

IOT based Air and Sound Pollution Monitoring System

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Received: February 13, 2019

Accepted: March 28, 2019

ABSTRACT: *In infrastructure and industrial plants the rapid growth creating environmental issues like pollution (Air, Water, Noise), climate change, malfunctioning and has greatly consequence for the requirement of an, operationally adaptable, efficient, cheap and smart monitoring systems. In this context where combination of many challenges of computer science, wireless communication and electronics; the Smart Sensor Networks are an emerging field of research. In this paper a solution to monitor the air and noise pollution levels in industrial environment or by using wireless embedded computing system a particular area of interest is proposed. The technology like Internet of Things (IoT) is included in the form of solution which is outcome of merged field of computer science and electronics. For monitoring the fluctuation of parameters like noise and air pollution levels from their normal levels in this case the sensing devices are connected to the embedded computing system. For the requirement of continuous monitoring, controlling and behavior analysis this model is adaptable and distributive for any infrastructural environment. For two or three parameters like noise, CO and radiation levels the implementation is tested with respect to the normal behavior levels or given specifications which provide a monitoring over the pollution control to make the environment smart and Eco - friendly*

Key Words: *(Eco-friendly, wireless, Environment, IoT, cheap, monitoring)*

I. Introduction

In recent years, IoT has gained a lot of importance in the field of science, The Internet of things (IoT) is the network of vehicles, home appliances, and other items which have electronics embedded within, there are software, sensors which help in connectivity which enables these things to connect, collect and exchange data. The word "Internet of Things" is consisted of two main parts; Internet the backbone of connectivity, and "Things" meaning devices . According to analyst firm Gartner and as shown in figure 1.1, there will be 8.4 billion connected things in 2017, setting the stage for 20.4 billion Internet of Things (IoT) devices to be deployed by 2020[5].

The purpose of this project is to identify the harm caused by the air and sound pollution to the environment. Pollution in simple words can be explained by, the presence of an foreign object in the environment which has harmful effect, we as a society have to ensure that all the pollution levels are maintained to the minimum, both first and second tier cities in Indian perform extremely poorly in cases of Air and Noise pollution India tops the world in pollution related deaths, accounting to 2.5 million deaths of the total 9 million worldwide. This project helps in detecting the major gases in air and the decibel levels in the surrounding environment. Our project will be a boon to the society as our project will be making

sure that every individual will be able to keep a track of the pollution from our app. It is the need of the hour to monitor air quality and keep it under control for a better future and healthy living for all.

II. Literature Survey

A. Statement of Purpose

The purpose of this project is to identify the harm caused by the air and sound pollution to the environment. Pollution in simple words can be explained by, the presence of an foreign object in the environment which has harmful effect, we as a society have to ensure that all the pollution levels are maintained to the minimum, In today's world, pollution is the biggest concern, pollution has a lot of harmful effects on the wellbeing of the people. As shown in figure 1.2, Table 1.1, both first and second tier cities in Indian perform extremely poorly in cases of Air and Noise pollution India tops the world in pollution related deaths, accounting to 2.5 million deaths of the total 9 million worldwide [4]. In Figure 1.3 and 1.4 are some of the worst and best cities in terms of pollution.

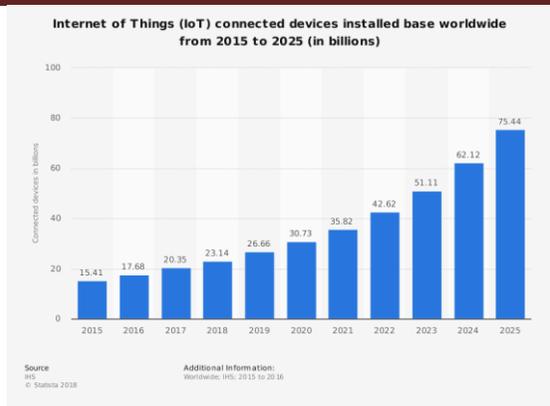


Fig 1.1 IOT

Our project is a small step to this big initiative to ensure that pollution stays under control. This project helps in detecting the major gases in air and the decibel levels in the surrounding environment. Our project will be a boon to the society as our project will be making sure that every individual will be able to keep a track of the pollution from our app. It is the need of the hour to monitor air quality and keep it under control for a better future and healthy living for all. For example, For optimum sound level refer Table 1.2.

City	Country	Average Hearing Loss (years)	Rank
Delhi	India	19.34	1
Mumbai	India	18.53	0.98
Cairo	Egypt	18.03	0.89
Madrid	Spain	16.26	0.68

Table 1.1 Average Hearing Loss

Zone	Time	Optimum Level
Residence	6:00 -22:00	55
Residence	22:00-06:00	50
School	Recess	55
Industrial/Commercial Sites	6:00 -22:00	68
Industrial/Commercial Sites	22:00 -6:00	63

Now here in this project we propose an air as well as sound pollution monitoring system that allows us to monitor and check live air quality as well as sound pollution in a particular areas through IOT.

B. Motivation

In infrastructure and industrial plants there is a rapid growth creating environmental issues like pollution (Air, Water, Noise)

- The Smart Sensor Networks are an emerging field of research.
- The technology like Internet of Things (IoT) is included in the form of solution for helping to try and reduce pollution levels.
- As the pollution levels of our country is high, there has to be a system to make sure that the track is kept of all the pollution levels, for the wellbeing of the society

III. Scope

Our proposed system ensures that we keep a track of the rise and fall of the pollution levels in the area. Our system makes sure that the environment in the designated area is maintained at optimum quality, if not alert the concerned authorities. This system will also send updates to the authorities when there is a change in the pollution levels. The system will also take into consideration levels of pollution to let the authorities take the required action. The app will show the levels and also show the GPS location of the mobile and according to the location it will display all the related information of the area. We plan of expanding this idea, for a centralised data collection, so that all the authorities can keep a good watch on degrading state of the environment. Our app will have an easy to use UI, this will in return help the user to search the pollution levels of different places, this idea will keep the thought of the degrading state of the environment in the users mind. This system will be placed in the areas with high pollution levels. This is important so that we have a database of all the pollution levels of the area. The app helps us display these levels to the user. This system can be also used to show the temperature and the humidity of the places. The app will be linked to a chatbot. The chatbot will make the user use the app from the google assistant, this will help the user know the pollution levels of all the places without going to that place. This will be useful for various organisations to get the accurate pollution levels to carry out the required actions at large scales. This ChatBot will also be able to answer basic questions about pollution, humidity and temperature.

C. Units

- Decibel : Denoted as Db unit used to measure the intensity of a sound or the power level of an electrical signal by comparing it with a given level on a logarithmic scale.
- Parts Per Million : Denoted as PPM used to measure the The AQI level is based on the level of six atmospheric pollutants

The 20 Worst Cities Worldwide For Air Pollution

Annual mean micrograms per cubic metre of PM10 in cities worldwide

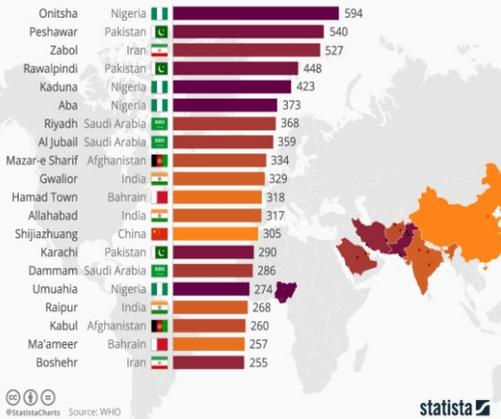


Fig 1.2 WorldWide Air Pollution

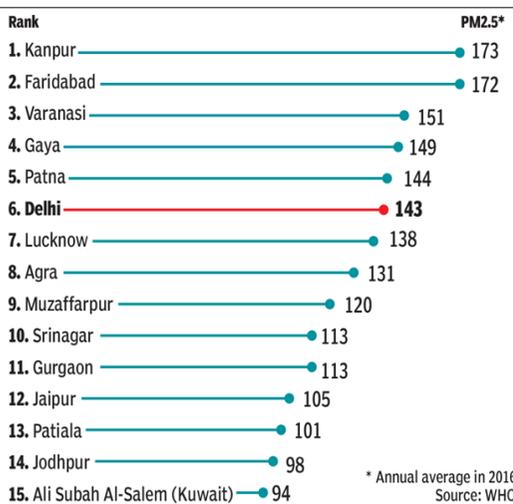


Fig 1.3 Worst Cities in India

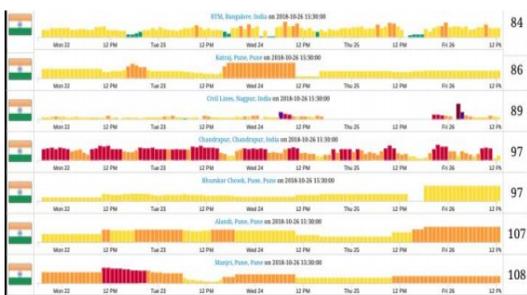
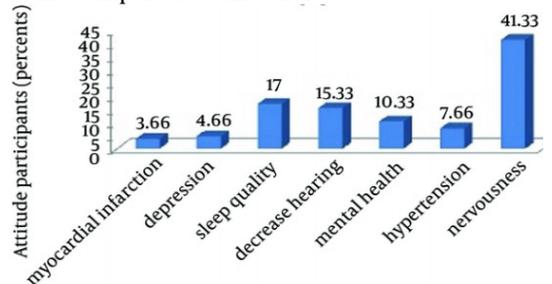


Fig 1.3 Best Cities in India

IV. Literature review

Literature survey is something when you look at a publication only from the surface, or an Aerial view. It includes Research, of all the places and people involved in the project, after a thorough research relevant surveys are shortlisted. In general, a literature survey helps the researcher identify the problem statement. Literature review is a text of scholarly paper, this includes

substantial knowledge and various methodologies about the topic. Literature survey is a must for making a person thorough with the topic. Review of the literature survey makes sure that all the context that has been mentioned is unique and there is no false predictions about the outcomes. The current system has its own flaws, the system cannot detect the noise and sound pollution levels at the same time, the system also not designed in a way to send alerts to the authorities if the levels cross a particular barrier. The current system also cannot note down real-time readings of the pollution levels[1][2]. Our project is a small initiative towards the wellbeing of the society and its people, the idea of the project has been derived from the recent problems of pollution due to a high increase in the industrial factories and an abnormal increase in the traffic cause high level of noise pollution. Table 2.1 shows the effects of noise in person's mental health. This project ensures that all the data is collected and assessed in a periodic manner. The current situation of Air and Noise pollution in India is harmful, this high increase in pollution levels is causing a harmful impact on the environment, disrupting the ecological balance. To maintain the balance in the ecosystems we need to take desperate measures to keep the pollution levels under control. As of 2018, India has the highest levels of pollution deaths compared to all other



health effects attributed to noise pollution

Fig 2.1 Effects

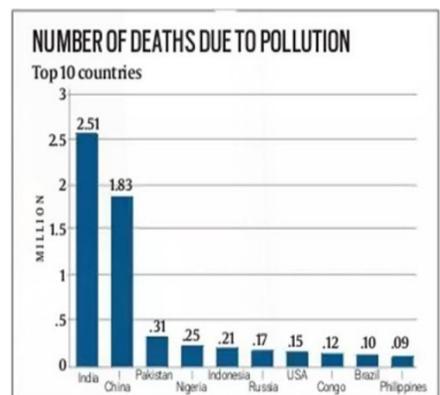


Fig 2.2 Deaths

VI. PROPOSED SYSTEM

As shown in figure 3.1, Our proposed system ensures that we keep a track of the rise and fall of the pollution levels in the area. Our system makes sure that the environment in the designated area is maintained at optimum quality, if not alert the concerned authorities. This system will also send updates to the authorities when there is a change in the pollution levels. The system will also take into consideration levels of pollution to let the authorities take the required action. The app will show the levels and also show the GPS location of the mobile and according to the location it will display all the related information of the area. The system will consist of Arduino and sensors that will detect the levels of sound and noise pollution, this system will be placed at the most populated place of the area (case in point is Nerul Station). The system will be in constant use and will be taking the readings required. These reading will be sent to the Admin. The Administrator will be able to access the entire database. The system will have 2 main users :

- Regular user
- Registered user (Hospitals, Schools, BMC)

The users will be given proper notifications about the real-time pollution levels of the area. These pollution levels will be shown to all the users after there is a change in the location. Our proposed system will also consist of the a chatbot, this The app will be linked to a chatbot. The chatbot will make the user use the app from the google assistant, this will help the user know the pollution levels of all the places without going to that place. This will be useful for various organisations to get the accurate pollution levels to carry out the required actions at large scales.

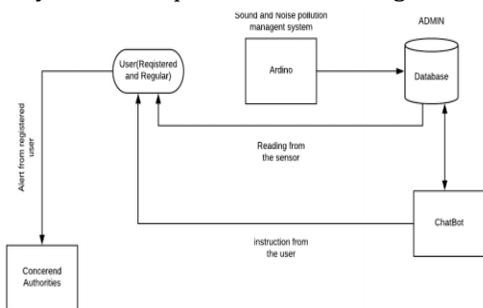


Fig 3.1 Block Diagram of the Proposed System

VII. OBJECTIVES

- To bring overall improvement in the quality of the environment in the State by effective implementation of laws related to the environment.
- Control of pollution at the source to the maximum extent possible with due regard to technological and economical viability.

- Coordination with other agencies of the State Government and local authorities to encourage the supervision over the levels of air and noise pollution.
- To make the system accessible to the common man.
- This system is Cost Effective
- Real-time Pollution monitoring
- This system will be User Friendly
- To reduce the levels of pollution
- Detection of benzene, alcohol, smoke, carbon monoxide, Carbon dioxide

VIII. Design

The Flow of working of our project is shown in Figure 5.1

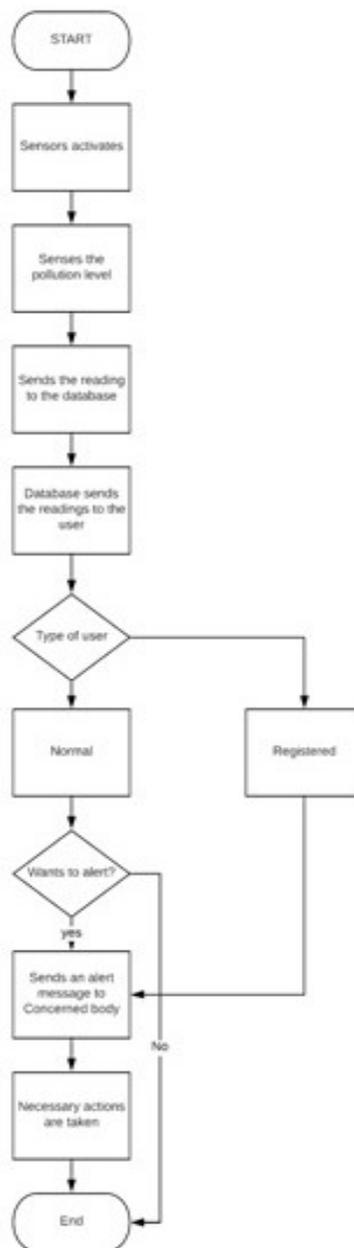


Fig 5.1

IX. Methodology

In this project, we are using Incremental model. It is one of the SDLC Model. As shown in the figure. It is a combination of many waterfall models. Here, the main project will be divided into multiple modules and each module will be developed separately. Finally all the developed modules will be integrated with other modules.

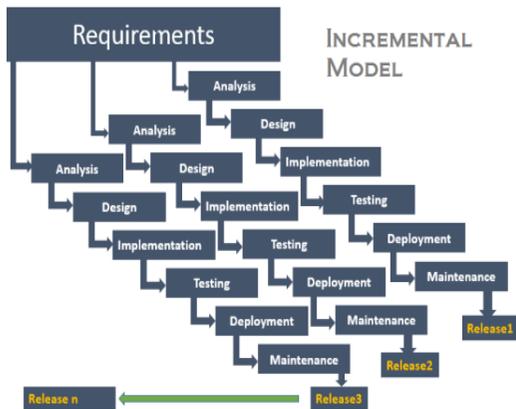


Fig 6.1

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