International Research Journal of Engineering and Technology (IRJET) e-ISSN: 2395-0056
Volume: 06 Issue: 03 | Mar 2019 www.irjet.net p-ISSN: 2395-0072

WEB-BASED AIR AND NOISE POLLUTION MONITORING AND ALERTING SYETEM

Prithiunan.D[1], Ramakrishnan.P[2], Sakthivel.R[3], Senthilkumar.M [4], Dr.Prasanna S.C.[5]

[1,2,3,4]Student, Department of Electronics and Instrumentation Engineering, Valliammai engineering college, Chennai, India.
[5]Assistant professor, Department of Electronics and Instrumentation Engineering, Valliammai engineering college, Chennai, India.

Abstract - *Pollution has proven to be a bigger threat to the planet and, air and noise pollution have several effects on not only humans but on the entire planet's species. So an appropriate system to monitor and alarm the rising levels of problems such that the situation can be handled. In this project the IOT based method to help us monitor the quality of air and sound levels in a particular region have been proposed. For this the system uses modules for air quality monitoring, sound intensity detection, cloud base monitoring module, and a connectivity Module. These modules are being connected to the raspberry pi, while the sensing modules send the data for respective parameter. Then after being processed they are being sent to the cloud server which can be accessed through internet. Finally, the alerting system alerts the user in case of an alarming situation. Using this system, the pollution levels could be broadcasted to the people around the region, and also could be warned about the rising levels.*

***Key Words*: Alarming system, GSM technology, Internet of things, Pollution detection, Raspberry pi, Remote monitoring,**

1. INTRODUCTION

The Air and sound pollution is at an alarming rise these days. It is necessary to monitor the air and sound pollution to save the environment and its dependant lives. With the rapid technological advancement and increased industrial plants, environmental issues and its effects on living beings influenced the need of pollution monitoring systems. Due to its low cost, high efficiency and easy usage and implementation, Internet of Things (IOT) has become an effective tool, now-a-days. Internet of Things (IOT) allows communication between the devices and humans through the internet. It forms a connecting medium from human to a system. In earlier days, data lines had to travel and cover large distance, to the various locations to collect data after which the analysis was done. But now, sensors and microcontrollers connected to the internet can make environmental parameter monitoring more flexible, accurate and less time consuming. When the environment monitored with sensors and devices it forms a smart environment. This embedded system makes the environment communicate with the objects. In this project, we are using a Raspberry Pi microcontroller, which will has a gas sensors and a sound detector connected to it, to monitor the fluctuating environmental parameters, mainly their pollution levels.

2. HARDWARE

2.1 Raspberry Pi

Raspberry pi 3b module is used which has an arm based single board computer which has a Wi-Fi and Bluetooth module already present in it. This controller is connected with the necessary sensor modules and GSM module .using these system we can acquire data and send it over the internet to a Cloud based storage area. The raspberry pi has the advantage of faster processing and better compatibility.

Fig-1 Raspberry pi

2.2 Sound sensor

To monitor sound pollution a sound sensor is used – LM393. When the sensor detects sound, it processes the sound into output voltage raspberry pi. This sensor has an independent output voltage comparators that are designed to operator from a single power supply. This can help to perform the necessary sound monitoring for the system

Fig-2 LM393 sensor

2.3 Gas and humidity sensor

The gas sensor used to monitor the air quality and determine the pollution levels is MQ135 sensor. It operates at 5v and can detect NH_3, CO_2, NO_x and smoke. This sensor has a wide range of detection, fast response and good sensitivity. It has an ion specific membrane which helps it to react selectively for specific ions and gases. these also makes it better choice for monitoring in building as well as urban areas temperature and humidity is being monitored with DHT11 sensor these can give immediate results and can be interfaced with raspberry pi module. Thus the combined usage both these sensors can give the air quality index of any particular region making it an effective system for monitoring the air pollution.

Fig-3 MQ135 sensor

2.4 GSM module

The module is used to establish communication between the computer and the gsm system, This enables high data transmission rate these required SIM to activate a connection with device in these project GSM module is used to connect to internet using mobile data .and so the measured parameters are being sent to the cloud data server and also can be accessed and monitored through internet.

3. METHODOLOGY

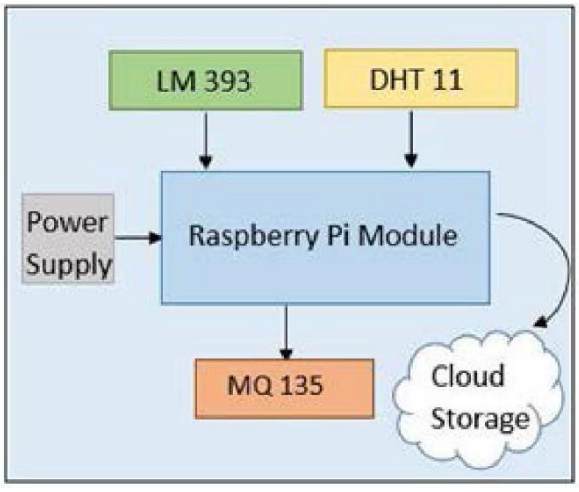

Fig-4 block diagram

3.1 Air quality index

It's the value proposed by the government to the public as to how pollution affects the environment or will. As the AQI increase various health issues come up. The AQI can be computed by calculating the average pollutant concentration over a specific period of time.

Air Quality Index	Health Impacts	Color
Good (0-50)	Minimal Impact	
Satisfy (51-100)	Mild Breathing Distress	
Moderately Polluted (101-200)	Breathing Distress and discomfort to people with heart disease	
Poor (201-300)	Breathing discomfort to people on prolonged exposure	
Very poor (301-400)	May cause respiratory illness	
Severe (401-500)	Severe respiratory impact on people with lungs and heart disease	

Fig-5 air quality index

3.2 Noise pollution level

Noise pollution affects several animals including human life. Noise pollution generally occurs due to sound from vehicles and industries these noise pollution can cause stress and several other mental illness, specifically in urban areas. Certain noise standards are being prescribed by government for safety levels to be maintained. These standards vary based on the environment that is being monitored. The objective is to monitor and detect the air quality and sound intensity of particular region. The method involves cloud based monitoring of the environmental parameters using internet also these has alert system that ensure user about alarming condition to take safety precautions

Code	Area	Day Time	Night Time
A	Industrial Area	75	70
B	Commercial Area	65	55
C	Residential Area	55	45
D	Silence Zone	50	40

Fig- 6 sound safety levels in decibels

4. AIR AND SOUND MONITORING

The AQI is measured mainly based on five pollutants that are particulate matter carbon-di-oxide, Sulphur-di-oxide and nitrogen oxide. Here air quality is effectively detected by MQ135 sensor. This mainly detects the NH_3, NO_x, SMOKE and CO_2 in the ambient air.

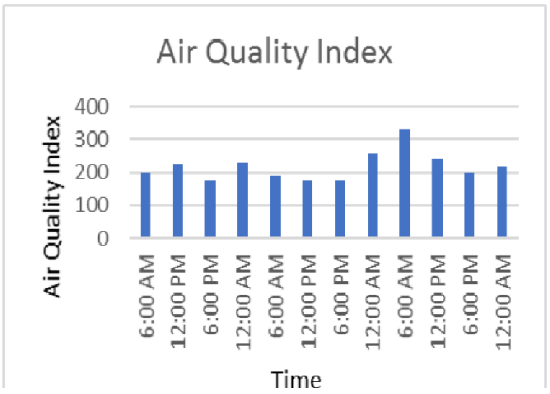

Fig-7 air quality index at an urban region

Sound detection is done by LM393 sensor with the motive to monitor sound pollution in area. Sound is measured in the form of decibels and its intensity depends on the time and region of the sensor position. The peak hours in urban areas have a high noise levels than during night time.

Uploading data to the cloud for communication to cloud system we need to access internet. This is achieved by GSM module that connects to internet. The acquired parameters are converted to digital data and saved these can be used for monitoring purpose and analyzing over a period of time these also has alert system which sends anomaly notification. If one of the parameters exceeds the alarming value, steps are taken to send notification in the form of email or SMS which is addressed to an anomaly.

5. CONCLUSION

Pollution of the environment is being done by human activities and his development in industrial, as well as scientific fields now pollution became a major threat to the planet. These system could help in many ways to monitor various environmental parameters. Incorporating the IOT helps to monitor various levels and accumulate data in cloud storage. By doing so, it helps the humanity to analyze various patterns in environmental changes and notify the public.

6. REFERENCES

[1] A. Arfire, A. Marjovi, and A. Martinoli, "Enhancing measurement quality through active sampling in mobile air quality monitoring sensor networks," in Proc. of AIM, 2016.

[2] "Mitigating slow dynamics of low-cost chemical M. Budde, R. El Masri, T. Riedel, and M. Beigl, "Enabling low-cost particulate matter measurement for participatory sensing scenarios," in Proc. of MUM. New York, NY, USA: ACM, 2013.

[3] J. M. Barcelo-Ordinas, J. Garcia-Vidal, M. Doudou, S. Rodrigo-Muoz, and A. Cerezo-Llavero, "Calibrating low-cost air quality sensors using multiple arrays of sensors," in Proc. of WCNC. IEEE, 2018.

[4]Y. Wang, A. Yang, Z. Li, X. Chen, P. Wang, and H. Yang, "Blind drift calibration of sensor networks using sparse bayesian learning," IEEE Sensors Journal, vol. 16, no. 16, pp. 6249–6260, 2016.