Overview of Sensors Used in Smart Environment Monitoring System

Introduction

In the Smart Environment Monitoring System, sensors play a vital role in collecting real-time environmental data. The system uses two main sensors: DHT11 and MQ-2. These sensors help in monitoring environmental conditions and ensuring safety.

1. DHT11 Sensor

--The DHT11 is a digital temperature and humidity sensor commonly used in IoT projects.

---Parameters Measured:
- Temperature (°C)
- Relative Humidity (%)

--How DHT11 Works:
The sensor contains a thermistor and a capacitive humidity sensor. It converts analog values into digital data and sends it to the microcontroller through a single data pin.

--How DHT11 is Used:
It is connected to the ESP32 GPIO pin. The ESP32 reads temperature and humidity values and sends them via MQTT.

--When DHT11 is Used:
Used for monitoring indoor environment, weather conditions, and agriculture systems.

--Why DHT11 is Used:
Low cost, easy interfacing, low power consumption, and suitable for academic projects.

--Advantages:
- Simple communication
- Low power usage
- Factory calibrated

--Limitations:
- Limited accuracy & Slow response

2. MQ-2 Gas Sensor

The MQ-2 is a gas and smoke sensor used for detecting combustible gases.

Gases Detected:
- LPG
- Methane
- Smoke
- Hydrogen

--How MQ-2 Works:
It uses a tin dioxide sensing element. Gas presence changes resistance and produces an analog voltage output read by ESP32.

--How MQ-2 is Used:
Connected to ESP32 analog pin. Gas levels are monitored and transmitted via MQTT.

--When MQ-2 is Used:
Used in gas leakage detection, fire safety, and pollution monitoring.

--Why MQ-2 is Used:
Detects multiple gases, reliable, and suitable for safety systems.

--Advantages:
- High sensitivity
- Simple circuit

--Limitations:
- Requires warm-up time
- High power consumption

3. Role of Sensors in the Project

DHT11 monitors temperature and humidity.
MQ-2 detects gas and smoke levels.

4. Conclusion

DHT11 and MQ-2 sensors provide essential environmental data. Their integration with ESP32 enables real-time monitoring, storage, and visualization, making the system efficient and suitable for IoT applications.