

Air Quality Monitoring System using IOT

https://www.youtube.com/watch?v=td_20AEX2hk

This project presents the design and implementation of an IoT-based Air Quality Monitoring System capable of detecting harmful gases such as carbon monoxide (CO) and nitrogen dioxide (NO₂) in real time. The system is built around the Arduino Uno microcontroller, which acts as the central processing unit. Gas sensors MQ-135 Gas Sensor and MQ-7 Gas Sensor are used to continuously monitor air quality levels.

When the concentration of harmful gases exceeds predefined threshold values, the system automatically activates a buzzer for alert and switches ON an exhaust fan to reduce pollution levels. Simultaneously, the real-time air quality status is displayed on an LCD module for local monitoring.

To enhance the system with remote monitoring capabilities, an ESP8266 Wi-Fi Module is integrated, enabling wireless transmission of sensor data to the cloud platform ThingSpeak. This allows users to visualize, analyze, and track air quality data in real time from anywhere using the internet.

The proposed system provides an efficient, low-cost, and scalable solution for environmental monitoring in homes, industries, and urban areas. By combining embedded systems with IoT technology, it not only ensures immediate local response through alerts and ventilation control but also enables long-term data logging and analysis for better decision-making and pollution control strategies.

The features of the project are:

- ☐ To design and develop a real-time air quality monitoring system using Arduino Uno.
- ☐ To detect harmful gases like carbon monoxide (CO) and nitrogen dioxide (NO₂) using MQ-7 Gas Sensor and MQ-135 Gas Sensor.

- ☐ To continuously monitor environmental air conditions and process sensor data using embedded programming.
- ☐ To provide immediate alerts through a buzzer when gas levels exceed safe limits.
- ☐ To automatically control an exhaust fan for reducing polluted air in the surroundings.
- ☐ To display real-time air quality status on an LCD module for local monitoring.
- ☐ To integrate IoT technology using the ESP8266 Wi-Fi Module for wireless data transmission.
- ☐ To upload and monitor sensor data remotely on the cloud platform ThingSpeak.
- ☐ To enable data logging, visualization, and analysis for better environmental awareness and decision-making.
- ☐ To develop a low-cost, reliable, and scalable system suitable for homes, industries, and smart city applications.

The main blocks of this project are:

- Power Supply.
- Arduino UNO.
- MQ135 sensor.
- MQ-7 sensor.
- Buzzer.
- LCD display.
- Exhaust fan.
- ESP8266 WI-FI.

Software's used:

- Arduino IDE for Embedded C programming.
- Express SCH for Circuit design.
- IoT technology.

Block diagram of the project:

Block diagram

