer Experience** – IoT can provide a more personalized and convenient experience for customers. For instance, in retail settings, IoT can be used to provide personalized recommendations and improve the shopping experience. In the hospitality industry, IoT can be used to provide guests with personalized services and amenities.

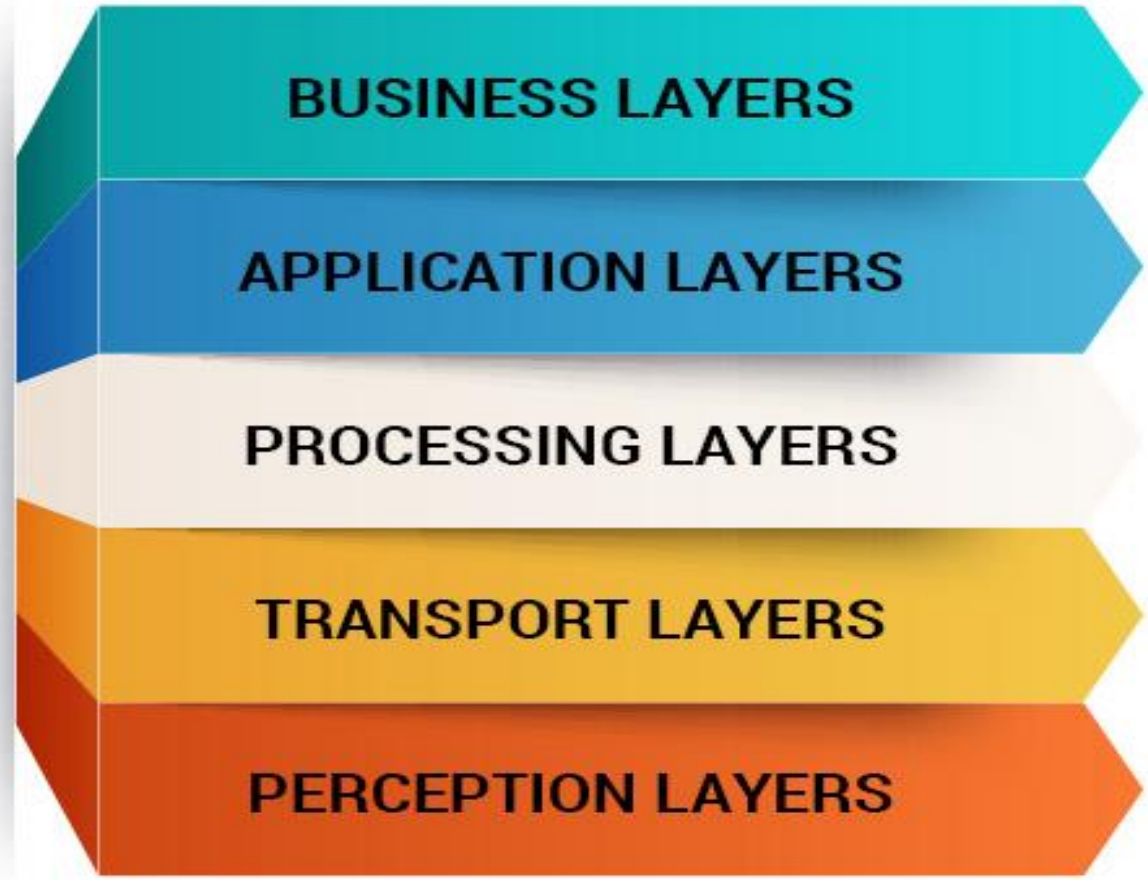
- **Cost Savings** – IoT can help organizations save money by reducing waste, improving efficiency, and optimizing processes. For example, in the energy industry, IoT can help optimize energy usage and reduce costs. In transportation, IoT can help optimize logistics and reduce fuel consumption.

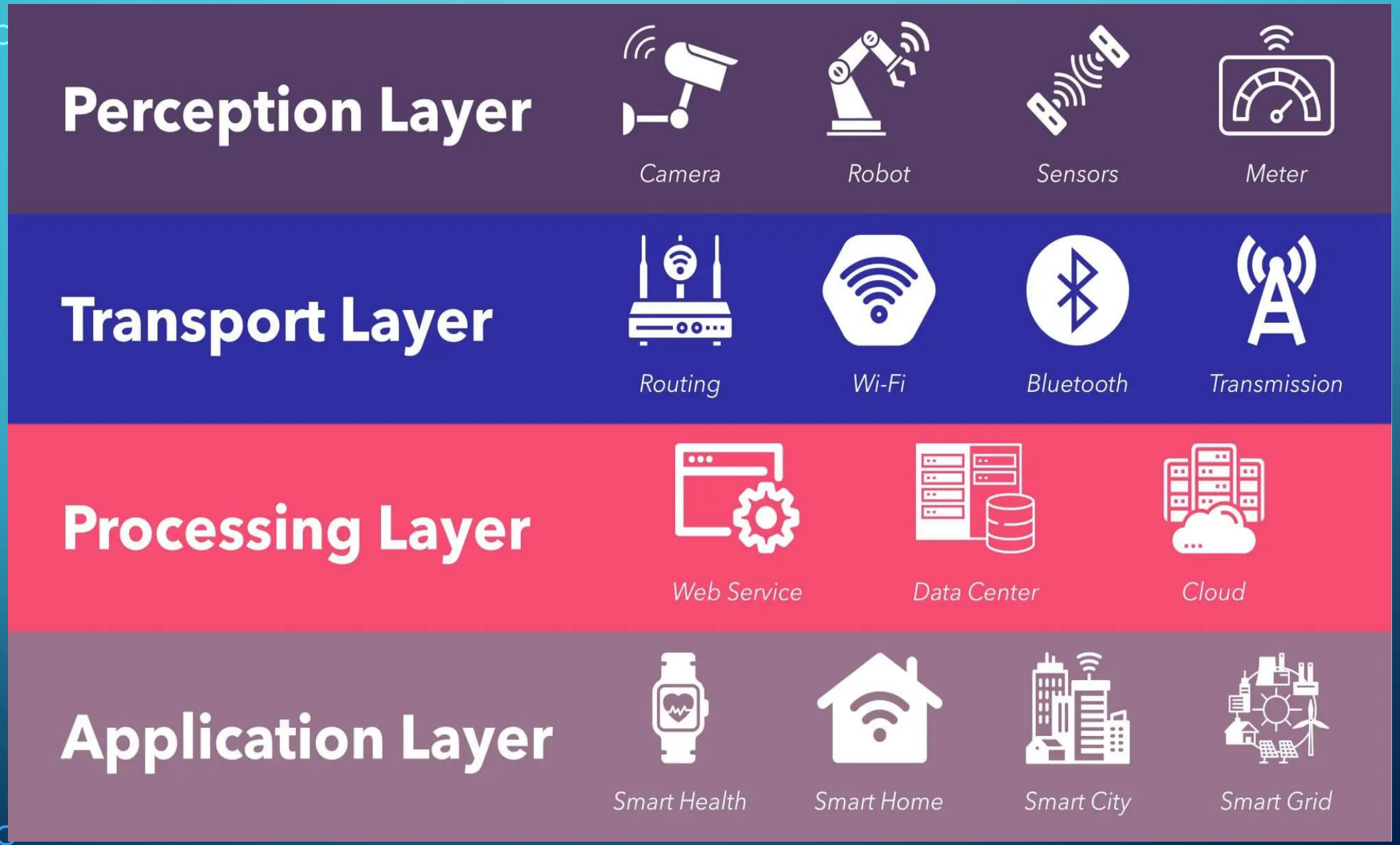
REAL TIME EXAMPLE OF IOT

- **Smart Homes** – Smart homes are an example of how IoT technology can be used to improve daily life. e.g lighting, security cameras, and voice assistants are used to automate and control various aspects of the home. It can be controlled through mobile apps, voice commands, or automated schedules, providing greater convenience and energy efficiency.
- **Industrial IoT** – Industrial IoT is another example of how IoT technology can be used to improve efficiency and productivity in industrial settings. IoT sensors and devices are used to monitor and optimize manufacturing processes, track inventory and assets, and manage supply chains. This technology can help reduce downtime, optimize energy usage, and improve safety

- **Healthcare IoT** – Healthcare IoT is a rapidly growing area that involves the use of IoT technology in healthcare settings. IoT devices such as wearables and remote monitoring devices can be used to *monitor patients' vital signs, track medication adherence, and provide real-time feedback to healthcare providers*. This technology can help improve patient outcomes and reduce healthcare costs.

LAYER OF IOT DEVICES




Perception Layer
Camera
Robot
Sensors
Meter
Transport Layer
Routing
Wi-Fi
Bluetooth
Transmission
Processing Layer
Web Service
Data Center
Cloud
Application Layer
Smart Health
Smart Home
Smart City
Smart Grid

EXAMPLES OF IOT APPLICATIONS USING 5-LAYER ARCHITECTURE

- **Smart Home Automation:-**

It is an IoT application that uses 5-layer architecture to automate home appliances and devices. In this application, *perception layer* includes devices such as *motion detectors, temperature sensors, and door locks*. *Network layer* includes *Wi-Fi and Zigbee protocols*, which are used to connect devices in home. *Data layer* includes *cloud storage and processing platforms*, which are used to *store and analyze data generated by devices*. *Application layer* includes mobile and web applications that *enable end-users to interact with devices*, and *business layer* includes rules engines and analytics tools that are used to *make decisions based on data generated by devices*.

EXAMPLE OF IOT

- **Smart home device :-** Smart lighting, smart door locks, smart speaker, smart TV
- **Wearable fitness tracker :-** It is an example of a wearable fitness tracker is the Fitbit. Fitbit device are designed to be worn on the wrist like a watch and they track various aspects of your physical activity and health. This tracker can monitor steps taken, distance traveled, calories burned, heart rate
- **Industrial sensor:-** Temperature sensor and pressure sensor
- *The Goal is to enhance efficiency convenience and functionality in various aspect of our lives*

Thank you