AQM-IOT

AIR QUALITY MONITORING

Project Objectives:

Air quality is a critical environmental factor that profoundly impacts human health and the well-being of our planet. The rise of the Internet of Things (IoT) technology presents an unprecedented opportunity to revolutionize the way we monitor and respond to air quality concerns. This project aims to harness the power of IoT to create a robust and comprehensive air quality monitoring system.

Our project objectives encompass real-time data collection, data sharing, public awareness, and health impact assessment. We deploy a network of IoT devices equipped with high-precision air quality sensors capable of measuring a range of parameters, including PM2.5, PM10, CO2, VOCs, temperature, and humidity. These devices are strategically positioned across urban, suburban, and industrial areas, ensuring wide geographic coverage.

Data collected by these IoT devices are transmitted in real-time to a central repository, processed using Python scripts to ensure accuracy and reliability, and made accessible through an intuitive web-based platform. This platform not only provides up-to-the-minute air quality data but also offers interactive visualizations and historical trend analysis.

Furthermore, our system includes threshold alerting mechanisms to notify the public when air quality levels reach critical thresholds. We engage the community through awareness campaigns, encouraging individuals to take informed actions to protect their health and the environment.

In collaboration with health experts, we analyze the collected data to assess the direct and indirect health impacts of air quality, particularly on respiratory diseases. By providing policymakers with valuable insights, we aim to support evidence-based decisions to improve air quality and safeguard public health.

This project represents a significant step forward in leveraging IoT technology to empower individuals and communities with real-time air quality information. It not only enhances public awareness but also contributes to creating a healthier and more sustainable future.

IoT Devices Designs

In this system design for air quality monitoring, four types of sensors (MQ-7, MQ-131, MQ-135, and PM10) are used to measure various air pollutants

MQ-7 for measuring CO (Carbon Monoxide) levels.

MQ-131 for measuring O3 (Ozone) levels.

MQ-135 for measuring SO2 (Sulfur Dioxide) levels.

PM10 sensor for measuring airborne particles smaller than 10 microns.

Arduino Uno:

The central controller of the system is an Arduino Uno, based on the ATmega328 microcontroller. Arduino Uno is equipped with multiple digital input/output pins, analog inputs, and essential components for control and data processing.

MQ-7: Measures CO levels, operates on 5V AC/DC, and is connected to analog pin A2 on Arduino.

MQ-131: Measures O3 levels, operates on 5V, and is connected to analog pin A0 on Arduino.

MQ-135: Measures SO2 levels, operates on 5V, and is connected to analog pin A1 on Arduino.

PM10: Measures airborne particles < 10 microns, and it's connected to analog pin A3 on Arduino.

Each sensor operates based on its specific characteristics and provides analog readings, which are then processed and transmitted by the Arduino

Data Sharing Platform And Integration Approach

IoT Edge Device will communicate with IoT gateways and collect data at the edge. IoT gateways help coordinate network usage and relay connections to the cloud through various network technologies.Data collected from edge devices is processed in cloud layer. It can consist of cloud services like Infrastructure-as-a-Service (IaaS) or Container-as-a-Service (CaaS), which host other services like MQTT brokers, databases, and web servers. Front End clients interact with the IoT system through web services APIs to access information, create alerts, and visualize data on maps.