

AIR POLLUTION MONITORING AND ALERT SYSTEM

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ABSTRACT

Air pollution level is rising everywhere year in most cities and states of India. It has now become a global concern. The existing system has low efficiency, low alertness level and doesn't provide ability to monitor combination of certain harmful gasses. Thus in our proposed system we use a sensor network system based on IOT. Different types of sensor are connected to Arduino uno and Wi-Fi module will send data to Firebase. The results of the sensors can be monitored on mobile app or webpage. The audio module is use to give voice alert messages in case of danger situation related to air pollution.

KEYWORDS: air quality, sensors, Wi-Fi module, IOT, audio kit, air quality index, firebase.

I. INTRODUCTION

Due to urbanization in large cities the pollutant levels has increased throughout the years. These pollutants can affect health of a human being .Air pollutants like no₂ particulate matter (pm₁₀) are considered to be most harmful for humans. Air pollution and contamination is mostly caused due to sources like vehicle emission and industrial discharge of gases. In northern India places such as Mumbai, Delhi and Kolkata have an inferior air quality compared to other cities. This is due to them being high populated cities having population around 1.84 cores, 1.94 cores, 0.58 cores respectively. Kolkata has higher pollution rate compared to other cities due to the fact the more factories in the nearby area.

According to the WHO (World Health Organization) Atmospheric pollutants like the one mentioned above causes 7 million deaths in 2012. These pollutants increases risk of getting diseases such as acute respiratory diseases and lung diseases. It can cause heart related diseases due to increased blood pressure.

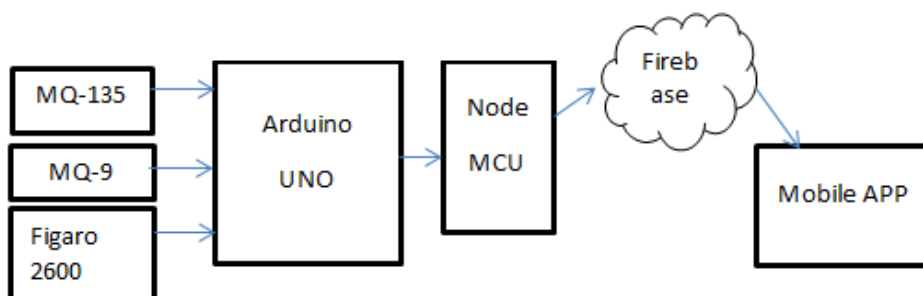
So to monitor these particulate matters we will use some sensors. Sensors can be costly therefore special type of sensors called as LCS (Low Cost Sensors) will be used . These sensors will be helpful to provide real time data with addition of providing high resolution and temporal air quality for a given time period. They provide information about concentration of pollutants atmosphere. LCS can detect gases like c₀₂, o₃, co, no₂, pm and so₂. Our main target multiple gases and monitor them using LCS.

These sensors can be clubbed to together in a network consisting of sensors nodes. This is called Wireless Sensor Network (WSN) .WSN has various applications including in medical, healthcare, industrial automation and forecast, etc. The WSN module can be connected in the IOT network to increase the overall efficiency of systems. An audio module is also being added for providing information accordingly. This can also help the blind people to receive messages in the form of audio alert.

II. METHODOLOGY

This paper we described implementation an IOT based air pollution monitoring and alert system. Internet of Things (IOT) is system of interrelated devices consisting of components such as computer devices, digital objects and devices, smart phones, watches and other smart devices which can sense other devices in the network and interact with them without the need of human to human or human to machine interaction. The IOT kit will have a device for recording voice and will provide alert messages based on a particular scenario. The Server can be accessed by user and on the other hand will update the user on pollution for a time period in real time. This system will therefore help the people to identify pollution level, provides suggestion based on it and a real time server which can be accessed to check the metrics.

a) Block Diagram



b) PROPOSED SYSTEM

Gas sensors like MQ135, MQ 9 and IR CO2 sensor. The addition of these three sensors would increase the overall accuracy of the system and provide details about the major pollutants level in the environment.

Then our system will process the data and send it to real-time cloud servers like Google firebase which totally free of cost. Having a dedicated real time server to monitor would provide accurate information. IT can be accessed both by mobile and pc using credentials to the server. UI (user Interface) can be interactive and usable

The improvement that our proposed system will provide is that it will alert the users about ppm level using 8 dedicated pre-recorded audio. Each pre-recorded audio will have it unique set of suggestion which help the people to interpret the pollution level without having previous knowledge.

III. MODELING AND ANALYSIS

Following figure shows the experimental setup of our project..

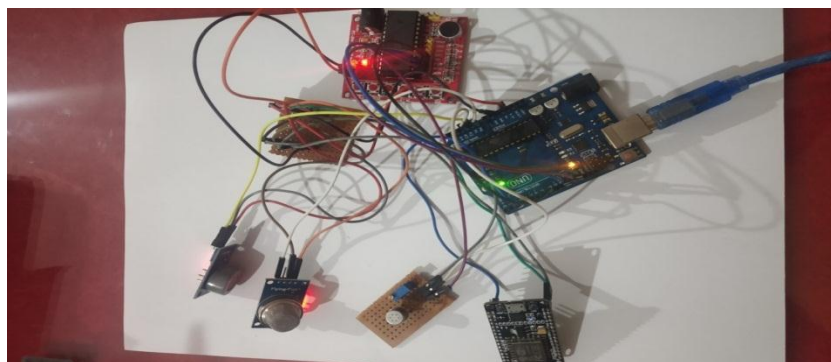


Figure:1 Hardware setup.

IV. RESULTS AND DISCUSSION

Three sensors are connected to arduino uno. Arduino uno reads and analyzes their values. Output of arduino is given to Node MCU. Node MCU with its wi-Fi communication ability sends all sensors values to firebase.

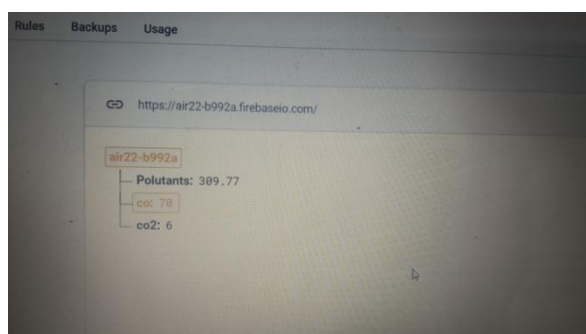


Figure: 2 Firebase output.

AIR QUALITY	
DETECTOR	
CO2 LEVEL	12.34ppm
CO LEVEL	56.78ppm
Polutants	12.34ppm



Figure: 3 Mobile App output.

V. CONCLUSION

With the use of MQ-135, MQ-9, Figaro 2600 we can make a perfect sensor network for the air pollution monitoring system. Node MCU is a Wi-Fi controller which suitable for the IoT applications. Firebase will work as online database and light MQTT for the connections. By using network of sensors with appropriate microcontroller we can monitor the air quality over the internet wirelessly. With the audio module this proposed system gives the alert audio announcement in case of emergency.

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