



# Graphic Era

(Deemed to be University)

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## MINI PROJECT REPORT

### SMOKE DETECTOR

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**CLASS ROLL NO.: - 06**

**SECTION: - B:**

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## DECLARATION

I, SHIVANI SHARMA student of B-tech, Semester 4, Department of Computer Science and Engineering, Graphic Era Deemed University, Dehradun, declare that the technical project work entitled "**SMOKE DETECTOR**" has been carried out by me and submitted in partial fulfilment of the course requirement for the award of degree in B-tech of Graphic Era Deemed University during the academic year 2021-2022. The matter embodied in this synopsis has not been submitted to any other university or institution for the award of any other degree or diploma.

Date: 14/07/22

Place: Dehradun

Name of the candidate:

Shivani Sharma

## ACKNOWLEDGEMENT

Here by I am submitting the project report on "**SMOKE DETECTOR**" as per the scheme of Graphic Era Deemed University, Dehradun. I would like to express our sincere gratitude to **Dr. Devesh Pratap Singh**, Head of Dept. of Computer Science, for providing a congenial environment to work in and carry out our project.

I consider it mine cardinal duty to express the deepest sense of gratitude to **Dr. Upma Jain**, Professor, Department of Computer Science and Application for the invaluable guidance extended at every stage and in every possible way.

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Finally, I am very much thankful to all the faculty members of the Department of Computer Science and Technology, friends and our parents for their constant encouragement, support and help throughout the period of project conduction.

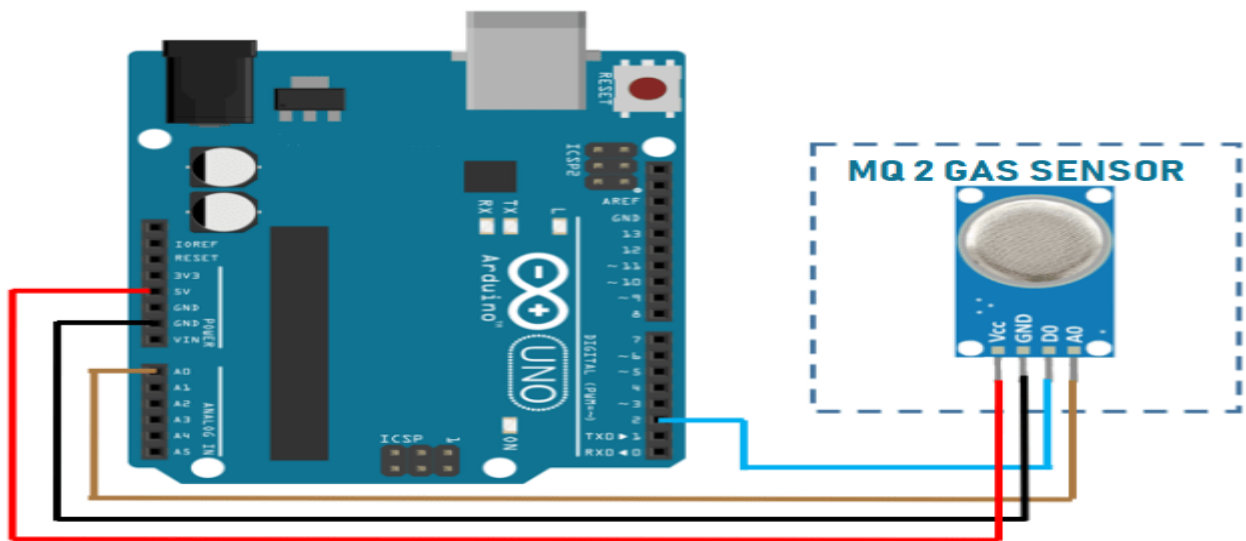
SHIVANI SHARMA

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# PROBLEM STATEMENT



*Fig(a): Arduino and MQ2 based smoke detector*

Safety is a crucial consideration in design of residential and commercial buildings in order to safeguard against loss of life and damage to property. Fire is a key element in safety considerations. This project therefore seeks to design an Arduino and a sensor-based smoke detector that will continuously monitor the presence of significant amount of smoke and activate an alarm to prompt a safety measure to control the situation.

This system can be of great in domestic as well as industrial settings to detect smoke and alert people on an impending fire since smoke is a precursor for fire, instead of relying on heat/temperature sensors which sounds alarm when the fire has already started. This system can also be used to detect and deter smokers in areas where smoking is prohibited.

Smoke detectors respond faster to fire in its early, smouldering stage (before it breaks into flame). The smoke from the smouldering stage of a fire is typically made up of large combustion particles—between 0.3 and 10.0  $\mu\text{m}$ . Smoke detectors respond faster (typically 30–60 seconds) in the flaming stage of a fire.

# INTRODUCTION

According to, Smoke detector has been reviewed as a fundamental component of active fire detection strategy of modern commercial and residential building. In the 1970's, industries recorded increased use of smoke detectors and this growth was accompanied by several significant research projects that reinforced the life safety protection provided by smoke detectors, thereby providing significant evidence that supported increase in use of smoke detectors. Also, in order to understand the response, working principle of these detectors in the environment, several researches were embarked. Accurate prediction of smoke detector is a very significant way of assessing detector system performance because occupants and fire service notification can be dependent upon smoke detector response. Fire Dynamic Simulator software, can be used to predict the response of smoke detector.

A smoke detector is a device that senses smoke, typically as an indicator of fire. It may issue a signal to a fire alarm control panel as part of fire alarm system. Smoke can be detected either optically (photoelectric) or by physical process(ionization). Smoke detectors have prior detection when compared with heat detectors, hence are preferred for fire detection. They also find application in detecting, and thus deter smoking in premises where it is banned.

Once there a fire, the fire detection system activates the alert thereby triggering the automatic sprinkler system. Researchers have been studying fire taking place in various places such as residential area and commercial buildings



## *MOTIVATION*

The Motivation of doing this project “SMOKE DETECTOR” comes from the idea that to decrease the fire accidents in our homes, workplace, offices, hospitals, and many more places. Fire hazards are not uncommon. In order to avoid the damage from fire accidents and incident, smoke detectors are installed at these high-security places, homes, hospitals etc. These smoke detectors detect any type of smoke as the fire breakout and an alarm will be buzzed off through the sensor.

## *TOOLS USED*

### *a) ARDIUNO-UNO BOARD:-*



*Fig(b): The Ardiuno-uno Board*

The Arduino UNO is a standard board of Arduino. It was also the first USB board released by Arduino. Arduino UNO is based on an ATmega328P microcontroller. It is easy to use compared to other boards, such as the Arduino Mega board, etc. The board consists of digital and analog Input/Output pins (I/O), shields, and other circuits.

The Arduino UNO includes 6 analog pin inputs, 14 digital pins, a USB connector, a power jack, and an ICSP (In-Circuit Serial

Programming) header. It is programmed based on IDE, which stands for Integrated Development Environment. It can run on both online and offline platforms.

*b)BUZZER: -*



*Fig(c): Buzzer*

A buzzer is an audio signalling device which may be used in alarm devices, timers and other forms of alerts. They may be mechanical, electromechanical, or piezoelectric. Electromechanical buzzers use a relay connected to interrupt its own actuating current, causing the contacts to buzz. Mechanical buzzers are purely mechanical and require drivers. Piezo electric elements are driven by an oscillating electronic circuit or other audio signal source, driven with a piezoelectric audio amplifier.

*c)MQ2 GAS SENSOR: -*



*Fig(d):MQ2 Front View*



*Fig(e):MQ2 Back View*



The MQ2 sensor module was selected to serve the purpose of sensing smoke.

The MQ-2 smoke sensor is sensitive to smoke and to the following flammable gases:

LPG

Butane

Propane

Methane

Alcohol

Hydrogen

The resistance of the sensor is different depending on the type of the gas.

#### *d) JUMPER WIRES: -*



*Fig(f): Jumper Wires*

A **jump wire** is an electrical wire, or group of them in a cable, with a connector or pin at each end, which is normally used to interconnect the components of a breadboard or other prototype or test circuit, internally or with other equipment or components, without soldering.

Individual jump wires are fitted by inserting their "end connectors" into the slots provided in a breadboard, the header connector of a circuit board, or a piece of test equipment.

*e) BREADBOARD: -*



*Fig(g): The Breadboard*

A breadboard is a solderless device for temporary prototype with electronics and test circuit designs. Most electronic components in electronic circuits can be interconnected by inserting their leads or terminals into the holes and then making connections through wires where appropriate. The breadboard has strips of metal underneath the board and connect the holes on the top of the board

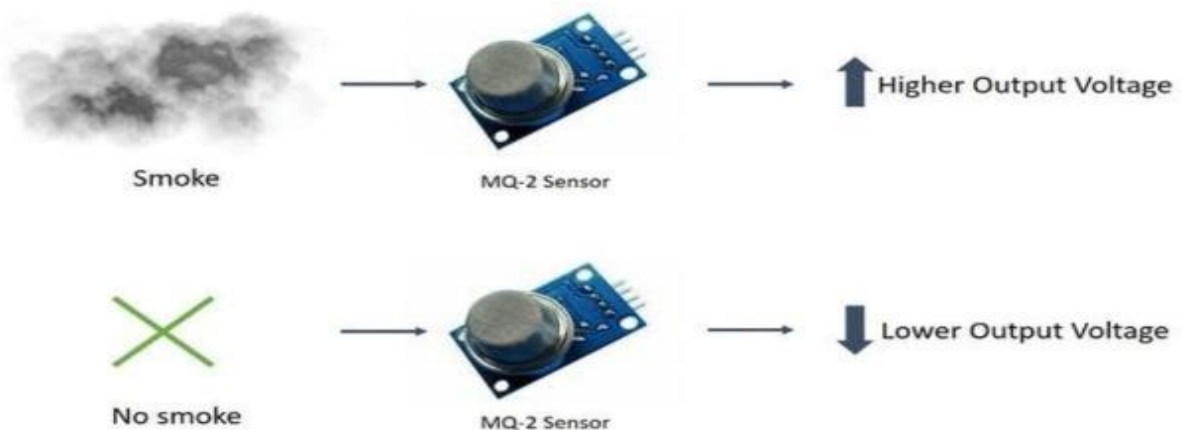
## METHODOLOGY

A smoke detector uses the method that warns people when smoke, fire, carbon monoxide or other fire-related emergencies are detected. These systems may be activated automatically from smoke detectors and heat detectors. Alarms can be either motorized bells or buzzers or horns. The voltage that the sensor outputs change accordingly to the smoke level that exists in the atmosphere.

## WORKING OF SMOKE DETECTOR ALARM

The voltage that the sensor outputs change accordingly to the smoke/gas level that exists in the atmosphere. The sensor outputs a voltage that is proportional to the concentration of smoke/gas. In other words, the relationship between voltage and gas concentration is the following:

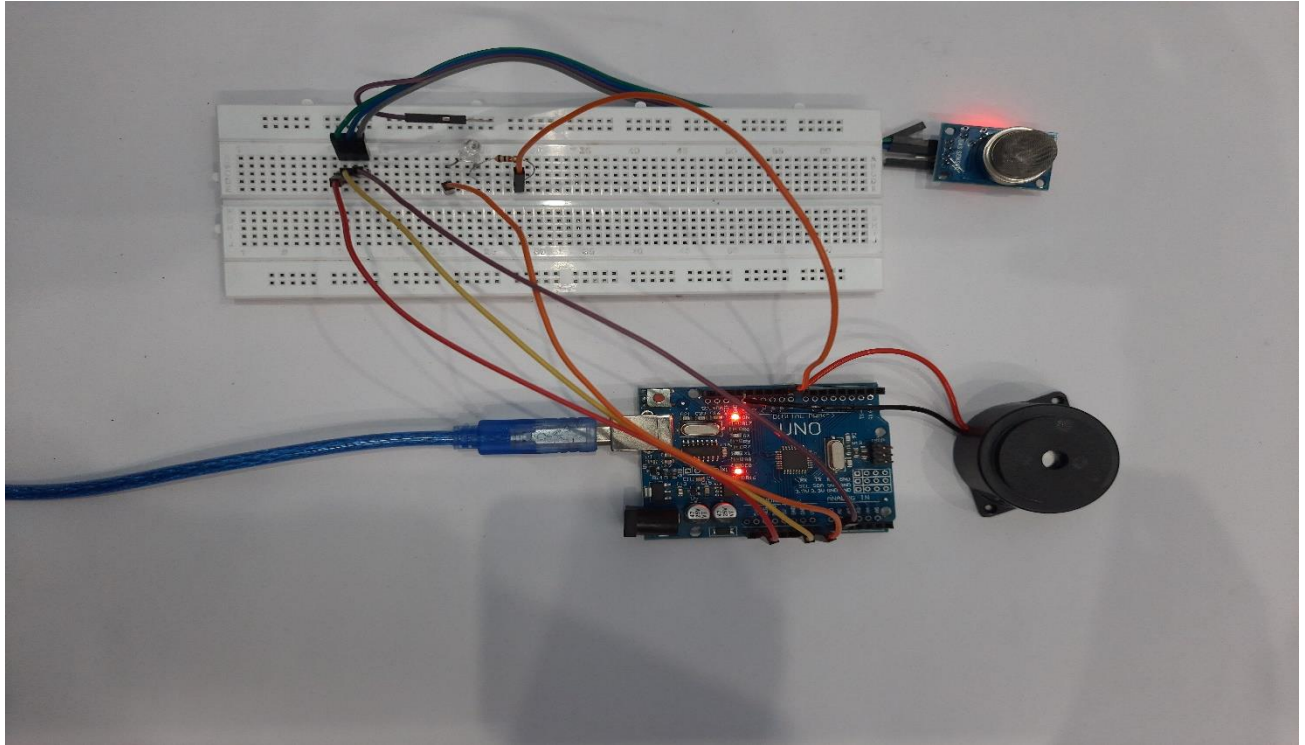
- The greater the gas concentration, the greater the output voltage
- The lower the gas concentration, the lower the output voltage



*Fig(h): Figure Explaining Working of MQ2 sensor.*

## RESULT

OVERALL, VIEW OF THE MODEL: -



*Fig(i): WORKING MODEL.*

## ADVANTAGES

- User friendly: we can edit the code whenever we want to change tone of the button.
- efficiency: it uses less power of only 5v.
- portable: it is very small to carry wherever you go
- Future Enhancement: This technology could be further modified and more upgraded as per individual need and interest. We have discussed some basic ideas of this technology. And depending on innovative applications user can upgrade as per requirement.

## *CONCLUSION*

Smoke detector is one of the easiest and low-cost devices. This system can be of great in domestic as well as industrial settings to detect smoke and alert people on an impending fire since smoke is a precursor for fire, instead of relying on heat/temperature sensors which sounds alarm when the fire has already started. This can go a long way in helping to save human life. This system can also be used to detect and deter smokers in areas where smoking is Prohibited. The cost of implementing this system is relatively low since the components used are relatively cheap and are easily available in the market.

The single microcontroller can be used to interface several sensors with alarms located in different locations as long as more pins are freed for multiple inputs multiple outputs. This system comes with a power supply that can be directly plugged to the mains (240V AC) source and give the appropriate operating voltage. we can use the project fire accidents can be controlled to a great extent in a place such as forests, home, colleges industries, trains and some other public places. Fire accidents leads to deaths of excess of people, by using this technique we can save those lives easily. To detects the chain smokers (which are hazardous to health).

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