

## Arduino Based Air Pollution Monitoring System

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**Abstract:** Day to day, the level of Air pollution is increasing rapidly due to increase industries, factories, vehicle use which affect human health. So here we have designed a device/system which can measure air quality around it and monitor air pollution levels and also indicates and warns us when the air quality goes down beyond a certain level. This system can sense LPG, Smoke, Alcohol, Propane, Hydrogen, Methane and CO, these gases are harmful to human health. So, this system is perfect for Air Quality Monitoring. This is a small portable device, we can use it at our home, office, classroom, and factory. It can save us from harmful gases. Air pollution is the presence of extra unwanted biological molecules, particulates or other harmful things into the earth atmosphere. It is a major cause of infections, allergies, and eventually reasons of death to some people. It also harms to other existing creatures like that animal as well as food crops, or the ecological or built environment. They are also and thus a reason of death if unprotected for a long time. The world health organization (WHO) in 2014 approximated those 7 million people deaths worldwide because of air pollution. The similar approximation roughly equalled by the International Energy Agency (IEA) also. These chemicals or pollutants are also responsible for various environmental calamities like acid rain and depletion of ozone layer. Because of a number of anthropogenic actions, air pollution is on the growth and its controlling is of significant importance to alleviate particular actions to limit it. In the past, the air quality measuring sensors were very big, non-portable and expensive. Presently, most air pollution sensors developed on five most common air pollutants viz. nitrous oxide, carbon monoxide, ozone, sulfur dioxide and particulate matter. In today's world, air pollution and quality monitoring are really vital as it has a great effect on human health. The developed air-quality measurement sensor can identify and observe the incidence of air pollution in the adjacent areas. It can be employed for both indoor and outdoor. With the help of future technological improvements, these sensors will become cheaper and more common, inexpensive, portable air-quality sensors which can be wearable by people to observe the local air quality.

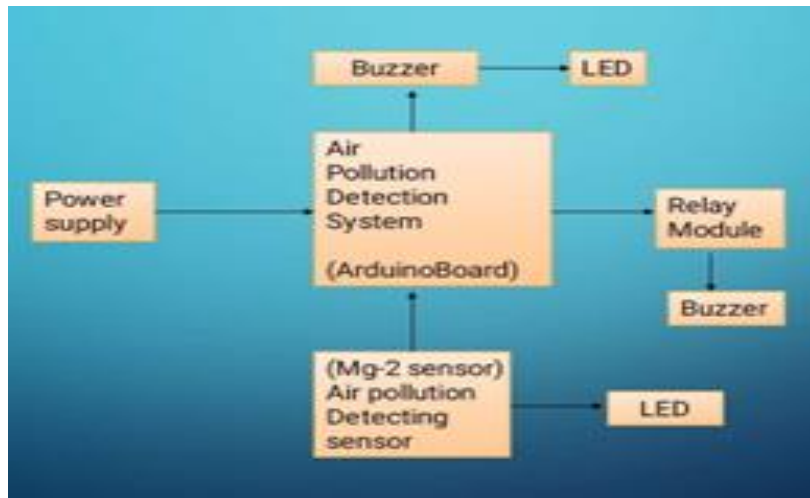
### 1. INTRODUCTION

The Air Excellence Guide (AEG) may be a common indicator of air quality. The Air Quality Indicator (AQI) is calculated and supported on air pollutants like CO and NO<sub>2</sub> compounds that consume opposing possessions appending the atmosphere and human health. The Air Quality Indicator may be a range that represents the very finest meditation of a specific air unused matter at a particular time. I propose an air quality as well as air pollution monitoring system that allows us to monitor and check live air quality as well as air pollution in an area through Arduino technology. It uses air sensors (Gas Sensor MQ2) to sense presence of harmful gases/compounds in the air and constantly transmit this data. In addition, system keeps detecting air pollutants in the air and alerts us immediately. The sensors interact with Arduino Nano board (Microcontroller) which processes this data and transmits it over the air pollution monitoring system. This allows authorities to monitor air pollution in different areas and act against it. In addition, authorities can keep a watch on the air pollution near schools, and hospitals areas. Normally, little concentrations area unit measured exploitation ppb (parts per billion), that represents units of mass of a material per one billion units of total mass. Parts per million (ppm) may be similar and unremarkable used unit to measure concentrations of pollutants. It determines the requirements of a new system and analyze on product and resource requirement, which is required for the successful system. The product requirement contains input and output requirements it gives the wants in term of input to produce the required productivity. The resource requirements define in brief about the hardware that are needed to achieve the required functionality. In this project I am going to make an Arduino based Air Pollution Detection/Monitoring System in which I monitor the Air Quality over an Arduino Nano using MQ2 sensor device and a trigger alarm when the air quality goes beyond a certain level means when there is number of harmful gases is present in the air like CO<sub>2</sub>. It detects if there is air pollution and indicates with the help of buzzer and red LED that I monitor it very easily.

## 2. LITERATURE SURVEY

The project is an implementation of Arduino Technology based Air Pollution Monitoring System Using Arduino Nano. Air pollution is a growing issue and it is necessary to monitor air quality for a better future and healthy living for all. This issue is getting popular by-day and standards are on its way. Therefore, collection of air quality information is easier. Analysis of monitoring data allows us to assess how bad air pollution from day to day. According to the recent survey, Dh, the capital of Bangladesh is the third in the list of most air-polluted city. Thus because of this expansion in the quantity of vehicles contamination is developing quickly and it influencing people groups wellbeing too. This air contamination makes disease and harm safe, neurological, regenerative and respiratory framework. In extraordinary cases, it can likewise cause passing. As indicated by overview 50000 to 100000 unexpected losses occurred to us only because of air contamination. Along these lines, there is a requirement for checking air quality and to monitor it. This is the system of physical gadgets, vehicles, home apparatuses, and different things implanted with hardware, programming, sensors, and availability which empowers these articles to associate and trade information. Arduino Nano board permits articles to be noticed or controlled.

## 3. PROPOSED METHOD



**FIGURE 1.** Block Diagram of proposed method

In the block diagram above, we see that an Arduino Nano board is used as microcontroller in the project. The controller controls the MQ2 gas sensor, buzzer, relay module and LEDs. The air pollution detection system works: When the power supply is given, the device gets automatically in condition mode. If the poisonous gases or air pollutants are high in air, then the MQ-2 sensor detects it. It sends the signal to Arduino Nano board. We are going to get alerts in the form of buzzer in ON state and red LED immediately. Once these dangerous gases are completely cleared, then the buzzer turns OFF along with green LED.

## 4. RESULT

The MQ2 Gas Sensor detects the gases like LPG, Smoke, Alcohol, Propane, Hydrogen, Methane and CO (Carbon monoxide) which effects the human health severely. So here we are designing a system called air pollution monitoring system that measures the air quality around it when the air pollutants are at a distance of 0.3m from the gas sensor. It helps to detect the gases in a range of 300-10000 ppm. Once these dangerous gases are detected by the gas sensor, then it sends the signal to the Arduino Nano board. The Arduino Nano Microcontroller processes the information and gives us an alert with the help of buzzer and red LED turns ON immediately. When these harmful gases are cleared in the surroundings, then we are again going to get an alert of buzzing alarm with the green LED turns ON. So, this system is perfect for Air Quality Monitoring. We can implement it in places like offices, houses, schools and everywhere. It can prevent us from long term effects of air pollution.

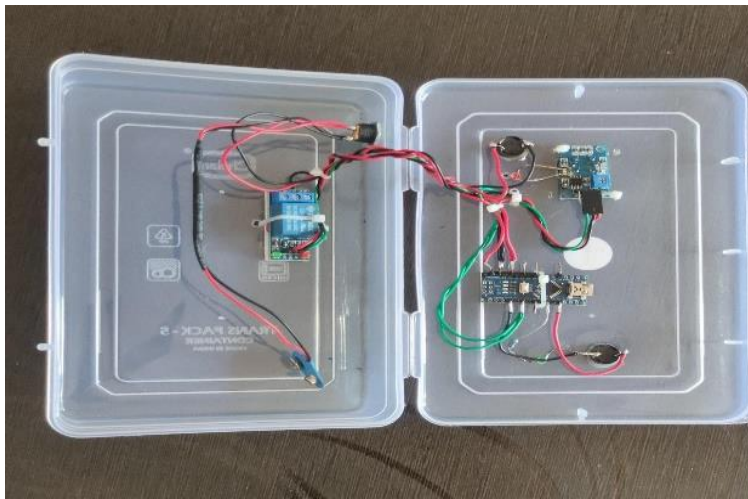


FIGURE 2. Hardware Setup

## 5. CONCLUSION

The air pollution monitoring system provides real time information about the level pollution, as well as provides an alert in case of drastic change in quality of air. This information can then be used by authorities to take prompt actions. We have developed an Arduino based air pollution detector which is a very effective air pollution monitoring system. Based on the performance we can say that it is easy to use, and functionality is comparable to the expensive existing air pollution detectors. It is a microcontroller based portable system. It is efficient and user-friendly air quality detection system.

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