



NATIONAL UNIVERSITY OF COMPUTER AND EMERGING SCIENCES  
(KARACHI CAMPUS)

Department of Computer Science

**Fall 2021**

A large, light blue circular seal of the National University of Computer and Emerging Sciences (FAST) is centered in the background. The seal features a central emblem with a green star and a yellow book, surrounded by the university's name in English and Urdu. The text "NATIONAL UNIVERSITY OF COMPUTER & EMERGING SCIENCES" is written in a circular path around the emblem.

**Project: [Gas Leakage Detector]**

**Group Members:**

[ Syed Aun Ali Zaidi (Group Leader) ] - [20K-0286]

[ Muhammad Anas ]-[20K-0179]

[ Ammar Amin ]-[20K-0285]

## **Introduction:**

Leakage of gas can potentially result in both material loss and human injuries. They can explode, cause fire, and even suffocate others depending upon their physical properties such as toxicity, flammability etc. In the past couple of years, the number of casualties because of gas leakage has increased dramatically. Old valves, substandard cylinders, worn out regulators and lack of awareness while handling gas are some of the reasons for gas explosions. LPG (or propane) and Natural Gas are the gases widely used as a source of fuel in homes because of its desirable properties like less smoke, less soot, and minimal harm to the environment. However, these gases are heavier than air and do not disperse easily. This may lead to suffocation or even worse, explosion! To avoid this problem there is a need for a system to detect the leakage of methane. Our Gas Leakage Detector will identify potentially hazardous gas in the atmosphere via MQ5 Gas Sensor and will sound a buzzer indicating presence of such gases in the atmosphere. In a compact design, this detector can be placed on a ceiling of your kitchen or anywhere where there is a chance of gas leakage thus avoiding any dangers of gas leakage.

## Background:

Safety was our top priority when we were considering this project. There were many practical examples for its use like:

- It can detect LPG, natural gas and coal gas.
- Used in gas leakage detecting equipment in factories.
- It is used in house as Methane leakage detection.
- This system is highly reliable and secure.
- The response time is quick because of high sensitivity of the sensor.
- The results are almost instantaneous with high accuracy.

Considering these factors, we were able to select this as our COAL project.

## Project Specifications:

The specifications of the project are as follows:

### 1) Arduino Uno:



**Arduino Uno** is a microcontroller board based on the ATmega328P. The Arduino Uno can be programmed with the [\(Arduino Software \(IDE\)\)](#). Via this, we were able to program our Gas Leakage Detector Project.



## 2) Buzzer:

A "**piezo buzzer**" is basically a tiny speaker that you can connect directly to an **Arduino**. From the **Arduino IDE**, you can make sounds with a **buzzer** by using `tone`. You have to tell it which pin the **buzzer** is on, what frequency (in Hertz, Hz) you want, and how long (in milliseconds) you want it to keep making the tone.

## 3) 16\*2 LCD Display:



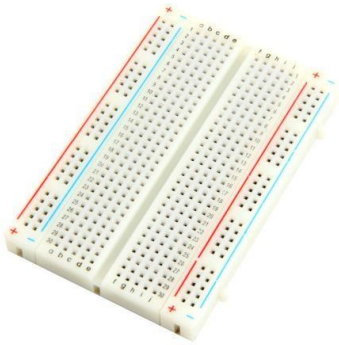
Liquid crystal displays (LCDs) are commonly used to display data in devices such as calculators, microwave ovens, and many other electronic devices.

#### 4) MQ5 Gas Sensor:



The Grove - **Gas Sensor (MQ5)** module is useful for gas leakage detection (in home and industry). It is suitable for detecting H<sub>2</sub>, LPG, CH<sub>4</sub>, CO, Alcohol. Due to its high sensitivity and fast response time, measurements can be taken as soon as possible. The sensitivity of the sensor can be adjusted by using the potentiometer

#### 5) Breadboard:



**Breadboard** is a way of constructing electronics without having to use a soldering iron. Components are pushed into the sockets on the **breadboard** and then extra 'jumper' wires are used to make connections.

#### 6) Jumper Wires:



**Jumper wires** are simply **wires** that have connector pins at each end, allowing them to be used to connect two points to each other without soldering. **Jumper wires** are typically used with breadboards and other prototyping tools in order to make it easy to change a circuit as needed.

## Solution Design:

The following code was uploaded on Arduino Uno:

```
1  //include <MQ5.h>
2  //include <Wire.h>
3  #include <LiquidCrystal.h>
4  //I2C pins declaration
5
6  const int rs = 12, en = 11, d4 = 5, d5 = 4, d6 = 3, d7 = 2;
7  LiquidCrystal lcd(rs, en, d4, d5, d6, d7);
8  int sensor = A0; //analogue pin number for MQ5
9  int gas;
10 int buzzer=10; //digital pin number for Buzzer
11 //MQ2 mq2(Analog_Input);
12
13 void setup(){
14     Serial.begin(9600);
15     lcd.begin(16, 2);
16     pinMode(sensor,INPUT);
17     pinMode(buzzer, OUTPUT); // Set buzzer - pin 9 as an output
18     //mq2.begin();
19 }
20 void loop(){
21     //float* values= mq2.read(true); //set it false if you don't want to print the values in the Serial
22     //lpg = values[0];
23     //lpg = mq2.readLPG();
24     //co = values[1];
25     //co = mq2.readCO();
26     //smoke = values[2];
27     //smoke = mq2.readSmoke();
28     gas=digitalRead(sensor);
29     lcd.setCursor(0,0);
30     if (gas>300){
31         tone(buzzer, 1000); // Send 1KHz sound signal...
32     }
33     else{
34         noTone(buzzer);    // Stop sound...
35     }
36     lcd.print("Gas Level:");
37     lcd.print(gas);
38     delay(1000);
39 }
```

## Conventional Assembly Implementation:

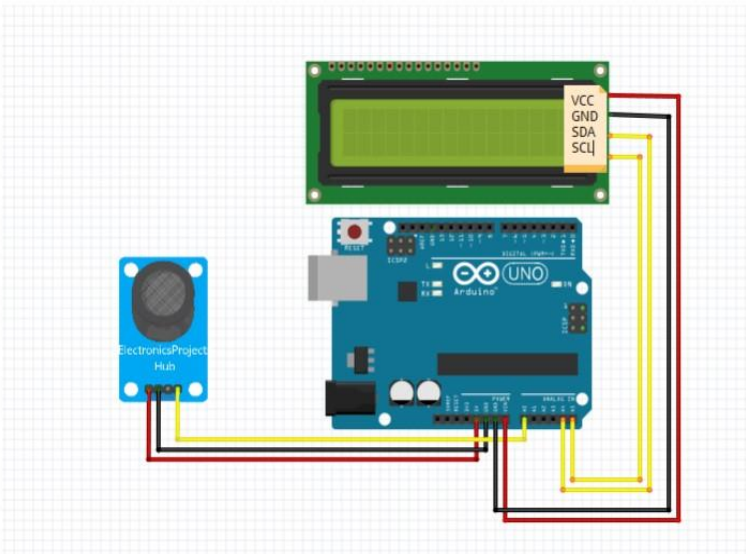
```
1  INCLUDE Irvine32.inc
2
3  .data
4      rs dword 12
5      en dword 11
6      d4 dword 5
7      d5 dword 4
8      d6 dword 3
9      d7 dword 2
10     gas dword ?
11     buzzer dword 10
12     msg1 byte "Enter value of sensor : ",0
13     msg2 byte "Enter value for gas : ",0
14     msg3 byte "Gas level is above 3000 and buzzer is beeping",0
15     msg4 byte "Gas level is below 3000 and buzzer is not beeping",0
16
17 .code
18 main Proc
19     mov eax, 0
20     mov ebx, 0
21     mov ecx, 0
22     mov edx, 0
23     mov esi, 0
24     mov edi, 0
25
26
27     call crlf
28     mov edx, offset msg2
29     call writestring
30     call readdec
31     mov gas, eax
32
33     ; passing to function lcd in Liquidcrystal library
34     call loop1
35
36
37 exit
38 main endp
39 setup proc
40     ; serial.begin called and 9600 passed
41     ; lcd.begin called and 16 with 2 is passed
42     ; pinMode is called twice with passing of sensor and input in first call
43     ; and buzzer and output in the second call
44     ret
45 setup endp
46
47 loop1 proc
48     ; lcd.setCursor called with passing of 0 and 0
49     mov eax, gas
50     mov ebx, 3000
51     cmp eax, ebx
52     ja tone
53     ; notone function is called with passing of buzzer
54     ; lcd.print called with "Gas level : " passed
55     ; lcd.print called with gas passed as parameter
56     ; delay of 1000 milliseconds
57     mov edx, offset msg4
58     call writestring
59     jmp last
60
61     tone :
62     ; tone function is called with buzzer and 1000 passed in its parameters
63     mov edx, offset msg3
64     call writestring
65     jmp last
66 last :
67     ret
68 loop1 endp
69 end main
```

The MQ5 sensor constantly takes reading from the atmosphere. Once the value exceeds a 300, the buzzer will activate with a frequency of 1 KHz alerting everyone nearby. The 16\*2 LCD will keep on constantly displaying the concentration of hazardous gas in the atmosphere, thus visually informing everyone who sees the screen about the presence of any hazardous gas in the atmosphere.

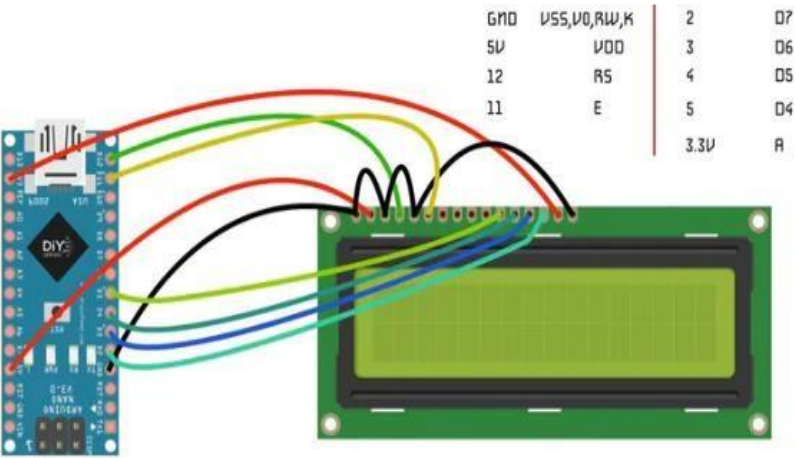


# Implementation & Testing:

MQ2 Connections with Arduino and IIC LCD Display



Circuit



## **Project Breakdown Structure:**

-Syed Aun Ali Zaidi (20K-0286):

- Coding
- Implementation

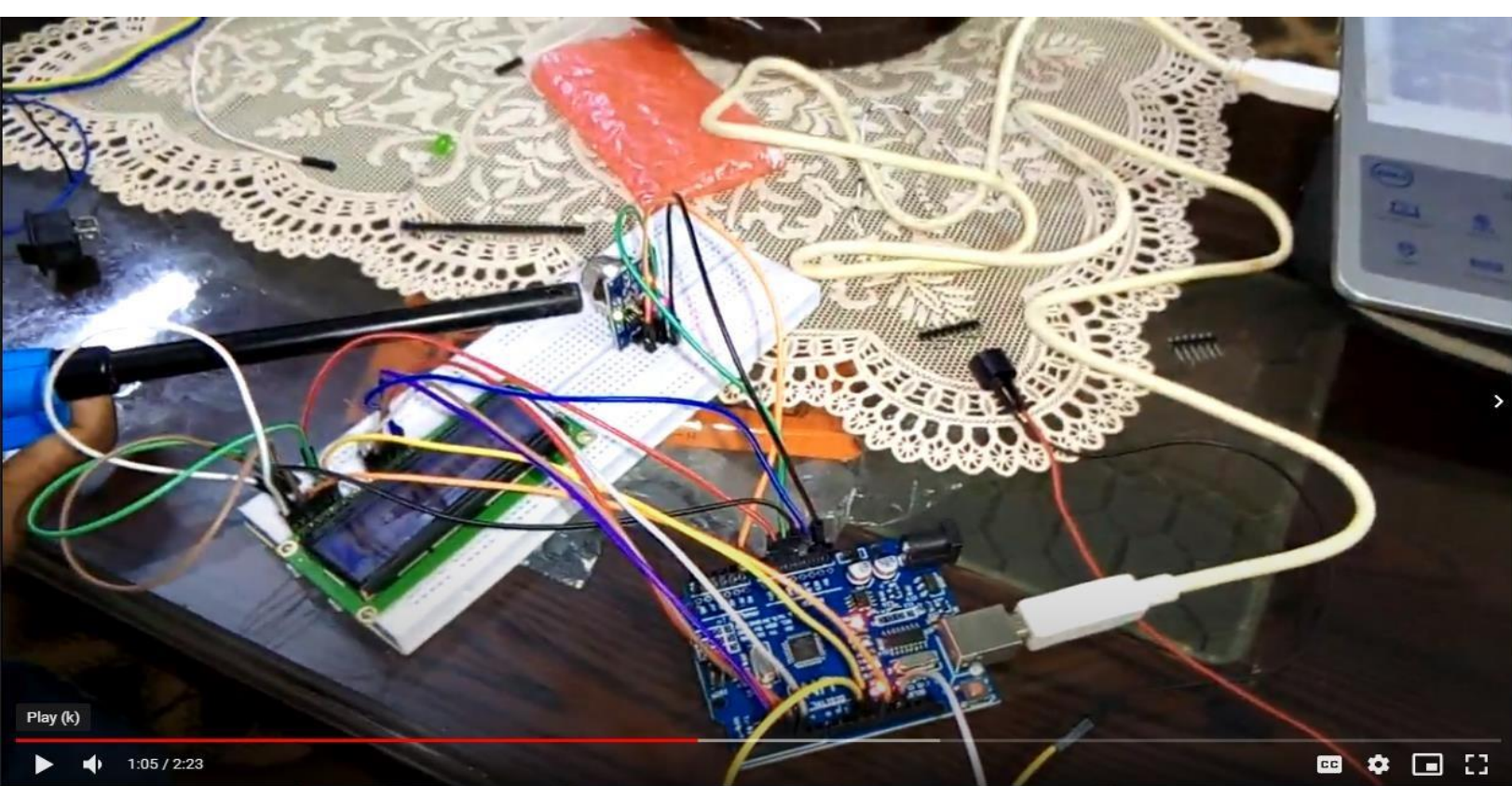
-Muhammad Anas (20K-0179):

- Got The Supplies From The Market
- Helped During Implementation

-Ammar Amin (20K-0285):

- Paid For The Supplies
- Helped During Implementation

## Result:



A Buzzer Sounds Whenever The Gas Sensor Detects The Presence Of Methane Gas.

## Conclusion:

Our project is accurate, feasible and efficient. The cheap availability of its components allows the product to be available to almost everyone. It ensures the safety of lives at home and at workplaces. It works flawlessly and can be installed anywhere where there is a chance of gas leakage.