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# Air Pollution Monitoring System using Android Application

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## ABSTRACT

Air Pollution is causing a severe threat to the environment. In order to the survival of the environment and humans, a new system is designed to reduce the pollution. In this system, two sensors MQ7 and MQ135 are used. MQ7 sensor is used to detect the level of Carbon Monoxide in the atmosphere. MQ135 sensor is used to detect the quality of air in the atmosphere. These sensors will detect the level of pollution in the environment. After detecting the level of pollution in the environment, it is made available for the people to view the pollution level using an android application. Android application is designed in such a way such that it is provided with user name and password. The android application is also made to be connected with Global Positioning System. In the android application, if the location is specified, the person can view the level of pollution. So, further actions can be taken for reducing pollution by informing to respective authorities. The user can use this android application anywhere and he can view the level of pollution.

**Key Words:** MQ7, MQ135 Sensor, Internet of Things, Android application

## INTRODUCTION

Pollution is being a major factor affecting our environment. It leads to several diseases due to the harmful gases emitted by them. According to World Health Organisation Global Urban Ambient pollution Database, 98% of cities in low and middle income countries do not meet air quality guidelines. There are four main types of air pollution sources: mobile sources – such as cars, buses, planes, trucks, and trains. Stationary sources – such as power plants, oil refineries, industrial facilities, and factories. Area sources – such as agricultural areas, cities, and wood burning fireplaces. Burning Money Causes Air Pollution. It's no surprise that burning trash is a massive source of air pollution. In fact, a study estimates that more than 40 percent of the world's garbage is burned, releasing carbon dioxide, carbon monoxide, mercury, particulate matter, and other toxins into the air.

A total amount of more than 2.4 million pounds of carbon dioxide released into the air every second. Carbon dioxide (CO<sub>2</sub>) is a good indicator of how much fossil fuel is burned and how much of other pollutants are emitted as a result. More than 5.5 million people worldwide are dying prematurely every year as a result of air pollution, according to new

research. Most of these deaths are occurring in the rapidly developing economies of China and India.

## MATERIALS AND METHODOLOGY

### 1. Working

MQ135 sensor is used to detect the quality of air. It is also a sensor which is used to detect the content of alcohol. It is also known as Alcohol sensor. MQ7 sensor is used to detect the level of Carbon Monoxide. These sensors are placed in a Bread Board. An Arduino UNO is also used, which is also placed on the bread board. A cable is connected and it acts as the bridge between the system and the Arduino. A Light Emitting Diode (LED) is also used which will be indicating the level of pollution. If the level of pollution is high, the light becomes ON and if the pollution level is low, the light becomes OFF. Hence the pollution will be detected through sensors and the level of pollution is gained as the output in parts per million (PPM). An android application is designed with a username and password page. After entering the login details, he might be asked to enter the location. After the location is specified, he will be able to view the level of pollution in his mobile.

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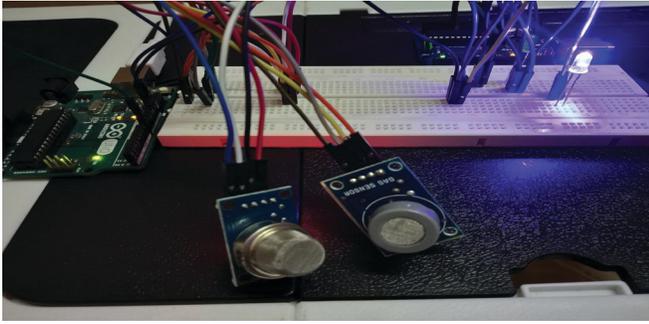
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## 1.2 Design:

The design of the monitoring system is given by Fig.1



### 1.2.1 Arduino Uno



The Arduino UNO is a widely used open-source microcontroller board based on the ATmega328P microcontroller. The board is equipped with sets of digital and analog input/output (I/O) pins that may be interfaced to various expansion boards (shields) and other circuits. The board features 14 Digital pins and 6 Analog pins. It is programmable with the Arduino IDE (Integrated Development Environment) via a type B USB cable. It can be powered by a USB cable or by an external 9 volt battery, though it accepts voltages between 7 and 20 volts. It is also similar to the Arduino Nano and Leonardo. The hardware reference design is distributed under a Creative Commons Attribution Share-Alike 2.5 license and is available on the Arduino website. Layout and production files for some versions of the hardware are also available. "Uno" means one in Italian and was chosen to mark the release of Arduino Software (IDE). The Uno board and version 1.0 of Arduino Software (IDE) were the reference versions of Arduino, now evolved to newer releases. The Uno board is the first in a series of USB Arduino boards, and the reference model for the Arduino platform. The ATmega328 on the Arduino Uno comes preprogrammed with a boot loader that allows to upload new code to it without the use of an external hardware programmer.

#### General Pin functions:

**LED:** There is a built-in LED driven by digital pin 13. When

the pin is HIGH value, the LED is on, when the pin is LOW, it's off.

**VIN:** The input voltage to the Arduino/Genuino board when it's using an external power source (as opposed to 5 volts from the USB connection or other regulated power source). You can supply voltage through this pin, or, if supplying voltage via the power jack, access it through this pin.

**5V:** This pin outputs a regulated 5V from the regulator on the board. The board can be supplied with power either from the DC power jack (7 - 20V), the USB connector (5V), or the VIN pin of the board (7-20V). Supplying voltage via the 5V or 3.3V pins bypasses the regulator, and can damage the board.

**3V3:** A 3.3 volt supply generated by the on-board regulator. Maximum current draw is 50 mA.

**GND:** Ground pins.

**IOREF:** This pin on the Arduino/Genuino board provides the voltage reference with which the microcontroller operates. A properly configured shield can read the IOREF pin voltage and select the appropriate power source or enable voltage translators on the outputs to work with the 5V or 3.3V.

**Reset:** Typically used to add a reset button to shields which block the one on the board.

### 1.2.2 MQ135 Gas Sensor:



Sensitive material of MQ135 gas sensor is SnO<sub>2</sub>, which with lower conductivity in clean air. When the target combustible gas exist, The sensors conductivity is more higher along with the gas concentration rising. Please use simple electro circuit, Convert change of conductivity to correspond output signal of gas concentration. MQ135 gas sensor has high sensitivity to Ammonia, Sulfide and Benzene steam, also sensitive to smoke and other harmful gases. It is with low cost and suitable for different application. Used for family, Surrounding environment noxious gas detection device, Apply to ammonia, aromatics, sulfur, benzene vapor, and other harmful gases/smoke, gas detection, tested concentration range: 10 to 1000ppm.

1.2.3 MQ7 Gas Sensor:



The MQ-7 is a Carbon Monoxide (CO) sensor suitable for sensing CO concentrations in the air. It can detect CO-gas concentrations anywhere from 20 to 2000 ppm. It make detection by method of cycle high and low temperature, and detect CO at low temperature. It is widely used in domestic CO gas leakage alarm, industrial CO gas alarm and portable CO gas detector. The sensor can operate at temperatures from -10 to 50°C and consumes less than 150 mA at 5 V.

1.3 Android application:

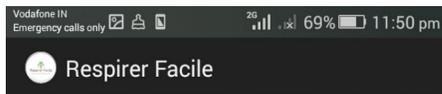


Figure 1: Illustrates the home page.



Figure 2: Illustrates the description of the android application.



[Already has account! Login here](#)

Figure 3: Could be the account registration page.

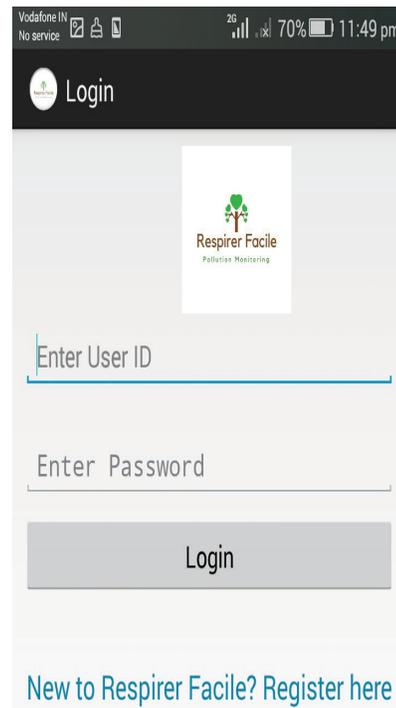


Figure 4: Could be the login page which requires username and password.

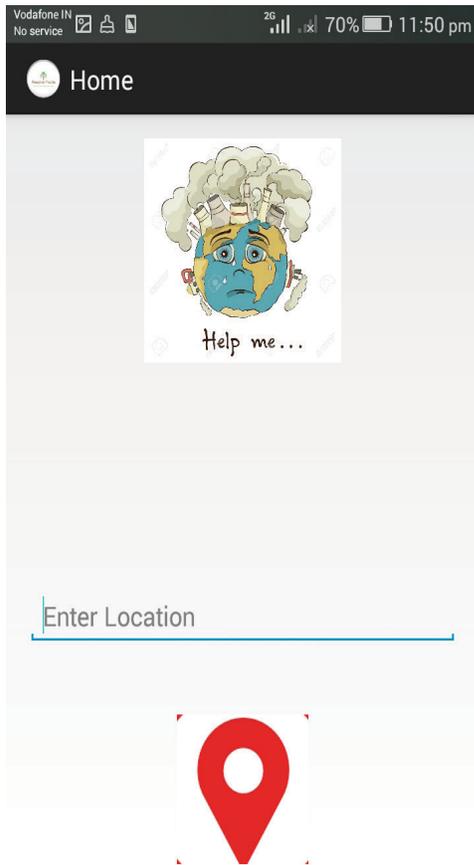


Figure 5: Illustrates the page which asks the user to enter the location for viewing the level of pollution.

The above figure illustrates the increase in pollution from year to year. In 2025, it could be inferred that there will be huge pollution in the environment.

The sensors will be detecting the level of pollution and according to the level of pollution, Light Emitting Diode (LED) is used and made to ON or OFF. The level of pollution will be detected and displayed in the serial monitor. It is further then uploaded in the android application so that anyone can able to view it. Hence, the concept of detecting the pollution is being implemented. There are various factors leading to several environmental problems. So, this system will be beneficial to the environment.

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## RESULTS AND DISCUSSION

