

# Detection of Gas and alert by Using Arduino UNO & MQ2 Sensor

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## **Abstract**

*In today's world, everyone is busy in their own life that people rarely take care of using resources effectively. We know gas is a useful component in environment. Some gases do not cause any harm if emitted in excess amount but some do. Gas like LPG is used household purpose for cooking food. Not only in household purpose but also in hotels, restaurants, hospitals, etc where there is human interaction. Also we can see CNG operated vehicles. If there is any amount of leakage of these type gases it can cause a huge loss to life and property. So what if we get a way to reduce or abandon the chances of this loss.*

**Index Terms— Arduino UNO, MQ2, CNG, LPG.**

## **INTRODUCTION**

A Arduino based MQ2 sensor which will detect gas leakage. We know that fire attacks due to gas leakage in buildings, restaurants, etc are increased severely. If the gas knob is left open accidentally for a few hours it only smells and does not catch fire, but it is kept open for a long time, and then if there is any ignition then the gas rapidly catches fire. In vehicles where we use CNG , if there is any leakage then there is also same possibility of the vehicle catching fire. The sensor in the circuit will sense the leakage, if the leakage is of high intensity it will put the alarm or the buzzer on so the owners will be alert so as to take precautions measures to minimize the possibility to catch fire or any loss to life or property. This is a robust Gas sensor suitable for sensing LPG, Smoke, Alcohol, Propane, Hydrogen, Methane and Carbon Monoxide concentrations in the air. If you are planning on creating an indoor air quality monitoring system; breath checker or early fire detection system, MQ2 Gas Sensor Module is a great choice.



Fig1. Physical view of MQ2 gas sensor

MQ2 is one of the commonly used gas sensors in MQ sensor series. It is a Metal Oxide Semiconductor (MOS) type Gas Sensor also known as Chemiresistors as the detection is based upon change of resistance of the sensing material when the Gas comes in contact with the material. Using a simple voltage divider network, concentrations of gas can be detected.

MQ2 Gas sensor works on 5V DC and draws around 800mW. It can detect LPG, Smoke, Alcohol, Propane, Hydrogen, Methane and Carbon Monoxide concentrations anywhere from 200 to 10000ppm.

As we have seen the use of various gases in various fields, if there is any leakage of any such gases, then it can be detected and a harm can be minimized. It has a high response for LPG and natural gases. It also detects smoke but has a small sensitivity towards it. As any of these gases are detected the sensor will sense those and the buzzer alarm will be turned on. Alarm will inform the locals that there is a leakage of gas somewhere so that they will take steps to minimize the harm. If the problem rises even after the alarm and no steps are taken then owner of the place will be informed and if still no action is taken then emergency services will be informed so as to minimize the disaster.



Fig2. Arduino UNO

## EXPERIMENTAL SETUP AND WORKING

When tin dioxide (semiconductor particles) is heated in air at high temperature, oxygen is adsorbed on the surface. In clean air, donor electrons in tin dioxide are attracted toward oxygen which is adsorbed on the surface of the sensing material. This prevents electric current flow.

In the presence of reducing gases, the surface density of adsorbed oxygen decreases as it reacts with the reducing gases. Electrons are then released into the tin dioxide, allowing current to flow freely through the sensor.

MQ2 Gas Sensor is not breadboard compatible, we do recommend this handy little breakout board. It's very easy to use and comes with two different outputs. It not only provides a binary indication of the presence of combustible gases but also an analog representation of their concentration in air.

The analog output voltage provided by the sensor changes in proportional to the concentration of smoke/gas. The greater the gas concentration, the higher is the output voltage; while lesser gas concentration results in low output voltage. The following figures illustrates the relationship between gas concentration and output voltage.



Fig3. Smoke Detection by Using MQ2 Sensor

The analog signal from MQ2 Gas sensor is further fed to LM393 High Precision Comparator (soldered on the bottom of the module), of course to digitize the signal. Along with the comparator is a little potentiometer you can turn to adjust the sensitivity of the sensor. You can use it to adjust the concentration of gas at which the sensor detects it.

The sensor is connected to the input of the arduino with the help of connecting cables or jumper cables. Further the circuit goes towards output where the buzzer is connected. If we differ the delay value of the buzzer then we get a variation in the buzzer sound. This can be applicable to detect various gases. Arduino is specially used in this design as it is easy to use in the circuit and the program upload is also very simple. That is why arduino is used. It is provided with 5v dc, which is a advantage that it won't require much power and is easy to install.

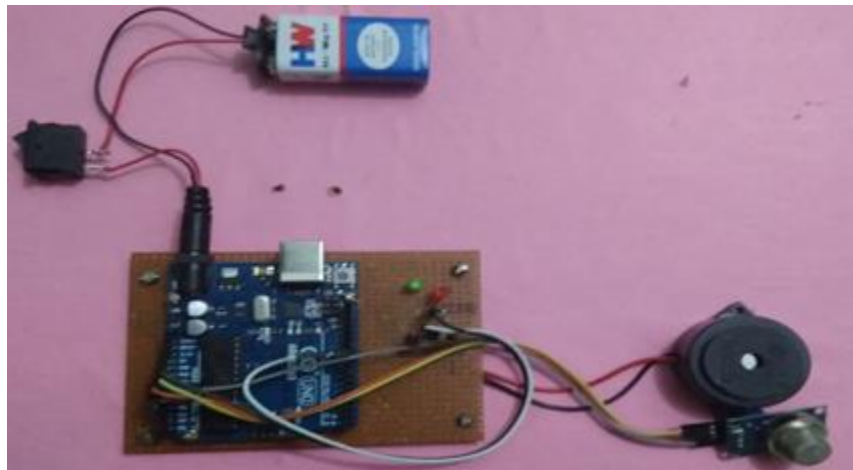


Fig4. Experimental Setup of Gas Sensor

