Uttara University

Excellence in Higher Education and Research

UATTR UNIVERSITY

February 2025

SMOKE, GAS & SMELL DETECTOR

COURSE TITLE: PROJECT AND THESIS

COURSE CODE: EEE-400

Uttara University

Excellence in Higher Education and Research

Supervised By :	**Submitted By:**
Md. Moiful Alam Assistant Professor (Physics) Department of Electrical & Electronic Engineering	Md.Ridoy Ahmed ID No: 2213171049 MD. Kamal Khan ID No: 2213171051 Md. Mahfuzar Rahman Khandker ID No: 2213171047

CANDIDATE'SDECLARATION

It is here by declared that this thesis or any par to fit has not been submitted elsewhere or the award of any degree or diploma.

Authors

NAME	ID	SIGN & DATE
Md.Ridoy Ahmed	**2213171049**	**.....**
Md. Kamal Khan	**2213171051**	**.....**
Md. Mahfuzar Rahman Khandker	**2213171047**	**.....**

DECLARATION

I hereby declare that this thesis is based on the results found by the mentioned students under my direct supervision. Materials of work found by other researcher are mentioned by reference. This thesis, neither in whole nor in part, has been previously submitted for any degree.

Signature of Supervisor

.....

Md. Moiful Alam

Assistant Professor (Physics)

Department of Electrical & Electronic Engineering

Uttara University, Dhaka-1230, Bangladesh

DEDICATED TO

OUR

BELOVED PARENTS

ACKNOWLEDGEMENT

First of all we express all our admiration and devotion to the almighty Allah, the most beneficent who has enabled us to perform this research work and to submit this thesis. We express our profound gratitude to my honorable supervisor Md. Moiful Alam, Assistant Professor (Physics), Department of Electrical & Electronic Engineering, Uttara University (UU), for his constant direction, constructive criticism and inspiration in pursuing the whole investigation of the present research. Words are always insufficient to express his working capacities and unending enthusiasm for scientific rigorousness for innovative investigations. This always becomes the everlasting source of inspiration for his students. It was really difficult for us to perform our research work at UU

Without amiable assistance, sincere support, and cordial collaboration from many friendly people of our surroundings.

Approval

Thesis to certify that the projection **"SMOKE, GAS & SMELL DETECTOR** "By
Md.Ridoy Ahmed

MD. Kamal Khan

Md. Mahfuzar Rahman Khandker

Has been carried out under our supervisor. The project has been carried out in partial fulfillment of the requirement for the degree of Bachelor of Science (BSc in Electrical and Electronics Engineeringoftheyear2024 and has been approve Edisto it style and contents.

INDEX

Chapter-4

FABRICATION

Chapter - 5 TESTING &

CALCULATION

LISTOFFIGURES

LISTOFTABLES

ABSTRACT

This project proposes designing and implementing an LPG gas leakage detection and alert system for households and industries. The increase in deaths caused by LPG explosions has highlighted the need for a gas leak detection system to identify potential hazards. Various gas sensors are used in this process, including wireless and GSM technology. The gas sensor detects the presence of LPG gas in the environment, and the microcontroller processes the sensor data to trigger an alarm or shut off the gas supply. The system can also send an SMS alert to a designated phone number in case of gas leakage. The proposed system is intended to prevent accidents, fires, and explosions by providing an early warning and taking necessary actions to minimize the damage caused by gas leakage. The proposed LPG Gas Leak Detection Smart Tool effectively addresses the growing concern about LPG explosions and their catastrophic consequences.

Keywords: Arduino, MQ-9 Sensor, Buzzer, GSM Module, 16*2 LCD Display, 12*C LCD display module, 12 Volt DC power supply, 1 SIM card

CHAPTER-1

1.1 INTRODUCTION

The use of liquefied petroleum gas (LPG) as a fuel source has become increasingly popular in households and industries due to its affordability and efficiency. However, the risk associated with LPG gas leakage cannot be overstated. LPG is highly flammable and explosive, and its leakage can lead to accidents, fires, and explosions that can cause fatalities and significant damage to property. Therefore, there is a growing need for an effective gas leak detection system that can identify potential hazards and provide early warning to prevent catastrophic consequences. To address this concern, this project proposes designing and implementing an LPG gas leakage detection and alert system for households and industries. The system is designed to detect the presence of LPG gas using various gas sensors, including wireless and GSM technology. These sensors can detect the concentration of LPG gas in the environment and send the data to a microcontroller for processing. The microcontroller processes the sensor data and triggers an alarm or shuts off the gas supply in case of a gas leak. Additionally, the system is designed to send an SMS alert to a designated phone number in case of gas leakage, providing an early warning to prevent accidents, fires, and explosions. The proposed LPG Gas Leak Detection Smart Tool offers a reliable and effective solution to address the growing concern about LPG explosions and their catastrophic consequences. By incorporating gas sensors, wireless and GSM technology, microcontrollers, and an alarm system, the system provides enhanced house safety and industrial safety, preventing potential hazards and minimizing the damage caused by gas leakage. Overall, this project aims to develop a gas leak detection system that offers an effective solution to the increasing concerns of LPG gas leakage, providing an early warning to prevent accidents, fires, and explosions, and enhancing the safety of households and industries

1.1 OBJECTIVE OF THE PROJECT

A. Aim To design and implement an LPG gas leakage detection and alert system that enhances the safety of households and industries by detecting potential gas hazards and providing an early warning to prevent accidents, fires, and explosions.

1) To research and identify the appropriate gas sensors, wireless and GSM technology, and microcontrollers needed to detect LPG gas leakage.

2) To design and develop gas leak detection system that can detect the presence of LPG gas and trigger an alarm or shut off the gas supply in case of a gas leak.

3) To integrate the gas leak detection system with wireless and GSM technology to send an SMS alert to a designated phone number in case of gas leakage.

4) To provide an effective solution to address the growing concerns of LPG explosions and their catastrophic consequences, enhancing the safety of household's and Industries

CHAPTER-2

EXISTING METHODOLOGY

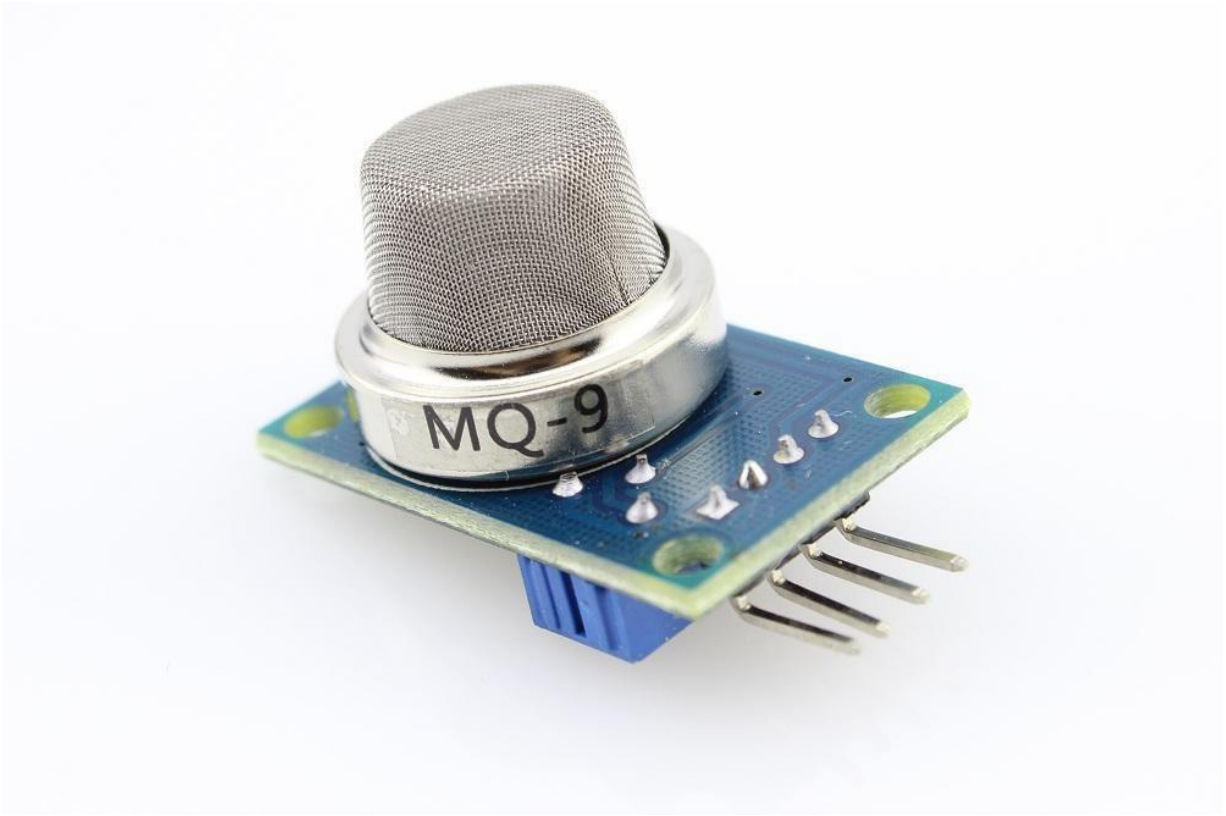
There are generally over 80% LPG customers in the country in which 35% has the gas related Accidents occur because of gas leakage. So, the real concern is spillage of LPG. Whenever the spillage of LPG
Has occurred, the gas sensor is used to detect the leakage of gas. The Adriano will alert the buzzer, triggering
The sound alarm and the LCD display are turned on. It sends SMS alert through GSM module. The above guidelines are also executed for the gas spillage identification system.

PROPOSED METHODOLOGY

In this study it can be described how the tool can work to capture the gas received by the sensor, then the sensor is processed in an Arduino program that can display data in the LCD, emit sound, and send a short message to the registered mobile number. The scheme can be seen in the block diagram

HARDWARE AND ITS DETAILS

The MQ9 is methane, carbon monoxide gas detection sensor. The sensor includes tin dioxide as its sensing element. The SnO2 (tin dioxide)has lower conductivity in pure air. When the air has carbon Monoxide, Coal, Liquefied, flammable gases, the conductivity of the sensor gets higher. A simple device makes measuring this change in conductivity and turning it into obvious data. However, the sensor requires some calibration.



 as you can see the 4 male header pins are labelled with

 A0

 D0

 GND

 Andvcc

1.11 SIM900A GSM MODULE:

GSM is a mobile communication modem; it is stands for global system for mobile communication. (GSM). The idea of GSM was developed at Bell Laboratories in 1970. It is widely used mobile communication system in the world. GSM is an open and digital cellular technology used for transmitting mobile voice and data services operates at the 850MHz, 900MHz, 1800MHz and 1900MHz frequency bands. GSM system was developed as a digital system using time division multiple access (TDMA) technique for communication purpose. A GSM digitizes and reduces the data, then sends it down through a channel with two different streams of client data, each in its own particular time slot. The digital system has an ability to carry 64 kbps to 120 Mbps of data rates.

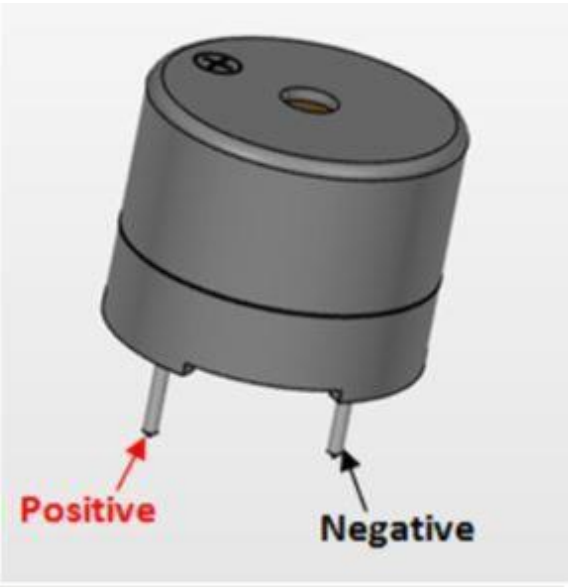
1.12 16×2 LCD MODULE:

LCD (Liquid Crystal Display) is the innovation utilized in scratch pad shows and other littler PCs. Like innovation for light-producing diode (LED) and gas-plasma, LCDs permit presentations tube a lot slenderer than innovation for cathode beam tube (CRT). LCDs expend considerably less power than LED shows and gas shows since they work as opposed to emanating it on the guideline of blocking light. LCD is either made with an uninvolved lattice or a showcase network for dynamic framework show.Likewisealluded to as a meager film transistor (TFT) show is the dynamic framework LCD. The uninvolved LCD lattice has a matrix of conductors at every crossing point of the network with pixels. Two conductors on the lattice send a current to control the light for any pixel. A functioning framework has a transistor situated at every pixel crossing point, requiring less current to control the luminance of a pixel.

1.13 BUZZER

The buzzer will be used to emit sounds to alert users during leakage. A buzzer or beeper is a signaling device usually electronics, that is most commonly consists of a number of switches or sensors connected to a control unit that determines if and which button was pushed or a pre-set timehaslapsed, and usually illuminates a light on the appropriate button or control panel, and sounds a warning in the form of a continuous or intermittent buzzing or beeping sound. Initially this device was based on an electromechanical system which was identical to an electric bell without the metal gong.

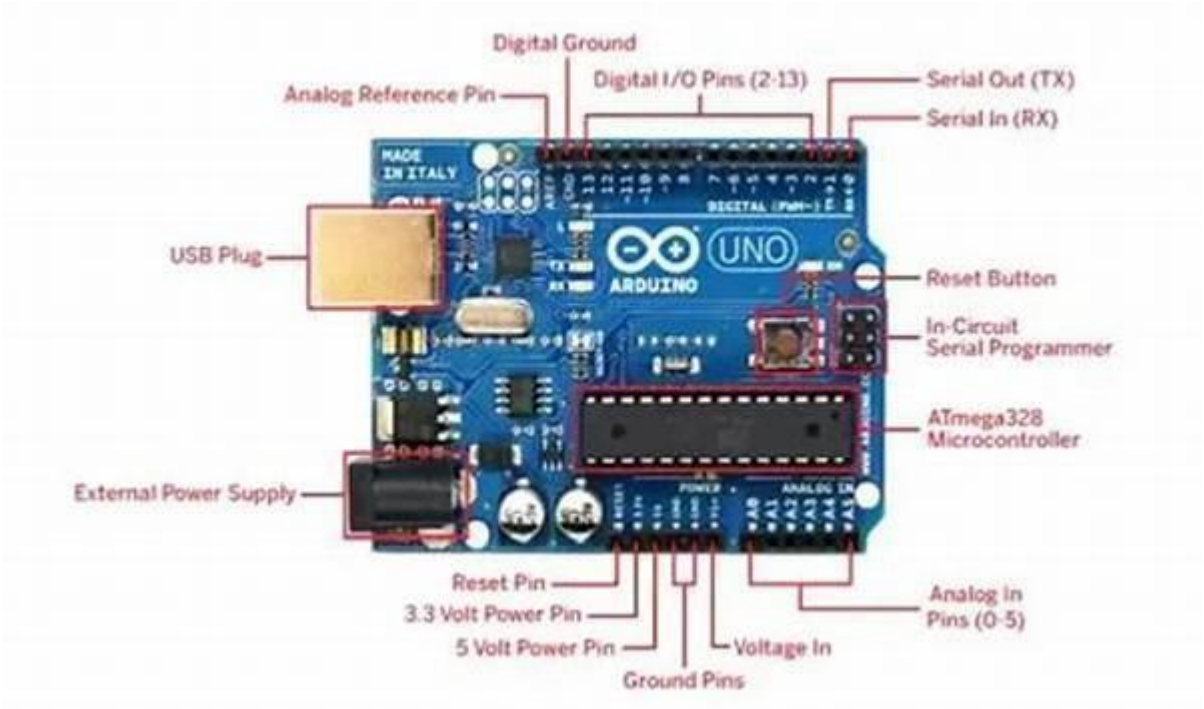
Active Passive Buzzer



Active Passive Buzzer Pinout

1.14 ARDUINO UNO:

The Uno with Cable is a micro-controller board base on the ATmega328. It has 14 digital input/output pins (of which 6 can be used as PWM outputs); 6-analog inputs, a 16 MHz ceramic resonator, a USB connection, a power jack, an ICSP header, and a reset button. It contains everything need to support the microcontroller; simply connect it to a computer with a USB cable or power it with an AC-to-DC adapter or battery to get started. “Uno” means one in Italian and is the name to mark the upcoming release of Arduino 1.0.The Uno and version 1.0 will be the reference versions of Arduino, moving forward. The Uno is the latest in a series of USB Arduino boards and the reference model for the Arduino platform; for a comparison with previous versions, see the index of Arduino boards. Note: The Uno R3 reference design can use an Atmega8, 168, or 328, Current models use an Atmega328, but an Atmega8 is shown in the schematic for reference. The pin configuration is identical on all three processors.



SOFTWARE AND ITS DETAILS

VIII.1 ARDUINO IDE 1.8.5

Arduino IDE where IDE stands for Integrated Development Environment – An official software introduced by Arduino.cc, that is mainly used for writing, compiling and uploading the code in the Arduino Device. Almost all Arduino modules are compatible with this software that is an open source and is readily available to install and start

compiling the code on the go. Arduino IDE is open-source software that is mainly used for writing and compiling the codeinto the Arduino Module. It is an official Arduino software, making code compilation too easy that even a common person with no prior technical knowledge can get their feet wet with the learning process.It is easily available for operating systems like MAC, Windows, and Linux and runs on the Java Platform that comes with inbuilt functions and commands that play a vital role for debugging, editing and compiling the code in the environment. A range of Arduino modules available including Arduino Uno, Arduino Mega, Arduino Leonardo, Arduino Micro and many more. Each of them contains a microcontroller on the board that is actually programmed and acceptsthe information in the form of code.The main code, also known as a sketch, created on the IDE platform will ultimately generate aHex File which is then transferred and uploaded in the controller on the board.The IDE environment mainly contains two basic parts: Editor and Compiler where former is used for writing the required code and later is used for compiling and uploading the code into the given Arduino Module. This environment supports both C and C++ languages. How to install Arduino IDE: You can download the Software from Arduino main website.

Program

```
#include <LiquidCrystal_I2C.h>

LiquidCrystal_I2C Icd(0x27,16,2);

int buzzer = 10;

int GASAO = A0;

int gasvalue;

void setup() { Icd.init();

Icd.init();

Icd.backlight() Serial.begin(9600);
```

```
pinMode(buzzer, OUTPUT);

Icd.setCursor(2,0);

Icd.print("UTTARA UNIVERSITY");

1 Icd.setCursor(7,1);

Icd.print("SMOKE DETECTOR');

delay(5000);

void loop() { int analogSensor = analogRead(GASA0);

int gasvalue=(analogSensor-50)/35;

2 Icd.setCursor(0,0);

2 Icd.print("Smoke Level ");

Icd.setCursor(12,0);

Icd.print(gasvalue);

Icd.setCursor(13,0);

lcd.print("%");

// Checks if it has reached the threshold value if (gasvalue >= 4)

(Icd.setCursor(0,1); Icd.print('DANGER

tone (buzzer, 1000, 10000); } else (Icd.setCursor(0,1);
lcd.print("NORMAL");
```

```
noTone (buzzer); }

delay(500); Icd.clear(

);}
```

1) Selection of Components: The first step is to identify and select the required components for the system. This includes an LPG gas sensor, Arduino Uno microcontroller, LCD screen, buzzer, GSM module, and a mobile phone.

2) Circuit Design: The next step involves designing the circuit for the system. The gas sensor is connected to the Arduino Uno microcontroller, which processes the sensor data

3) and triggers an alarm through the buzzer and LCD screen in case of gas leakage. The GSM module is also connected to the microcontroller to send an SMS alert to a designated phone number. Fig. Circuit Design

1) Programming: The third step involves programming the microcontroller. The code is written in the Arduino IDE, which controls the gas sensor, LCD screen, buzzer, and GSM module. The code also includes the SMS alert system, which sends a text message to the designated phone number in case of gas leakage.

2) System Integration: The fourth step involves integrating all the components of the system. The gas sensor, microcontroller, LCD screen, buzzer, and GSM module are connected according to the circuit design. The mobile phone is also configured to receive SMS alerts.

3) Testing: The final step involves testing the system to ensure that it is accurate and reliable. The system is tested in a controlled environment using LPG gas to simulate real-world conditions. The system's performance is evaluated, and any necessary modifications are made to ensure that it meets the specified requirements and objectives

Overall, the methodology for designing and implementing an LPG gas leakage detection and alert system involves a systematic approach that involves component selection, circuit design, programming, system integration, and testing to ensure that the system is accurate, reliable, and effective in detecting LPG gas leakage and providing an early warning to prevent catastrophic consequence

The flowchart represents the working of an LPG gas leakage detection and alert system.

Fig: Flow chart

At the starting point of the system. The gas sensor detects the presence of LPG gas in the environment. If there is no gas leak, the system does not take any action. However, a yellow light blinks on the LCD to indicate that the system is functioning correctly. This is the end of the system's working when no gas leak is detected. If the gas sensor detects a gas leak, the system takes necessary actions to prevent accidents, fires, and explosions. A red light blinks on the LCD to indicate that there is a gas leak. The buzzer is activated to provide an audible warning to the people in the vicinity. The system sends an SMS alert to a designated phone number to inform about the gas leak. This is the end of the system's working when a gas leak is detected, and necessary actions are taken to minimize the damage caused by gas leakage. Overall, the flowchart represents the simple and effective working of the LPG gas leakage detection and alert system

REQUIREMENT
A. Hardware Used
1) Arduino Uno Microcontroller
2) MQ2 sensor
3) GSM Module SIM900A
4) 16*2 LCD module
5) Power supply
6) Buzzer
7) LED light red and yellow
8) Handphone
B. Software Used
1) Arduino Compiler IDE
2) Coding language- JAVA
3) GOS- LINUX, WINDOWS

ABSTRACT
The fire detection system combines the simultaneous measurements of smoke, carbon monoxide, and carbon dioxide. The security
of campus against intruders moving in laboratories, class rooms, staffrooms or washrooms. The fire alarm system consists of Fire
detectors (with can be smoke detector, heat, or Infra-Red detectors), control unit and alarm system. A fire detection system is
developed based on the simultaneous measurements of temperature and smoke. The fire detection system with the alarm algorithm
detected fires that were not alarmed by smoke sensors, and alarmed in shorter times than smoke sensors operating alone.
Previous fire detection algorithms used data from sensors for temperature, smoke, and combustion products. The smoke sensor

alarms when the analog output signal exceeds or equal the threshold value. The node includes analog sensors to measure smoke,
carbon monoxide (CO) and temperature. A fire alarm system should reliably and in a timely way notify building occupants about
the presence of fire indicators, such as smoke or high temperatures.
Key Words: Arduino UNO, MQ2 Gas Sensor, DH-11 sensor, GSM Module, LCD and Buzzer.

Fire and Gas detection alarm systems are important tools for safeguarding our residence home, building, office, market, and other
places. A well designed fire and gas system is intended to detect and in some cases automatically mitigate fire, flammable gas and
toxic gas hazards. Proper placement of detectors is critical in the design of a fire and gas system to ensure that coverage is
adequate to detect hazards at their incipient stage, in order to prevent escalation. The rates of increase of these three components
are used in the fire alarm algorithm to determine the presence of a fire. The smoke sensor provides a mean to detect smoke and to
serve as an early fire warning. Heat detectors are the oldest type of automatic fire detection device [5]. They respond either when
the detecting element reaches a predetermined fixed temperature or to a specified rate of temperature change. If a fire should
result, systems can be attached to extinguish the fire and protect other areas from the actions of the fire. Generally, the fire
detection system and gas detection system is combined into one fire and gas system. A separation that may be made is to have one
fire and gas system for the processing areas and another sub-system for the usefulness or office/accommodation areas.

2. SYSTEM COMPONENTS AND TYPES

This system is implemented fire and gas detection and alarm. It consists of the following components to integrate the system goal:
Arduino UNO [1, 2], GSM module SIM900. Gas sensor MQ-2, Temperature and Humidity sensor DH-11, Buzzer, and the Liquid
Crystal Display LCD.

2.1 Arduino UNO

Arduino Uno is microcontroller board and based on the Atmel's ATmega328 microcontroller. "Uno" means one in
Italian and the uno board is the latest in a series of USB (Universal Serial Bus) .The Arduino Uno board has a 16 MHz ceramic
resonator, a USB connection, a power jack, an ICSP header, a reset button, 6 analog inputs and 14 digital input/output pins (of
which 6 can be used as PWM outputs). The board has 32 KB flash memory of which 0.5 KB is used by boot-loader, 2 KB of
SRAM, 1 KB of EEPROM and 16 MHz clock speed. The Arduino system offers a set of analog and digital pins that can be
Integrated to many other boards and circuits which absolutely have different functions in a design. Arduino board provides a USB serial communication interfaces for loading the codes from computer. To do the codes, Arduino has prepared its own software

Called integrated development environment (IDE) which completely supports C and C++ programming languages [1, 2].

Figure1. Arduino UNO microcontroller and MQ-6 Sensor

2.2 MQ-6 Smokes and Gas Sensor

The MQ series of gas sensors use a small heater inside with an electro-chemical sensor shown in figure 1. They are sensitive for a range of gasses and are used indoors at room temperature. The output is an analog signal and can be read with an analog input of a PIC microcontroller. The MQ-6 Gas Sensor module is useful for gas leakage detecting in home and industry. It is highly sensitive in the detection of the presence LPG, butane, propane, methane, alcohol, hydrogen and smoke. Some modules have a built-in variable resistor to adjust the sensitivity of the sensor. It was used in this research work for the detection of LPG and smoke in the building. The resistance of the sensor is different depending on the type of the gas. The smoke sensor has a built-in potentiometer that allows you to adjust the sensor sensitivity according to how accurate you want to detect gas [5, 7]. The coding for smoke detection is as follows:

```
void setup() {
pinMode(buzzer, OUTPUT);
pinMode(smokeA0, INPUT);
Serial.begin(9600); }
void loop()
{ int analogSensor = analogRead(smokeA0);
Serial.print("Pin A0: ");
Serial.println(analogSensor);
if (analogSensor > 400) tone(buzzer, 1000, 200);
else noTone(buzzer);
delay(1000);
}
```

2.3 Temperature and Humidity Sensor

Humidity is a very important feature in detecting a fire. In case fire the air will be dry thus decreasing the humidity. This decrease in humidity can give us indication of forest fire. The DHT-11 sensor can be used to detect humidity in the range of 20-90% RH with the accuracy of ±5% RH. DHT-11 uses resistive type humidity measurement component. The DHT11 and DHT22 sensors are fairly easy to connect. They have four pins: The DHT11 sensors are fairly easy to connect. They have four pins: VCC, Data, NC and Ground [5, 6, 7]. In figure 2, DH-11 sensor, Buzzer, GSM modem and LCD is displayed.

VCC pin supplies power for the sensor. Although supply voltage ranges from 3.3V to 5.5V, 5V supply is recommended.

In case of 5V power supply, you can keep the sensor as long as 20 meters. However, with 3.3V supply voltage, cable length shall not be greater than 1 meter. Data pin is used to communication between the sensor and the microcontroller. The casing is in two parts so to get inside it is just a matter of getting a sharp knife and splitting the case apart.

Inside the case, on the sensing side, there is a humidity sensing component along with a NTC temperature sensor (or thermostat). Humidity sensing component is used, of course to measure humidity, which has two electrodes with moisture holding substrate (usually a salt or conductive plastic Polymer) sandwiched between them. Higher relative humidity decreases the resistance between the electrodes, while lower Relative humidity increases the resistance between the electrodes. In the Arduino IDE, enter and will print the temperature and Relative humidity values on the LCD display.

```
void setup()
{
pinMode(buzzer, OUTPUT);
Serial.begin(9600); }
Void loop()
{ int readData = DHT.read11(dataPin); // DHT11
float t = DHT.temperature; // Gets the values of the temperature
float h = DHT.humidity; // Gets the values of the humidity
Serial.print("Temperature = ", t," ");
Serial.print((char)176);//shows degrees character
Serial.print("C | ");
if (dataPin > 45)
tone(buzzer, 1000, 200);
else noTone(buzzer);
Serial.print((t * 9.0) / 5.0 + 32.0," ");//print the temperature in Fahrenheit
Serial.print((char)176);//shows degrees character
Serial.println("F ");
Serial.print("Humidity = ", h, " % ");
delay(1000); // Delays 2 secods
```

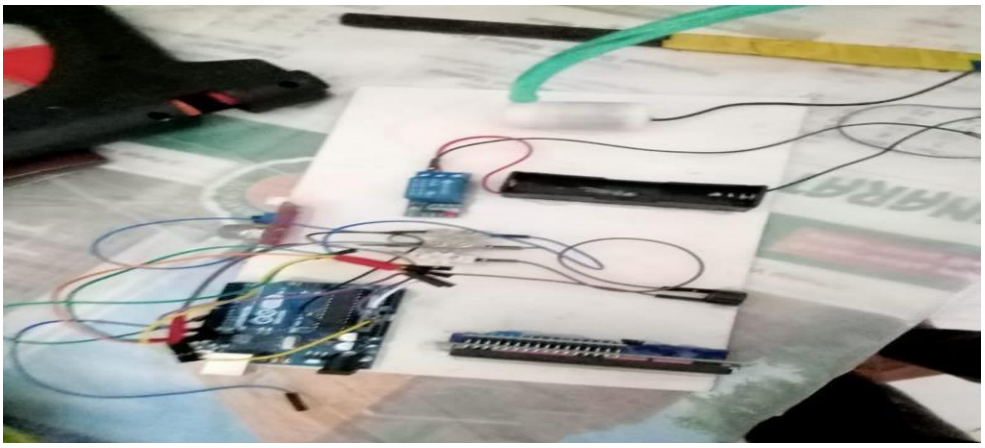


Figure: SMOKE, GAS & SMELL DETECTOR PROJECT

2.4 GSM Module

This is a GSM/GPRS-compatible Quad-band cell phone, which works on a frequency of 850/900/1800/1900MHz and which can be used not only to access the Internet, but also for oral communication (provided that it is connected to a microphone and a small loud speaker) and for SMSs. The module is managed by an AMR926EJ-S processor, which controls phone Communication, data communication (through an integrated TCP/IP stack), and (through an

UART and a TTL serial interface) the Communication with the circuit interfaced with the cell phone itself. The processor is also in charge of a SIM card (3 or 1,8V) which needs to be attached to the outer wall of the module. In addition, the GSM modem (Sim900) device integrates an analog
interface, an A/D converter, an RTC, an SPI bus, an IC, and a PWM module [3, 4].
2.5 Liquid Crystal Display Unit (LCD) This unit consists of a 16×2 Character LCD. The liquid crystal display is connected through a variable resistor; the variable resistor (10kΩ) is used to adjust the brightness of the LCD. The LCD displays the status of the system when gas detected or when a flame is detected through the various sensors installed the system. The following program will print the temperature and relative humidity values on the 16×2 character LCD [8]. Liquid Crystal lcd(12, 11, 5, 4, 3, 2); // Creates an LCD object. Parameters: (rs, enable, d4, d5, d6, d7)

```
dht DHT;
bool showcelciusorfarenheit = false;
void setup()
{ lcd.begin(16,2); }
void loop()
{ int readData = DHT.read11(dataPin);
float t = DHT.temperature;
float h = DHT.humidity;
lcd.setCursor(0,0);
lcd.print("Temp.: ");
if(showcelciusorfarenheit){ lcd.print(t);
lcd.print((char)223);//shows degrees character
lcd.print("C");
showcelciusorfarenheit = false; }
else{ lcd.print((t * 9.0) / 5.0 + 32.0);
lcd.print((char)223);//shows degrees character
lcd.print("F");
showcelciusorfarenheit = true; }
lcd.setCursor(0,1);
lcd.print("Humi.: ");
lcd.print(h);
```

```
lcd.print(" %");
delay(2000);
}
```

2.6 Buzzer

A buzzer is a mechanical, electromechanical, magnetic, electromagnetic, electro-acoustic or piezoelectric audio signaling device. A piezo-electric buzzer can be driven by an oscillating electronic circuit or other audio signal source. A click, beep or ring can indicate that a button has been pressed. It consists of a number of switches or sensors connected to a control unit that determines if and which button was pushed or a preset time has lapsed. It usually illuminates a light on the appropriate button or control panel, and sounds a warning in the form of a continuous or intermittent buzzing or beeping sound [8].

3. FIRE DETECTION AND ALARM SYSTEMS

Fire alarm systems include: Conventional fire alarm system, Addressable fire alarm system, Analogue addressable fire alarm system, and Wireless fire alarm system. Wireless fire alarm systems are an effective alternative to traditional wired fire alarm systems for all applications. It is a simple concept, which provides many unique benefits and is a full analogue addressable fire detection system without the need for cable. These systems can provide several main functions. First they provide a means to identify a developing fire based on smoke and gas through automatic methods and second, they alert building occupants to a fire condition. Another common function is the transmission of an alarm notification signal to the fire department or other emergency response organization. They may also shut down electrical, air handling equipment or special process operations, and they may be used to initiate automatic suppression systems. A fire sensor system based on the simultaneous detection CO, CO2, and smoke concentrations, is demonstrated [6]. A fire detector is usually implemented as a smoke sensor due to its early fire detection capability, fast response time and relatively low cost. The installed Arduino device which was programmed with Android Studio takes received gas, smoke, the temperature, and humidity signals from the sensors. 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. By using Arduino Integrated Development Environment (IDE),

MQ2 sensor Connect Arduino microcontroller to the computer. Then connect the VCC pin of your module to the to the 5V pin of Arduino and connect the GND pin of your module to the GND pin of your Arduino. Finally, connect the Output pin of your module to the A0 pin of Arduino. The LCD shows the status of the system when there is a presence of gas or smoke which may lead to fire outbreak in the environment.

3.1 Hardware Design

In this system, a fire and smoke detection system is designed and developed using arduino controller. The arduino controller act as a main controller of system, Temperature and humidity sensor is used to detect rise in temperature and smoke sensor is used to detect the smoke. Buzzer act as an alarm and Wife module is used to create the wireless communication between android phone and controller. Also the controller will send command to virtual terminal of android phone about the fire and smoke detection through the GSM module. General Fire detection and alarm system and Block diagram are shown in figure 3 and Arduino fire alarm system is an important system for industrial purposes as well as for household purposes. Whenever it detects fire or smoke then it instantly alerts the user about the fire through the GSM module. Software design is as shown in figure5.

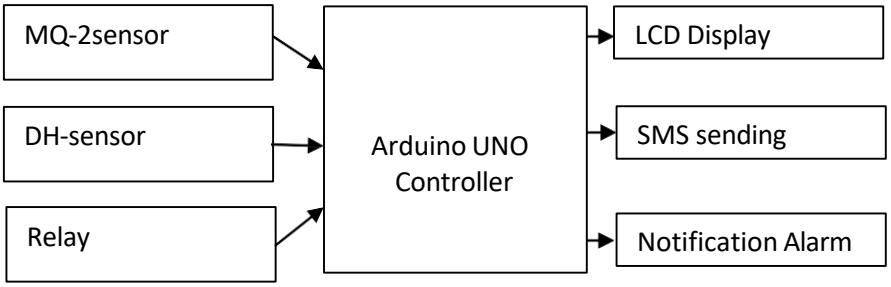


Figure 4. Block Diagram

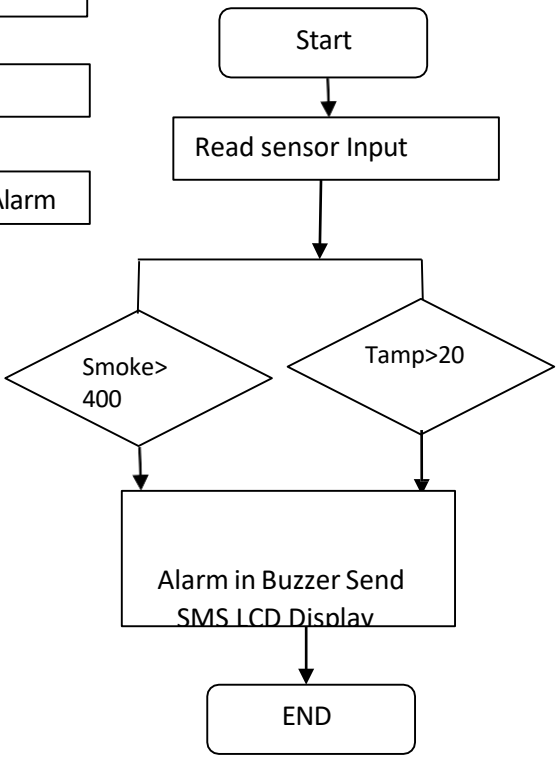


Figure 5. Flow chat of the System

4. IMPLEMENTATION RESULT

The hardware of this case consists of Gas sensor, temperature and humidity sensor, Arduino microcontroller, GSM SIM- 900A that is connected with Arduino through an relay module to control it. A fire alarm system is number of devices working together to detect and warn people through visual and audio appliances when smoke, fire, carbon monoxide or other emergencies are present. Fire and smoke that spread within a building can be affected by various factors such as the geometry, dimension, layout and usage of the building. If a detector detects smoke or heat, or someone operates a break glass unit, then alarm sounders operate to warn others in the building that there may be a fire and to abandon.

This paper presents the design and implementation of a cost-effective and reliable automated GSM based fire alarm system. Fire detectors use various sensor, generally a smoke sensor and temperature and humidity sensor. The sensor input data is connected with Arduino controller. LCD display, Buzzer and GSM module also is connected with Arduino for output result. Buzzer is notify for fire alarm and LCD is displayed the fire detection status. GSM module

can be informed to specific user to know or prevent their home, office or building. This system can be applied in residential places, offices and hotels. With this system safety is assured. The system can perform different parameter measurements for early detection of building fires. There should be a minimum of two or three smoke and detectors in your home. You should install a smoke and detector on each floor of a house. Always have a smoke and detector and fire alarm system in your home for your own safety. The advantages of the system can help in early reaction, saving lives and property. It can also protects us and our residence.

EXPERIMENTAL RESULTS

The results of this case study on the system and this tool can help humans to increase proven LPG gas reserves and provide assistance to their owners that they have an LPG gas leak in the form of an alarm is also sent a message in the form of an SMS to the owner. This system and tool work as expected, and are able to detect LPG gas leaks that occur within the detection radius of the MQ-2 gas sensor which is attached to the system and the device, which is between 50 cm - 80 cm and placed in a relatively closed. With this system and tool, the people or people who use it feel safe and comfortable. In other words, do not worry about the danger if there is an LPG gas leak that is unknown to the owner. Because the system and tool are able to work in accordance with the objective this system and tools can send information to the owner if an unknown LPG gas leak occurs through an SMS message sent to the owner's hand phone. Overall, the experimental results of LPG gas leakage detection and the alert system should demonstrate its ability to detect gas leakage, provide an early warning to prevent accidents and minimize damage, and enhance the house and industrial safety.

The LPG gas leakage detection and alert system is an essential tool for enhancing safety in households and industries. LPG gas leakage can cause serious accidents, fires, and explosions, leading to fatalities and significant damage to property. The proposed system offers a reliable and effective solution to detect potential hazards and provide an early warning to prevent Catastrophic consequences. Various gas sensors, wireless and GSM technology, microcontrollers, and an alarm system are used to detect the presence of LPG gas and trigger an alarm, shut off the gas supply, and send an SMS alert in case of gas leakage. The experimental results of the system should demonstrate its ability to accurately detect gas leakage, provide an early warning, and minimize damage caused by gas leakage. Hence, the proposed LPG Gas Leak Detection Smart Tool can significantly improve house safety and

industrial safety, prevent accidents, and minimize damage caused by gas leakage. Therefore, it is a valuable and necessary investment for anyone using LPG gas as a fuel source.

The LPG gas leakage detection and the alert system have a significant future in improving safety and preventing accidents in households and industries. With advancements in technology, the system can be further enhanced to provide more accurate and efficient detection of gas leakage. The integration of artificial intelligence and machine learning algorithms can improve the system's ability to identify potential hazards and trigger appropriate responses. Additionally, the system can be connected to a central monitoring system, enabling remote monitoring and management of gas leakage in real time. Overall, the future scope of the LPG gas leakage detection and alert system is promising, and continuous research and development can further enhance its capabilities.

Arduino-Based Gas and Smoke Detector Realized Using MQ-2 Sensor

Abstract— System for detecting carbon monoxide, particles of smoke and combustible gases is described in this paper. Detector is based on application of Arduino platform with MQ-2 sensor as a source of input signal. The gas sensor functioning principles and detector configuration are explained in details. The described detector could be successfully used for various gas leakage detection, alone, or as a part of more complex system. The experimental results are given for burning paper smoke and three types of combustible gases. They confirm good performance of the system. Index Terms—Arduino, microcontroller,flammable gas detector.We are the witnesses of rapid growth and wide application of electronic devices and systems in everyday life. The new disciplines and branches of technical sciences have emerged, which are now developing at an even faster pace.Electronic, mechanical and computer science engineering offer implementation of components that enable the development of complex systems that have a wide range of applications in industry, medicine and other fields of human life and work. Protection of human lives and health becomes a primary goal in modern conditions. The Arduino platform has an enormous potential as an educational and research tool, and represents an excellent base for designing important real-life systems. By using the

Arduino platform, which consists of a physical part with a microcontroller and of software, it is possible to design a system that is capable of protecting a human life and goods from fire and combustible gases.

I. SYSTEM COMPONENTS

Key components for gas/smoke detector system are J1 piezo buzzer, a green and a red LED diode, an MQ-2 smoke detector and Arduino platform. Some of them will be explained in more details next.Arduino is an open-source electronics platform, based on easy-to-use hardware and software [1]. Over the years, it has been used for thousands of projects, from everyday circuits to complex scientific instruments. The entire Arduino project has started in 2004. When a Colombian student made a "Wiring" platform for his graduate thesis. In this way a new, low cost, and simple electronic device for fast prototyping was created. Arduino programs are written using a simplified version of C++, which makes it easier to learn. Arduino boards are very versatile and can be used for a variety of different applications. Some of them are: Uno, Due, Mega, Leonardo, Micro, Esplora etc. For the purpose of gas detection system, Arduino Uno was considered quite acceptable. Arduino Unions the most frequently used variant, since it is very beginner friendly. It consists of 14-digital I/O pins, where 6-pins could potentially be used for the Pulse Width Modulation (PWM) outputs, 6-analog inputs, a reset button, a power jack, a USB connection, In-Circuit Serial Programming (ICSP) header etc., and – ATMega328 [2]. ATMega328 is a high performance AVR microcontroller with 8-bit RISC (Reduced Instruction Set Computer) architecture. It has low power Consumption and can execute 131 instructions per single clock cycle. It has 32KB ISP (In-System Programming) flash memory with read- while-write capabilities, 2KB SRAM, 1KB EEPROM and maximum operating frequency of 20MHz.

B. MQ-2 gas and smoke detector

from 2013. To 2017 there were more than 350 thousand fires per year occurring only in homes, and that number is only a quarter of total number of fires. Smoke detectors are very much needed, since they can help in reducing the number of fires or at least decrease the damage done. Having any smoke detector is better than having none. Best smoke detectors can detect smoke particles, flames and carbon monoxide. Smart smoke detectors represent a cutting-edge technology for fire safety, since they can communicate through the apps and deliver alerts to a phone or some other device or system. Smoke detectors should always have

a backup power source for the case of power loss.There is two basic types of passive smoke detectors: photoelectric and ionization [3]. Combination of these makes a dual sensor smoke alarm, which is recommended for maximum protection from both fast flaming and slower fires. Photoelectric alarms use light to detect smoke. They sense sudden scattering of light when smoke enters into the detectors chamber, which further triggers the alarm. This method of detection can detect fires that begin with long duration of smoldering aptly. Photoelectric smoke detectors respond from 15 to 50 minutes faster than ionization alarms in early stages of fire. Ionization alarms use radiation to detect smoke [4]. They carry a small amount of radioactive materialArduino-Based Gas and Smoke Detector Realized Using MQ-2 Sensor Petar Stannic, between two electrically charged plates, which ionizes the air and causes current to flow between the plates. The smoke disrupts the flow of ions and reduces the flow of current, which triggers the alarm. Ionization alarms are highly sensitive and respond from 30 to 90 seconds faster than photoelectric alarms to fast flaming fires. This type of detectors is more suited to rapid flaming fire outbursts, unlike the photoelectric detectors, which responds better to smoldering stages. Ionization detectors might perform better where there is risk of fast flaming fire, whereas photoelectric detectors react better to cases of slow smoldering, like electrical or furnishing fire. Dual smoke detectors include both photoelectric and ionization sensors, making them safest smoke and fire detection devices. MQ-2 is a Metal Oxide Semiconductor (MOS) type of gas sensor, also known as chemiresistor. Chemiresistor is a material which changes its electrical resistance as a response to changes in the nearby environment. Sensors made from metal oxides require high temperatures (200 °C or higher) to operate because, in order for the resistivity to change, an activation energy must be overcome, thus leading us to the conclusion of MQ-2 being more efficient where there is risk of fast flaming fire, as the high temperature will be reached in shorter amount of time[7]. In our case, MQ-2 sensor’s resistance changes when smoke or flammable gases are present. It requires 5V DC power supply and draws about 800mW of power. Beside the smoke, it can also detect Liquefied Petroleum Gas (LPG), alcohol, butane, propane, hydrogen, methane and carbon monoxide concentrations from 200 to 10 thousand ppm [5]. The sensitivity curve of MQ-2 sensor for different gases is shown in

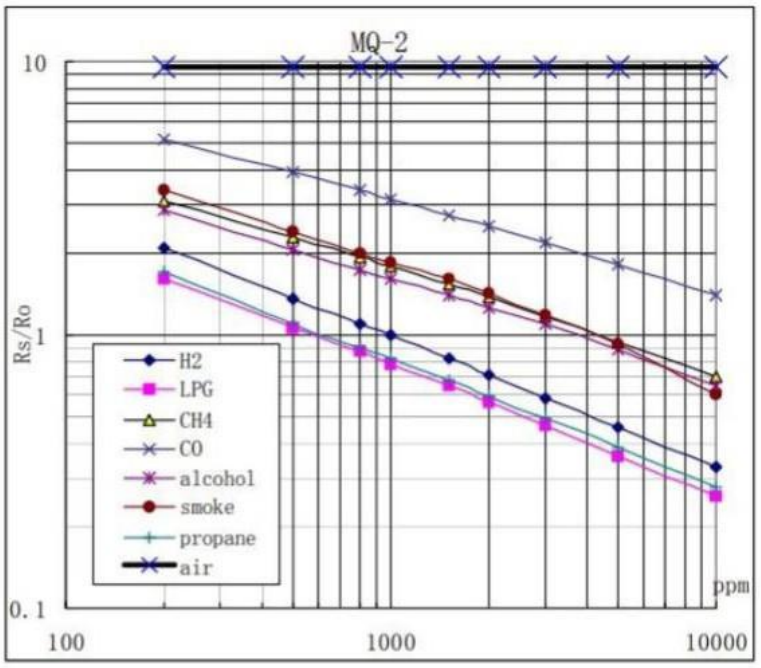
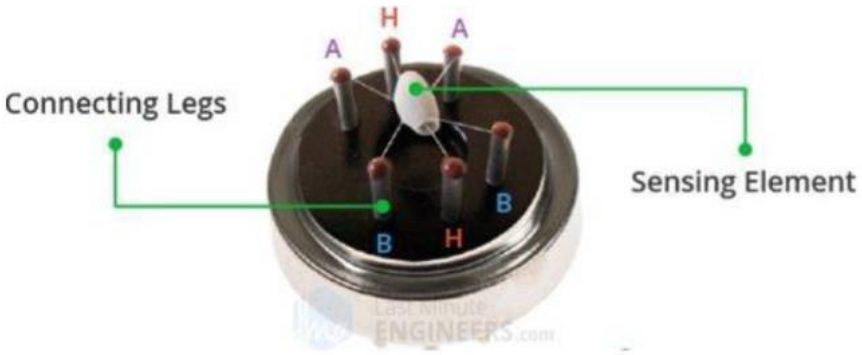


Fig.1. MQ-2 sensitivity characteristic curve.

Where R0 is sensor resistance at 1000ppm (parts per million) of H2 in the air, and RS is sensor resistance at various concentrations of gases. The sensor is sealed between two layers of stainless steel called anti-explosion network. It is necessary to ensure that the heater inside the sensor does not explode when flammable gases are sensed. The sensor also filters the air particles and allows that only gaseous elements pass inside the chamber. The anti-explosion network is attached to the enclosure with a copper plated clamping ring. Fig.2.MQ-2 external structure. Figures 2 and 3 show the external and internal structure of The MQ-2 sensor. Internal star-shaped structure is formed from sensing element and six connecting legs. Two of six leads, (H in Fig.3.) are dedicated for heating the sensing element and connected through the nickel-chromium coil (conductive alloy). The remaining four leads (As and Bs in Fig. 3) generate the output signal and are connected using platinum wires which are linked to the sensing element and deliver small changes in the current that passes through the sensing element Sensing element is made of aluminum oxide and a tin dioxide coating. Tin dioxide coating is the most important part of the component since it is sensitive to combustible gases. Aluminum oxide increases the heating efficiency and ensures that the sensor reaches the working temperature. If the air is clean, donor electrons from tin dioxide are attracted toward oxygen adsorbed on the surface of the

sensing material, which prevents electric current flow as shown in Fig. 3. In the presence

of smoke or combustible gases, oxygen reacts with gases which causes decrease of the Surface oxygen density. Electrons from Fig.5.Are released back into the tin dioxide, allowing the current to flow through the sensor



Fug: 2-MQ internal Structure

Gas/smoke. [9]

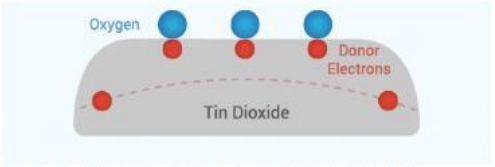


Fig. 3. Absorbed oxygen in clean air prevents the current flow.[9]

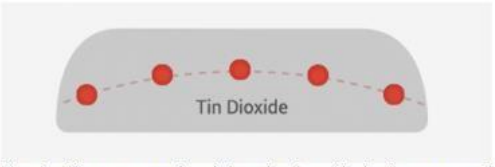


Fig. 4. Electrons are released into the tin oxide in the presence of

The generated output voltage of the sensor is proportional to the concentration of the present smoke or gas. Higher gas concentration causes higher output voltage. The analog signal from MQ-2 is digitized as in the case of Arduino board based gas detection system implementation.

II. SYSTEM REALIZATION

For simulations and realization of this project, software environment “Fritzing” was used [6]. Frizzing is an open-source hardware initiative mainly used for documenting and sharing prototypes, layouts and manufacturing of Printed Circuit Boards (PCBs).

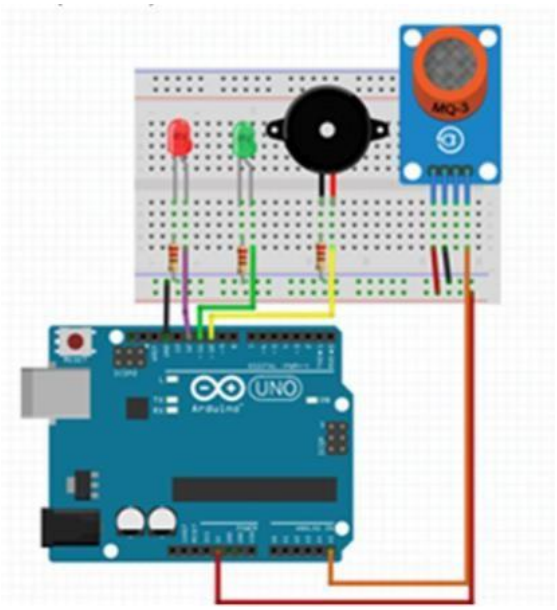


Fig.5. Breadboard realization of the system using Frizzing.

Breadboard realization of the system using Frizzing is shown in Fig. 5.

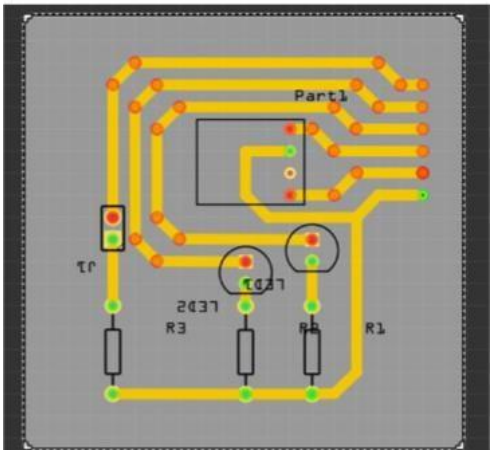


Fig.6. PCB of our project.

PCB of the smoke/gas detection system is shown in Fig. 6.

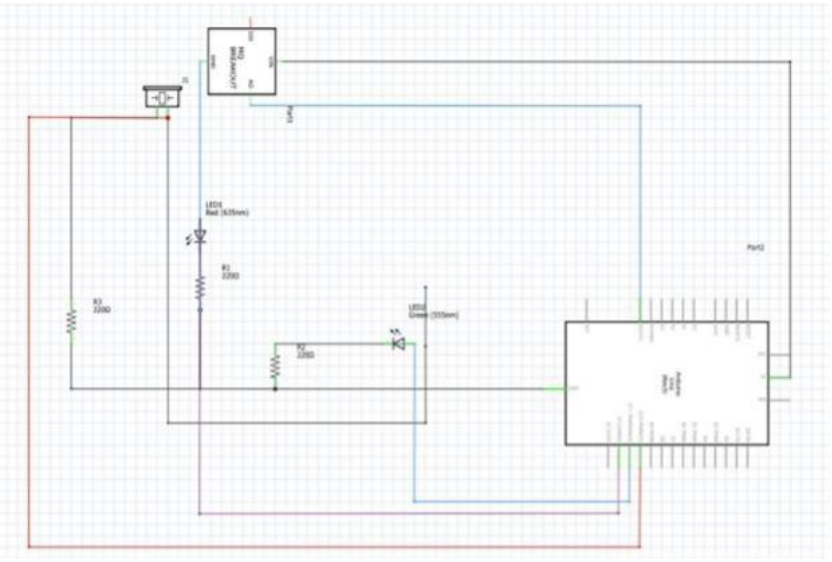


Fig.7. Schematic of the system.

Schematic diagram of the system is shown in Fig. 7.

III. THE EXPERIMENTAL RESULTS

The verification of the described detector system is performed in modest improvised laboratory environment. The greatest attention is paid to the fact that all measurements are performed in similar conditions as would be expected in real- live scenarios. In order not to endanger household safety, the measurements were performed inside a pan with a lid, as shown in Fig. 8. In this way a sufficient concentration of gases and good sensor response to small amount of gas is achieved.

Fig.8.Experimental Conditions.

Experiments show that smoke sensitivity of MQ-2 is considerably lower than its sensitivity to combustion substances (butane, alcohol and LPG in our case). This can be noticed from Fig.10. After conducting multiple measurements, we could calculate the detector's sensitivity value (slope of the given characteristics) for different gases using the following equation: (1) where is voltage on analog pin A5 with maximal possible value of 5V. A5 is a digital representative of measured voltage on the sensor with maximal value of 1024.

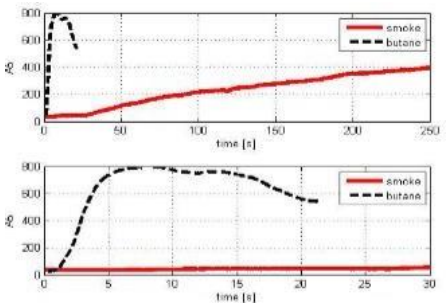


Fig.9. Measured voltage for smoke and butane.

The relevant measure of sensor sensitivity could be the sensor's output voltage change rate

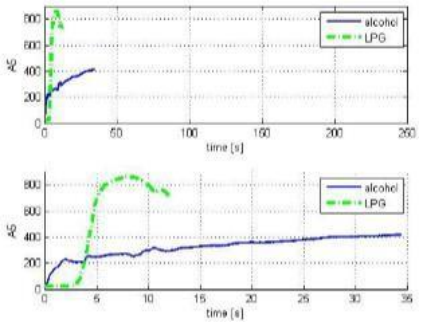


Fig.10. Measured voltage results for alcohol and LPG.

That value is estimated from collected data, shown in Figs.9 and 10, taking into account only part of the curve where the slope was constant and maximal.

- Butane: 0.9896 V*s-1
- Alcohol: 0.5127 V*s-1
- LPG: 1.8815 V*s-1
- Smoke: 0.0145 V*s-1

Measured voltage values were shown in Serial Monitor view in Frizzing, and it allowed us to track results in real time via serial data transfer (In this case it was set to 9600 bauds).Gathered data was imported in MATLAB after which it was used to generate the above characteristics. Those graphs show cumulative data. The latter graphs are zoomed and show curve parts where MQ-2 shows significant change when detecting larger amounts of gas. One can conclude that MQ-2 is very sensitive to gases mentioned above. Considering the conditions in which experiment was conducted, obtained sensitivities cannot be considered as very accurate. The source of LPG was a 20l gas bottle. In short time it can deliver larger amounts of gas than a lighter (used as a source for butane). It is also noticed that the sensitivity to alcohol vapors is slightly lower. Measured results are in compliance with data from Fig.1while maximal sensitivity is obtained for the LPG. Home Conditions were not very satisfactory because the main priority was not to burn the sensor (small distance from the fire), while maintaining to “feed” the fire by removing the lid Regularly. Real time information from Serial Monitor detected the smoke concentration drop with lid removal (to obtain more paper fuel) and this caused slow increase of sensor Output voltage. At the end we can conclude that with the right calibration, the MQ-2 can be used for detecting (and alarming) larger quantities of combustible gases in houses or storages.

In this paper one possible solution for realization of detector system for recognizing presence of smoke or combustible gases is presented. System is tested in home conditions with exposing MQ-2 sensor to different types of gases. Output sensor voltage is monitored for smoke generated by burning papers and cigarettes and for available combustible gases as butane from lighter, stove LPG and alcohol vapors. Experiments prove high sensitivity of MQ-2 sensor making it a good choice in detector system basic sensor selection. By combining with other types of sensors, it is possible to create more complex detectors.

ACKNOWLEDGMENT

This work has been supported by the Ministry of Education, Science and Technological Development of the Republic of Serbia.

REFERENCES

[1] M. Verde, “Pic Microcontroller”, Beograd : Mikroelektronika; 2008

[2] http://www.atmel.com/devices/ATMEGA328.aspx

[3] https://www.ifsecglobal.com/smoke-detectors/

[4] D.Malain,and P. Kanchana. "Evaluation of radiation safety for ionization chamber smoke detectors containing Am-241,”Journal of Physics:Conference Series”, Vol. 1285. No. 1. IOP Publishing, 2019.[5] https://lastminuteengineers.com/mq2-gas-senser-arduino tutorial/?fbclid=IwAR1gYvlT6VbUM_3bxXKsW8CnFyzmtqPiCwA6myb9DaOV_6P4SWNYBfN3sQM

[6] https://fritzing.org/

[7] O. Asif, Md. B. Hossain, M. Hasan, M. T. Rahman and M. E. H. Chowdhury, “Fire-Detectors Review and Design of an Automated, Quick Responsive Fire-Alarm System Based on SMS”, Int. J. Communications, Network and System Sciences, Vol. 7, pp. 386-395,2014

[8] https://www.pololu.com/file/0J309/MQ2.pdf?fbclid=IwAR3zv-g1QSDJtT4FSUAfIC3BxyQVeRiqy7dfRQjnLVBjb440svr5GfqUwWI

[9] https://lastminuteengineers.com/mq2-gas-senser-arduino-tuto

SMOKE DETECTOR USING ARDUINO

Abstract- A smoke detector is a device that senses smoke typically as an indicator of fire. Smoke detector basically works on principle of optical detection or on ionization and for increased sensitivity for smoke detection both the methods are used .By this smoke detectors can be used to detect the smokers in public places. However these smoke detectors in large commercial industrial and residential are usually provided by a central fire alarm system. Smoke detection is done by MQ2 analog gas sensor. This sensor is also used to detect LPG i-butane, propane, methane, alcohol, hydrogen ,smoke. There by whenever smoke is detected by this sensor it gives information to arduino, and the programmer in the Arduino runs and gives the information that smoke detected and buzzer buzzes in caution of smoke. Coming to design of smoke detectors, these are typically housed in a disc shaped plastic enclosure about 150mm in diameters and 25mm in thick, but shape can vary by manufacturer or product line. Abstract- A smoke detector is a device that senses smoke typically as an indicator of fire. Smoke detector basically works on principle of optical detection or on ionization and for increased sensitivity for smoke detection both the methods are used .By this smoke detectors can be used to detect the smokers in public places. However these smoke detectors in large commercial industrial and residential are usually provided by a central fire alarm system. Smoke detection is done by MQ2 analog gas sensor. This sensor is also used to detect LPG, i-butane, propane, methane, alcohol, hydrogen, smoke. There by whenever smoke is detected by this sensor it gives information to arduino, and the programmed in the Arduino runs and gives the information that smoke detected and buzzer buzzes in caution of smoke. Coming to design of smoke detectors, these are typically housed in a disc shaped plastic enclosure about 150mm in diameters and 25mm in thick, but shape can vary by manufacturer or product line.

Abstract- A smoke detector is a device that senses smoke typically as an indicator of fire. Smoke detector basically works on principle of optical detection or on ionization and for increased sensitivity for smoke detection both the methods are used .By this smoke detectors can be used to detect the smokers in public places. However these smoke detectors in large commercial industrial and residential are usually provided by a central fire alarm system. Smoke detection is done by MQ2 analog gas sensor. This sensor is also used to detect LPG, i-butane, propane, methane, alcohol, hydrogen, smoke. There by whenever smoke is detected by this sensor it gives information to arduino, and the program

Me in the Arduino runs and gives the information that smoke detected and buzzer buzzes in caution of smoke. Coming to design of smoke detectors, these are typically housed in a disc shaped plastic enclosure about 150mm in diameters and 25mm in thick, but shape can vary by manufacturer or product line. While the Uno imparts utilizing the first STK500 protocol, it contrasts from all former sheets in that it doesn't utilize the FTDI USB-to- chronic driver chip. All things being equal, it utilizes the Atmega16U2 (Atmega8U2 up to variant R2) modified as a USB-to-chronic converter.

Fig. 1. Circuit diagram of the project

FIG -3

Features of Arduino Uno:

The operating voltage of this aduino Uno is 5V• Input voltage ranges from 6V to 20V.

- 14 output pins
- 6 input pins.
- Memory is 32KB.
- CLK speed is 16 MHz.
- SRAM is 2KB.

• DC current for input or output pin
is 40mA.

SMOKE SENSOR (MQ2):

This sensor is also called as grove gas sensor module. This smoke sensor senses hydrogen, LPG, butane, propane, alcohol etc. This MQ2 sensor has high sensitivity and also fast response time .it gives fast instructions when the smoke is detected. The sensitive material of the selected sensor is SnO2, it has lower conductivity, so when the sensor is exposed to any smoke, the sensitive material of smoke detector detects the smoke within fraction of seconds. With this it is worthy sensor to engage in detection of smoke in wide range of gases. One of the most useful uses is that its cost is less and it's affordable to everyone.

PROPERTIES OF Smoke
SENSOR:

1. Good sensitivity
2. High sensitivity to gases
3. Long life

FIG 3

3.3 BUZZER:

A buzzer or beeper is a audio signaling device. Which may be mechanical, electrochemical, or piezoelectric typical uses of buzzers and beepers include alarms, timers, and confirmation of user input such as a mouse click .Applications of buzzer:

1. Alarms
2. Automobiles
3. Warning devices
4. Electric field

FIG-4

FIG-5

PINS:

The pins or connecting wires (male to female) pins are used in the project to connect between smoke sensor and arduino. And for the connection of buzzer to arduino these pins may be used. These wires allows current to flow from one region i.e. from smoke sensor to arduino. The wire is made up of copper which is a good conductor of electricity and is insulated with thermoplastic material. This gives projection to the user in working.

POWER SUPPLY:

The Arduino Uno can be controlled through the USB association or with an outer force supply. The force source is chosen naturally. Outer (non-USB) force can come either from an AC-to-DC connector (divider mole) or battery. The connector can be associated by connecting a 2.1mm focus positive attachment to the board's force jack. Leads from a battery can be embedded in the GND and VIN pin headers of the POWER Connector. The board can work on an outside supply of 6 to 20 volts. Whenever provided with under 7V, notwithstanding, the 5V pin may supply fewer than five volts and the board might be precarious. On the off chance that utilizing more than 12V, the voltage controller may overheat and harm the board. The prescribed reach is 7 to 12 volts. The force pins are as per the following:

• VIN. The info voltage to the Arduino board when it's utilizing an outer force source (instead of 5 volts from the USB association or other managed power source). You can supply voltage through this pin, or, if providing voltage by means of the force jack, access it through Fig. i3. Pin diagram if iNodeMCUiESP8266. I

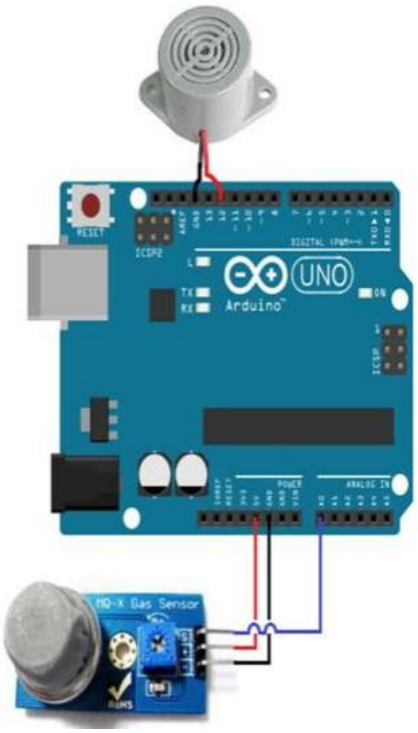
IV. WORKING

Firstly ,let us know about working of smoke sensor , how it works, MQ2 is a metal oxide semiconductor type gas sensor also called as chemiresistors.So the detection of smoke is based on change in resistance os sensing material when the gas is combined with this. sensor is enclosed with two layers one is clamp ring and another is anti-explosion network when the anti-explosion network is removed a star like connection with six legs is observed in that two of them are responsible for detecting the smoke and reaming four concentrates on producing proper out. Majorly sno2 is the sensing compound which is present in MQ2 sensor, in normal conditions when no smoke is being detected sno2 absorbs oxygen molecules from surroundings as it can pair with oxygen atoms, so current flow could be stooped when this happen, when the sensor is exposed to any combustible gas the paired moxygen atoms are depaired and it conducts and flow of electrons occur and current pass through it and voltages are sent to output. And this sensor consists of four pin out one is Vcc which can be connected to arduino to 5v output. And another pin is GND which is ground and it is connected to GND in the arduino. Another pin is which provides output voltage in proportional to the concentration of smoke. Do represent the digital representation of pretense of combustible gas. This pin.

•5V. this pin yields a directed 5V from the controller on the board. The board can be provided with power either from the DC power jacks (7 - 12V), the USB connector (5V), or the VIN pin of the board (7-12V).Providing voltage by means of the 5V or 3.3V pins sidesteps the controller, and can harm your board. We don't prompt it. 3V3. A 3.3 volt supply created by the on-board controller. Most extreme current draw is 50 mA.

• GND. Ground pin

Then , the pins of smoke sensor i.e.A0 connected to A0 port in arduino and GND from sensor is connected to GND in arduino and Vcc of sensor is connected to 5v in arduino, so when the combustible gas is detected around the sensor then the A0 will give output varying with the concentration of gas , the power to the sensor is give by connecting to 5v in the arduino port and arduino gets power from USB cable or adapter provided for that arduino, and ground pin of sensor is attached to ground port of arduino and this is the operation of smoke sensor with the arduino , this should be symbolized and the output pin we adjusted here is 13 port and buzzer is connected to 13 port and ground which gives sound on detecting the smoke. In this way smoke or any combustible gases are detected and a buzzer sound is made when the sensor detects the smoke.



This is the sample circuit connection which is similar to real time application using the arduinouno.

IV. ADVANTAGES

 Ionization smoke sensors are less expensive, and they detect Fast, flaming fires more Readily.

 Photoelectric smoke sensors detect slow and smoldering fires.

 In industrial sector like automobiles producing companies smoke an fire sensors are Necessary. In household works also it can be used when smoke or fire breaks.

V. DISADVANTAGES

As ionization type smoke sensor costs less whereas photoelectric type sensor is a bit costly. These smoke sensors are used up to only a period of ten years.

VI. CONCLUSION

The conclusions should be drawn from this project are: In order to be saved from major happening fire or smoke breakouts in industries and in many hospitals and also in household purposes ,for all these natural or artificial breakouts of fire or smoke , when this device is uploaded near any ventilator it gives siren that smoke or fire is engulfing
The area under it. So many lives can be saved by using this low cost smoke sensor.
The smoke sensor MQ2 is very effective towards butane, propane, LPG, smoke and

Combustible gases and it is cost efficient and life of this sensor is long, so thus has been a major merit that it can be used in saving many lives of people. So , in the view of concluding project its main agenda is to cope up with the moder technology and saving millions of lives and brightening with the useful aspect of this device. It's a geat device that performs its own activity efficiently and importantly saving lives.

REFERENCES

[1] J. Christian and N. Komar, "PrototipeSistemPendeteksiKebocoran Gas LPG Menggunakan Sensor Gas MQ2, Board ArduinoDuemilanove, Buzzer, danArduino GSM Shield pada PT. Alfa Retailindo (Carrefour PasarMinggu)," Jurnal TICOM, pp. 1-7, 2013 https://en.wikipedia.org/wiki/Tilburg_Institute_of_Comparative_and_Transnational_Law

[2] T. H. Mujawar, V. D. Bachuwar, M. S. Kasbe, A. D. Shaligram, and L. P. Deshmukh, "Development of wireless sensor network system for LPG gas leakage detection system," International Journal of Scientific & Engineering Research, vol. 6, pp. 1-6, 2015. [3] K. Padma Priya and RatneshPrabhakar GSM Based Gas Leakage Detection System, published in 2013. [4] Attia, Hussain A., and Halah Y. Ali. "Electronic Design of Liquefied Petroleum Gas Leakage Monitoring, Alarm, and Protection System Based on Discrete Components." International Journal of Applied Engineering Research, vol. 11, no. 19, pp. 9721-9726, 2016. [5] Apeh, S. T., K. B. Erameh, and U. Iruansi. "Design and Development of Kitchen Gas Leakage Detection and Automatic Gas Shut off System." Journal of Emerging Trends in Engineering and Applied Sciences, vol. 5, no. 3, pp. 222-228, 2014