

# IOT Based Air and Noise Pollution Monitoring System

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**ABSTRACT:** Now a days in metropolitan cities air and noise pollution becomes serious issues. due to high decibels and toxic gases present in the environment which directly effect on human's health and thus needs a special attention. Therefore, it has now become necessary to control the pollution (air and noise)to ensure healthy livelihood and better future. To overcome with these issues, Here we implement the system. Where it detects the harmful gases and noise present in the environment. The embedded sensors in the system help to detect major air polluting gases such as CO<sub>2</sub>, SO<sub>2</sub> and CO and level of sound pollution. The Air and noise Pollution Monitoring device can be accessed by the authorities and the common people belonging to the area. The device will be installed through a mobile application which will show the live updates of the pollution level of the area. It could be controlled in time to reduce the pollution which may affect the environment. This system works on the methods of IOT which is a rising technology based on the fusion of electronics and computer science. The concept of IOT helps to access data from remote locations.

**KEYWORDS:** air pollution, sound pollution, IOT, sensors, monitoring system.

## I. INTRODUCTION

In this era of modernization, technologies are advancing rapidly. Every day we realize some new technology coming in market to simplify our lives more than ever. Back in time checking the pollution in a particular area was a very tedious task which was not very efficient also. With the increasing pollution and advancing technology various new methods were introduced to keep an eye on the rapid increase in pollution more efficiently. Internet of things is one of the latest works that has been done in this path. The increment in use of internet and the interaction of human with machine gave rise to IOT[1]. It allows exchange of information among various devices like fridge, washing machine, automobiles, watches etc. This exchange of information takes place with the help numerous sensors. The account for the success of IOT is its efficiency and makes it a feasible technology at low cost.

Air and noise pollution are two main constituents that have the most adverse effect on humans as well as the entire earth. Therefore it is very important to check and control it. Traditional methods involves manual work in which data loggers used to visit the site to collect the data, analyse it and perform comparisons to provide the output which was very lengthy and time consuming besides being inefficient. The pollution monitoring system involves use of sensors (MQ135[2] and sound sensor FC04[3]) which measures the noise pollution concentration and level of harmful gases like CO and SO<sub>2</sub> which mainly pollutes the air. Comparisons are done automatically using previously stored data in database and output is stored on cloud to make it accessible from remote areas. This paper involves description of the system that presents its output with the help of an android application [4] which the user can download in their mobile phones and access it whenever they want. It can be used for notifying the authorities.

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## II.LITERATURE REVIEW

The motive of making a smart city can be fulfilled by using technology, thus making the life better and also enhancing the quality of services, therefore meeting every individual's needs. With modern technology in fields of information and communication, it has become easy to interact with the authorized people of city to tell them where about of the area or city, how well the city is developing and how to make it possible to achieve a better life quality. In this system, an application was created to make one more step in the fulfilment of the goal. An area is analysed for evaluating how much pollution is affecting the area. The components of gases and their amounts are calculated and checked. If the amount is higher than normal then the officials are reported about it. After that the people are made to clear the area and taken to a safe place. The combined network architecture and the interconnecting mechanisms for the accurate estimation of parameters by sensors are being explained and delivery of data through internet is presented.

Some of the research work made for monitoring the pollution parameters in a particular location in order to make the environment safe and that area smart. Different methods were used in the past and are described in this section. First is Smart Environment Monitoring using Wireless sensor networks in which the main focus was on the developing an environment free of pollution by making it smart. Wireless sensors are fitted all over the city and in public transports. By monitoring all the sensor networks, all the environmental happenings can be gathered as a streaming database to analyse the environmental position.

## III.ARCHITECTURE

This system is made to fulfil the purpose and need of the society to monitor and check the live air quality and noise pollution in an area through IOT. The system uses air sensors to check the presence of harmful and hazardous gases/compounds [such as Methane, propane, Butane, alcohol, noxious gases, carbon monoxide etc.] in the air and also uses the noise sensor to keep measuring noise level in the surroundings. MQ135 is the air sensors which are used to collect air pollutants and a noise sensor module mic is used to capture sound. These sensors interact with microprocessor which processes this data and then transmit it over the mobile application. To send the data over remote location WIFI module is also installed. And whenever the noise pollution is detected, a buzzer immediately beeps and when there is a air pollution an buzzer starts beeps for three times. With this system not only the authorities but also the localized people can check the transmitted data through their mobile phone and that too without spending single rupee and the people can act against it on their level and try to bring the pollution level under control. This system would contribute as a part in the building of a healthy society.

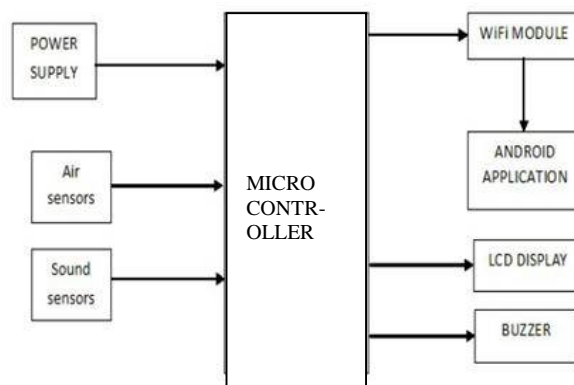


Fig 1: Block Diagram

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## IV. WORKING

The air and noise pollution monitoring system consists of ARM7 microcontroller [5] and sensors. Microcontroller is also known as the mind of the device. Initially, the microcontroller is provided with a 5V supply. Sensors provide the data to the microcontroller that is displayed on the LCD display continuously, LCD Display is connected to the microcontroller board and if the air pollution exceeds the set limit (defined by the programmer) then the output is shown in the analog form i.e. if the air pollution is raised it will be displayed on the output pane, Buzzer simultaneously buzz and similarly when the sound pollution exceeds the set limit (90dB in this case) the buzzer will be displayed as output on the output panel. Now the data which is retrieved from air and sound sensor will be provided to the WiFi module which is connected to the 3.3 V pin on the microcontroller board. This WiFi module (nRF24L01 module) will then provide this data to the android application accessible to all the android phone users and accordingly the local people can take actions on their part.

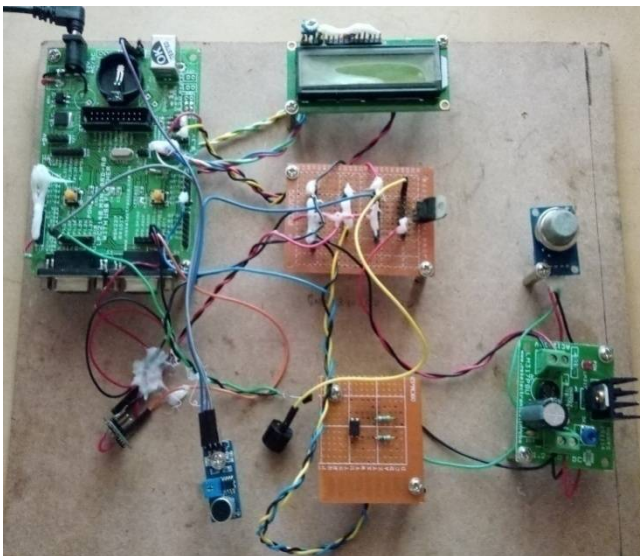


Fig 2: Hardware

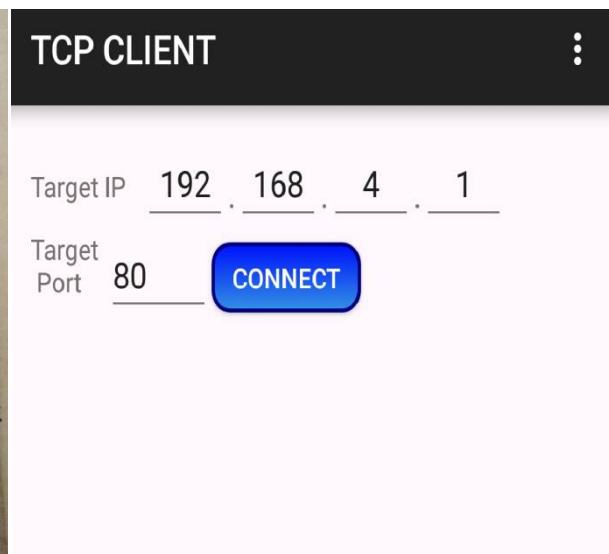


Fig 3: Android Application used to connect device(tcp/udp test tool app)

## V. CONCLUSION

This IOT based air and noise pollution monitoring device is a great step towards a healthy livelihood. With the help of this device not only the municipal authorities but even the common people can participate in the process of controlling pollution and ensure safe environment. This automatic device, once installed is capable of continuously tracking the pollution level and analyse the detected information. The most highlighting feature of this device is that the output is represented in digital as well as analog format with the help of a simple mobile application which is usable on all android devices like smart phones, tablets, PDA's etc. The device itself is very eco-friendly and does not harm the environment in any way. Moreover, it is based on one of the modern technology and also inexpensive as compared to other technologies developed so far and can be installed anywhere.

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## VI.RESULT

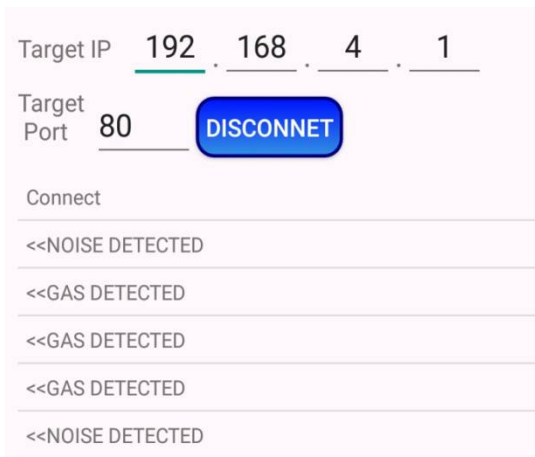


Fig 4: output is shown in android app

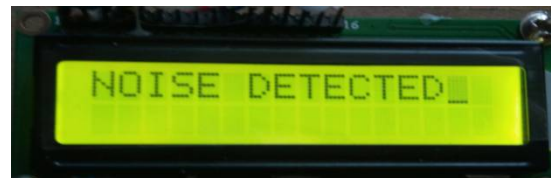
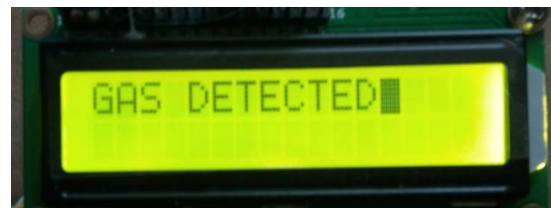


Fig 5: output shown on device lcd display

The output of this pollution monitoring device is provided using a mobile application. The monitoring systems will be fitted at different locations in the city or any area such as hospitals, highways, schools, campus, streets, parks, homes and malls, etc. Sensors continuously sense the level of air or sound pollution and give the results. The indication will be given through the device by a beep sound if the air and noise pollution increases from a certain value (decided by the programmer). By using the GPS of the android phone user can check air and noise pollution level in that area. This application can be used to get the knowledge regarding pollution in a particular area, and then the common people can take relative measures accordingly and authorities can warn various industries about the level of pollution they contribute in and take the required steps and measures.

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