IOT PROJECT

AIR QUALITY MONITORING

1. \*\*Problem Definition:\*\*

- Clearly define the purpose of the system. Is it for personal use, public health, environmental research, or industrial applications?

- Identify the specific air quality parameters to monitor, such as particulate matter (PM2.5, PM10), gases (CO, CO2, NO2, etc.), temperature, humidity, and more.

2. \*\*Hardware Selection:\*\*

- Choose appropriate sensors for each parameter based on accuracy, sensitivity, and cost.

- Select microcontrollers or development boards (e.g., Arduino, Raspberry Pi) for data processing and communication.

3. \*\*Sensor Deployment:\*\*

- Determine the optimal locations for sensor deployment. Consider factors like air circulation and proximity to pollution sources.

- Ensure proper calibration and maintenance of sensors.

4. \*\*Data Acquisition:\*\*

- Interface sensors with the chosen microcontroller or development board.

- Develop code to read data from sensors at regular intervals.

5. \*\*Data Processing:\*\*

- Analyze and preprocess the collected data. This may involve filtering, outlier detection, or data smoothing.

- Calculate air quality indices if required.

6. \*\*Data Transmission:\*\*

- Implement communication protocols (e.g., Wi-Fi, Bluetooth, LoRa, cellular) to transmit data to a central server or cloud platform.

7. \*\*Data Storage:\*\*

- Store incoming data securely, considering data retention policies and privacy regulations.

8. \*\*Visualization and Alerting:\*\*

- Create a user-friendly interface for data visualization, possibly using a web or mobile app.

- Set up alerting mechanisms to notify users when air quality reaches predefined thresholds.

9. \*\*Power Management:\*\*

- Optimize power usage to extend the system’s battery life or reduce energy consumption for continuous operation.

10. \*\*Security and Privacy:\*\*

- Implement robust security measures to protect data integrity and user privacy.

11. \*\*Scalability and Maintenance:\*\*

- Plan for system scalability to accommodate more sensors or locations if needed.

- Develop a maintenance plan to regularly calibrate sensors and update firmware.

12. \*\*Regulatory Compliance:\*\*

- Ensure compliance with local regulations and standards for air quality monitoring systems.

13. \*\*Data Analysis and Insights:\*\*

- Use historical data for trend analysis and identifying patterns.

- Share insights and findings with relevant stakeholders or the public.

14. \*\*Cost Considerations:\*\*

- Keep the cost of hardware, connectivity, and data storage within budget constraints.

15. \*\*Documentation and Training:\*\*

- Document the system design, installation, and maintenance procedures.

- Train personnel responsible for system operation and maintenance.

16. \*\*Feedback and Improvement:\*\*

- Collect feedback from users and stakeholders to make continuous improvements to the system.

Remember that the design of an IoT air quality monitoring system can vary widely depending on the specific use case and requirements. Collaboration with experts in air quality monitoring, environmental science, and IoT technology can be valuable in ensuring the success of your project.

PROJECT BY

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ECE 3RD YEAR

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