AIR QUALITY MANAGEMENT

ABSTRACT

This project aims to develop a comprehensive solution for providing real-time air quality information to the public. Leveraging IoT technology and Python integration, the project encompasses the design and implementation of an air quality monitoring system with sensors for key pollutants. The data collected is seamlessly integrated into a user-friendly platform, offering an intuitive interface for the public to access up-to-date air quality information. Through a design thinking approach, the project ensures user empathy, iterative development, and community engagement. The platform not only serves as a source of information but also aims to raise awareness about air quality issues, empowering individuals to make informed decisions for their well-being and the environment.

PROJECT DEFINITION

The project involves setting up IOT devices to measure air quality parameters and make the data publicly available for raising awareness about air quality and its impact on public health. The objective is to create a platform that provides real-time air quality information to the public. This project includes defining objectives, designing the IOT monitoring system, developing the data sharing platform and integrating them using IOT technology and python

DESIGN THINKING

PROJECT OBJECTIVES:

The primary objectives of this project are to enhance public awareness regarding air quality and its consequential effects on public health, and second, to establish a comprehensive air quality monitoring system. The system's core objectives involve the real-time collection of air quality data, encompassing critical parameters like particulate matter (PM2.5 and PM10), various gases (CO, NO2, SO2, O3), and environmental conditions such as temperature and humidity. The acquired data will be made readily accessible to the public through an intuitive and user-friendly platform, which will employ data visualization techniques, including charts, graphs, and maps, to facilitate comprehension.

IOT DEVICE DESIGN:

Hardware: Single-board microcontroller (e.g., Raspberry Pi or Arduino)

Sensors: PM2.5 sensor (e.g., SDS011), gas sensor (e.g., MQ135), temperature and humidity sensor (e.g., DHT11)

Data collection: Analog-to-digital converters (ADCs).

Data transmission: MQTT protocol over Wi-Fi or cellular modem.

Power supply: Battery or power adapter.

Software: MQTT

Install an MQTT broker on a cloud server.

Configure the device to connect to the MQTT broker.

Publish the air quality data to the MQTT broker.

Create a web-based or mobile application to subscribe to the air quality data from the MQTT broker.

DATA SHARING PLATFORM:

The web-based data sharing platform is designed to deliver real-time air quality information to the public in an accessible and user-friendly manner. The platform features an intuitive web interface with visually engaging graphics and charts, presenting up-to-the-minute data on key pollutants such as PM, NO2, SO2, O3, and CO. Users can navigate the platform effortlessly to explore detailed air quality metrics specific to their location. The user interface employs responsive design principles, ensuring compatibility across various devices. An alert system is integrated to notify users of elevated pollution levels or critical events. Additionally, the platform incorporates educational content to enhance public awareness about air quality issues and their impact on health. The overall design prioritizes simplicity and clarity, empowering the public to make informed decisions based on real-time air quality data.

INTEGRATION APPROACH:

IoT devices gather air quality data and format it before securely transmitting it over the chosen network using communication protocols like MQTT or HTTP. The data is then received, validated, and stored by the data-sharing platform, where it undergoes processing. This processed information is made accessible to the public through user-friendly interfaces, enabling real-time monitoring of air quality and enhancing awareness about its impact on public health.