

# EMBEDDED SYSTEM BASED AIR POLLUTION DETECTOR

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## Abstract:

The growing air and sound pollution are one of the serious issues these days. As the pollution is increasing it is giving rise to number of diseases. So, it has become necessity to control the pollution to ensure healthy living and better future. The Air and Sound Pollution Monitoring device can be accessed by the each and every people curious about the pollution level. The device can be installed through a mobile application which will show the pollution level. This device is can also detect the temperature, humidity and light intensity in its area and update the same to the concerned authorities as

they can take necessary actions on situation and can control it to reduce loss. 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 and save it in database so that we don't need to actually be present in that area.

## 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. 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 sound 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 involve manual work in which data loggers used to visit the site to collect the data, analyze 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 which measures the sound pollution concentration and level of harmful gases like CO and SO2 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 which the user can download in their mobile phones and access it whenever they want. It can be used for notifying the fire brigade authorities and fire brigades itself if and fire has taken place in the areas. This device is a useful asset to save precious lives of people and property.

## II. Existing Method

Air pollution and sound pollution are major constituents for having adverse and harmful effects on environment as well on human beings. To monitor this pollution is a very difficult task. Traditionally, authorities like data loggers were used to collect the data of the site to be analyzed. They had to visit the site to be analyzed every time they wanted the data. This was a lengthy, time consuming and expensive task.

## III. Proposed Method

In this project we are using gas, sound, and DHT11 and Pressure sensors to calculate air quality, sound intensity, temperature humidity and pressure in air. All these sensors continuously monitor the values from the sensors and uploading it to server. Humidity increases motor will rotate and for temperature and gas Fan will start rotating. The values will be continuously displayed on LCD.

## Block Diagram

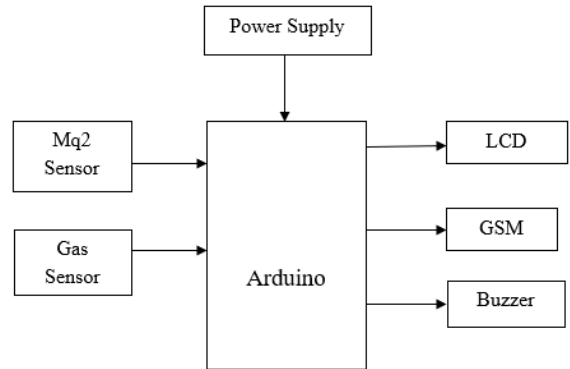


Fig1: Block Diagram

## IV. Hardware Requirements

### A) Arduino:

The Arduino microcontroller is an easy to use yet powerful single board computer that has gained considerable traction in the hobby and professional market. The Arduino is open-source, which means hardware is reasonably priced and development software is free.

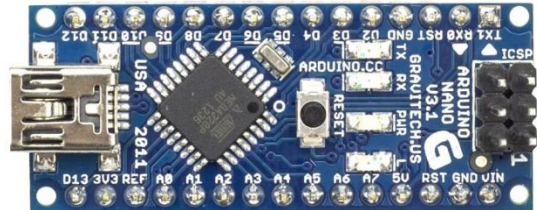


Fig2: Arduino

### B) Power Supply: Transformer:

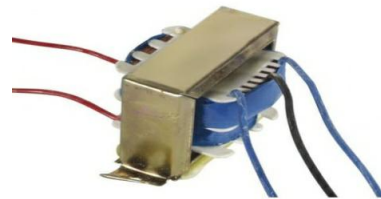


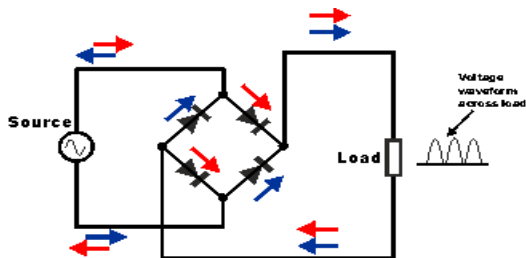
Fig3: Transformer

Transformer is a device which reduces A.C current into required D.C current.

**Bridge Rectifier:**



**Fig4: Bridge rectifier**



**Fig5: Bridge rectifier circuit**

A diode bridge is a technique of four diodes in a bridge circuit arrangement that provides equal polarity of output for mutually polarity of input. While used in its maximum shared application, for transformation of an alternating-current input into a direct-current output, it is called as a bridge rectifier.

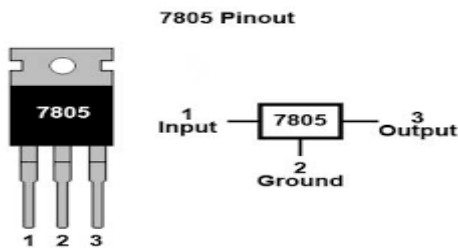
**Capacitor:**



**Fig6: Capacitor**

A capacitor could be a passive two terminal electrical component that stores current in a electric field. The result of this can be termed as capacitance.

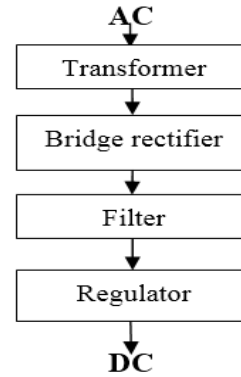
**Regulator:**



**Fig7: Regulator**

A voltage regulator IC keeps the output voltage at a continuous value. 7805 IC is one of the IC of 78xx family. It maintains fixed linear regulators which is used to maintain fluctuations.

**Flow chart of power supply:**

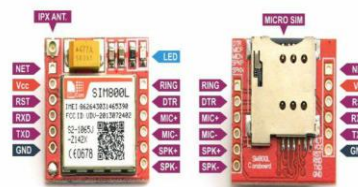


All the above components are used to convert AC voltage to DC voltage.

**C) GSM Module:**

GSM speaks to Global System for Mobile Communications. It is a standard set made by the European Telecommunications Standards Institute (ETSI) to depict traditions for second time (2G) automated cell frameworks used by PDAs.

A Modem is a gadget which modulates and demodulates signals as per communication requirements. It converts an analogue carrier signal to digital signal and also converts such a carrier signal to required information.



**Fig8: GSM**

**E) Gas Sensor:**

MQ2 gas sensor can be used to detect the presence of LPG, Propane and Hydrogen, also could be used to detect Methane and other

combustible steam, it is with low cost and suitable for different application. Sensor is sensitive to flammable gas and smoke.



**Fig9: Gas Sensor**

#### F) LCD:

LCD (Liquid Crystal Display) is the innovation utilized in scratch pad shows and other littler PCs. Like innovation for light-producing diode (LED) and gas-plasma, LCDs permit presentations to be a lot slenderer than innovation for cathode beam tube (CRT). LCDs expend considerably less power than LED shows and gas shows since they work as opposed to emanating it on the guideline of blocking light.



**Fig10: LCD**

## VI. Software Requirements

### A) Arduino IDE:

The Arduino IDE software is an open source software, where we can have the example codes for the beginners. In the present world there are a lot of versions in the Arduino IDE in which the present usage is Version 1.0.5. It is very easy to connect the PC with the Arduino Board.

## VII. Advantages

- Easy handling.
- Smart usage.

## VIII. Applications

- In industries
- In houses
- In any offices
- In bus systems
- In train systems

## IX. Working of the Project

The proposed Air Pollution Monitoring System is based on the block diagram as shown in Fig.1. The data of air is recognized by the MQ2 gas sensor and the MQ6 LPG gas sensor. The MQ2 sensor can sense NH<sub>3</sub>, NO<sub>x</sub>, alcohol, Benzene, smoke, CO<sub>2</sub>. So, it is a dynamic gas sensor for our Air Pollution Monitoring system. When it is connected to the Arduino, it will sense all gases, and it will give the Pollution level in PPM (parts per million). The MQ135 gas sensor will give the output in the form of voltage levels, and we have to convert it into PPM. So, for converting the output in PPM, we have used a library for the MQ2 gas sensor and the MQ6 sensor. The sensor is giving us a value of 90 when there is no gas near it, and the air quality safe level is 350, and it should not exceed the threshold. When it exceeds the limit, it will cause headaches, sleepiness, and stagnant, stuffy air. If it exceeds beyond the threshold, then it will cause an increased heart rate and many different diseases. When the value will be less than 1000 PPM, when the value will increase from 1000 PPM, then the buzzer will start beeping, and the LCD and webpage will display "Poor Air". And when it increases, the buzzer will keep beeping and give an alert message on a smartphone through GSM.

## Conclusion

The Automatic Air & Sound management system is a step forward to contribute a solution to the biggest threat. The air & sound monitoring system overcomes the problem of the highly-polluted areas, which is a major issue. It supports the new technology and effectively supports the

healthy life concept. This system has features for the people to monitor the amount of pollution on their mobile phones using the application.

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