Android application of Air Pollution Monitoring by using IoT

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Abstract - *Today, Air pollution is the largest environmental risk and damaging the public health throughout the world. This mainly affects human health by diverse diseases like lung diseases, hair fall, throat infection etc. Air polluted due to release of Toxic gases by industries, vehicular emissions and increased concentration of harmful gases and particulate matter in the atmosphere. Particulate matter is one of the most important parameter having the significant contribution to the increase in air pollution. This creates a need for measurement and analysis of real-time air quality monitoring so that appropriate decisions can be taken in a timely period. This paper presents a real-time standalone air quality monitoring system which includes various parameters: PM 2.5, carbon monoxide, carbon dioxide, temperature, humidity and air pressure. Internet of Things is nowadays finding profound use in each and every sector, plays a key role. We implemented proposed method by Internet of Things by using firebase technologies to analyze air quality. In this work we developed efficient application to identify air pollution and provide suitable recommendation system to reduce or avoid the air pollution.*

Key Words: air, pollution, recommendation, monitoring, harmful, gas.

1. INTRODUCTION

Air pollution has become a common phenomenon everywhere. Mainly in the municipal areas, air pollution is a major cause of health problems [1]. One of the reason of air pollution is the increased number of petrol and diesel vehicles and the presence of industrial areas at the outskirts of the major cities are the main causes of air pollution. In metropolitan cities [2] people are seriously intensified due to air pollution. Through the world wide all Governments [3] are seriously taking this is main challenge to reduce or avoid air pollution. Some countries [4] are planning replacing the petrol and diesel vehicles with the electric vehicles by 2030. Even India also implements the same by 2025.

The main aim of this project is to develop a device which can monitor PPM in air in real time, tell the quality of air which can be displayed in the android application.

The air monitoring device developed in this project is based on Nodemcu. The NodeMCU board connects with the sensor used for monitoring the air pollution is MQ-135 gas sensor. The sensor data is also displayed in android application.

In this work we used as an application for the **Air Pollution Monitoring** to display the value of the pollution level in ppm (parts per million) in the application. Harmful substances [5] including particulates and biological molecules existing in Earth's atmosphere are main cause of air pollution. These substances results in diseases, allergies or death in humans and also harm to other living organisms such as animals and food crops, and may spoil the natural environment. Another cause of air pollution is human activity and natural processes[6]. Our project can be used as an application to detect the harmful gases which are present in the environment by using the MQ135 gas sensor and an NodeMCU board which is connected to firebase i.e., database which is used to store the value of the pollution level(output). The Air pollution Monitoring application is an android based application in which a secure login page is available. It also gives the message according to the pollution level i.e., if the pollution level is less than 1000ppm it will display "Fresh Air". If the pollution level is more than 2000ppm then it will display "Danger" else if the pollution level is in between 1000ppm and 2000ppm then it will display "Poor Air". The values which are displaying on the screen i.e., in the android application is acquired from the firebase which is the database which we are using for our project.

We developed an IOT based Air Pollution Monitoring android based application in which the pollution level will be displayed in the android application using the database as firebase. And it will also display the message on such a way that the air quality is good (or) danger (or) poor according to the pollution level values which we will get in ppm. Our implementation results exhibits more accuracy with minimal time consumption in wireless transmission.

2. EXPERIMENT ANALYSIS

```
$R'€â=Ñÿÿconnecting.
connected: 192.168.0.105
POllution level 782.00
PPM
POllution level 780.00
PPM
POllution level 781.00
PPM
POllution level 780.00
PPM
```

This is the output values we get from the Nodemcu. These we will get after uploading the arduino code to nodemcuand the connection are made as per the circuit diagram. Before displaying the output values these are sent to firebase database that we mentioned in the arduino code. These values are stored in firebase database and there are retrieved again from the firebase database and displayed here.

These are the 2 variables (Air pollution, Air pollution log) which are stored in the Real Time Database named air pollution monitor in firebase. Nodemcu after sensing the value and converting it into ppm it sends the value to the air pollution monitor database of firebase. From here the values are retrieved and displayed.
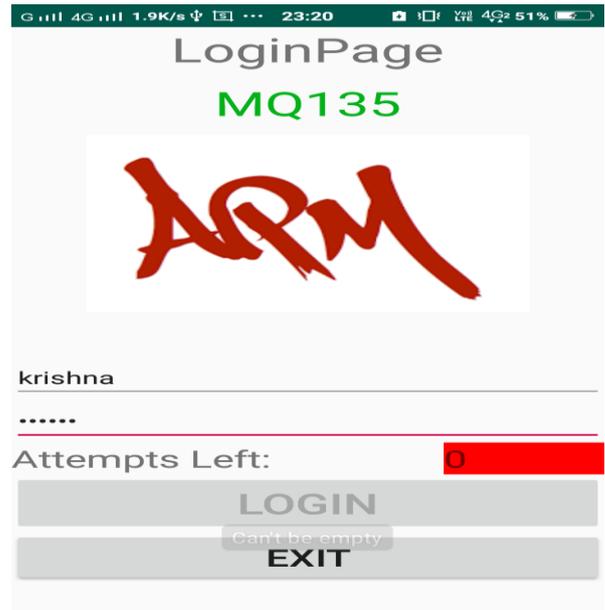
Fig 2.2: Login button is disabled

If you have entered both name and password wrong more than 3 times then the login button will become disabled and you can't login further, you need to exit the application and then try again. The Attempts left option will be showing you the number of options that are left. On clicking the exit option the activity gets destroyed it means the app gets closed.
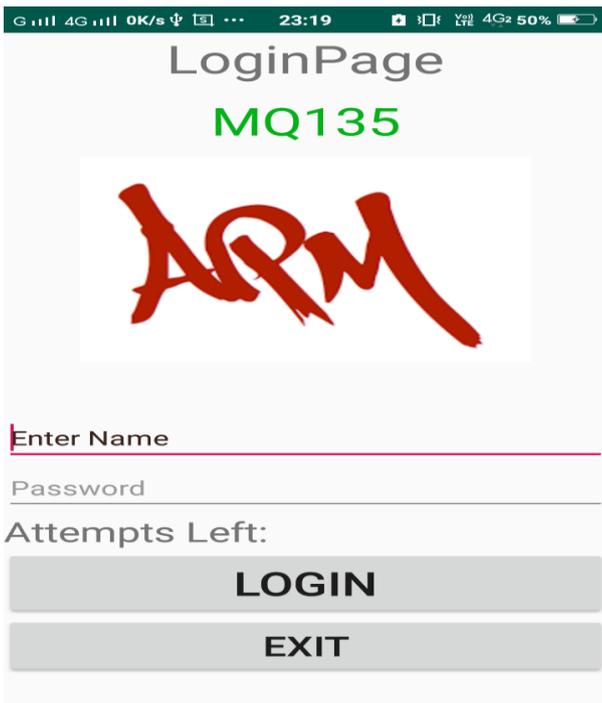
Fig 2.1: Login page of the application

This is the login page of Air pollution monitoring application.. Here you need to enter the name and password in the given edit text fields. On clicking the login button it will check if both name and password are equal to krishna or not. If both are equal to krishna you will be redirected o next intent else you will stay in the same intent.

Fig 2.3: The Apm activity page

The REFRESH button is used to update the newly sensed values and used to indicate the quality of air. In the circle with ppm we will be displaying the air pollution values in ppm. Here we will getting the ppm values of the place where the sensor is kept .the indicator text view will be updated with the indicator value whether the air is fresh, bad and worse depending on the ppm value.

Fig 2.4: Updated UI after clicking on the refresh button

On clicking on the refresh button the APM application retrieves the value from the firebase. The ppm text which is there in the circle will be replaced with the value retrieved from the firebase and the indicator will be updated to particular value depending upon the value retrieved from firebase. On clicking the refresh button again it will be updating the user interface with new value retrieved from the firebase. If old value and new value are same means it won't update user interface it will be same

3. CONCLUSION

The Air Pollution Monitoring Application (APM) using Nodemcu, IOT Technology is proposed to improve the quality of air. Here the using of MQ135 gas sensor gives the sense of different type of dangerous gases and NodeMCUis the heart of project which controls the entire process. NodeMCU consists of Wi-Fi module which connects the whole process to the internet there by we can send data sensed to firebase.by using our app we can retrieve the data stored at firebase.

4. FUTURE ENHANCEMENT

As we are living in highly polluted environment it will be very useful if we can monitor the Air pollution around us. In future we can extent the apps like APM to display the Air pollution values of various locations. It will be helpful for the people who are having breathing problems.

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