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A Study On Air Pollution Monitoring Systemcx

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Abstract
Air pollution is a harmful phenomenon caused by the introduction of gases, dust particles, fumes, and odours into the atmosphere. This problem poses a serious threat to the health of both humans and other living beings on the planet. Air pollution leads to the formation of smog and acid rain, causes cancer and respiratory diseases, depletes the ozone layer, and contributes to global warming. While it may not be possible to completely eliminate air pollution in this industrial age, efforts can be made to control and reduce it. Governments have developed guidelines and ordinances to restrict emissions and improve air quality. On an individual level, we can reduce our contribution to air pollution by carpooling or using public transportation, buying energy-efficient appliances and light bulbs, and reducing our electricity consumption. The work done & presented in this paper is the result of the mini-project work that has been done by the first sem engineering students of the college and as such there is little novelty in it and the references are being taken from various sources from the internet, the paper is being written by the students to test their writing skills in the starting of their engineering career and also to test the presentation skills during their mini-project presentation. The work done & presented in this paper is the report of the assignment / alternate assessment tool as a part and parcel of the academic assignment of the first year subject on nanotechnology & IoT.
Keywords: Air, Pollution, Monitor, IoT

1. Introduction
Air pollution poses a significant global environmental challenge with severe impacts on public health. The World Health Organization (WHO) reports that air pollution is responsible for approximately 7 million premature deaths annually. Sources of air pollution include industrial activities, transportation, and household practices. The detrimental effects of air pollution on human health encompass respiratory diseases, heart conditions, and even cancer [1]. Consequently, it becomes imperative to monitor air quality in different areas, identify pollution sources, and implement measures to mitigate it. Leveraging the widespread use of smartphones, the development of a cost-effective air pollution monitoring system capable of providing real-time information regarding air quality in various locations becomes feasible [2]. Smartphones come equipped with multiple sensors that can measure diverse air pollutants, such as particulate matter, carbon monoxide, and nitrogen oxides. By harnessing these sensors, a system can be devised to detect and quantify the level of air pollution in a given area. Collecting data from numerous smartphones allows for a comprehensive and holistic understanding of air quality within a specific location as shown in the Fig. 1 [3].

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2. Scope of the project

The scope of this project is to develop a smartphone-based air pollution monitoring system that can measure the level of air pollution in a given area [5]. The system uses the sensors in the smartphone to measure different air pollutants such as particulate matter, carbon monoxide, and nitrogen oxides. The data collected from the sensors is then analyzed to provide a real-time air quality index. The system can be used by individuals to monitor air quality in their surroundings or by governments to monitor air quality in different locations [4].

3. Objectives of this project [6]

- To develop a low-cost air pollution monitoring system using smartphones.
- To measure different air pollutants such as particulate matter, carbon monoxide, and nitrogen oxides using the sensors in the smartphone.
- To analyze the data collected from the sensors to provide a real-time air quality index.
- To test the system in different and reliability.

4. Proposed Methodology & Block Diagram [7]

- Hardware design: We used the ESP8266 microcontroller board and sensors such as DHT11 (temperature and humidity), MQ-7 (CO), and MQ-135 (NO2) to measure the air quality parameters.
- Programming: We wrote a code in Arduino IDE to configure the ESP8266 board and sensors to collect the air quality data and send it to the Blynk IoT platform.
- Blynk IoT Configuration: We created an account on the Blynk IoT platform and configured the device to receive the data from the ESP8266 board. We also created a dashboard to display the real-time data of air quality parameters.
- Data Visualization: We used the Blynk IoT platform to create graphs and charts to visualize the air quality data collected from the sensors.

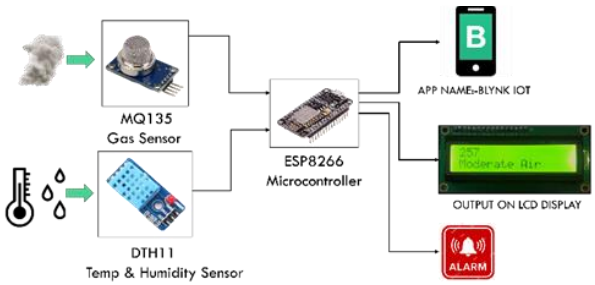

Fig. 1 : Overall block-diagram of the proejct work

5. Experimental Results

The proposed system was implemented using an Android smartphone and various sensors. The smartphone app used was Blynk IoT [8]. The system was tested in various locations to collect data on air quality. The collected data was analysed to determine the levels of pollutants such as particulate matter, nitrogen oxides, and sulphur dioxide. The results showed that the proposed system can provide real-time air quality information that can be used for public health and environmental management purposes as shwon in the Fig. 2 [9].

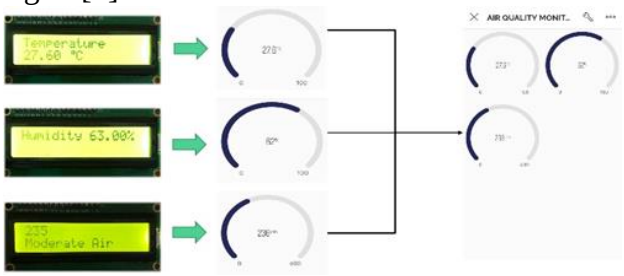

Fig. 2 : Experimental results

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6. Conclusions

The utilization of smartphones for air pollution monitoring has demonstrated promising outcomes by offering real-time and cost-effective data on air pollution levels. However, there are several challenges that necessitate attention to ensure the project's success. Firstly, it is crucial to validate the accuracy of smartphone-based air pollution monitoring against traditional monitoring methods. While smartphone-based monitoring is affordable and accessible, verifying the accuracy of measurements is essential to establish their reliability and validity. Secondly, the project needs to be expanded to encompass a larger geographic area. Although successful in monitoring air pollution levels in a small region, scaling up the project is necessary to provide a more comprehensive understanding of air pollution across a broader area. Thirdly, integration into existing air pollution monitoring systems is vital. While smartphone-based monitoring can furnish real-time data, integration with established air pollution monitoring systems ensures the consistency and reliability of the collected data. In conclusion, the air pollution monitoring project using smartphones presents a cost-effective and accessible solution to address the growing concern of air pollution. However, further research and development are imperative to ensure the accuracy and dependability of smartphone-based monitoring. By integrating smartphone-based monitoring with existing air pollution monitoring systems, a more comprehensive assessment of air pollution levels can be obtained, informing public health policies and urban planning decisions.

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