# Survey on IoT-Based Air Quality and Sound Intensity Monitoring System using Raspberry Pi

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*Abstract*— Clean city has become an essential aspect in present day and age. Usage of IoT-based method for gathering Air Quality and Sound Intensity parameters provides accurate analysis of the air pollutants and the intensity of the sound using which analysis of data is carried on by a cloud-based monitoring system. The WIFI models present in Raspberry pi helps in acquiring data and giving periodical alerts to the users in the situations when ant undesired fluctuations occur in surrounding.
***Keywords:*** IoT, Raspberry Pi, Air Quality, Sound Intensity

## I. Introduction

In present day scenario, the increasing level of pollution is becoming a hazardous issue. The rapid growth of industries and urbanization has led to increase in air and sound pollution. The periodic monitoring of the pollutants has become a necessary measure. The development of the technologies has given a ray of hope to monitor these effects in a smarter way. IoT has gained a lot of importance in the field due to its versatility, cost effectiveness, communication and information technologies etc. The Raspberry Pi microcontroller used has the sensors connected to it. The connectivity to the internet helps the device for machine-to-machine communication. This leads to a faster and better monitoring systems for the variations in the environmental parameters.

Few of the air pollutants such as Carbon Monoxide (CO), Carbon Dioxide (CO2) and Particulate matter (PM10 and PM2.5) are increasing due to which environmental degradation has become inevitable. The levels of these pollutants are to be monitored and alerts have to be given in a particular region when and where there is an excessive increase in the pollutants level. The sound intensity should also be monitored in industrial areas where there are heavy machines that produce a lot of noise. There are standards given by the Govt. of India that specify the maximum level of the pollution that is acceptable.

The raspberry pi mini-computer is connected with different sensors that give the input continuously. These inputs are gathered to give a graphical comparison between the measured values and the threshold value. If the measured value is higher than the threshold value, the alerting system informs the user about the fluctuations.

## II. Air quality monitoring

Air is what all living beings breathe. It is a composition of 78% nitrogen, 21% oxygen, 1% argon, 0.04% carbon dioxide and small amounts of other gases. Carbon dioxide is one of the important polluters for changing climate, but there are many other polluters that are causing major problems to the environment. Particulate matter like smoke, smog, soot and few small dust particles are grouped together on the basis of their size. These particulate matters that are of the size 2.5 microns in width (PM2.5), and PM10 which are between 10 and 2.5 microns in width are very important pollutants in the perspective of health. The respiratory disorders, heart diseases, lung cancer is the main consideration.

The sensors that sense the air quality and this detail can be used to measure the level of pollution in the particular area. By continuous monitoring, we can control the level of the air pollutants by taking necessary measurements. The alerting system informs the user in the particular area if there is any excess amount of pollution in that area. By using the internet, the monitoring system becomes very effective and the analysis becomes easier.

## III. Sound quality monitoring

The sound Quality Monitoring is used to describe the “Sound Quality Monitoring system” that combines the information of sound decibels in a particular area and to provide awareness of the level of decibels in that area. As we can see Sound pollution is also one of the major problems faced in many areas. It leads to many health issues in public for which respective measures are to be taken. Research in sound monitoring includes the role of Internet of Things in the detection of noise in environment and measurement of noise in industrial as well as in areas where the human population is more.

The aim of this sound monitoring system is to measure the amount of noise in a particular area and storing the data for further utilization of measuring values in different areas and at different amount of times. The safe limit for Sound intensity is different in different regions at different amounts of time. So the measurement of sound intensity using the previously stored values gives the accurate values during the time of measurement. The development of the system to get accurate values is possible with the connection of sound sensors with the cloud and continuous monitoring of the data. The continuous monitoring of data will be done by using a WIFI model connected to the system. Connection of cloud to the system makes it able to carry large amount of data.

## IV. Temperature and Humidity control

Temperature and Humidity plays a vital role in the measurement of sound and air pollution. At a standard temperature of 15 ºC , a decrease in sound level between a listener and source 3DB may occur due to decrease in humidity from 80% to 20%.This is one of the factors which affects measurement repeatedly, although humidity changes slowly. An increase in temperature from 15 ºC to 30 ºC would decrease the sound level 800 m from the noise source by 3 dB (at 1000 Hz) by fixing the relative humidity at 80%. Temperature variations of this order of magnitude are common during a 24-hour period. National standards may

 

vary in the way the effect of weather should be treated in environmental noise measurements, so refer to your local standards for more information. Based on the temperature and humidity levels an estimate of upcoming weather conditions can be done.

## V. CONCLUSION

The above discussed IOT based applications are utilized for better monitoring of environment and used to give prior notice in case of excess of pollutants in that area. One of the major challenge of IOT applications is that they produce large amount of information and data which should be dealt efficiently which is been efficiently handled in the proposed system by connecting the cloud to the system. Usage of cloud along with the sensors makes system more efficient in measure the air and noise pollutants. The usage of Raspberry pi in the proposed system makes it more efficient when compared with the usage of Arduino for measuring pollutants. Future works of the system can be providing mobility to the system and to increase the range within which the pollutants are measured.

## REFERENCE

[1] Arnab Kumar Saha, Sachet Sircar, Priyasha Chatterjee, Souvik Dutta, Anwesha Mitra, Aishwarya Chatterjee, Soummyo Priyo Chattopadhyay, Himadri Nath Saha, "A Raspberry Pi Controlled Cloud Based Air and Sound Pollution Monitoring System with Temperature and Humidity Sensing", IEEE Conference paper, 2018.
[2] MingHua yang, SiJie Shao, XiaoYan Wang, "The monitoring system design of harmful gas inside special vehicle", IEEE Conference paper, 2012.
[3] Giovanni B. Fioccola, Raffaele Sommese, Imma Tufano, Roberto Canonico and Giorgio Ventre, "Polluino: An Efficient Cloud-based Management of IoT Devices for Air Quality Monitoring", IEEE Conference paper, 2016.
[4] Anwar Alshamsi, Younas Anwar, Maryam Almulla, Mouza Aldohoori, Nasser Hamad, Mohammed Awad, "Monitoring Pollution: Applying IoT to Create a Smart Environment", IEEE Conference paper, 2017.
[5] Gagan Parmar, Sagar Lakhani, Manju K. Chattopadhyay, "An IoT Based Low Cost Air Pollution Monitoring System", IEEE Conference paper, 2017.
[6] Kiruthika.R, A. Umamakeswari, "Low Cost Pollution Control and Air Quality Monitoring System using Raspberry Pi for Internet of Things", IEEE Conference paper, 2017.
[7] Yung-Chung Tsao1, Bo-Rui Su2, Chin-Tan Lee2 and Chia-Chun Wu, "An Implementation of a Distributed Sound Sensing System to Visualize the Noise Pollution", IEEE Conference paper, 2017.
[8] V.Sandeep , K.Lalith Gopal, S.Naveen, A.Amudhan, L. S. Kumar, "Globally Accessible Machine Automation Using Raspberry Pi" , IEEE Conference paper, 2015.
[9] Md.Shaedul Islam, "An Intelligent System on Environment Quality Remote Monitoring and Cloud Data Logging Using Internet of Things (IoT)", IEEE Conference paper, 2018.
[10] Xuan Zhao, Siming Zuo, Rami Ghannam, Qammer H. Abbasi and Hadi Heidari, "Design and Implementation of Portable Sensory System for Air Pollution Monitoring", IEEE Conference paper, 2018.

 