Air Quality Monitoring Project:

Abstract:
The IoT-based Air Quality Monitoring Project is designed to provide real-time monitoring of air quality parameters in a specific location. Poor air quality can have detrimental effects on human health and the environment. This project aims to address this issue by using IoT technology to collect, analyze, and display air quality data through a user-friendly interface. The system utilizes sensors to measure key air quality indicators such as particulate matter (PM2.5 and PM10), carbon dioxide (CO2), carbon monoxide (CO), ozone (O3), and humidity. The collected data is then transmitted to a cloud-based platform for storage and analysis. Users can access the air quality information via a web or mobile application, allowing them to make informed decisions and take necessary actions to mitigate air pollution.

Manual: IoT-based Air Quality Monitoring Project

Components Required:
1. Microcontroller (e.g., Raspberry Pi, Arduino)
2. Air quality sensors (e.g., PM2.5, PM10, CO2, CO, O3, humidity)
3. Wi-Fi or Ethernet module
4. Power supply
5. Cloud platform (e.g., AWS, Google Cloud, Azure)
6. Web or mobile application development tools

Step-by-Step Instructions:

1. Sensor Setup:
- Connect the air quality sensors to the microcontroller.
- Ensure proper wiring and follow the sensor datasheets for reference.

2. Microcontroller Configuration:
- Set up the microcontroller (Raspberry Pi, Arduino) with the necessary software development environment.
- Write code to read data from the sensors and store it locally.

3. Connectivity:
- Connect the microcontroller to the internet using Wi-Fi or Ethernet.
- Configure network settings.

4. Cloud Integration:
- Create an account on a cloud platform (e.g., AWS, Google Cloud, Azure).
- Set up a database or storage system to store the collected air quality data.

5. Data Transmission:
- Modify your microcontroller code to send air quality data to the cloud platform at regular intervals.
- Implement secure data transmission protocols (e.g., HTTPS) to protect data in transit.

6. Web/Mobile App Development:
- Create a web or mobile application to visualize the air quality data.
- Use web development frameworks or app development tools.

7. Data Visualization:
- Integrate the cloud database with your application to retrieve and display air quality data in real-time.
- Create user-friendly charts and graphs to represent the data.

8. User Authentication (Optional):
- Implement user authentication for secure access to the air quality information.

9. Alerts and Notifications (Optional):
- Set up alerts and notifications based on predefined air quality thresholds.
- Notify users when air quality deteriorates beyond safe levels.

10. Testing:
- Test the entire system thoroughly to ensure accurate data collection and display.

11. Deployment:
- Install the sensors and microcontroller in the desired location.
- Deploy the web/mobile application for user access.

12. Maintenance:
- Regularly calibrate and maintain the sensors.
- Update the system as needed for improved performance and security.

This IoT-based Air Quality Monitoring Project enables users to monitor air quality in real-time and make informed decisions to protect their health and the environment.