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## Air monitoring system

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### ABSTRACT

*Air is one of the essential pillars that sustain life and existence of organisms itself. The air that we breathe in today is nowhere as clean as it used to be hundreds of years ago. Advancement of civilization and technology has led to the birth of numerous new methods that pollute and contaminate the air. Polluted air such as smog can cause various problems and slowly disrupt the normal working of the human body and begin a slow impending end. Hence, the air we breathe in is important to be analyzed and made sure we do not end up breathing in toxic substances or radioactive particles that affect the human body terribly ending in painful deaths. This project is to establish a multipurpose air monitoring system that can be used at homes, roads, nuclear facilities, and hospitals and it is implemented with the help of MQ135 sensor which is used to monitor the quality of air around us. A wifi module is attached the Arduino Uno through which the output is displayed. The architectural design is extendable to add on other devices. The scope and applications of this system are adaptable as per the needs arise over time. One of the major advantages of this system is, with the implementation of the Internet of Things they can be used on a larger scale.*

**Keywords**— MQ135 sensor, Wi-Fi module, Scope, Implementation

### 1. INTRODUCTION

Air pollution has become a common phenomenon everywhere. Especially in urban areas, air pollution is a real-life problem. A lot of people get sick only due to air pollution. So now it has become an important factor to monitor air pollution mainly in urban areas. Generation and transport of pollutant materials are not governed properly which in turn leads to an increase in further air pollution. There are many ways to measure air pollution, with both simple chemical and physical methods and with more sophisticated electronic techniques, where electronic techniques are considered reliable and worthy. A vast majority of the urban and suburban areas in the world is exposed to conditions which exceed air quality standards set by WHO. Especially, the large cities in developing countries have the highest air pollution levels. The design of effective abatement strategies for reduction emission becomes very

difficult if we take into account the socio-economical problems. The population growth leads to increasing economy as well as industrial activities which cannot be inhibited due to the development needs. These difficulties could be solved using an improved technology to reduce pollution. Monitoring of air pollution is one of the most important tools. It helps us to understand the status of air pollution levels and to understand the evolution of air pollution. Monitoring gives us information on emissions sources because monitoring could be done on the roadside for evaluating the traffic emissions and in the industrial park for evaluating the industrial emission sources. Hence to cope with colossal amount and levels of air pollution, we are proposing a reliable system of air monitoring which would control the amount of air pollution caused tremendously.

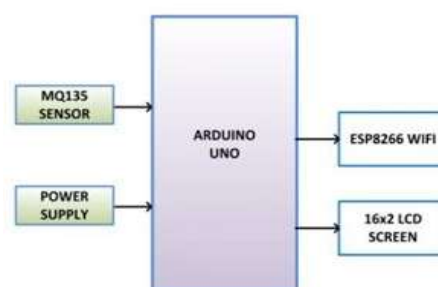


Fig. 1: The flow of the process

### 2. PROBLEM STATEMENT

Indoor air pollution and poor urban air quality are listed as two of the world's worst toxic pollution problems. The quality of the air we breathe is estimated to become nonbreathable in a few hundred years. Right awareness should be given to the people around the world to rethink their decisions that affect the air and pollute its composition making it harmful to us. There exists no universal system or device that can work efficiently in all sorts of environments from homes, roads, nuclear facilities to hospitals. The main problem arises due to poor monitoring of air pollution due to miscellaneous interactions, limited protocol standardization, security of data storage and complex identification systems to access data. The whole air monitoring process is under scrutiny in the case of urban areas. Hence to overcome all these problems we are proposing the Air monitoring system.

### 3. EXISTING SYSTEM

There are many existing systems for air monitoring which includes FTIR spectroscopy and environmental air pollution monitoring system. FTIR Spectroscopy is a technique based on the determination of the interaction between an IR radiation and a sample that can be solid, liquid or gaseous. It measures the frequencies at which the sample absorbs, and also the intensities of these absorptions. The frequencies are helpful for the identification of the sample's chemical make-up due to the fact that chemical functional groups are responsible for the absorption of radiation at different frequencies. EAPMS measures the major polluting gases using a semiconductor sensor array. The sensor array is connected to the STIM. In addition to that, a warning generation buzzer is also connected. The STIM is linked to a Network Capable Application Processor PC through transducer independent interface.

### 4. PROPOSED SYSTEM

The proposed "Air monitoring system" consists of a dust sensor, wi-fi module and Arduino Uno which are the three main components for the proposed system. The Arduino board and the Wi-Fi module require 3.3 V while MQ-135 sensor needs 5V DC for their operation. The Arduino can be powered by connecting it to a USB connection. Since the voltage supply and ground pins of the other modules are connected with the common VCC and ground respectively, the rest of the components draw power from the 5V output of the Arduino board itself. The MQ135 sensor and the Wi-Fi module are interfaced and powered by the Arduino Uno. The MQ135 sensor detects the amount of air pollution present and sends it to the Arduino Uno which then executes the data and with the help Wi-Fi module, the final output of the amount of air pollution is displayed in a web screen. The amount of air pollution is shown under the unit parts per million (ppm). The amount of pollution ppm shown depends only for a particular distance of the surrounding. The one advantage of this system is that it is easier to connect, use and display output in the web screen, which would help in monitoring the air pollution regularly.

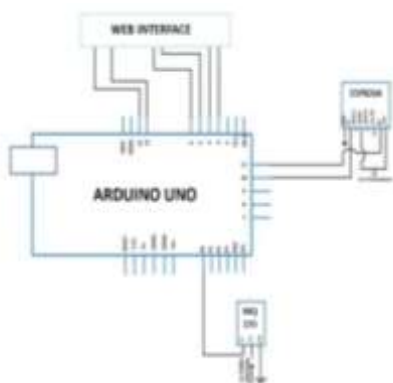


Fig. 2: Circuit diagram

### 5. SYSTEM OVERVIEW

The device developed in this project can be installed using any Wi-Fi hotspot in a populated urban area. As the device is powered, the Arduino board loads the required libraries and start sensing data from the MQ-135 sensor. The sensor can be calibrated so that its analog output voltage is proportional to the concentration of polluting gases in PPM. The Wi-Fi module is configured to connect with the ThingSpeak IOT platform. The Wi-Fi module can be connected with the ThingSpeak server by sending AT commands from the module.



Fig. 3: Wi-Fi Module

The MQ135 sensor is an air quality sensor for detecting a wide range of gases. Ideal for use in an office or a factory. The MQ135 gas sensor has high sensitivity to Ammonia, Sulfide and Benzene steam, also sensitive to smoke and other harmful gases. It used to detect the amount of air pollution present in the air and sends it to the Arduino Uno.



Fig. 4: MQ135 sensor

### 6. CONCLUSION

This proposed system which is designed shows the simulated output of the amount of air pollution caused in particular day in a graphical form live. This gives a proper data which in turn leads to improvement of the proper air monitoring system which is powered by IoT. This proposed system can provide an analysis of air contaminant levels over a long period of time and this method of air monitoring is unrestricted by range since it can be viewed from anywhere once it is connected to a Wi-Fi source. Air monitoring system is one of the must needed system in the future as with the swelling development in progress. Amount of air pollution will also increase. So to build a well-maintained society around us air monitoring system is required.

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