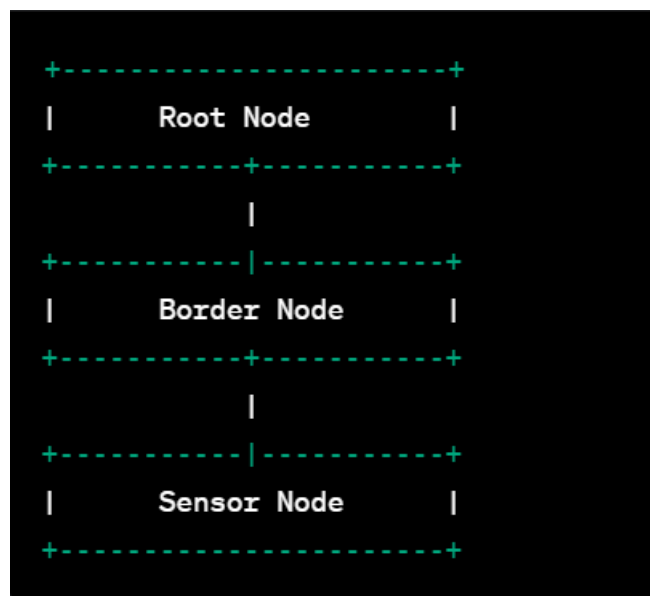Tutorial 04

1. Explain the major function of the sensors used in IoT?

Major Functions of Sensors in IoT: Sensors play a crucial role in the Internet of Things (IoT) by collecting data from the physical world and converting it into digital information that can be processed and analyzed. The major functions of sensors in IoT include:

- **Data Acquisition:** Sensors collect real-world data, such as temperature, humidity, light, motion, and more, depending on the type of sensor.

- **Data Transmission:** Many sensors are equipped with communication capabilities to transmit the collected data to other devices or a central server for further processing.

- **Environmental Monitoring:** Sensors can monitor and measure various environmental parameters to provide insights into conditions such as air quality, pollution levels, and weather.

- **Object Detection and Identification:** Sensors can detect the presence of objects and, in some cases, identify them using technologies like RFID or image recognition.

- **Feedback and Control:** Sensors can be integrated into systems that use the collected data to provide feedback for control mechanisms. For example, adjusting the temperature based on a temperature sensor's readings.

- **Energy Efficiency:** Sensors can contribute to energy efficiency by monitoring and controlling the usage of resources like electricity, water, and gas.

2. Explain Wireless Sensor Network (WSN) aid of a diagram. Hint : indicate all border nodes, root nodes and other require component of the network clearly.

```
+----------------------+
|       Root Node      |
+-----------+----------+
            |
+----------|-----------+
|      Border Node     |
+-----------+----------+
            |
+----------|-----------+
|      Sensor Node     |
+----------------------+
```

- **Root Node:** The central node that typically collects and processes data from the entire network. It may connect to external systems for further analysis.

- **Border Node:** Acts as an interface between the sensor network and external networks (e.g., the internet). It manages communication between the WSN and the outside world.

- **Sensor Node:** The individual nodes equipped with sensors that monitor the physical environment. They collect data and communicate with other nodes in the network.

3. Brief on the relation between WSN and IoT. Explain with example

Relation between WSN and IoT: WSN is a subset of IoT, where IoT encompasses a broader range of devices and systems beyond sensors. WSN focuses specifically on the interconnectivity of sensors to monitor and collect data. An example could be a smart agriculture system where WSN is used to monitor soil moisture, temperature, and other parameters, and IoT integrates this data with other systems to provide comprehensive insights and automated control.

4. Write note on : RFID, Near Field Communication (NFC), ZigBee.

- **RFID (Radio-Frequency Identification):** RFID is a technology that uses radio waves to identify and track objects. It consists of tags (attached to objects) and readers that communicate wirelessly. RFID is commonly used in supply chain management, access control systems, and asset tracking.

- **Near Field Communication (NFC):** NFC is a short-range wireless communication technology that allows data exchange between devices in close proximity (typically a few centimeters). It is often used for contactless payments, access control, and data transfer between smartphones and other devices.

- **ZigBee:** ZigBee is a low-power, short-range wireless communication standard designed for small-scale, low-data-rate applications. It is commonly used in home automation, industrial control, and sensor networks due to its low energy consumption and reliability in communication between devices.