The Project entitled

ACCIDENT PREVENTION USING LPG GAS SENSOR

Submitted in partial fulfillment of academic requirements for the award of the degree of Bachelor of Engineering (Computer Science and Engineering)

By

Korapuri Naresh Kumar	**2451-16-733-018**
Tallapelli Bharath	**2451-16-733-019**
Marupakula Sai Kumar	**2451-16-733-020**

Department of Computer Science and Engineering
M.V.S.R. ENGINEERING COLLEGE
(Affiliated to Osmania University & Recognized by AICTE)
Nadergul, Saroor Nagar Mandal, Hyderabad • 501 510

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CERTIFICATE

This is to certify that the project entitled **ACCIDENT PREVENTION USING LPG GAS SENSOR ,** is being submitted by Mr**.Korapuri Naresh Kumar** bearing H.T No **2451-16-733-018,** Mr**.Tallapelli Bharath** bearing H.T No **2451-16-733-019,**Mr**.Marupakula Sai Kumar** bearing H.T No **2451-16-733-020** in partial fulfillment of academic requirements for the award of the degree of BACHELOR OF ENGINEERING in COMPUTER SCIENCE AND ENGINEERING from MVSR Engineering College, affiliated to OSMANIA UNIVERSITY, is a record of bonafide work carried out by him under the guidance and supervision of the faculty (CSED). The results embodied in this project report have not been submitted to any other University or Institute for the award of any degree or diploma to the best of my knowledge and belief.

Internal Guide
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ACKNOWLEDGMENT

I take this opportunity to express my profound and sincere gratitude to all those who helped us in carrying out this project successfully.

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I would like to thank our Internal Project Guide Ms**. D.Sirisha** Assistant/Associate Professor, Department of Computer Science and Engineering, MVSR Engineering College for his/her useful suggestions, guidance and encouragement.

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Finally we are thankful to our parents for their cooperation and support throughout all endeavours in our life.

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Abstract

Ideal gas sensor is used to detect the presence of a dangerous LPG leak in your car or in a service station, storage tank environment. This unit can be easily incorporated into an alarm unit, to sound an alarm or give a visual indication of the LPG concentration. The sensor has excellent sensitivity combined with a quick response time. The sensor can also sense H2,CO,LPG and cigarette smoke.If the LPG sensor senses any gas leakage from storage the output of this sensor goes low. This low signal is monitored by the micro controller and it will identify the gas leakage. Now the micro controller is turn on LED and Buzzer.So turn on exhaust fan for throwing gas out and continue send messages as “GAS LEAKAGE” to a mobile number.

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CHAPTER 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.

1.1 Problem Definition

Nowadays, security is the major problem in many fields due to fire accidents and blasts due to LPG gas leakage. At present, LPG gas can be used in the car, in the storage tank or service station. But, due to some reasons the LPG gas might leak from the gas cylinders, this may cause the cylinder blast, damage the house and risk of a life to the living persons in the house. The fire ignite can be occurred due to many reasons such as an electrical short circuit, oil lamps or candles kept inside the house. Sometimes fire accidents are very small, but if proper action is not taken to control the fire, then it can spread in complete house. To overcome this problem, an LPG gas sensor is used to detect the presence of a dangerous LPG gas leak in various places.

1.2 Classification of Leak Detection Technologies

There are various classifications available for leakage detection. Several criteria are considered for classification, some of which are, the amount of human intervention needed, the physical quantity measured and the technical nature of the methods

(Murvaya, 2011). If the degree of intervention needed from a human, by each detection method is used for classification, three categories are used to distinguish between them (Murvaya, 2011):

- Automated detection – complete monitoring systems that, can report the detection of a gas leak without the need of a human operator, once they are installed (e.g. fibre optic or cable sensors);
- Semi-automated detection – solutions that need a certain amount of input or help in performing some tasks (e.g. statistical or digital signal processing methods); and
- Manual detection – systems and devices that can only be directly operated by a person (e.g. thermal image's or Light Detection and Ranging (LIDAR) devices).

1.3 Objectives

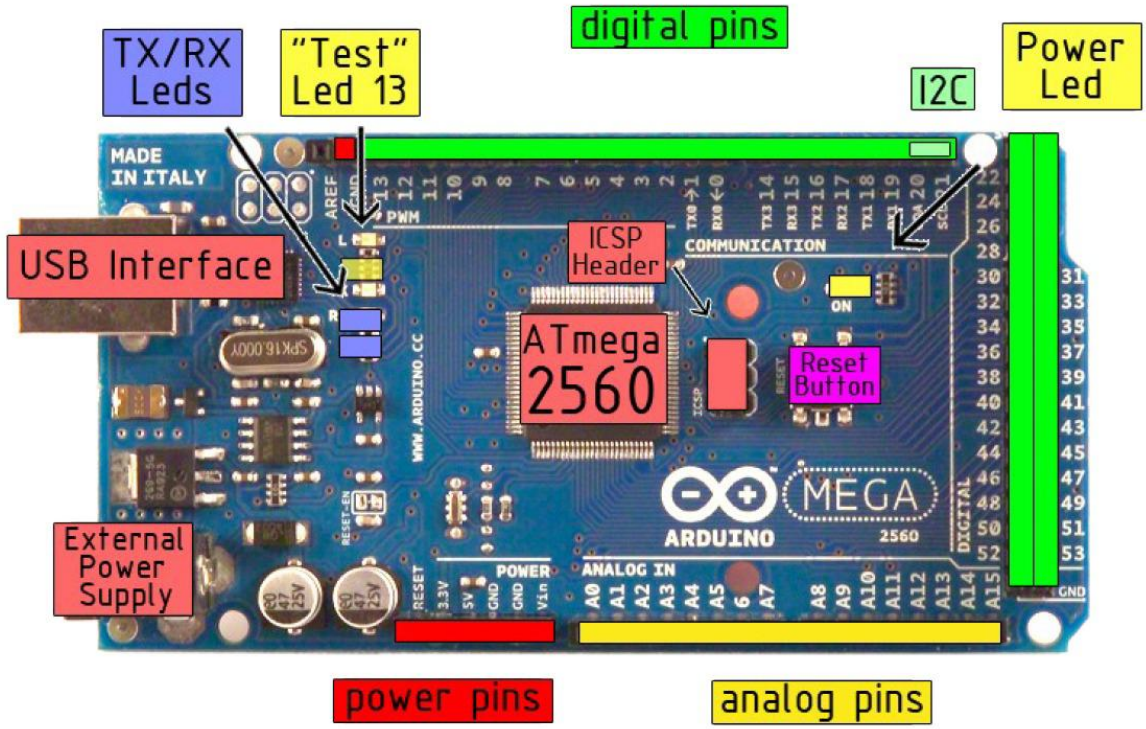
The objectives of this project are:

- To design a system that monitors LPG leakage in an enclosed area (home, car or industry).
- To design a system that alarms the user of leakage.
- To design a system that shuts down LPG supply during leakage.

1.4 Domain

1.4.1 Arduino ATMega 2560:

The MEGA 2560 is designed for more complex projects. With 54 digital I/O pins, 16 analog inputs and a larger space for your sketch it is the recommended board for 3D printers and robotics projects. This gives your projects plenty of room and opportunities.



Specifications:

Microcontroller	ATmega2560
Operating Voltage	5V
Input Voltage (recommended)	7-12V
Input Voltage (limits)	6-20V
Digital I/O Pins	54 (of which 14 provide PWM output)
Analog Input Pins	16
DC Current per I/O Pin	40 mA
DC Current for 3.3V Pin	50 mA
Flash Memory	256 KB of which 8 KB used by bootloader
SRAM	8 KB
EEPROM	4 KB
Clock Speed	16 MHz

1.4.2 MQ5 GAS SENSOR

FEATURES

- High sensitivity to LPG, natural gas , town gas
- Small sensitivity to alcohol, smoke.
- Fast response .
- Stable and long life
- Simple drive circuit

APPLICATION

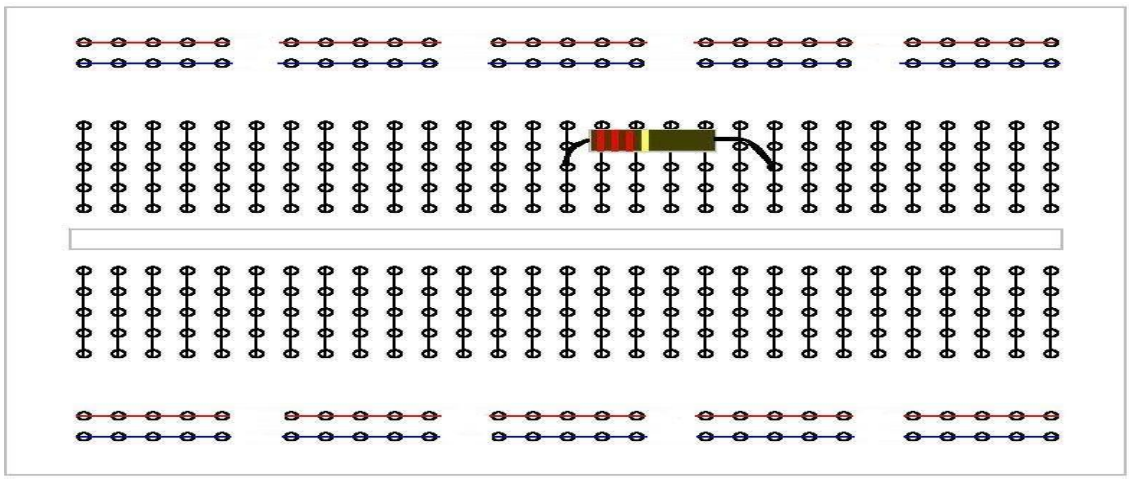
They are used in gas leakage detecting equipments in family and industry, are suitable for detecting of LPG, natural gas , town gas, avoid the noise of alcohol and cooking fumes and cigarette smoke.

S NO	PARTS	MATERIALS
1	Gas sensing layer	SnO2
2	Electrodes	Au
3	Electrode line	Pt
4	Heater coil	Ni-Cr alloy
5	Tubular ceramic	Al2O3
6	Anti expansion network	Stain less steel gauge (SUS316 100-mesh)
7	Clamp ring	Copper plating Ni
8	Resin base	Bakelite
9	Tube pin	Copper plating Ni

1.4.3 Bread Board

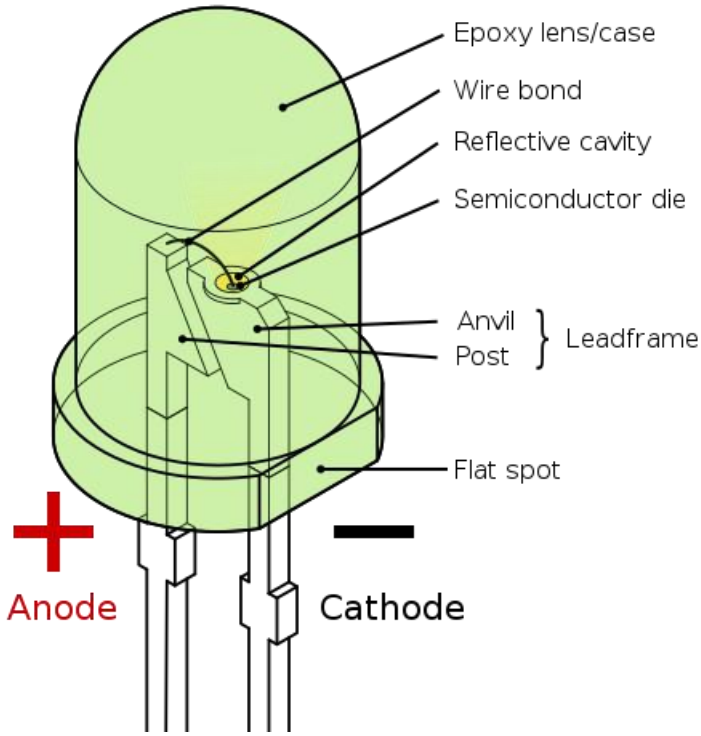
A breadboard is a construction base for prototyping of electronics. Originally it was literally a bread board, a polished piece of wood used for slicing bread. In the 1970s the solderless breadboard (a.k.a. Plug board, a terminal array board) became available and nowadays the term "breadboard" is commonly used to refer to these.

Because the solderless breadboard does not require soldering, it is reusable. This makes it easy to use for creating temporary prototypes and experimenting with circuit design. For this reason, solderless breadboards are also popular with students and in technological education.



1.4.4 LED

A **light-emitting diode** (**LED**) is a two-lead semiconductor light source. It is a p–n junction diode that emits light when activated When a suitable current is applied to the leads, electrons are able to recombine with electron holes within the device, releasing energy in the form of photons. This effect is called electroluminescence, and the color of the light (corresponding to the energy of the photon) is determined by the energy band gap of the semiconductor. LED s are typically small (less than 1 mm^2) and integrated optical components may be used to shape the radiation pattern.

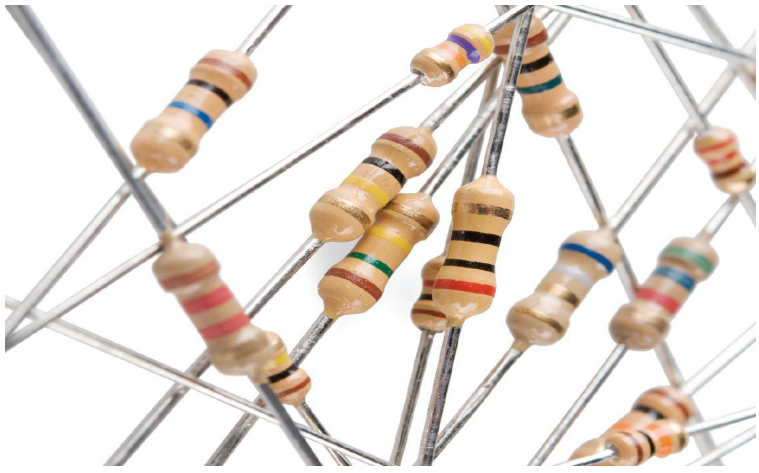


1.4.5 Buzzer

A **buzzer** or **beeper** is an audio signalling device, which may be mechanical, electromechanical, or piezoelectric (*piezo* for short). Typical uses of buzzers and beepers include alarm devices, timers, and confirmation of user input such as a mouse click or keystroke.

1.4.6 Resistor

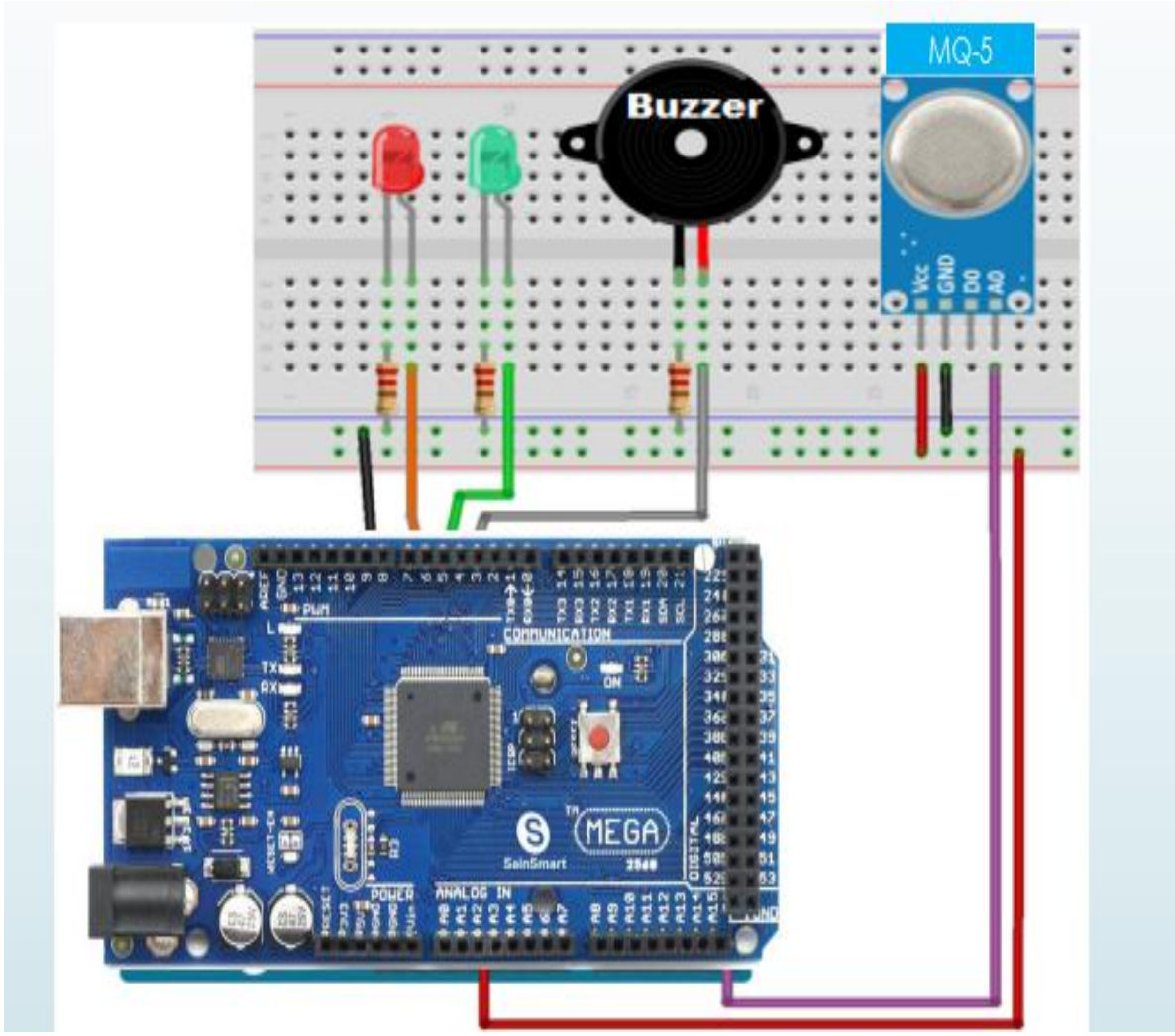
A **resistor** is a passive two-terminal electrical component that implements electrical resistance as a circuit element. In electronic circuits, resistors are used to reduce current flow, adjust signal levels, to divide voltages, bias active elements, and terminate transmission lines, among other uses. High-power resistors that can dissipate many watts of electrical power as heat, may be used as part of motor controls, in power distribution systems, or as test loads for generators.



1.5 Circuit Explanation

- Pin details of the gas sensor module are shown in Fig. An MQ-5 gas sensor is used in the gas sensor module. As per its data sheet, it has high sensitivity to propane, butane, iso butane.
- LPG and natural gas. The sensor can also be used to detect combustible gases, especially methane. This circuit has been tested with LPG gas and was found to work very fine.
- Whenever there is LPG concentration of 150 ppm (parts per million) in the area, the OUT pin of the sensor module goes high.
- This signal drives timer IC 555, which is wired as an a stable multi vibrator. The multi vibrator basically works as a tone generator.
- Output pin 12 of IC 555 is connected to LED1 and Buzzer respectively. LED1 glows and the alarm sounds to alert the user of gas leakage. The pitch of the tone can be changed by varying values.

1.6 Circuit Diagram



1.7 HARDWARE REQUIRED

1.Arduino Mega2560

2.Buzzer

3.Green LED,Red LED

4.1K Resister

5.Bread Board

6.MQ5 Gas Sensor

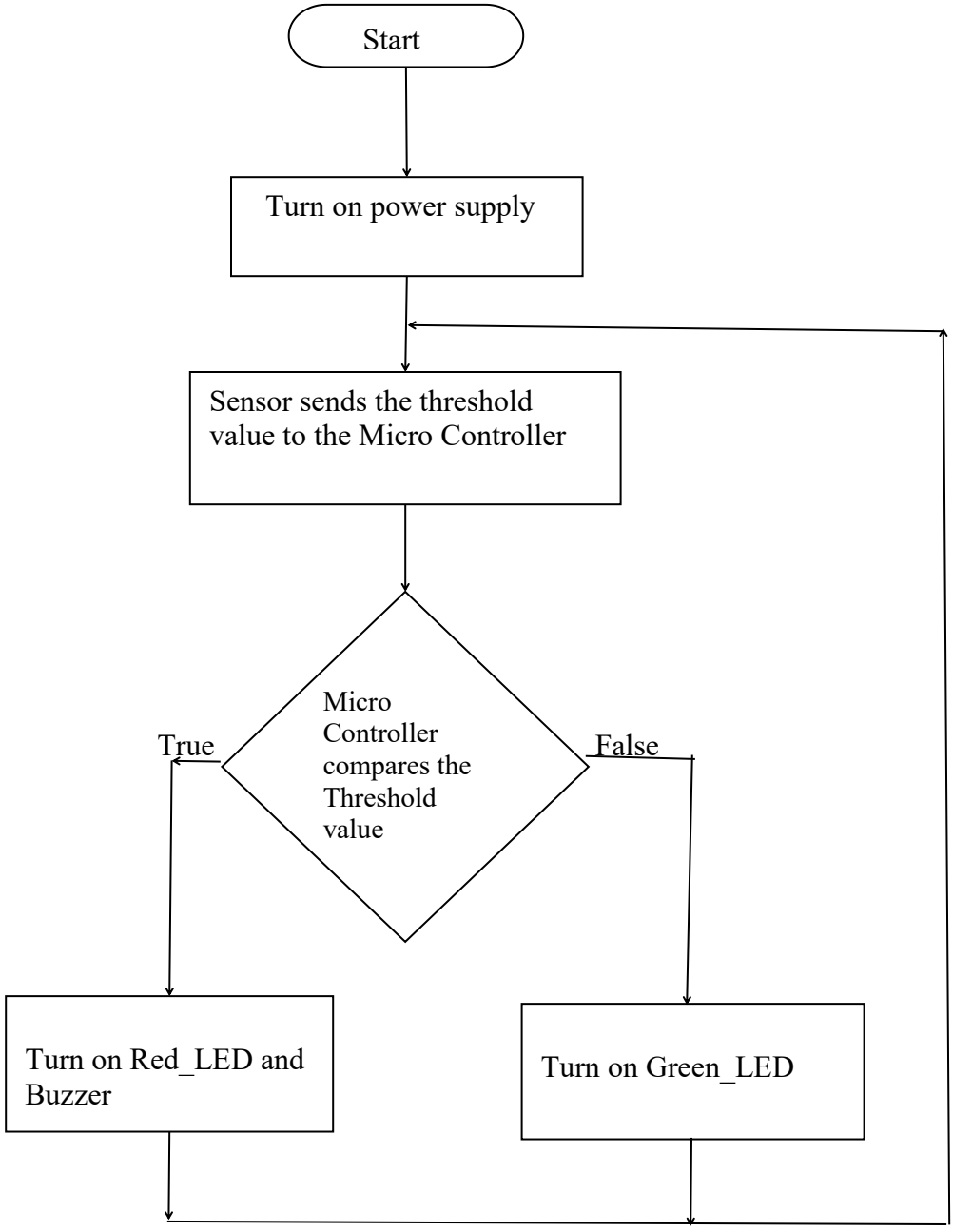
7.Connecting Wires

1.8 SOFTWARE REQUIRED

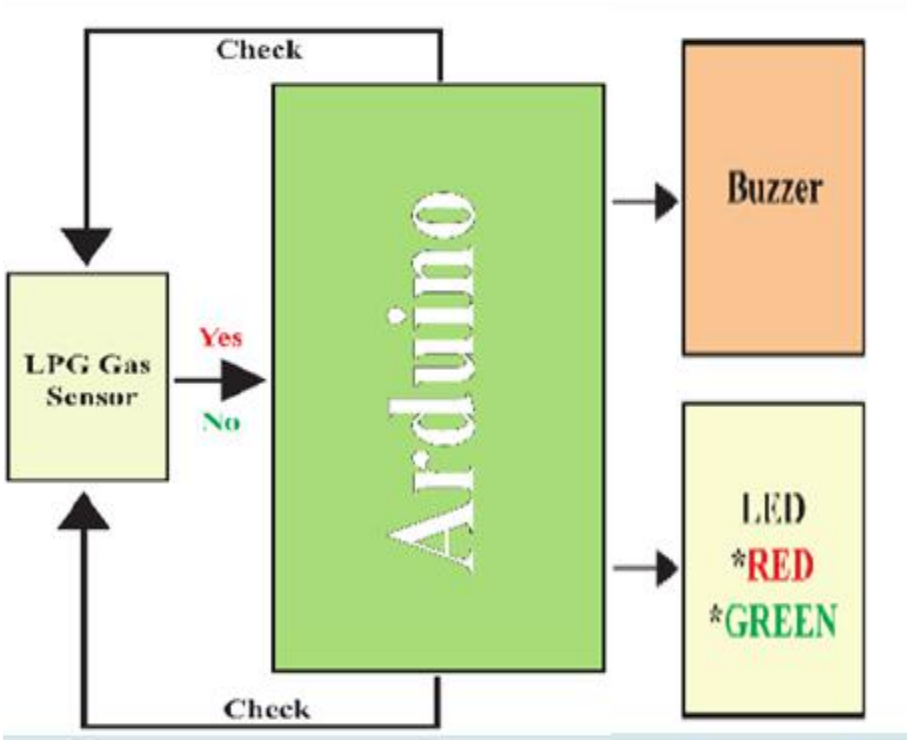
1.Arduino IDE

Chapter 2

FLOW CHART



2.1 Algorithm



If‘yes’	If’No’
BUZZER High	BUZZER low
LED: Red-High	LED: Red-Low
Green-low	Green-High

2.2 Explanation

- In this project I use a LPG gas sensor module (MQ 5, sensitive to LPG, CNG and others combustible gases), an Arduino Mega2560, a Buzzer, LED (one RED & one GREEN.
- LPG gas sensor act as input module, Buzzer, LED acts as output module and Arduino act like main processing unit.
- When Sensor send density of gas above 150ppm Arduino, Arduino consider it as yes signal. And the density is under 150ppm it is considered as no signal. If the signal is yes, then Buzzer gets HIGH, Red LED blinks. If the signal is no,Buzzer gets LOW, Green LED blinks.

Chapter 3
IMPLEMENTATION

3.1 Coding

```
int redLed = 12;
int greenLed = 11;
int buzzer = 10;
int smokeA0 = A5;
// Your threshold value
int sensorThres = 400;

void setup()

        {
                pinMode(redLed, OUTPUT);
                 pinMode(greenLed, OUTPUT);
                  pinMode(buzzer, OUTPUT);
                   pinMode(smokeA0, INPUT);
                  Serial.begin(9600);
         }

void loop()

        {
                        int analogSensor = analogRead(smokeA0);

          Serial.print("Pin A0: ");
          Serial.println(analogSensor);
```

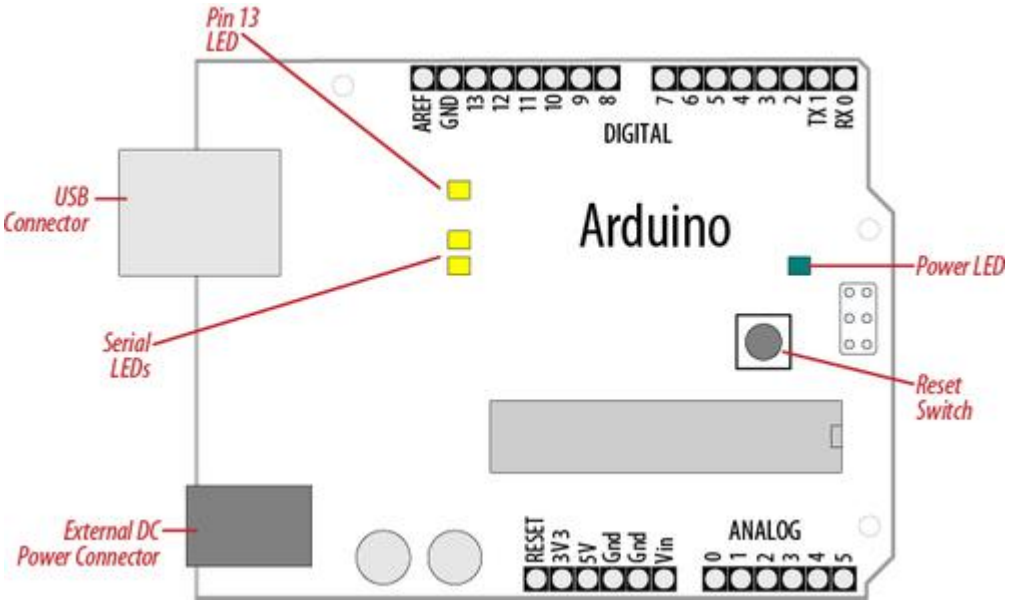
```
  if (analogSensor > sensorThres)
          {
                    digitalWrite(redLed, HIGH);
                    digitalWrite(greenLed, LOW);
                    tone(buzzer, 1000, 200);
          }
 else
          {
                    digitalWrite(redLed, LOW);
                    digitalWrite(greenLed, HIGH);
                    noTone(buzzer);
          }
delay(100);
 }
```

Chapter 4
TESTING

4.1 Testing of Arduino Mega 2560

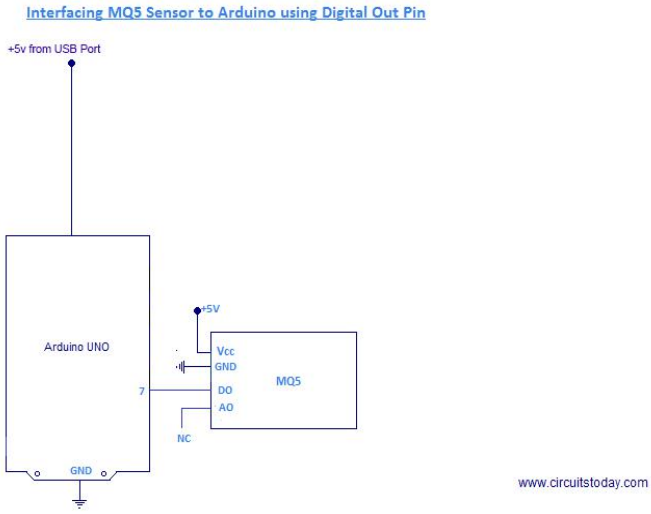
Plug the board into a USB port on your computer and check that the green LED power indicator on the board illuminates. Standard Arduino boards (Uno , Duemilanove, and Mega) have a green LED power indicator located near the reset switch.

An orange LED near the center of the board (labeled “Pin 13 LED” in the image below) should flash on and off when the board is powered up (boards come from the factory pre loaded with software to flash the LED as a simple check that the board is working).



If the power LED does not illuminate when the board is connected to your computer, the board is probably not receiving power.

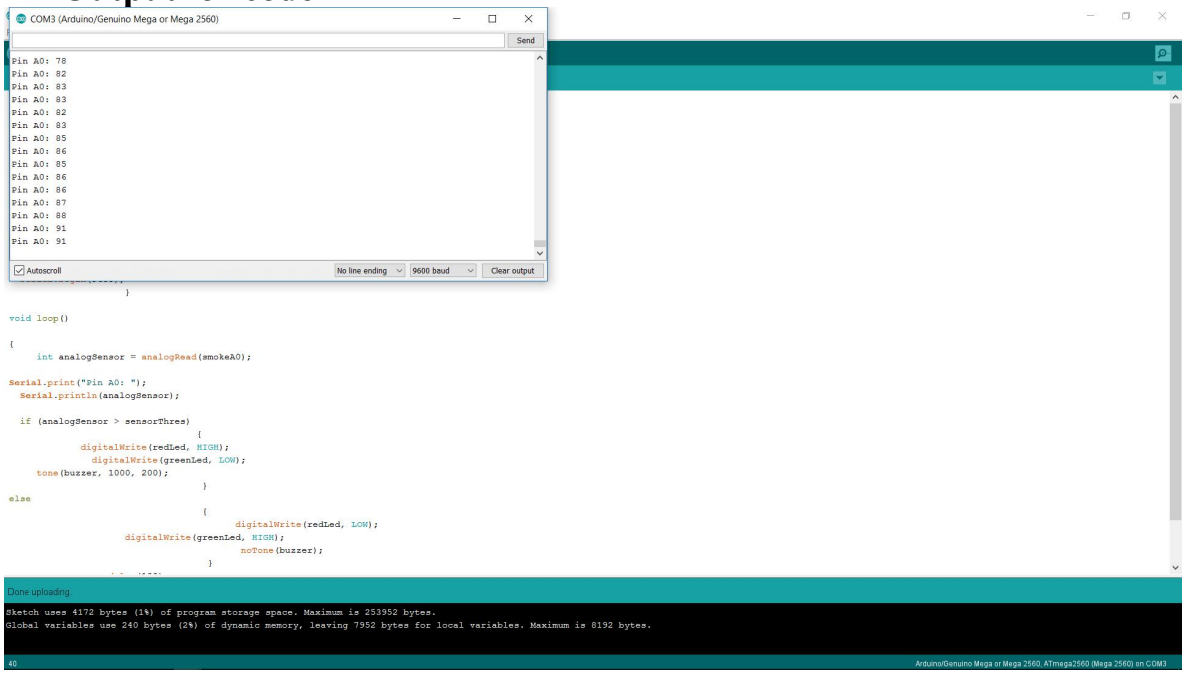
4.2 Testing of MQ5 Sensor



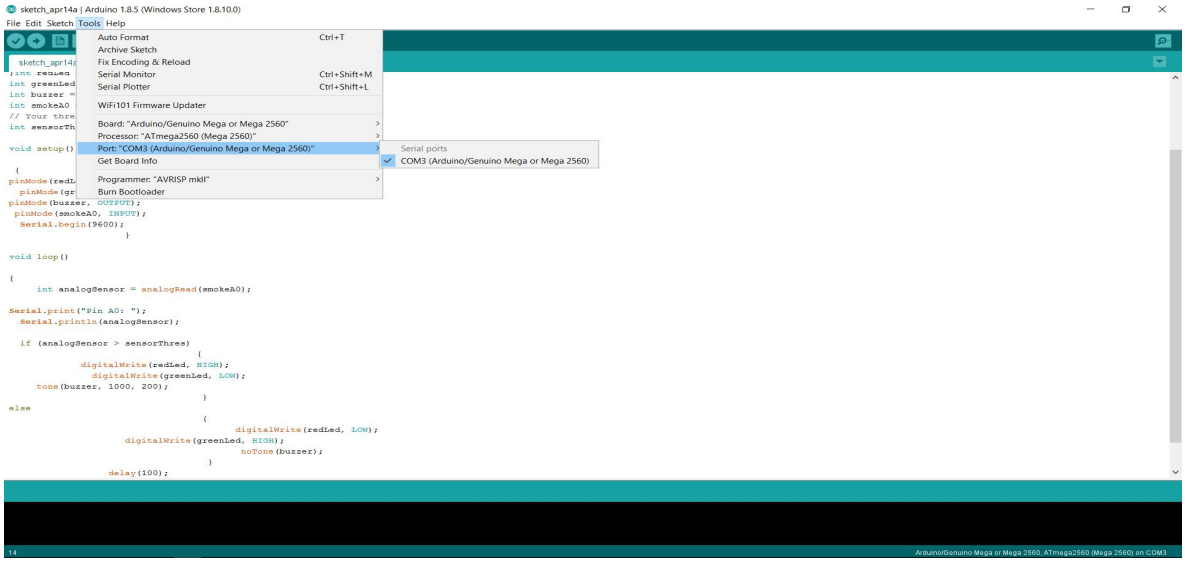
- **Code for testing of mQ5**

```
Int gas_value;
Int Sensor=A5;
Void Setup()
{
pinMode(Sensor,INPUT);
Serial.begin(9600);
}
Void loop()
{
Gas_value=digitalRead(Sensor);
Serial.print("pin A0");
Serial.println(Gas_value);
}
```

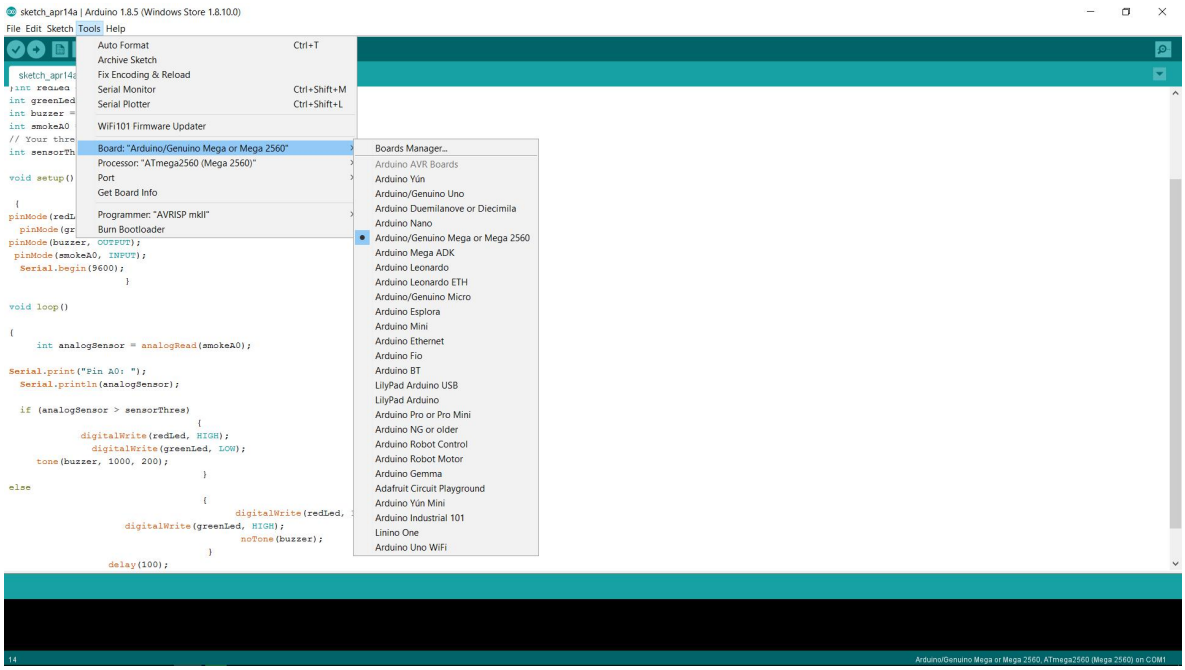
- **Output for code**



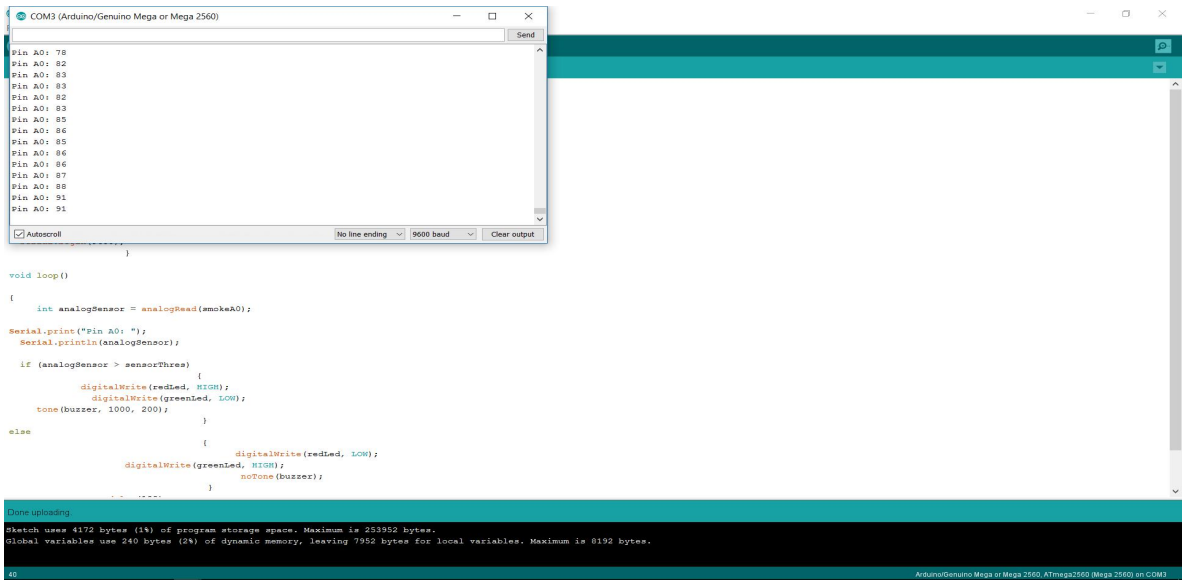
4.4 Output Screens



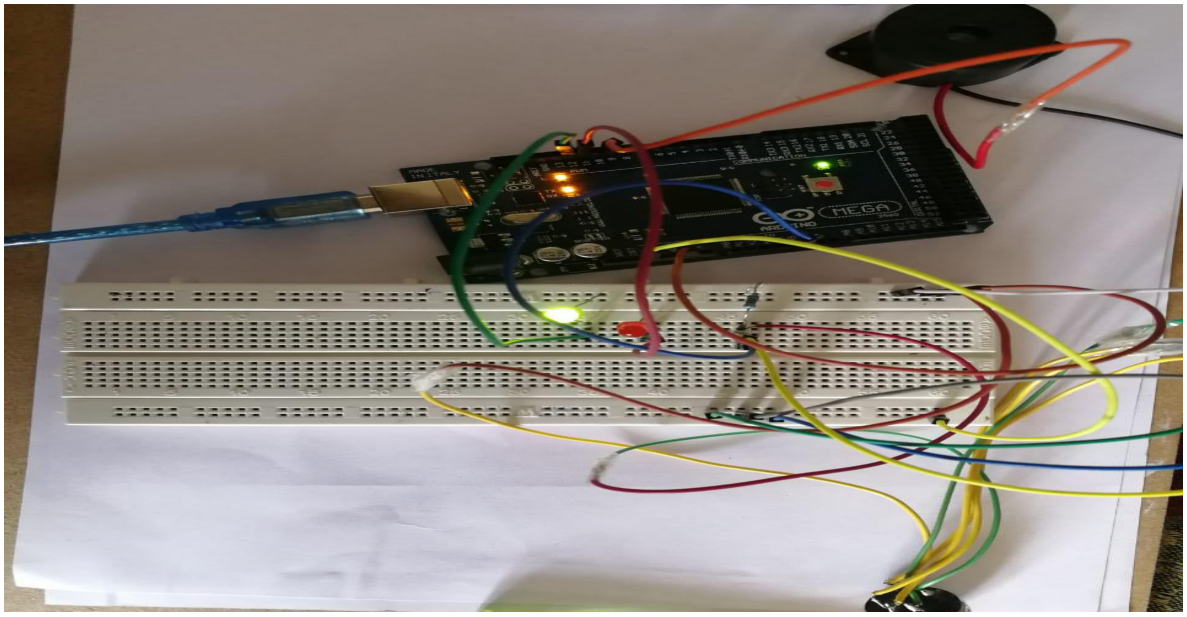
Fig(i)



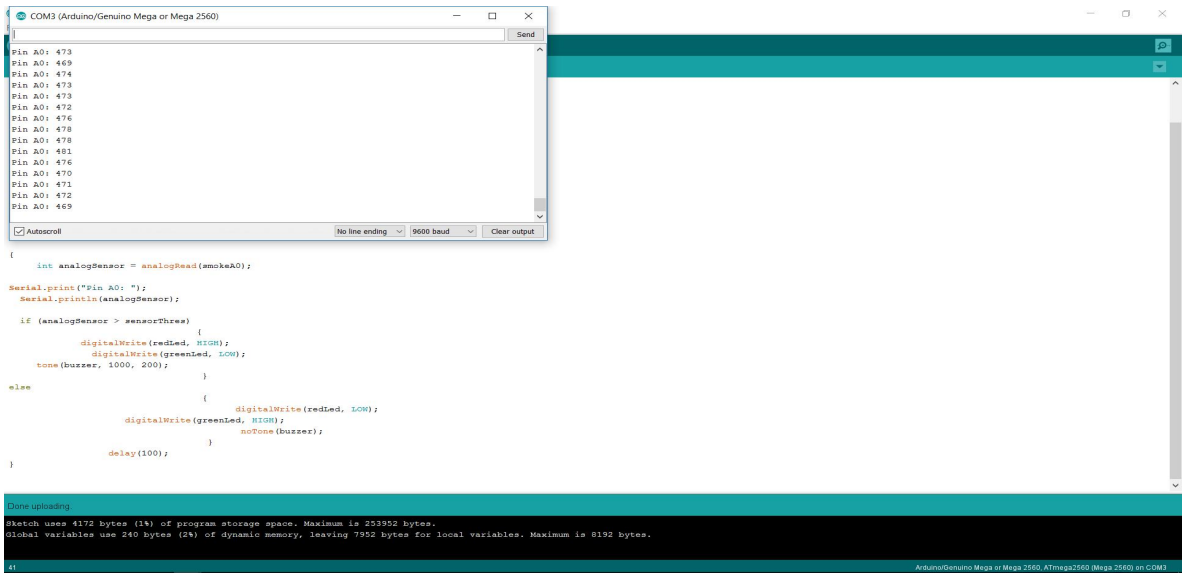
Fig(ii)



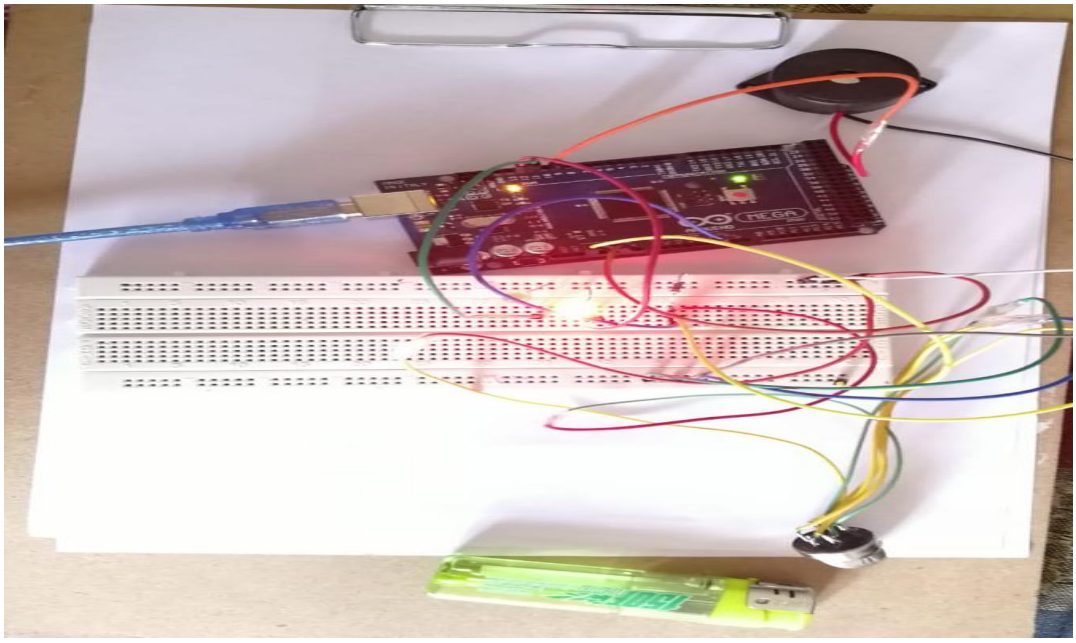
Fig(iii)



Fig(iv)


COM3 (Arduino/Genuino Mega or Mega 2560)
Send
Pin A0: 473
Pin A0: 469
Pin A0: 474
Pin A0: 473
Pin A0: 473
Pin A0: 472
Pin A0: 476
Pin A0: 478
Pin A0: 478
Pin A0: 481
Pin A0: 476
Pin A0: 470
Pin A0: 471
Pin A0: 472
Pin A0: 469
Autoscroll
No line ending
9600 baud
Clear output
{
int analogSensor = analogRead(smokeA0);
Serial.print("Pin A0: ");
Serial.println(analogSensor);
if (analogSensor > sensorThres)
{
digitalWrite(redLed, HIGH);
digitalWrite(greenLed, LOW);
tone(buzzer, 1000, 200);
}
else
{
digitalWrite(redLed, LOW);
digitalWrite(greenLed, HIGH);
noTone(buzzer);
}
delay(100);
}
Done uploading.
Sketch uses 4172 bytes (1%) of program storage space. Maximum is 253952 bytes.
Global variables use 240 bytes (2%) of dynamic memory, leaving 7952 bytes for local variables. Maximum is 8192 bytes.
41
Arduino/Genuino Mega or Mega 2560, ATmega2560 (Mega 2560) on COM3

Fig(v)



Fig(vi)

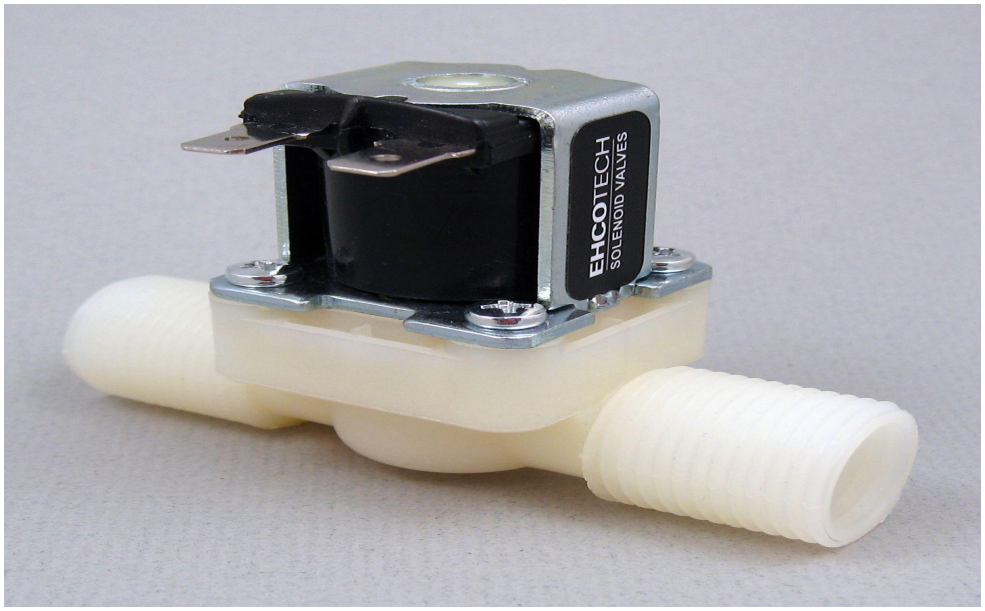
- Fig(i) and Fig(ii) shows the port and Arduino mega 2560 board selection respectively.
- Fig(iii) shows the normal threshold value in the environment.
- Fig(iv) shows when the green light indication because environmental threshold value is less then the given threshold value.
- Fig(v) shows the increased threshold value in the environment.
- Fig(vi) shows when the red light, buzzer indication because environmental threshold value is greater then the given threshold value.

Chapter 5

FUTURE WORK

5.1 Enhancement

- GSM Module : By using GSM Module we send message to our mobile phone numbers.
- LCD Display:By using LCD Display we can display that “gas leakage” on the screen.
- By using different threshold value limit we have to use this kit for different gases like H2,smoke,Co,etc.
- Solenoid valve: A solenoid valve is an electromechanically operated valve. The valve is controlled by an electric current through a solenoid: in the case of a two-port valve the flow is switched on or off; in the case of a three-port valve, the outflow is switched between the two outlet ports. Multiple solenoid valves can be placed together on a manifold.Solenoid valves are the most frequently used control elements in fluidics. Their tasks are to shut off, release, dose, distribute or mix fluids. They are found in many application areas. Solenoids offer fast and safe switching, high reliability, long service life, good medium compatibility of the materials used, low control power and compact design.



Chapter 6
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