

# **GAS LEAKAGE MONITORING AND ALERTING SYSTEM FOR INDUSTRIES**

## **PROJECT REPORT**

### **1.INTRODUCTION:**

#### **1.1 Project Overview:**

In today's world, safety is of the utmost importance, and certain measures must be taken at both work and home to ensure it. Working or living in a dangerous environment necessitates specific safety measures, whether the subject is electricity or oil and gas. A type of natural gas known as "Liquified Petroleum Gas" (LPG) is compressed under high pressure and stored in a metal cylinder. LPG is extremely vulnerable to fire and can result in catastrophic damage if left unprotected near any fire source. LPG is primarily utilized for cooking and is more readily available than any other natural gas. Sadly, its widespread use makes gas leakage or even a blast a common occurrence. As a result, a system for detecting and monitoring gas leaks is required. Through a flame sensor, the system will keep an eye on fire and flame. The buzzer begins to ring when a fire is detected. Tests have shown that the system can keep track of the wastage of gas and leaks and notify the user. The performance that was produced showed that it was successful in reducing the amount of domestic gas that was wasted.

#### **1.2 Purpose:**

Nowadays the home safety detection system plays an important role in the security of people. Since all the people from the home goes to work on a daily bases, it makes it impossible to check on the appliances available at home especially LPG gas cylinder, wired circuits, Etc. In the last three years, there is a tremendous hike in the demand for liquefied petroleum gas (LPG) and natural gas. To meet this access amount of demand for energy and replace oil or coal due to their environmental disadvantage, LPG and natural gas are preferred. These gases are mostly used on a large scale in industry, as heating, home appliances, and motor fuel. To monitor this gas

leak, the system includes an MQ6 gas detector. This sensor detects the amount of leaking gas present in the surrounding atmosphere in Industry. In this way, the consequences of an explosion or gas leak can be avoided.

## 2.LITERATURE SURVEY

### 2.1 Existing problem:

The Internet of Things aims towards making life simpler by automating every small task around us. As much as IoT helps in automating tasks, the benefits of IoT can also be extended to enhancing the existing safety standards. Safety, the elementary concern of any project, has not been left untouched by IoT. Gas Leakages in open or closed areas can prove to be dangerous and lethal. The traditional Gas Leakage Detector Systems though have great precision, fail to acknowledge a few factors in the field of alerting people about the leakage. Therefore, we have used IoT technology to make a Gas Leakage Detector for society which has Smart Alerting techniques involving sending a text message to the concerned authority and the ability to perform data analytics on sensor readings. Our main aim is to propose a gas leakage system for a society where each flat has gas leakage detector hardware. This will detect the harmful gases in the environment and alerting to society members through the alarm and sending notifications.

### 2.2 References:

- [1] "IOT Based Smart Gas Monitoring System", *IOSR Journal of Electrical and Electronics Engineering (IOSR-JEEE)*, no. 2278-1676, pp. 82-87.
- [2] S. S. S. K. S. M. C. Sanjoy Das, "Gas Leakage Detection and Prevention using IOT", *Scientific Research & Engineering Trends*, vol. 6, 2020.
- [3]A. A. K. R. R. A. K, "GAS LEAKAGE MONITORING SYSTEM OVER IOT", *International Journal of Current Advanced Research*, vol. 8, pp. 17998-18000, 2019.
- [4]M. T. A. A. M. N. M. Hussien, "A smart gas leakage monitoring system for use in hospitals", *Research Gate*, pp. 1048-1054, 2020.

[5]P. N. R. K. K. R. R. Naik, "Arduino Based LPG gas Monitoring & Automatic Cylinder", *Journal of Electronics and Communication Engineering*, vol. 11.

[6]M. I. F. A. A. H. N. T. a. A. S. Mohammad Monirujjaman Khan, "Research and Development of a Smart nternet-of-Things–Based System to Monitor and Prevent Household Gas Wastage", *MDPI*, vol. 67, no. 1, 2020.

[7]A.M. Leman and Nor Hidayah, Occupational Safety and Health: Workers and Industrial Safety Monitoring for Sustainable Work Environment Development, Health and Safety, AET,

[8]A. Varma, S Prabhakar and K. Jayavel, "Gas Leakage Detection and Smart Alerting and prediction using IoT"

[9]A. Banik, B. Aich and S. Ghosh, "Microcontroller based low cost gas leakage detector with SMS alert"

[10]M. Santiputri and M. Tio, "IoT-based Gas Leak Detection Device", 2018 *International Conference on Applied Engineering (ICAE)*, pp. 1-4, 2018.

[11]S. Z. Yahaya, M. N. Mohd Zailani, Z. H. Che Soh and K. A. Ahmad, "IoT Based System for Monitoring and Control of Gas Leaking".

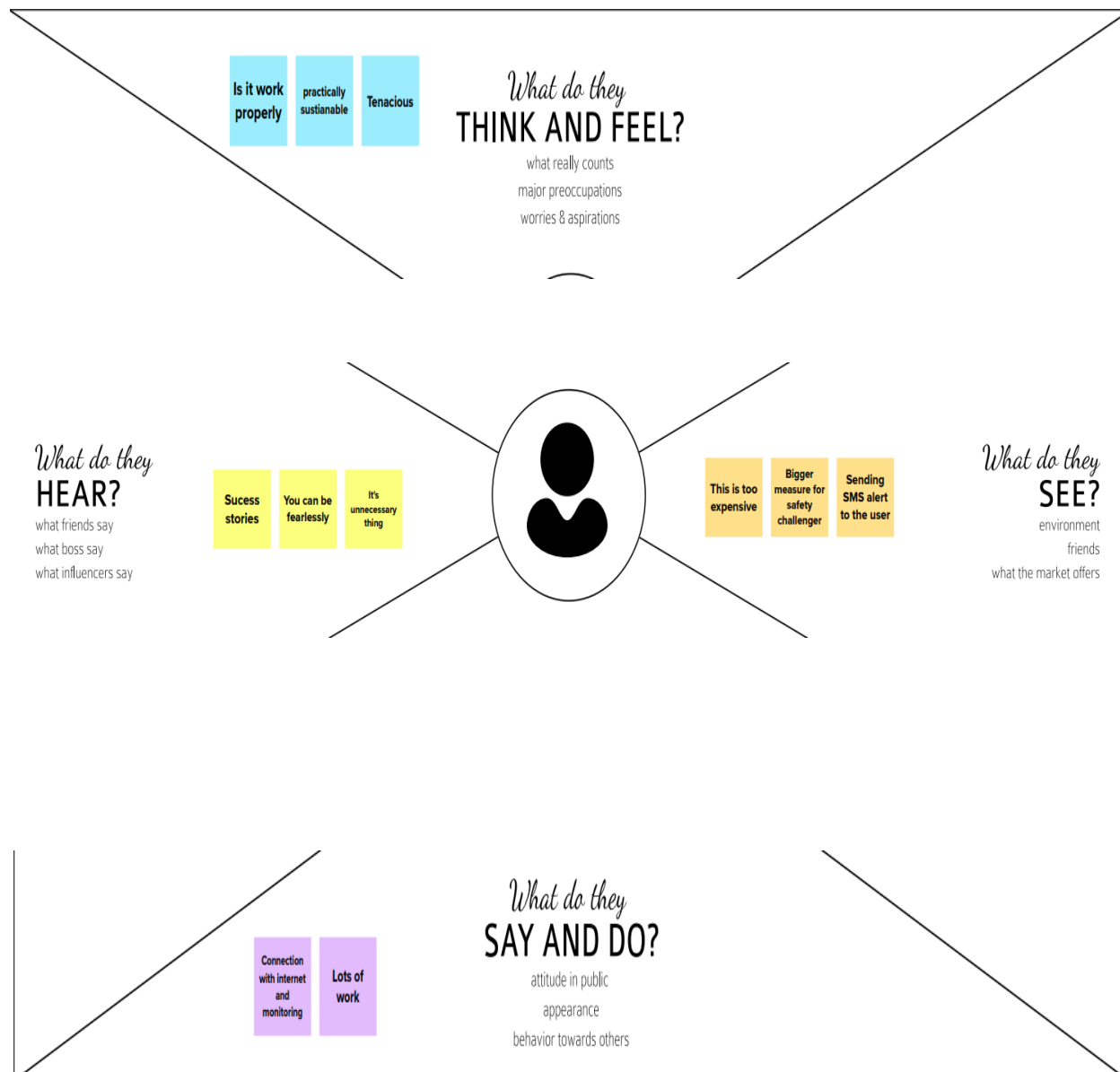
## **2.3 Problem Statement :**

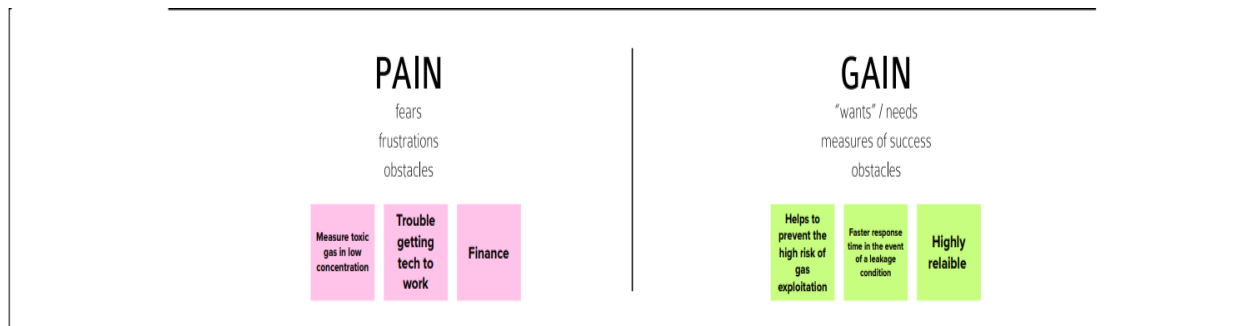
Problem Statement (PS)	I am	I'm trying to	But	Because	Which makes me feel
PS-1	user	Control the leakage	It is hard	It is highly flammable	The serious injury and death of the user

### 3.IDEATION & PROPOSED SOLUTION

#### 3.1 Empathy Map Canvas:








### 3.2 Ideation & Brainstorming:

Brainstorming provides a free and open environment that encourages everyone within a team to participate in the creative thinking process that leads to problem solving. Prioritizing volume over value, out-of-the-box ideas are welcome and built upon, and all participants are encouraged to collaborate, helping each other develop a rich amount of creative solutions. Use this template in your own brainstorming sessions so your team can unleash their imagination and start shaping concepts even if you're not sitting in the same room. The Internet of Things aims towards making life simpler by automating every small task around us. As much as IoT helps in automating tasks, the benefits of IoT can also be extended to enhancing the existing safety standards. Safety has always been an important criterion while designing a home, buildings, industries as well as cities. The increased concentration of certain gases in the atmosphere can prove to be extremely dangerous. These gases might be flammable at certain temperature and humidity conditions, toxic after exceeding the specified concentrations limits, or even a contributing factor in the air pollution of an area leading to problems such as smog and reduced visibility which can in turn cause severe accidents and have an adverse effect on the health of people. Most societies have a fire safety mechanism. But it can use after the fire exists. In order to have control over such conditions we proposed a system that uses sensors that can detect the gases such as LPG, CO<sub>2</sub>, CO, and CH<sub>4</sub>. This system will not only be able to detect the leakage of gas but also alert through audible alarms. The presence of excess amounts of harmful gases in the environment then this system can notify the user. The system can notify to society admin about the condition before a mishap takes place through a message. The system consists of gas detector sensors, an Arduino board, ESP8266, and a Cloud server. One

Society authority person can register the all-flat member user to our system. Society admin can add the details of per flat user such as user name, mobile number, and per-user flat sensor details information. Society admin can configure the threshold value of each sensor. System hardware can be deployed on each flat. Sensors can sense the value per time. The system can send the values to the cloud server. The server can Check that the sensor values existed in the threshold value. If the sensor value can cross the limit the server can send the command to the hardware for buzzing the alarm. The server also sends the notification message to the user.

## Step1- TeamGathering, Collaboration And Select The Problem Statement

Template



### Brainstorm & idea prioritization

Use this template in your own brainstorming sessions so your team can unleash their imagination and start shaping concepts even if you're not sitting in the same room.

🕒 10 minutes to prepare  
🕒 1 hour to collaborate  
👤 2-8 people recommended

➔

**Before you collaborate**

A little bit of preparation goes a long way with this session. Here's what you need to do to get going.

🕒 10 minutes

A

**Team gathering**

Define who should participate in the session and send an invite. Share relevant information or pre-work ahead.

B

**Set the goal**

Think about the problem you'll be focusing on solving in the brainstorming session.

C

**Learn how to use the facilitation tools**

Use the Facilitation Superpowers to run a happy and productive session.

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1


**Define your problem statement**

What problem are you trying to solve? Frame your problem as a How Might We statement. This will be the focus of your brainstorm.

🕒 5 minutes

PROBLEM

How might we [your problem statement]?



#### Key rules of brainstorming

To run a smooth and productive session

➕ Stay in topic.

💡 Encourage wild ideas.

➖ Defer judgment.

👂 Listen to others.

🗣️ Go for volume.

👁️ If possible, be visual.

## Step 2- BrainStrom, Idea Listing And Grouping:

Person 1

the electric power supply is shut down to prevent this accident	gas sensor used to detect high gasses like propane and butane	this system consist of module which alerts user by sending SMS
when leakage occurs it leads to explosion	this energy source composed of mainly butane and propane	it is detected by semiconductor sensor
this leakage starts mainly by forget to close the valve	the one of the identified in which leakage occurs exhausted fan is on	and also it sense it and give output to micro controller

Person 2

the GSM module sends an message to user	the RF link is responsible for producing the alarm	the LCD displays the warning
the automatic control action takes place	it also indicates by buzzing	the stepper motor involves in this process
the stepper motor is use to do mechanism like closing the valve	using exhaust fan switch on the gas inside room decreases	closing the main power supply using stepper motor we can stoppied it

Person 3

by using gsm method	to monitor for liquid petroleum gas (LPG) leakage to avoid the accidents	Gsm Based Gas Leakage Monitor & Alarming System
Gas Leakage Detection system project using Arduino	The sensors used in the circuit will detect that it turns on the LED whenever gas leakage	GSM modem will send an SMS alert to the mobile
gas sensor tool will be used	It consists of multiple layers that include two electrolytic and powdered pellet filters	It contains a sensing material whose resistance, when in contact with the gas, changes

Person 4

Green and Red LED tool will be used	The main goal of the system is to detect leakage gas and will also send a SMS to the user about the leakage gas.	collect input data as process and also release output data
Liquid crystal display module	The angular direction of the shaft changes if the coded signal changes	LCD technology is used to display the image.
At First Simulink Uno's pin 15V of power was connected with Vcc pin of MQ-2 Gas Sensor	supplying it with the electrical supply.	LCD display shows 'No Gas Detected' and 'Gas gate is connected

Person 5

The leakage of the gas counts destructive impact to the lives and as well as the heritage of the people	So keeping it in the concept of the project we have decreased develop cost	The system provides alternative such as savings is easier with the better for the eager person
The main objective of this project is that it is extremely accurate least cost	The control over from the gas detector if gas leakage important having leakage is important equity	The detection of the hazardous gas the alarming message reached to the person
The project system is back to detect gas leakage also warn people around buzzer beep sound	The time is been saved regardless person for preparatory safety calculations	Gsm based gas leakage detection system in which gas module for wireless alert

Person 6

we began the process walking around the area	Encourage wild and exaggerated	Go for large quantities of ideas lead to quality
We have the most common calibration gasses in stock chip world wide	Member having more ideas can share their ideas freely	Build on each other idea's
Generate and view daily weekly fuel cost to analyze expenses	The usage of the gas brings great problem in the domestic well as working places	The inflammable gas such as liquefied petroleum gas in the house and work places

Person 7

The increased concentration of certain gases in the atmosphere can prove to be extremely dangerous	Most of the societies have fire safety mechanism	This system will not only able to detect the leakage of gas but also alerting through audio alarm
Presence of excess amount of harmful gases in environment then this system can notify the user	System can notify to society admin about the condition before mishap takes place through a message	Gas Leakages in open or closed areas can prove to be dangerous and lethal
Our main aim is to proposing the gas leakage system for society where each flat need gas message detector hardware	we have used the IoT technology to make a Gas Leakage Detector for society which having smart alarming technology	System hardware can be deployed on each flat

Person 8

we can control any electronic equipment in homes and industries	Number of sensors can be used in different places. They sensor used in homes, buildings, industries and gas pipelines and gas storage units for detecting LPG, Propane, Methane or any other harmful gas leakage	Gas leakage is a major problem with industrial sector industries processes and gas pipelines and gas storage units for detecting LPG, Propane, Methane or any other harmful gas leakage
Gas leakage detection is not only important but stopping leakage is equally essential	GSM module is used which alert the user by sending an SMS, besides to provide high accuracy gas sensor MQ-6 has been used	This project provides the design approach on both software and hardware
The main objective of the work is designing microcontroller based using gas detecting and alerting system	These system does not require any hardware modification and can be use with standard gas detecting system, it does not require human attention	The choice of using a real time gas leakage monitoring and alerting the critical levels of the gas clearly observed by the IoT system

## Step 3- Idea Prioritization:

### Group Ideas:



**IOT  
System**

catalytic diffusion sensor are the most widely used device for the detection of combustion gases and vapour

Electromagnetic sensor are used in the detection of toxic gases and work by producing electrode signal

In other words ,a CB LEL sensor detect gas through the actual burning of the gaas

**Detection  
and  
indication**

The arudino turns on the LCD and buzzer.It even truns on the GSM model after that, it continues to send SMS to mobile numbers

The sensor has the advantage to combine a sensitivity response time.If the LPG sensor senses a gas leake from the workplace or home, sensor output goes to active low condition

## Prioritize:



### 3.3 Proposed Solution:

S.No.	Parameter	Description
1.	<b>Problem Statement (Problem to be solved)</b>	<ul style="list-style-type: none"><li>➤ Leaks are considered very dangerous since they can build into an explosive concentration So the proposed solution is used for the development for an efficient system &amp; an application that can monitor and alert the workers</li></ul>
2.	<b>Idea / Solution description</b>	<ul style="list-style-type: none"><li>➤ In several areas, the gas sensors will be integrated to monitor the gas leakage</li><li>➤ The proposed system takes an automatic control action after the detection of 0.001% of LPG leakage.</li><li>➤ This automatic control action provides a mechanical handle driven by stepper motor for closing the valve</li><li>➤ We are increasing the security for human by using the combination of a relay and the stepper motor which will shutdown the electric power of the house .Also by using a GSM module, we are sending an alert message by SMS (Short messaging services) to warn the</li></ul>

		<p>users about the LPG leakage and a buzzer is provided for alerting the neighbors in case of the absence of the users about the LPG leakage</p> <ul style="list-style-type: none"> <li>➤ The main advantage of this system over the manual method is that, it does all the process automatically and has a quick response time.</li> </ul>
3.	<b>Novelty / Uniqueness</b>	<ul style="list-style-type: none"> <li>➤ User friendly</li> <li>➤ Pioneering study of natural gas detection with CCD in visible range</li> </ul>
4.	<b>Social Impact / Customer Satisfaction</b>	<ul style="list-style-type: none"> <li>➤ Cost efficient</li> <li>➤ Easy installation and provide efficient results.</li> </ul>
5.	<b>Business Model (Revenue Model)</b>	<ul style="list-style-type: none"> <li>➤ With widespread deployment of the urban natural gas industry, the energy security is now becoming one of the priorities in practice.</li> <li>➤ The gas leakage model was applied to analyse the pressure, temperature and flow rate of gas leakage over time under both the steady-state and dynamic conditions.</li> <li>➤ As the product usage can be understood by everyone, it is easy for them to use it properly for their safest organization.</li> </ul>
6.	<b>Scalability of the Solution</b>	<ul style="list-style-type: none"> <li>➤ Establishing fast communication equipment with the nearest fire station and other relief station to have the fastest response in case of an accident.</li> <li>➤ Even when the gas leakage is more, the product sense the accurate values and alerts the workers effectively</li> </ul>

### 3.4 Problem Solution Fit:

<b>1.CUSTOMER SEGMENTS</b> <ul style="list-style-type: none"> <li>✓ For industry owner-Ensuring the safety of workers is the main thing.</li> <li>✓ Sometimes it is hard to identify the area where the leakage occurs.</li> <li>✓ The detection of leakage prevents the loss of lives</li> </ul>	<b>6. CUSTOMER CONSTRAINTS</b> <ul style="list-style-type: none"> <li>✓ Proper maintenance should be taken atleast once in a month and this prevents the customers from taking actions in gas leakage problem.</li> </ul>	<b>5. AVAILABLE SOLUTIONS</b> <ul style="list-style-type: none"> <li>✓ Usage of sensors to sense gas Leakage.</li> <li>✓ Buzzer to indicate the leakage.</li> <li>✓ GSM module helps us to get notification when there is a gas leakage.</li> </ul>
<b>2. JOBS-TO-BE-DONE / PROBLEMS</b> <ul style="list-style-type: none"> <li>✓ Capability of the device to withstand in harsh environment is questionable.</li> <li>✓ Due to network issue data couldn't be uploaded to the cloud at all times.</li> </ul>	<b>9. PROBLEM ROOT CAUSE</b> <ul style="list-style-type: none"> <li>✓ Sometimes sensor doesn't work properly which can cause the major problem.</li> <li>✓ Location of the device installation and the network plan used by the user are the root cause of the network issue.</li> </ul>	<b>7. BEHAVIOUR</b> <ul style="list-style-type: none"> <li>✓ Network issue is very common as most of the industries are located at the country side. Here contact both the developers and the service providers.</li> <li>✓ To determine the gas characteristics and solve the issue, they will locate the leak and identify the warning.</li> </ul>
<b>3.TRIGGERS</b> <ul style="list-style-type: none"> <li>✓ Accidents due to gas leakages and loss of physical property and life.</li> <li>✓ Safe precautions for the workers to work without fear.</li> </ul> <b>4.EMOTIONS:Before/After</b> <ul style="list-style-type: none"> <li>✓ Before the action is taken the user feels deceived and cheated.</li> <li>✓ After the problem is resolved user feels the sincerity of the developer</li> </ul>	<b>10. YOUR SOLUTION</b> <ul style="list-style-type: none"> <li>✓ Low cost IOT based device that can be easily accessed and fixed by people.</li> <li>✓ Network strength must be boosted in the device.</li> <li>✓ Device can be manufactured in multiple standards based on the environment.</li> </ul>	<b>8. CHANNELS OF BEHAVIOUR</b> <p><b>ONLINE</b></p> <ul style="list-style-type: none"> <li>✓ Monitor the status of the sensors</li> <li>✓ Notification incase of any gas leakage.</li> </ul> <p><b>OFFLINE</b></p> <ul style="list-style-type: none"> <li>✓ Prevent physical damage to sensor.</li> <li>✓ Provide proper network and power supply to sensors.</li> <li>✓ Complaint letters.</li> </ul>

## 4.REQUIREMENT ANALYSIS:

### 4.1 Functional Requirement:

FR No.	Functional Requirement (Epic)	Sub Requirement (Story / Sub-Task)
FR-1	User Registration	Registration through Form Registration through Gmail Registration through LinkedIn
FR-2	User Confirmation	Confirmation via Email Confirmation via OTP
FR-3	Hardware Requirement	Optical Sensors Ultra-Sonic Flow Meter
FR-4	Software Requirement	Flow change Pressure point Statistic
FR-5	User Welfare	Calibration No Poisoning of the Sensor Reliable in All Environmental Conditions Easy to Use

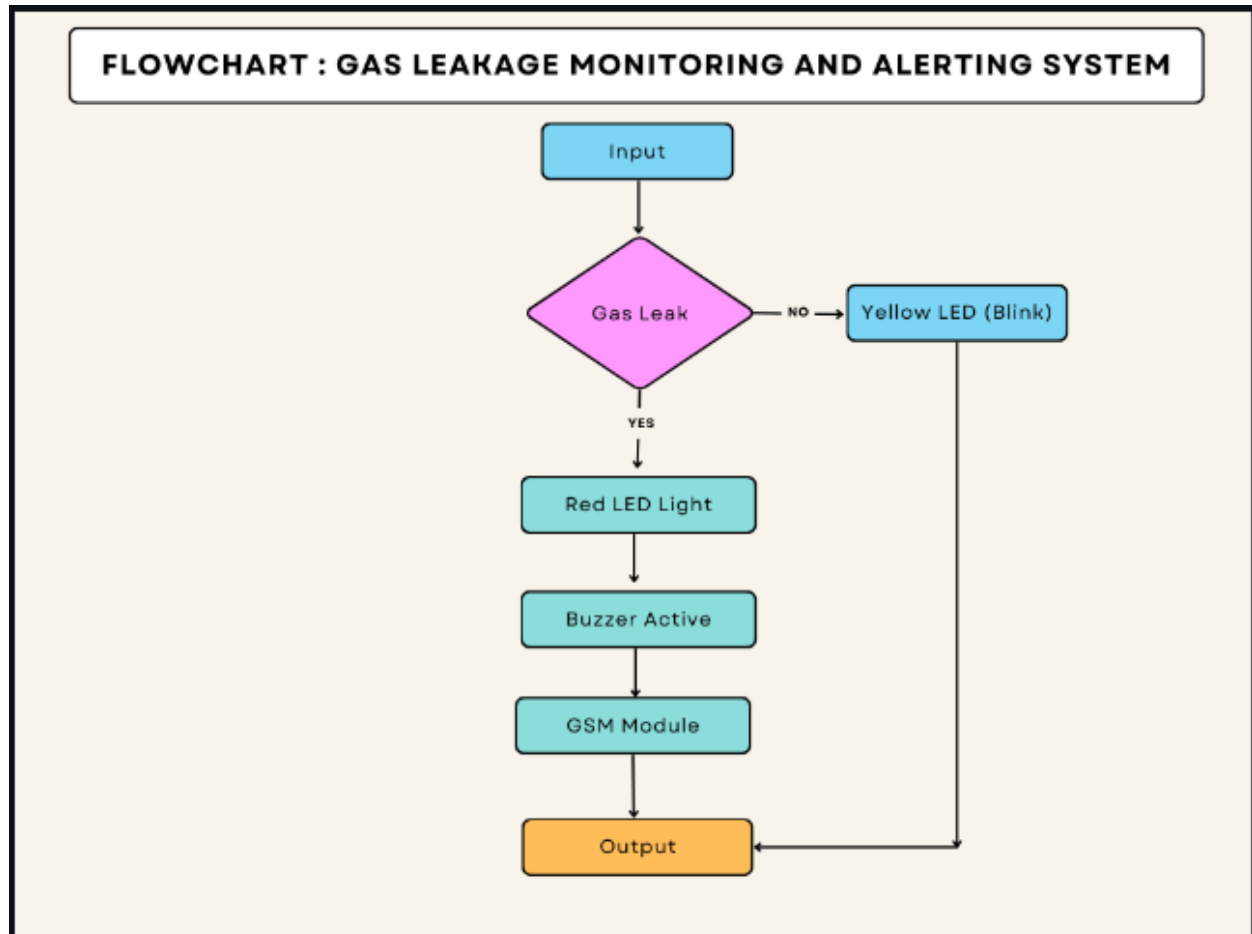
### Non-Functional Requirement:

FR No.	Non-Functional Requirement	Description
NFR-1	Usability	The sensor-enabled solution helps prevent the high risk of gas explosions and affecting any casualties within and outside the premises
NFR-2	Security	The device is intended for use in household safety where appliances and heaters that use natural gas and liquid petroleum gas (LPG) may be a source of risk.
NFR-3	Reliability	Gas Leakage Detection System (GLDS) can detect leakage at homes, commercial premises or factories. GLDS detects the leakage soon after it happened and sends users an immediate alarm on the incident.

NFR-4	<b>Performance</b>	The Gas Leakage Detector is a wall mounted device fitted close to the floor level with an alarm setting at 20% of lower explosive limit. Whenever there is a leak, the in-built sensor detects and alerts the user in less than 5 minutes, much before it can cause any accidents
NFR-5	<b>Availability</b>	The circuit for an LPG leakage detector is readily available in the market, but it is extremely expensive). Presented here is a low-cost circuit for a Gas Leakage Detection that you can build easily.
NFR-6	<b>Scalability</b>	The system proves the need for gas detection alarm systems to be 100% reliable. A backup power supply can be included in the system design to augment for power failure condition. Also, calibration of the gas sensor can be done in other for a specific gas to be sensed instead of the LPG numerous gases it sense

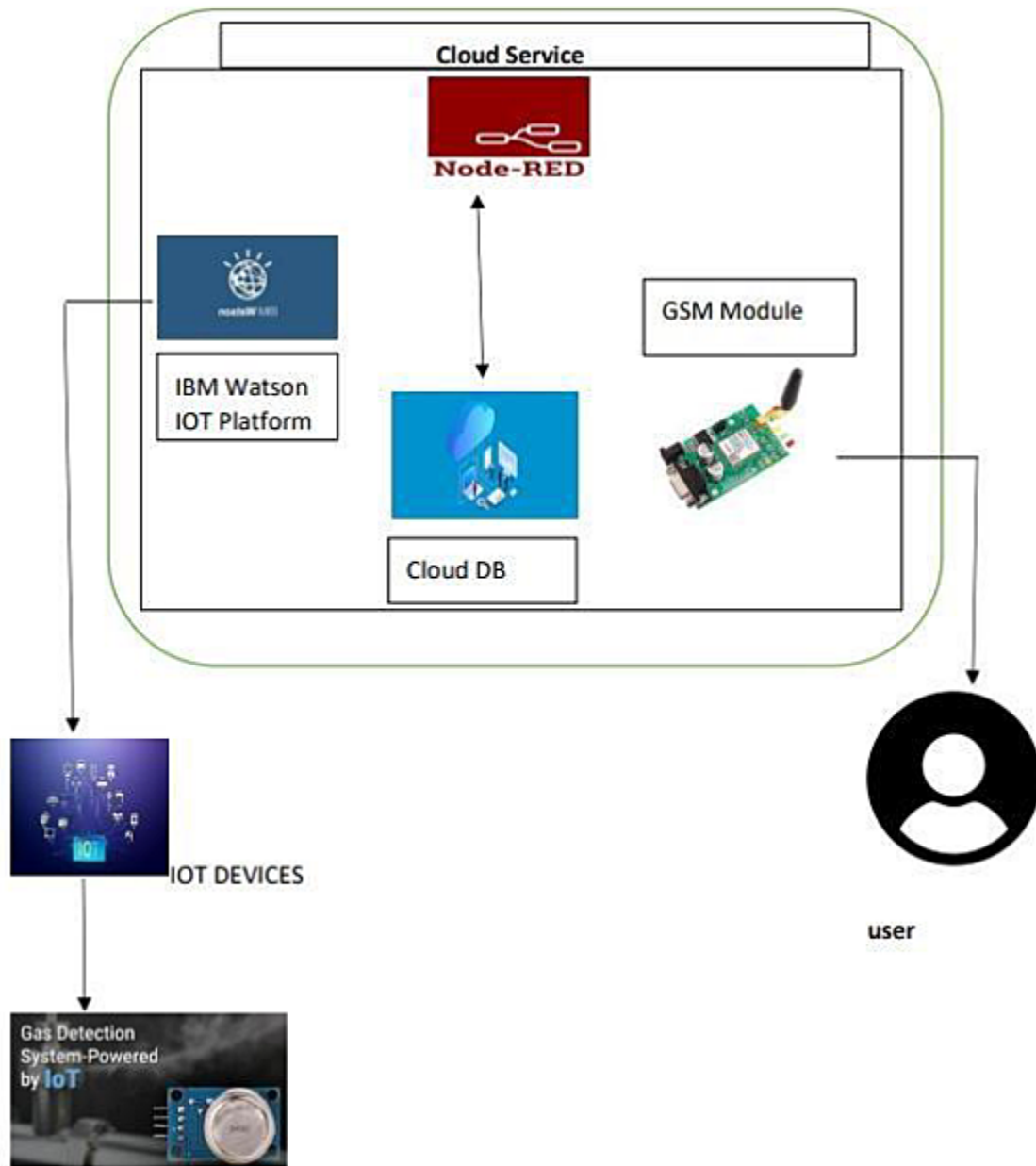
## 5.PROJECT DESIGN:

### 5.1 Data Flow Diagram:





## 5.2 Solution & Technical Architecture:



## 5.3 User Stories:

The system can be taken as a small attempt in connecting the existing primary gas detection methods to a mobile platform integrated with IoT platforms. The gases are sensed in an area of a 1m radius of the rover and the sensor output data are continuously transferred to the local server. The accuracy of sensors is not up to the mark thus stray gases are also detected which creates an amount of error in the outputs of the sensors, especially in the case of methane. Further, the availability and

storage of toxic gases like hydrogen sulfide also create problems for testing the assembled hardware. As the system operates outside the pipeline, the complication of system maintenance and material selection of the system in case of corrosive gases is reduced. Thus, the system at this stage can only be used as a primary indicator of leakage inside a plant.

## 6.PROJECT PLANNING & SCHEDULING:

### 6.1 Sprint Plan & Estimation:

- SPRINT PLAN
- ANALYZE THE PROBLEM
- PREPARE An ABSTRACT, PROBLEM STATEMENT
- LIST A REQUIRED OBJECT NEEDED
- CREATE A PROGRAM CODE AND RUN IT
- MAKE A PROTOTYPE TO IMPLEMENT
- TEST WITH THE CREATED CODE AND CHECK THE DESIGNED PROTOTYPE .

Use the below template to create product backlog and sprint schedule

Sprint	Functional Requirement (Epic)	User Story Number	User Story / Task	Story Points	Priority	Team Members
Sprint-1	Monitor the gas leakage	USN-1	The Industrialist have own industries so the industry owner must take of workers.The workers have family so the industries give security assurance of workers.	2	High	Siva S
Sprint-2	Avoid From Disaster	USN-2	The gas leakage occur at the time fire service will take care to protect the people from the disaster.	1	High	Nisha E
Sprint-3	Detect the gas	USN-3	We have monitor the gas by 24/7 hrs. To avoid leakage,the industry have quality pipes to transfer the gas and proper maintenance service once in a month. The industry must take care of what are the necessary process to avoid the gas leakage.	2	Low	Sona R
Sprint-4	The model is trained and tested by sample dataset.	USN-4	The programmer design the model to detect the gas leakage.	2	Medium	Shibin RB

### 6.2 Sprint Delivery Schedule:

- Sprint 1
- Sprint 2
- Sprint 3
- Sprint 4

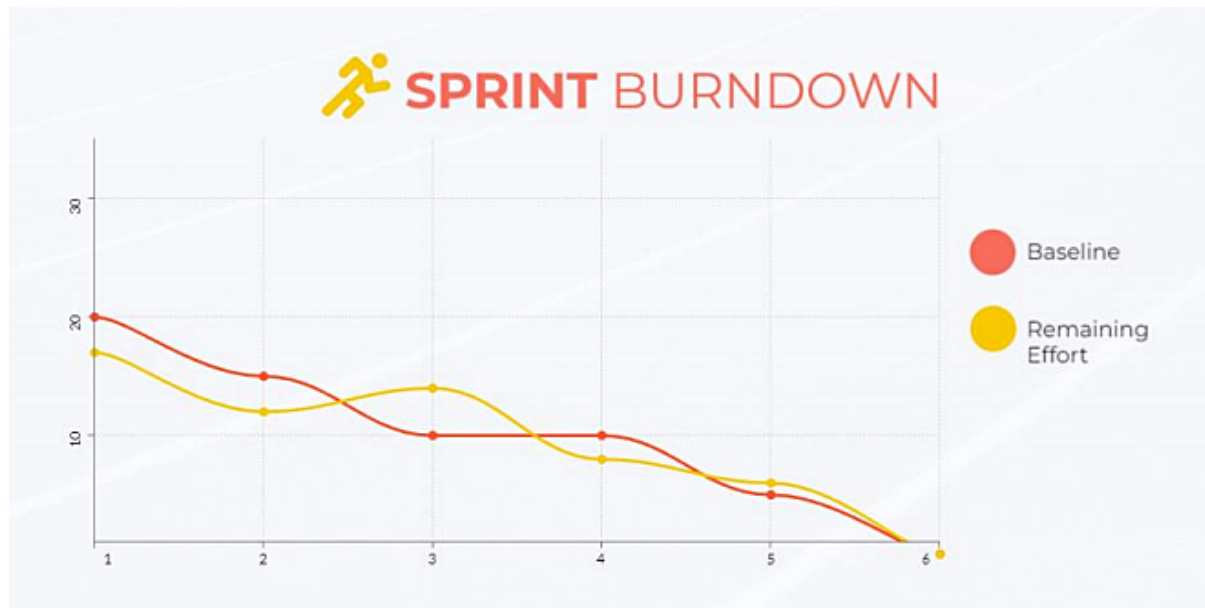
We are Developing the code in this Schedule.

Project Tracker, Velocity & Burndown Chart: (4 Marks)

Sprint	Total Story Points	Duration	Sprint Start Date	Sprint End Date (Planned)	Story Points Completed (as on Planned End Date)	Sprint Release Date (Actual)
Sprint-1	20	6 Days	24 Oct 2022	29 Oct 2022	20	29 Oct 2022
Sprint-2	20	6 Days	31 Oct 2022	05 Nov 2022	20	05 Nov 2022
Sprint-3	20	6 Days	07 Nov 2022	12 Nov 2022	20	12 Nov 2022
Sprint-4	20	6 Days	14 Nov 2022	19 Nov 2022	20	19 Nov 2022

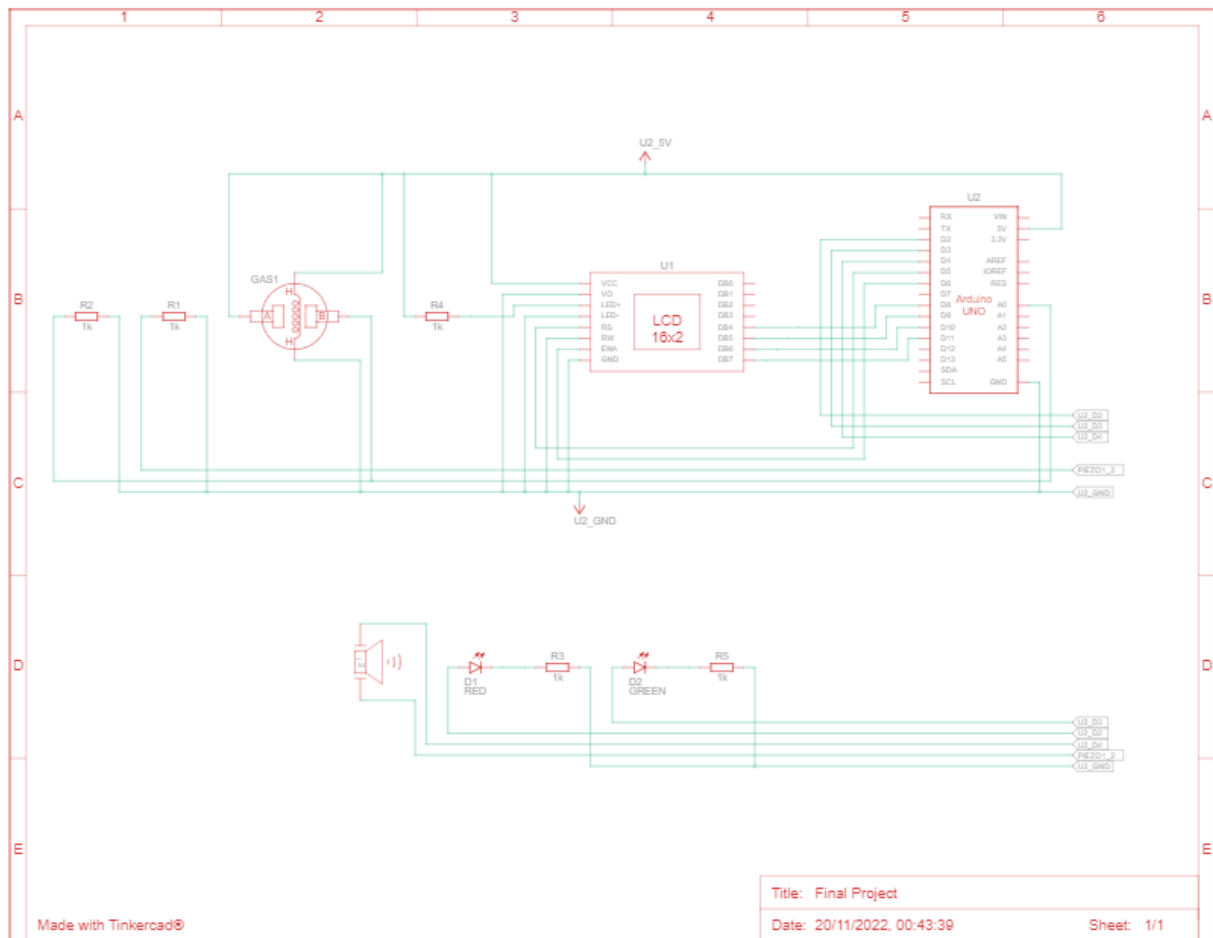
## Burndown Chart:

A burn down chart is a graphical representation of work left to do versus time. It is often used in agile software development methodologies such as Scrum. However, burn down charts can be applied to any project containing measurable progress over time.

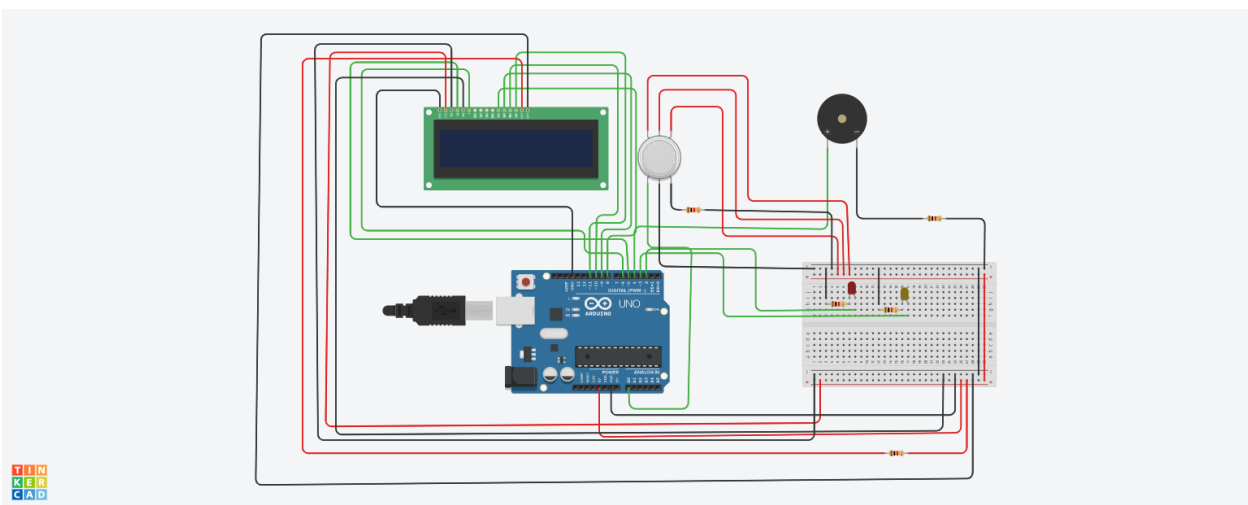


## 7. SCHEMATIC DIAGRAM OF PROJECT & COMPONENTS:

### 7.1 Schematic Diagram:



## Circuit Daigram:



## 7.2 Components:

S.No	Name of the Component	Quantity
1.	Arduino UNO R3	1
2.	Breadboard	1
3.	LED	2
4.	Resistor	5
5.	Piezo	1
6.	Gas Sensor	1
7.	LCD (16x2)	1

## 8.CONCLUSION:

After this project performance can conclude that the detection of the LPG gas leakage is incredible in the project system. Applicable usefully for industrial and domestic purposes. In dangerous situations, we can save the life by using this system. An alert is indicated by the GSM module. A sensor node senses gas like CO<sub>2</sub>, oxygen, and propane. The estimated range of transmission and consumption of power is obtained. The simple procedures and Arduino UNO Micro controller area used to build the sensor.

## 9.FUTURE SCOPE:

We propose to build the system using an MQ6 gas detection sensor and interface it with an Aurdino Uno microcontroller along with an LCD Display. Our system uses the gas sensor to detect any gas leakages. The gas sensor sends out a signal to the microcontroller as soon as it encounters a gas leakage. The microcontroller processes this signal and a message is displayed on the LCD to alert the user.

## 10.APPENDIX:

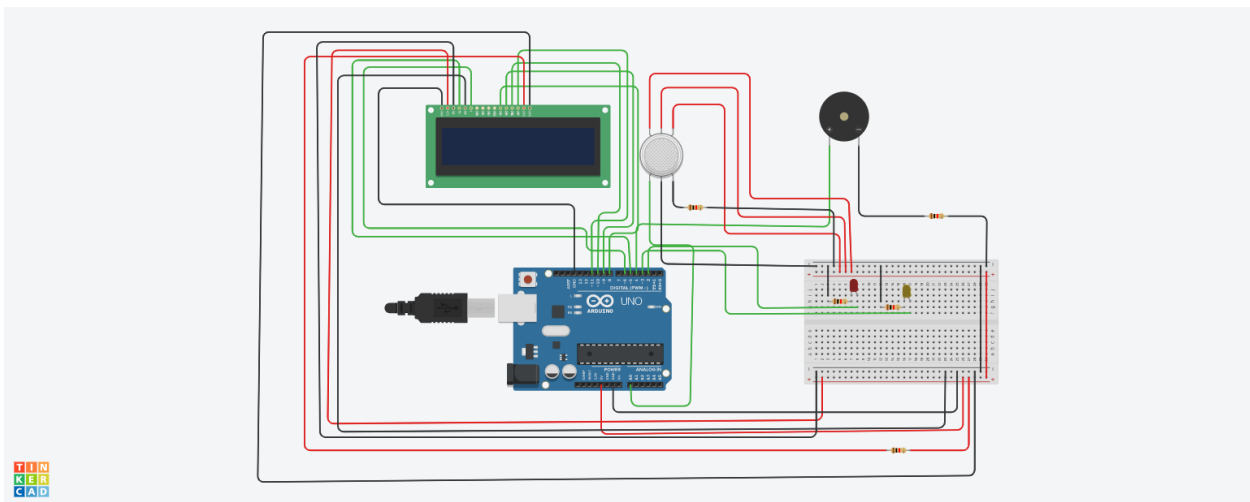
## 10.1 SOURCE CODE:

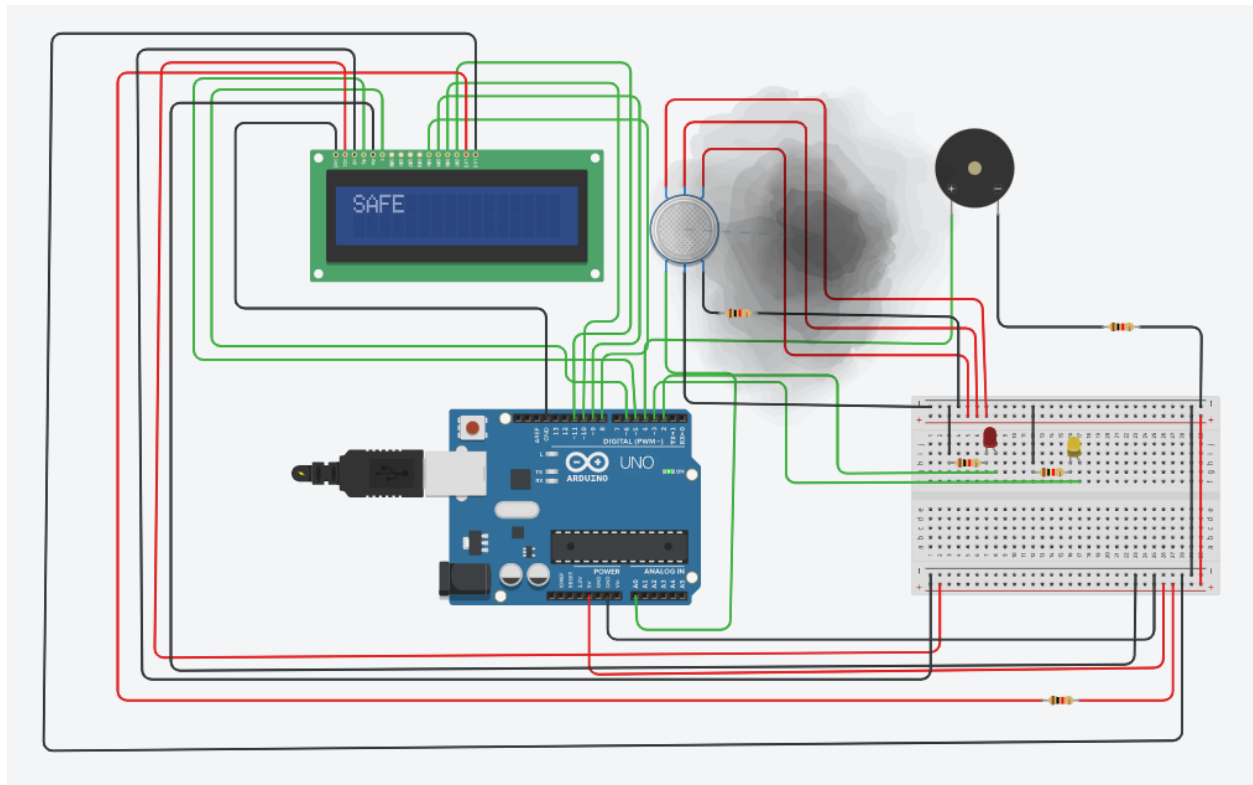
```
#include LiquidCrystal lcd(5,6,8,9,10,11);

int redled = 2;
int greenled = 3;
int buzzer = 4;
int sensor = A0;
int sensorThresh = 400;
void setup()
{
  pinMode(redled, OUTPUT);
  pinMode(greenled,OUTPUT);
  pinMode(buzzer,OUTPUT);
  pinMode(sensor,INPUT);
  Serial.begin(9600);
  lcd.begin(16,2);
}
void loop()
{
  int analogValue = analogRead(sensor);
  Serial.print(analogValue);
  if(analogValue>sensorThresh)
  {
    digitalWrite(redled,HIGH);
    digitalWrite(greenled,LOW);
    tone(buzzer,1000,10000);
    lcd.clear();
    lcd.setCursor(0,1);
    lcd.print("ALERT");
    delay(1000);
    lcd.clear();
    lcd.setCursor(0,1);
    lcd.print("EVACUATE");
    delay(1000);
  }
  else
  {
    digitalWrite(greenled,HIGH);
```

```
digitalWrite(redled,LOW);  
noTone(buzzer);  
lcd.clear();  
lcd.setCursor(0,0);  
lcd.print("SAFE");  
delay(1000);  
lcd.clear();  
lcd.setCursor(0,1);  
lcd.print("ALL CLEAR");  
delay(1000); }  
}
```

Output:





### GitHub & Project Demo Link:

#### ➤ GitHub Link:

<https://github.com/IBM-EPBL/IBM-Project-43722-1660719020>

#### ➤ Project Demo Link:

<https://www.tinkercad.com/things/aABH77qqRJQ-final-project->