

IOT Based Air & Sound Pollution Monitoring system using Raspberry pi

Abhishek S. Ghongade¹, Tukaram S. Barure², Chandrashekhar R. Ambure³, Prof. A. A. Trikolikar⁴

^{1,2,3} B.E Student, Department of E&TC Engineering, Jspm's Imperial College of Engineering & Research, Wagholi Pune, India – 412207

⁴Assistant Professor, Department of E&TC Engineering, Jspm's Imperial College of Engineering & Research, Wagholi Pune, India – 412207

Abstract – Now a day's air and noise pollution is rising issue day by day thanks to increasing in Industries, no. of vehicles, growing infrastructure etc. for that issue we've to initial monitor the pollution and displayed it so we are able to unfold awareness regarding air and noise pollution. during this project we are using raspberry pi as a microcontroller for processing the information collected by various sensing elements like gas sensor, sound sensing element and displayed it on monitor and uploaded to cloud system with facilitate of Wi-Fi module that is gift within the raspberry pi so it store the info to cloud and sends real time update on our mobile through SMS. This acts as a warning to the authorities regarding the pollution rate. A graph is premeditated mistreatment the monitored values mistreatment issue speak platform.

Key Words: Raspberry pi, Internet of Things, Sound sensor, Temperature sensor, Gas sensor.

1. INTRODUCTION

Air and noise pollution could be a growing issue of late. it's necessary to watch the air and noise pollution levels to make sure a healthy and safe atmosphere. With the fast increase in infrastructure and industrial plants, environmental problems have greatly influenced the requirement of sensible observation systems. thanks to its low price, high potency and flexibility, web of Things (IoT) has become extremely popular currently of late. web of Things (IoT) permits interaction between devices and humans. It forms a communication medium from human to machine.

Previously, knowledge collectors had to travel long distances to the assorted locations to gather knowledge when that the analysis was done. This was drawn-out and time intense. But now, sensors and microcontrollers connected to the web will create environmental parameter observation additional versatile, correct and fewer time intense. once the atmosphere Merges with sensors and devices to self-protect and self-monitor it forms a sensible atmosphere. Embedded intelligence makes the atmosphere act with the objects. during this model, we tend to square measure employing a Raspberry Pi 3B microcontroller, which can have gas sensors and noise sensors connected to that, to watch the unsteady environmental parameters.

2. RELATED WORK

There are numerous works that have been done related to IOT based air and sound pollution monitoring Projects.

Varun Jain, Mansi Goel, Mukulika Maity, Vinayak Naik, Ramachandran Ramjee propose a framework to estimate air pollution for a given locality by using maximum advantages of the existing infrastructure of monitoring stations. Unfortunately, India still lacks the infrastructure required to measure pollution at a granular scale.

Archit Aggarwal, Tanupriya Choudhary, Praveen Kumar Proposes a fuzzy interface system for the calculation of AQI using two pollutants with each having six linguistic variables.

The traditional method used is linear interpolation where only one pollutant is considered to calculate AQI.

Somansh Kumar, Ashish Jasuja present work, the air quality Data from New Delhi, Mumbai, Chennai and Bengaluru has been used. Initially, dimension reduction has been performed on the data. After that, the data has been de-seasonalized.

Arnab Kumar Saha¹, Sachet Sircar², Priyasha Chatterjee³ Proposed that in today's world, the continuous rise in air and sound pollution has become a serious problem. Controlling and carefully monitoring the situation has become necessary in order to take the necessary steps to alleviate the situation. This research has proposed an IOT-based technique for monitoring the air quality index and noise intensity of a region.

Xuan Zhao, Siming Zuo, Rami Ghannam proposed that Air pollution is becoming a more significant concern, resulting in a slew of environmental issues such as the fog-haze weather phenomenon, which can be hazardous to human health. The design and manufacturing of a portable sensory system for air pollution monitoring that can detect temperature, humidity, and particle matter is the topic of this research (PM).

Manisha Sharma¹, Ajay Kumar², Abhishek Bachhar³ Proposed that the industrial development and reduction in forests which are two main root cause of air pollution has

increased. It detecting impurities using gas sensor. The sensor is connected to the Arduino which consist of code which will help us in detecting the amount of impurities in the air.

Baihaqi Siregar says wireless sensor network (WSN) utilizing wasp mote smart cities device, connected with several sensors, such as dust sensor PM-10 (GPY21010AU0F), humidity sensor (808H5V5), luminosity sensor (LDR), and microphone (dBA). As a communication protocol we used 3G connectivity to store the data to the cloud system

3. METHODOLOGY

The project is geared toward developing a system capable of Monitoring pollutants within the air and noise within the sound. The projected System was developed exploitation Raspberry pi, sound device, Gas device and temperature device. This air quality and sound quality detection and observance System provides real time information which might be accessed from Computers and mobile devices. The diagram of the projected system is illustrated in Figure one.

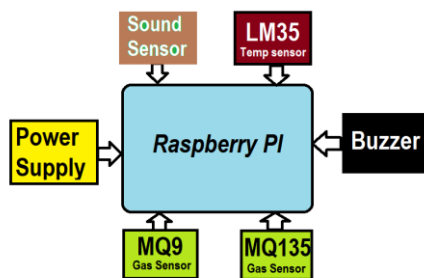


Figure 1: Block diagram

3.1. System Design

The MQ135 and MQ9 Gas sensing element was accustomed collect pollution. And sound sensing element and temperature sensing element (LM35) accustomed collect sound intensity and temperature severally. the information is transmitted via LAN module that is gift in raspberry pi mistreatment the web to the cloud servers, this info may be retrieved via sensible phone or internet enabled devices. The transmission and retrieving of information happens in close to real time. the information of the parameters being measured area unit displayed on a 16*2 alphanumeric display screen. AN alarm would sound within the event once the pollution and pollution is detected. And information is send to cloud storage which is easily available for anyone. Also it draw the graph on thingspeak site for analysis the data for government authority.

3.1. System Specification:

1.The Raspberry Pi may be a low cost, credit-card sized pc that plugs into a pc monitor or TV, and uses a customary

keyboard and mouse. it's a capable very little device that permits individuals of all ages to explore computing, and to be told the way to program in languages like Scratch and Python



Figure 2: raspberry pi

2. This MQ-9 CO gas, Methane, and LPG Gas sensor Module are accustomed sense CO gas and aliphatic compound Gas. SnO₂ is the sensitive material of the gas sensor MQ9, that has lower physical phenomenon in clean air. It makes detection by the maneuver of cycle high and cold, and sight CO once the cold (heated by one.5V). The sensor's physical phenomenon is higher at the facet of the gas concentration rising



Figure 3: MQ9 Sensor

3. A temperature detector may be a device accustomed live temperature. this may be air temperature, liquid temperature or the temperature of solid matter. There ar differing types of temperature sensors offered and them every use totally different technologies and principles to require the temperature activity. Temperature sensors accustomed measure temperature in many alternative applications and industries.



Figure 4: Temp Sensor

4. A sound sensor is defined as a module that detects sound waves through its intensity and converts them to electrical signals. Sound detection sensor works similarly to our Ears, having a diaphragm which con- verts vibration into signals.

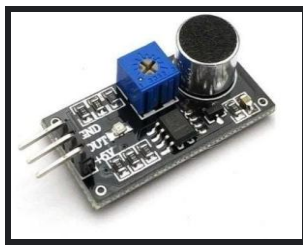


Figure 5: Sound Sensor

5. The MQ series of gas devices utilize a touch heater inside with associate natural science detector. These sensors square measure sensitive to a spread of gases used at temperature. MQ135 alcohol device is also a SnO_2 with a lower natural phenomenon of contemporary air.

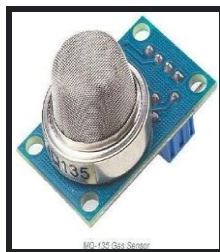


Figure 6: MQ135 Sensor

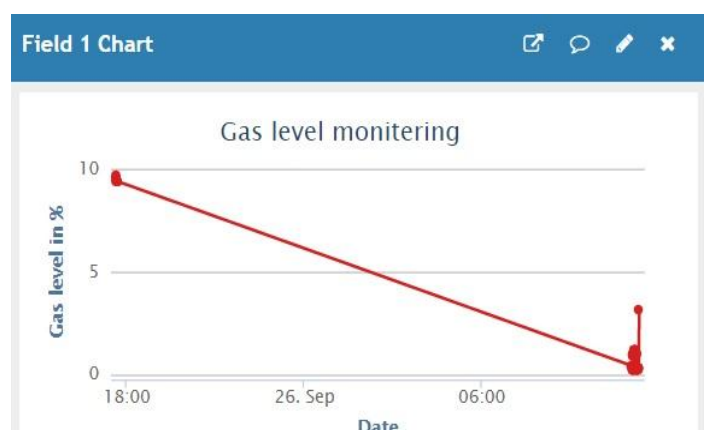
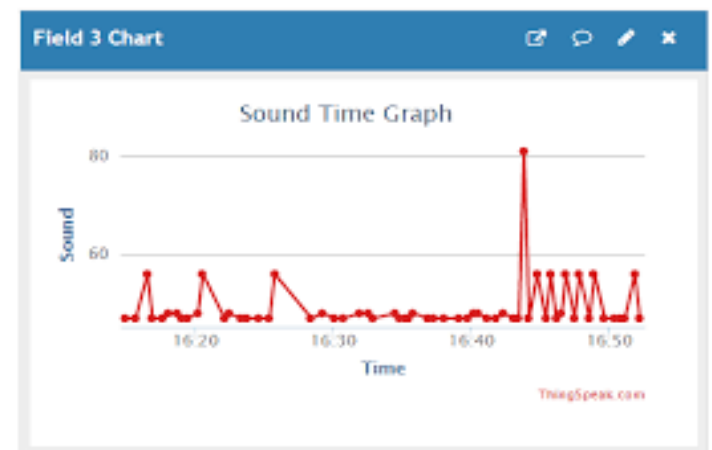
6. The buzzer could be a sounding device that may convert audio signals into sound signals. It's sometimes power-driven by DC voltage. It's wide utilized in alarms, computers, printers and alternative electronic merchandise as sound devices.



Figure 7: Buzzer

4. RESULT

The detected air pollution, sound pollution and temperature are displayed below in Fig.8



4. CONCLUSION

The smart because of monitor setting and a cheap, low price embedded system is given with fully completely different models throughout this paper. At intervals the projected style functions of assorted modules were mentioned. The noise and pollution observation system with internet of Things (IoT) concept through an experiment tested for observation 2 parameters. It additionally sent the device parameters values to the cloud. This information are going to

be useful for future analysis and it will be simply shared to alternative finish users. This model will be additional swollen to watch the developing cities and industrial zones for pollution observation. to guard the general public health from pollution, this model provides associate economical and low price answer for continuous observation of surroundings.

REFERENCES

- [1] 1. L.Ezhilarasi, K.Sripriya, A .Suganya, K.Vinodhini, “ A System For Monitor- ing Air And Sound Pollution Using Arduino Controller With Iot Technology.”, International Research Journal in Advanced Engineering and Technology (IR- JAET)
- [2] Mahantesh B Dalawai, Siva Yellampalli, Pradeep S.V, “IOT Based Air and Noise Pollution Monitoring in Urban and Rural Areas, Important Zones like Schools and Hospitals in Real Time.”, International e-Journal for Technology and Research-2017.
- [3] Arushi Singh, Divya Pathak, Prachi Pandit1, Shruti Patil, P Priti. C. Golar, “IOT based Air and Sound Pollution Monitoring System.” International Jour- nal of Advanced Research in Electrical,
- [4] A. Sumithra, J.Jane Ida, K. Karthika , S. Gavaskar, “A Smart Environmental Monitoring System Using Internet Of Things.” International Journal of Scien- tific Engineering and Applied Science (IJSEAS) – Volume-2, Issue-3, March 2016
- [5] Mohannad Ibrahim, Abdelghafor Elgamri, Sharief Babiker . Ahmed Mo- hamed, “Internet of things based smart environmental monitoring using the Raspberry-Pi computer.” Fifth International Conference on Digital Informa- tion Processing and Communications (ICD IPC), 2015
- [6] Giovanni B. Fioccola , Raffaele Sommese, Imma Tufano, Roberto Canonico, Giorgio Ventre, “ Pollution: An efficient cloud-based management of IoT devices for air quality monitoring.” IEEE 2nd International Forum on Re- search and Technologies for Society and Industry Leveraging a better tomor- row (RTSI), 2016
- [7] SRM.ArthiShri,NB.Keerthana,S.Sandhiyaa,P.Deepa, D.Mythili,” Noise and Air Pollution Monitoring System Using IOT.” SSRG International Journal of Electrical and Electronics Engineering– (ICETM-2017) - Special Issue- March 2017.
- [8] Seung Ho Kim; Jong Mun Jeong ; Min Tae Hwang ; Chang Soon Kang, “De- velopment of an IoT-based atmospheric environment monitoring system.” In- ternational Conference on Information and Communication Technology Con- vergence (ICTC)., 2017