LPG Detection and Alert System

Mini Project Report submitted in partial fulfillment.

of the requirement for the degree of

T. E. (Information Technology)

Sahil G Sawant (19101B0036)
Pavan Hembade (19101B0038)
Shubham Yadav (19101B0063)

Under the Guidance of

Prof. Neha Kudu

Department of Information Technology

Vidyalankar Institute of Technology

Wadala(E), Mumbai 400 037

University of Mumbai

2021-22

CERTIFICATE OF APPROVAL

For

Mini Project Report

This is to Certify that

Sahil G Sawant
19101B0036

Pavan Hembade
19101B0038

Shubham Yadav
19101B0063

Have successfully carried out Mini Project entitled

"LPG Detection and Alert System"

In partial fulfillment of degree course in

Information Technology

As laid down by University of Mumbai during the academic year 2021-22

Under the Guidance of
"Prof. Neha Kudu"

Signature of Guide

Head of Department

Examiner 1

Examiner 2

Principal
Dr. S. A. Patekar

ACKNOWLEGEMENT

We would like to express our deepest appreciation to all those who provided us the possibility to complete this report. We express our profound gratitude we give to our **Prof.Neha Kudu** Ma'am, our respectable project guide, for her gigantic support and guidance. Without her counseling our project would not have seen the light of the day.

We extend our sincere thanks to **Dr. Vipul Dalal**, Head of the Department of Information Technology for offering valuable advice at every stage of this undertaking. We would like to thank all the staff members who willingly helped us. We are grateful to VIDYALANKAR INSTITUTE OF TECHNOLOGY for giving us this opportunity.

The days we have spent in the institute will always be remembered and also be reckoned as guiding in our career.

1. **Sahil G Sawant**
2. **Pavan Hembade**
3. **Shubham Yadav**

Table of Contents

1. Introduction

Gas leakage leads to various accidents resulting in both material loss and human injuries. The risk of explosion, firing, suffocation are based on their physical properties such toxicity, flammability, etc. The number of deaths due to explosion of gas cylinders has been increasing in recent years. The reason for such explosion is due to substandard cylinders, old valves, worn out regulators and lack of awareness in handling gas cylinders. The LPG or propane is a flammable mixture of hydrocarbon gases used as fuel in many applications like homes, hostels, industries, automobiles, vehicles because of its desirable properties which include high calorific value, less smoke, less soot, and meager harm to the environment. Natural gas is another widely used fuel in homes. Both gases burns to produce clean energy, however there is a serious problem of their leakage. Being heavier than air, these gases do not disperse easily. It may lead to suffocation when inhaled and may lead to explosion .

Due to the explosion of LPG, the number of deaths has been increased in recent years. To avoid this problem there is a need for a system to detect the leakage of LPG. Gas leak detection is the process of identifying potentially hazardous gas leaks by means of various sensors.

2. AIM

The objective of this project is:

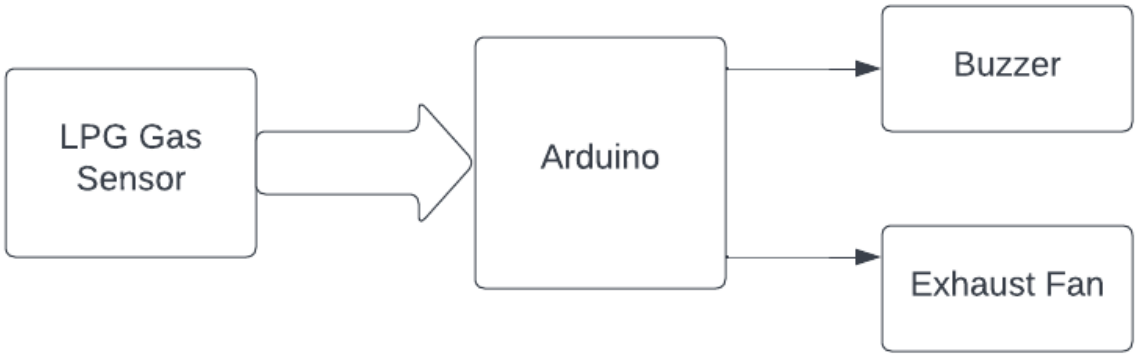
- To design and develop a LPG Gas leakage monitoring & alert system using Arduino.
- To activate the buzzer as soon as the leakage and turn on the exhaust fan.

3. PROBLEM DEFINITION

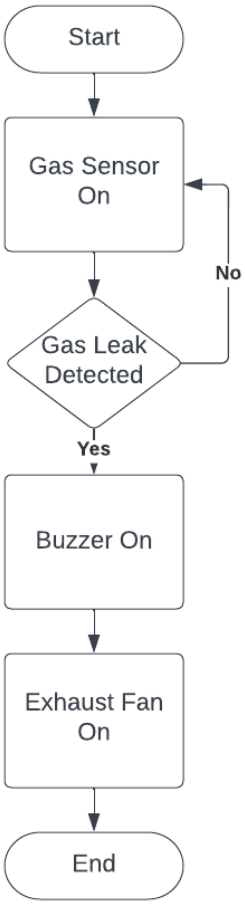
LPG gas cylinders are used in our homes for various purposes. Cooking and heating water are a major part of the same. Hence it would not be wrong to say that it is an integral part of our life. However, there have been cases in the past about accidents due to gas leakage. The basic objective of the project is to provide a security system to prevent a caused due to the leakage of gas This can be achieved by creating a ready standalone system of the same.

4. PROPOSED SYSTEM

4.1 Block Diagram:



4.2 Flow Chart:



5. COMPONENTS

5.1 HARDWARE:

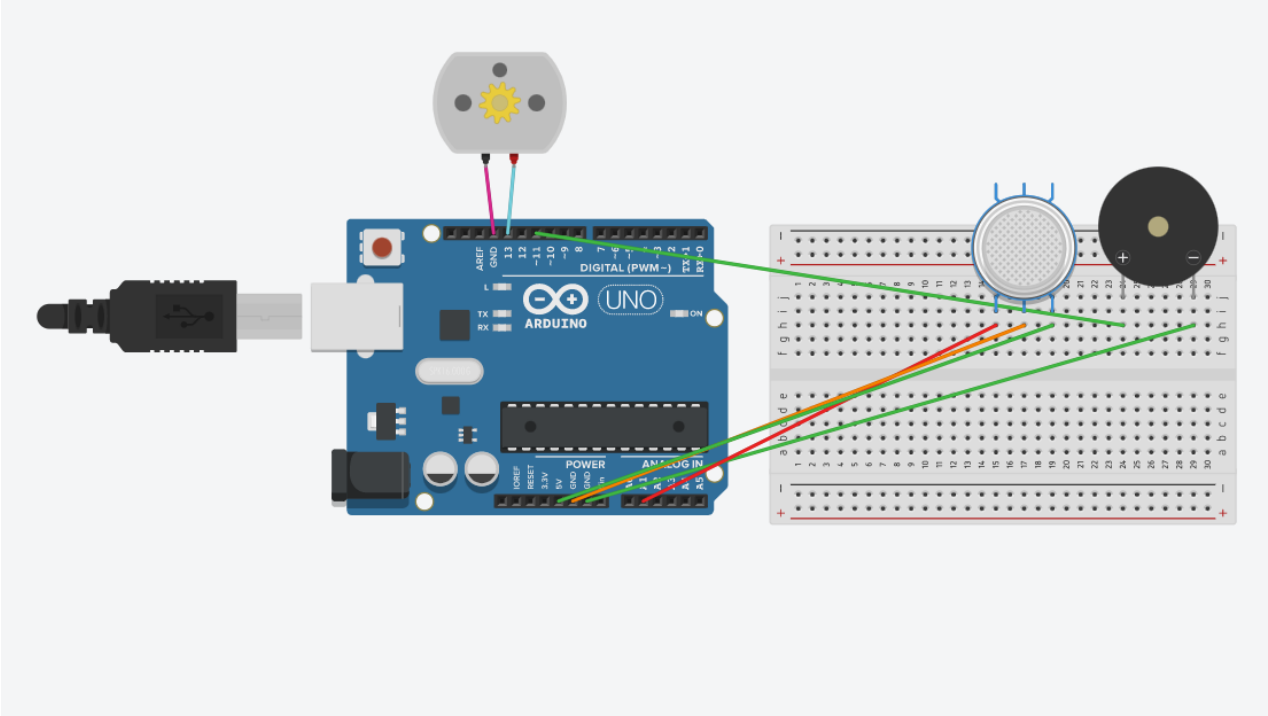
1. Arduino board UNO
2. MQ-2 Sensor
3. Buzzer
4. Jumper wires
5. Exhaust Fan
6. Bread board

5.2 SOFTWARE:

Arduino software

6. PROJECT ARCHITECTURE

The system consists of MQ-2 gas sensor which will in turn sense the gas, and send alert to the Arduino uno. Once the alert is sent, the buzzer will turn on and the exhaust fan will start rotating in order to remove the gas in the air out of the room.



The gas sensor detects the presence of lpg gas emitted by the gas cylinder. It gives logic 1 as output if gas is detected, otherwise, it gives logic 0 as output. Arduino Uno checks the logic level on the output pin of the sensor and performs further tasks such as activating the buzzer and exhaust fan.

7. CODE

```
const int flamepin=A1;
const int fanpin=13;
const int buzpin=11;
const int threshold=200;// sets threshold value for flame sensor
int flamesensvalue=0; // initialize flamesensor reading
void setup() {
Serial.begin(9600);
pinMode(flamepin,INPUT);
pinMode(buzpin,OUTPUT);
pinMode(A1,INPUT);
pinMode(fanpin, OUTPUT);
}
void loop() {
int a =analogRead(A1);
Serial.println(a);
delay(1000);
flamesensvalue=analogRead(flamepin); // reads analog data from flame sensor
if (flamesensvalue>=threshold) { // compares reading from flame sensor with the
threshold value
digitalWrite(fanpin, HIGH); //turns on led and buzzer
tone(buzpin,100);
delay(1000); //stops program for 1 second
}
else{
digitalWrite(fanpin,LOW); //turns led off led and buzzer
noTone(buzpin);
}
}
```

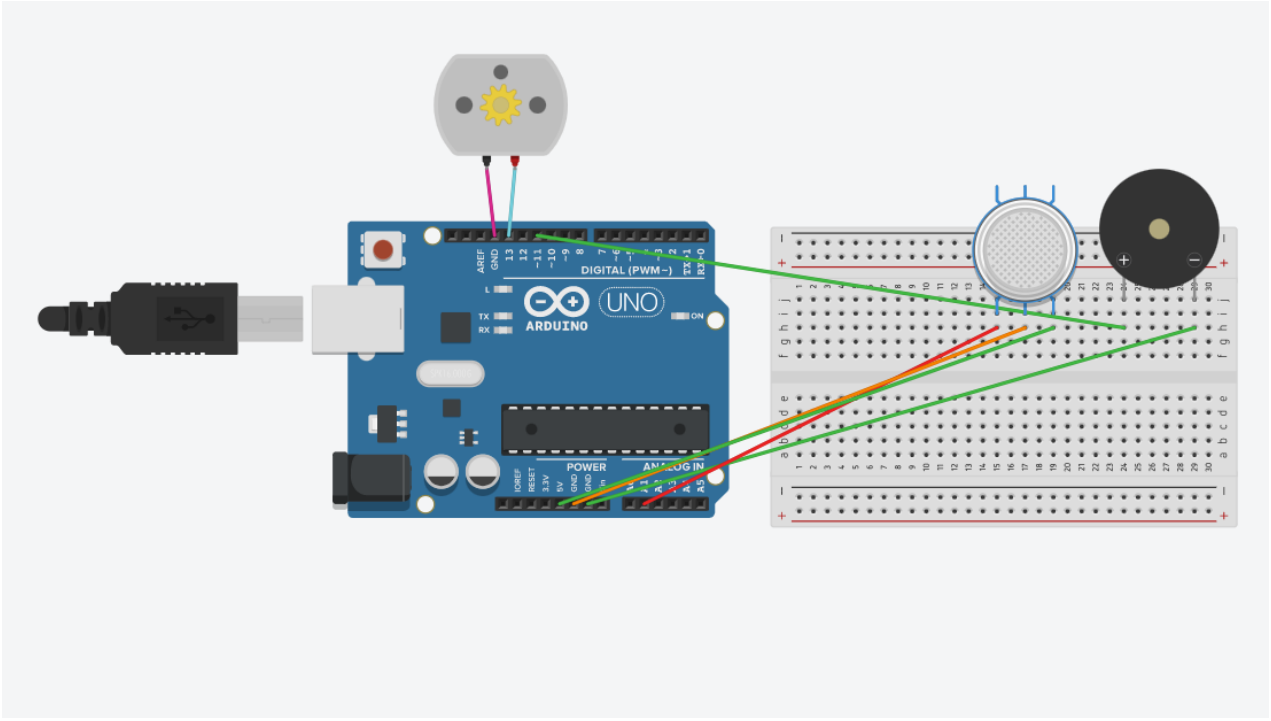
8. IMPLEMENTATION

8.1 WORKING:

Ardiuno Uno is a open-source microcontroller board based on the ATmega328p microcontroller. The gas sensor detects the presence of lpg gas emitted by the gas cylinder. It gives logic 1 as output if gas is detected, otherwise, it gives logic 0 as output. Arduino Uno checks the logic level on the output pin of the sensor and performs further tasks such as activating the buzzer and exhaust fan.

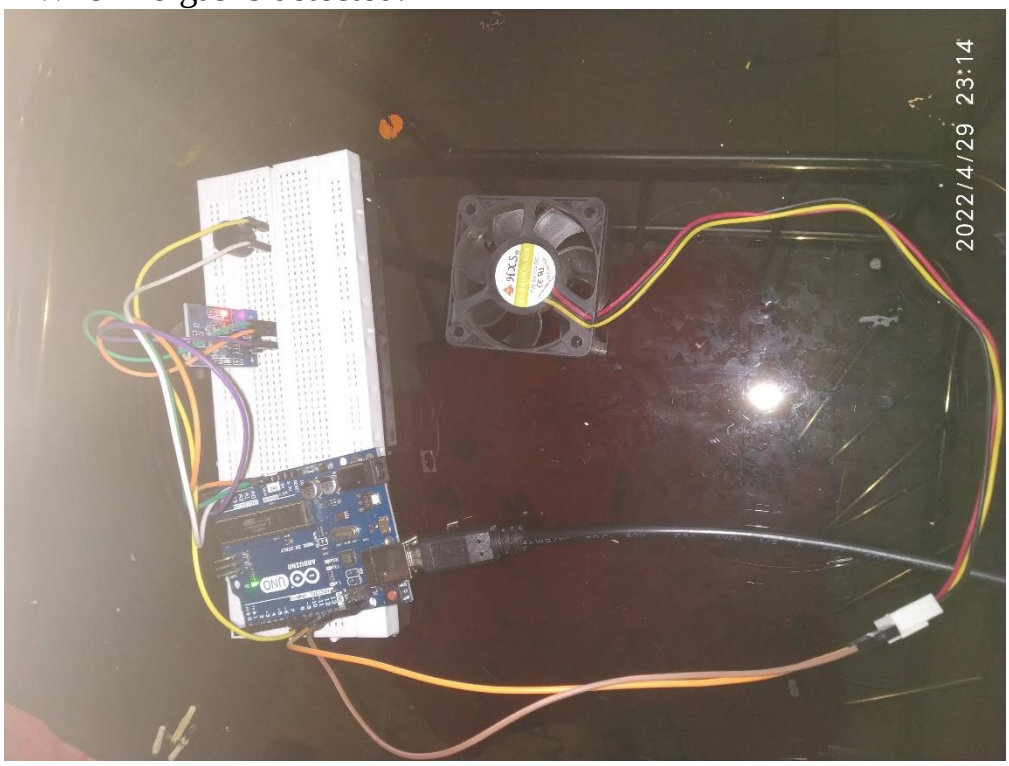
The system consists of MQ-2 gas sensor which will in turn sense the gas, and send alert to the Arduino uno. Once the alert is sent, the buzzer will turn on and the exhaust fan will start rotating in order to remove the gas in the air out of the room.

8.2 Circuit Diagram:

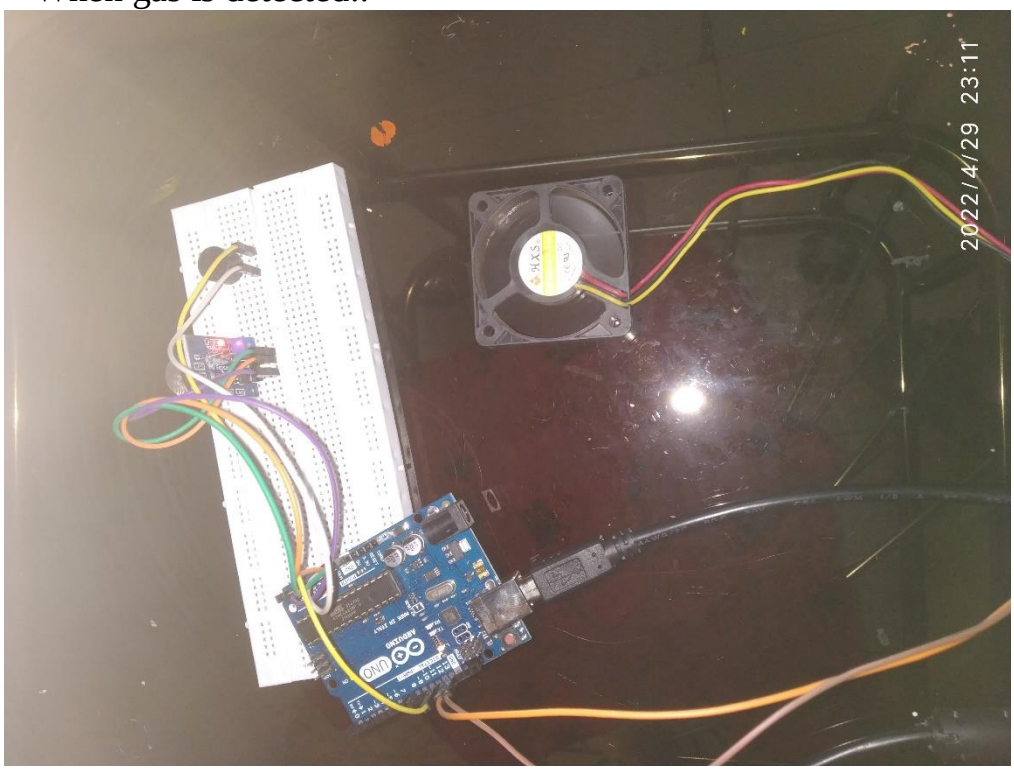


9. RESULTS

When no gas is detected:



When gas is detected:.



10.FUTURE SCOPE & CONCLUSION

10.1 FUTURE SCOPE

Overall, software and hardware parts of the systems have been developed and tested by introducing a small amount of LPG near gas sensor module. The authors of this paper are currently working to include multi functions with this device. One of the notable future functions of this system is to add a sub system where wastage of gas and the uses of gas can be monitored using this system. The system is flexible as a greater number of sensors and relays can be added to it according to the whole LPG supply setup in those premises. The author is adding more software based intelligent functions with this system. This is an automatic gas detection, control and alert system. In future this system will have a feature where it can notify the emergency services if any accidents happen. A mobile app and web-based app for real time monitoring also will be added. In the user app for this system many smart features will be added. The overall features will make the system more safe for the users. The system will be optimized for use in many places like the car, the home, industries and many other places.

10.2 CONCLUSION:

Gas leakage leads to severe accidents resulting in material losses and human injuries. Gas leakage occurs mainly due to poor maintenance of equipments and inadequate awareness of the people. Hence, LPG leakage detection is essential to prevent accidents and to save human lives. This report presented LPG leakage detection and alert system. This system triggers exhaust fan and buzzer to alert people when LPG leakage is detected. This system is very simple yet reliable.

LPG Gas Detection And Alert System

Sahil Sawant Shubham Yadav Pavan Hembade

Department of Information Technology

Vidyalankar Institute of Technology

Wadala, Mumbai

19101B0036 19101B0038 19101B0063

sahil.sawant@vit.edu.in pavan.hemabade @vit.edu.in shubham.yadav @vit.edu.in

Abstract :The presence of hazardous LPG gas leakage in a domestic, work place, also, stored gases container gas which exhibits ideal characteristic is use. For that sake, an alarm unit is used to vibrate an alarm which is buzzer. Buzzer gives an audible sign of the presence of LPG volume. The sensors are widely used to detect essence of propane, iso-butane, LPG and even smoke. The sensor has an advantage to combine a sensitivity response time. If the LPG sensor senses gas leak from work place or home, sensor output goes to active low (logic-0) condition. Arduino UNO is used in the project; low signals are overlooked by the Arduino and gas leakage is been noticed by the Arduino. The Arduino UNO turns on the LCD and buzzer. It even turns on the GSM modem after that, it continues to send messages SMS to mobile number specifically mentioned in the program of the source code for alerting danger to the people.

INTRODUCTION

I. Gas leakage leads to various accidents resulting in both material loss and human injuries. The risk of explosion, firing, suffocation are based on their physical properties such toxicity, flammability, etc.

II. The number of deaths due to explosion of gas cylinders has been increasing in recent years. The reason for such explosion is due to substandard cylinders, old valves, worn out regulators and lack of awareness in handling gas cylinders.

III. The LPG or propane is a flammable mixture of hydrocarbon gases used as fuel in many applications like homes, hostels, industries, automobiles, vehicles because of its desirable properties which include high calorific value, less smoke, less soot, and meager harm to the environment.

IV. Natural gas is another widely used fuel in homes. Both gases burns to produce clean energy, however there is a serious problem of their leakage. Being heavier than air, these gases do not disperse easily. It may lead to suffocation when inhaled and may lead to explosion .

V.

VI. Due to the explosion of LPG, the number of deaths has been increased in recent years. To avoid this problem there is a need for a system to detect the leakage of LPG. Gas leak detection is the process of identifying potentially hazardous gas leaks by means of various sensors.

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LITERATURE REVIEW

A. Existing Systems

A gas detector is a device that detects the presence of gas in an area, often as a part of safety system. This type of equipment is used to detect gas leak or other emissions and can interface with a control system so a process can automatically shut down. A gas detector can sound an alarm to operators in the area where the leak is occurring, giving them opportunity to alert. These types of devices are important because there are many harmful gases that can be harmful to organic life such as humans and animals. Gas detectors can be used to detect flame- able, combustible and toxic gases and oxygen depletion. This type of device is widely used in industry and can be found in locations such as oil rings, to monitor manufacture process and emerging technologies such as photovoltaic. Gas leak detection methods become concern after the affects of harmful gases on human health is discovered. Before modern electronic sensors

Their use in automobiles was initially for engine emission control, but now gas sensors may also be used ensure passenger comfort and safety. Carbon dioxide sensors are being installed into buildings as part of demand control ventilation systems. Sophisticated gas sensor systems are being researched for use in medical diagnostic, monitoring and treatment system, well beyond their initial use in operating rooms. Gas monitors and alarms for carbon monoxide and other harmful gases are increasingly available for office and domestic use, and are becoming legally required in some jurisdictions

early detection methods relied on less precise detectors. Though the 19 and 20th centuries coal miners would bring canaries down to the tunnels with them as an early detection system against life –threatening gases such as carbon dioxide, carbon monoxide and methane.. The first gas detector in industrial age was the safety lamp or day lamp was invented by Hunpohry Davy (of England) in 1815 to detect the presence of methane gas in the underground coal mines. The flame safety lamp consisted of an oil flame adjusted to specific height in the fresh sir. To prevent ignition with the lamps flame was contained within a glass sleeve with a mess flame arrestor. The flames height varied depending on the presence of methane or the lack of the oxygen

Issues with current Systems

The user is required to physically interact with the communication-based hardware and is also required to open the gas knob themselves as well, these systems seem like they are complicating something which isn't that complicated.

Thus, the problem with existing systems is still the major amount of user interaction that is required.

B. Problem Statement

LPG gas cylinders are used in our homes for various purposes.detection .

Cooking and heating water are a major part of the same. Hence it would not be wrong to say that it is an integral part of our life. However, there have been cases in the past about accidents due to gas leakage The basic objective of the project is to provide a security system to prevent a caused due to the leakage of gas This can be achieved by creating a ready standalone system of the same..

VII. PROPOSED SYSTEM

A signal conditioning of the Arduino UNO is done by output signal of the sensor, provided input to Arduino. Indicates the people of danger in work place, factory, home. Buzzer activity with beep(siren) sound is made amount of heat.

Following Components will be used:

LPG Detection System

- Arduino Uno
- MQ-2 Sensor
- Buzzer
- Jumper wires
- Exhaust Fan
- Bread board

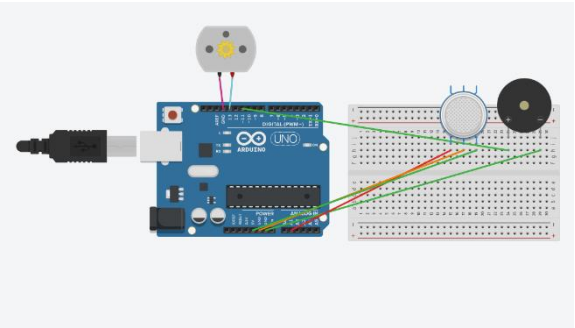


Fig 3.2 Architecture of LPG gas detector system

The system consists of MQ-2 gas sensor which will in turn sense the gas, and send alert to the Arduino uno. Once the alert is sent, the buzzer will turn on and the exhaust fan will start rotating in ord er to remove the gas in the air out of the room.

Information about the components:

Hardware:

LPG gas detection System:

- Arduino Uno

  Arduino/Genuino Uno is a microcontroller board based on the ATmega328P (datasheet). It has 14 digital input/output pins (of which 6 can be used as PWM outputs), 6 analog inputs, a 16 MHz quartz crystal, a USB connection, a power jack, an ICSP header and a reset button
- Buzzer

  A buzzer or beeper is an audio signaling device, which maybe mechanical, electromechani cal, or piezoelectric . Typical uses of buzzers and beepers include alarm devices, timers, and confirmation of user input such as a mouse click or keystroke.
- 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
- Breadboard

  A breadboard, or protoboard, is a construction basefor prototyping of electronics

Fig . Block Diagram of LPG gas Detector System

With this system we make sure that the user/owner doesn't have to be present at thedoor personally to open it.

The flowchart also puts the working into a diagrammatical view and helps in understanding the process through which the proposed system will work. Attached below is the flowchart.

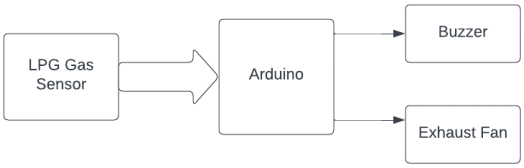
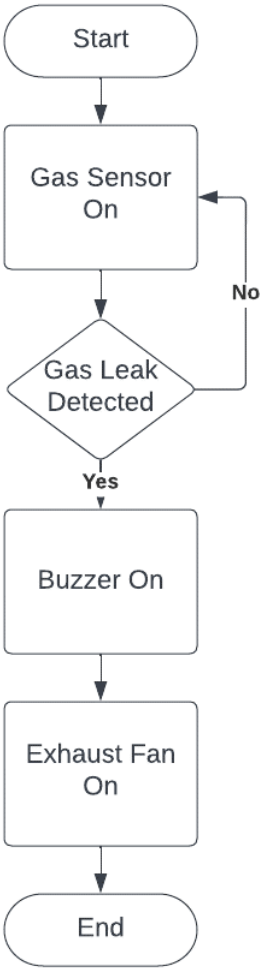


Fig. Flow Chart Of the System



Software:

- **Arduino IDE**

  It is an open-source software which helps to write and upload the code on the board. This software can be used with any Arduino board.

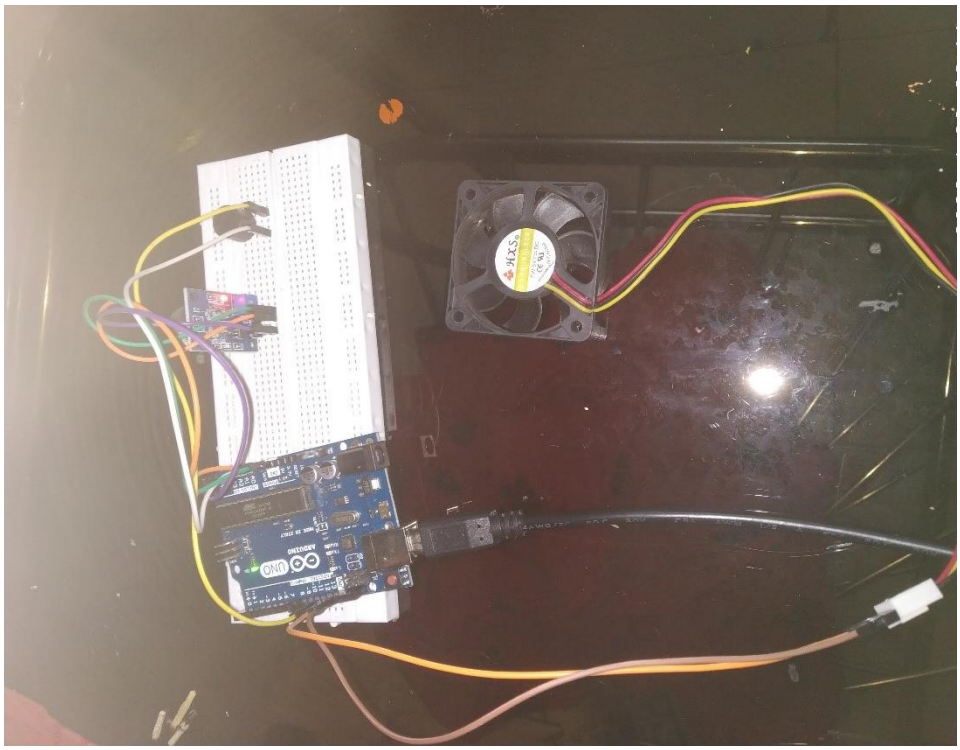
Working

I.Ardiuno Uno is a open-source microcontroller board based on the ATmega328pmicrocontroller.
II. The gas sensor detects the presence of lpg gas emitted by the gas cylinder. It gives logic 1 as output if gas is detected, otherwise, it gives logic 0 as output. Arduino Uno checks the logic level on the output pin of the sensor and performs further tasks such as activating the buzzer and exhaust fan.

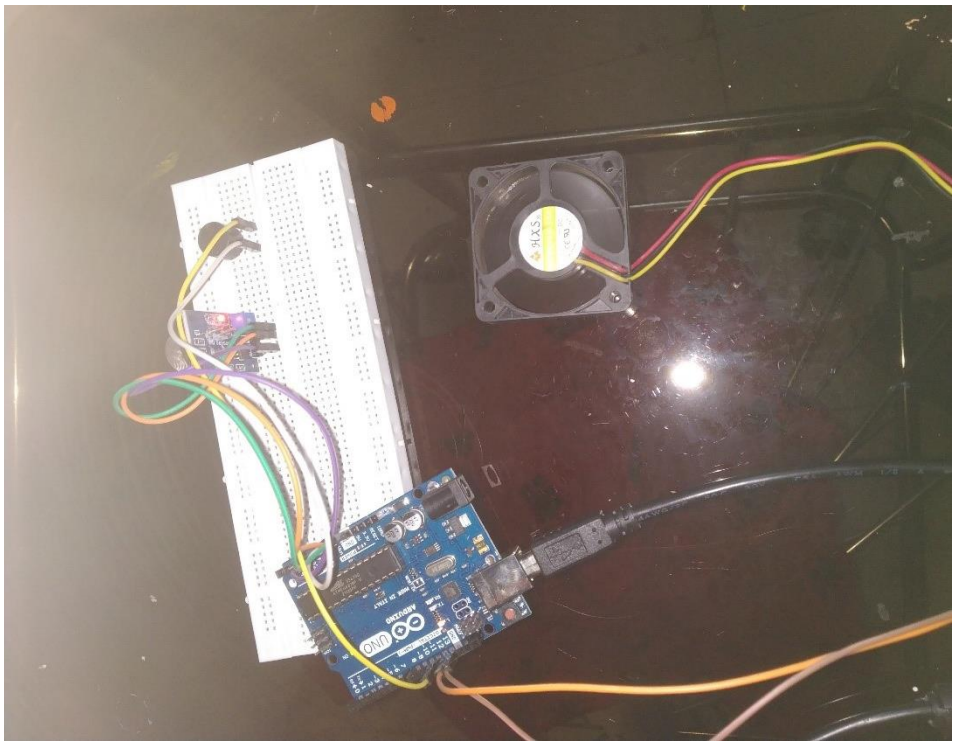
III.The system consists of MQ-2 gas sensor which will in turn sense the gas, and send alert to the Arduino uno. Once the alert is sent, the buzzer will turn on and the exhaust fan will start rotating in order to remove the gas in the air out of the room

OUTPUT:

I. When No Gas Detected :



II.When Gas Detected



Conclusion:

Gas leakage leads to severe accidents resulting in material losses and human injuries. Gas leakage occurs mainly due to poor maintenance of equipments and inadequate awareness of the people. Hence, LPG leakage detection is essential to prevent accidents and to save human lives. This report presented LPG leakage detection and alert system. This system triggers exhaust fan and buzzer to alert people when LPG leakage is detected. This system is very simple yet reliable.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