# PROJECT BASED EXPERIENTIAL LEARNING PROGRAM (NALAIYA THIRAN)

# TITILE OF THE PROJECT

## A PROJECT REPORT

***Submitted by***


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**TEAM ID :** PNT2022TMID16039

**Gas Leakage Monitoring & Alerting System For Industries**


**DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING**

**R.M.K.ENGINEERING COLLEGE**

(An Autonomous Institution)

**R.S.M. Nagar, Kavaraipettai-601 206**


**NOVEMBER 2022**

# PROJECT REPORT

## 1.INTRODUCTION

**Project Overview**:

In today's world, safety is of the utmost importance, and certain measures must be taken at both work and home to e 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.

**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 this way, the consequences of an explosion or gas leak can be avoided.

## 2.LITERATURE SURVEY

### 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.

### Reference

P.Meenakshi Vidya, S.Abinaya, G.Geetha Rajeswari, N.Guna, “Automatic LPG detection and hazard controlling “ published in April 2014 proposed the leakage detection and real-time gas monitoring system. In this system, the gas leakage is detected and controlled by means of the exhaust fan. The level of LPG in the cylinder is also continuously monitored.

Srinivasan, Leela, Jeya bharathi, Kirthik,Rajasree; in this research paper they told about gas leakage detection and control. In this paper, the gas leakage resulting in fatal inferno has become a serious problem in households and other areas where household gas is handled and used. It alerts the subscriber through the alarm and the status display besides turning off the gas supply valve as a primary safety measure.

Hitendra Rawat, Ashish Kushwah, Khyati Asthana, Akanksha Shivhare, in the year 2014 planned a framework, they gave security issues against hoodlums, spillage, and fire mishaps. In those cases, their framework sends an SMS to the crisis number given to it

B. B. Did paye, Prof. S. K. Nanda; in this paper, they talked about their research on leakage detection and review of "Automated unified system for LPG using microcontroller and GSM module". Their paper proposed an advance and innovative approach for LPG leakage detection, prevention, and automatic booking for a refill. In advance, the system provides the automatic control of the LPG regulator also if leakage is detected the system will automatically turn off the main switch of the power supply. Hence it helps to avoid explosions and blasts.

Pal-Stefan Murvaya, Ioan Sileaa, 2008, they told in their survey on gas leak detection and localization techniques various ways to detect gas leakage. They introduce some old or new techniques to detect the gas. The proposed techniques in this paper are nontechnical methods and hardware-based methods which include acoustic methods, optical methods, and active methods. In their survey they told a wide variety of leak-detecting techniques is available for gas pipelines

**Literature Survey 1:**

The author has observed gas leakage and LPG levels where gas leakage occurs automatically. The authors suggests that gas leakage is performed by various gas sensors. Whose author has worked on gas leaks and mentions that we can take care if a found using a sensor and gas booking can be done automatically when a small amount of gas is taken closed.

RFID tag microcontroller, pressure sensors and buzzers are used to monitor gas. Through this paper important parameters are used to find the level of gas in the container. The good purpose of this project is to get notification of gas leak to user when gas leakage is started. Arduino was originally created as a tool for fast sampling and activities for students with no knowledge for electronics. This paper uses a microcontroller, buzzer and a gas sensor to detect gas leakage system. When a gas leak is detected by a gas sensor ,the microcontroller turn on the buzzer in critical condition. The author suggest that this message or instruction may be displayed using an LCD display for LPG monitoring.

- The proposed system detects LPG leaks and alerts customers. The alarm starts when the system notice and increases in LPG leakage concentration by sending an alarm and sending a message to specific mobile phone. The device assures safety and prevents explosions. A microcontroller based system based on gas sensor(MQ6) has been developed in proposed system to detect LPG leakage . The unit is also integrated with an alarm unit to detect signal a leak.

**Literature Survey 2:**

A number of reviews on the subject of gas leakage detection techniques were done in the past either as part of research papers/technical reports on a certain leak detection method and other gas related subjects. A.Mahalingam, r. T. Naayagi, n. E. Mastorakis; they introduce design and implementation of an economic gas leakage detector. They gave the formulation of many problems in previous gas leakage detectors. They told that several standards have been formulated for the design of a gas leakage detection system such as IEEE, BS 5730, and IEC.For this work, the recommended UK safety standards have been adopted. The proposed alarm system is mainly meant to detect LPG leakage, which is most commonly used in residential and commercial premises. The system detects not only the presence of gas (gas leak), but also the amount of leakage in the air, and accordingly raises an appropriate audio visual alarm. The objective of the system is to detect LPG gases such as propane and butane. The allowed UK level for butane is 600 ppm above which it is considered to be of high level and poses a danger. The proposed system ensures a continuous monitoring of the gas levels. If the gas level increases above the normal threshold level of 400 ppm butane (LPG), the system starts to issue early warning alarms at 100ms interval, which implies low level gas leakage. If the leakage level increases to 575 ppm of butane (LPG), the system activates high severity audio alarms at 50 ms intervals warning the occupants to run to safety.

**Literature Survey 3:**

A number of reviews on the subject of gas leakage detection techniques were done in the past either as part of research papers/technical reports on a certain leak detection method and other gas related subjects. A.Mahalingam, r. T. Naayagi, n. E. Mastorakis; they introduce design and implementation of an economic gas leakage detector. They gave the formulation of many problems in previous gas leakage detectors. They told that several standards have been formulated for the design of a gas leakage detection system such as IEEE, BS 5730, and IEC.For this work, the recommended UK safety standards have been adopted. The proposed alarm system is mainly meant to detect LPG leakage, which is most commonly used in residential and commercial premises. The system detects not only the presence of gas (gas leak), but also the amount of leakage in the air, and accordingly raises an appropriate audio visual alarm. The objective of the system is to detect LPG gases such as propane and butane. The allowed UK level for butane is 600 ppm above which it is considered to be of high level and poses a danger. The proposed system ensures a continuous monitoring of the gas levels. If the gas level increases above the normal threshold level of 400 ppm butane (LPG), the system starts to issue early warning alarms at 100ms interval, which implies low level gas leakage. If the leakage level increases to 575 ppm of butane (LPG), the system activates high severity audio alarms at 50 ms intervals warning the occupants to run to safety.

**Literature Survey 4:**

Prof. M.Amsaveni, A.Anurupa, R.S.Anu Preetha, C.Malarvizhi, M.Gunasekaran; they told in their research paper on "GSM based LPG leakage detection and controlling system" the leakage of LPG gas is detected by the MQ-6 gas sensor. Its analog output is given to the microcontroller. It consists of predefined instruction set. Based on this, the exhaust fan is switched on. So, the concentration of gas inside the room gets decreased. Then, the stepper motor is rotated thus closing the knob of the cylinder. Because of this process, the leakage of gas is stopped. The relay is switched to off the power supply of the house. The buzzer produces an alarm to indicate the gas leakage. Then, the user is alerted by SMS through the GSM module. They proposed their methodology that the system takes an automatic control action after the detection of 0.001% of LPG leakage. This automatic control action provides a mechanical handle for closing the valve. We are increasing the security for human by means of a relay which will shut down the electric power to the house. Also by using GSM, we are sending an alert message to the users and a buzzer is provided for alerting the neighbors about the leakage.

**Literature Survey 5:**

Ch. Manohar Raju and N. Sushma Rani, they introduce an android based automatic gas detection and indication robot. They proposed prototype depicts a mini mobile robot which is capable to detect gas leakage in hazardous places. Whenever there is an occurrence of gas leakage in a particular place the robot immediately read and sends the data to android mobile through wireless communication like Bluetooth. We develop an android application for android based smartphones which can receive data from robot directly through Bluetooth. The application warns with an indication whenever there is an occurrence of gas leakage and we can also control the robot movements via Bluetooth by using text commands as well as voice commands. The previous mobile robots are based on heterogeneous technologies like GSM, GPS, internet based etc., but the main disadvantage of those prototypes were the absence of communication in particular areas. So, with the rapid developments and tremendous changes in technology we have lots of techniques to eradicate previous problems. Wireless communication protocols play a vital role in present trends. Bluetooth, WI-Fi, Zigbee etc., we use one of the best feature of smartphone, i.e., the Bluetooth technology to

control and monitor parameters driven by a robot. They introduce a robot and mobile application for In the meantime, the system prototype has imposingly demonstrated its use and capability in intensive series of tests. The drive unit, the navigation system and, therefore, the complementary sensor systems performed superbly throughout the tests. The robot facilitates independent gas detection and leak localization in sites that are otherwise troublesome to access. Moreover, it helps to avoid mistreatment of human inspectors in probably dangerous environments. However, before ready-ing in industrial settings, more development is needed (e.g., in explosion protection, package development, etc.), and in fact leg a problems should be processed before ready-ing in business settings. Still, it is certain that an autonomous, mobile gas detection and leak localization robot is possible today and can significantly enhance safety.

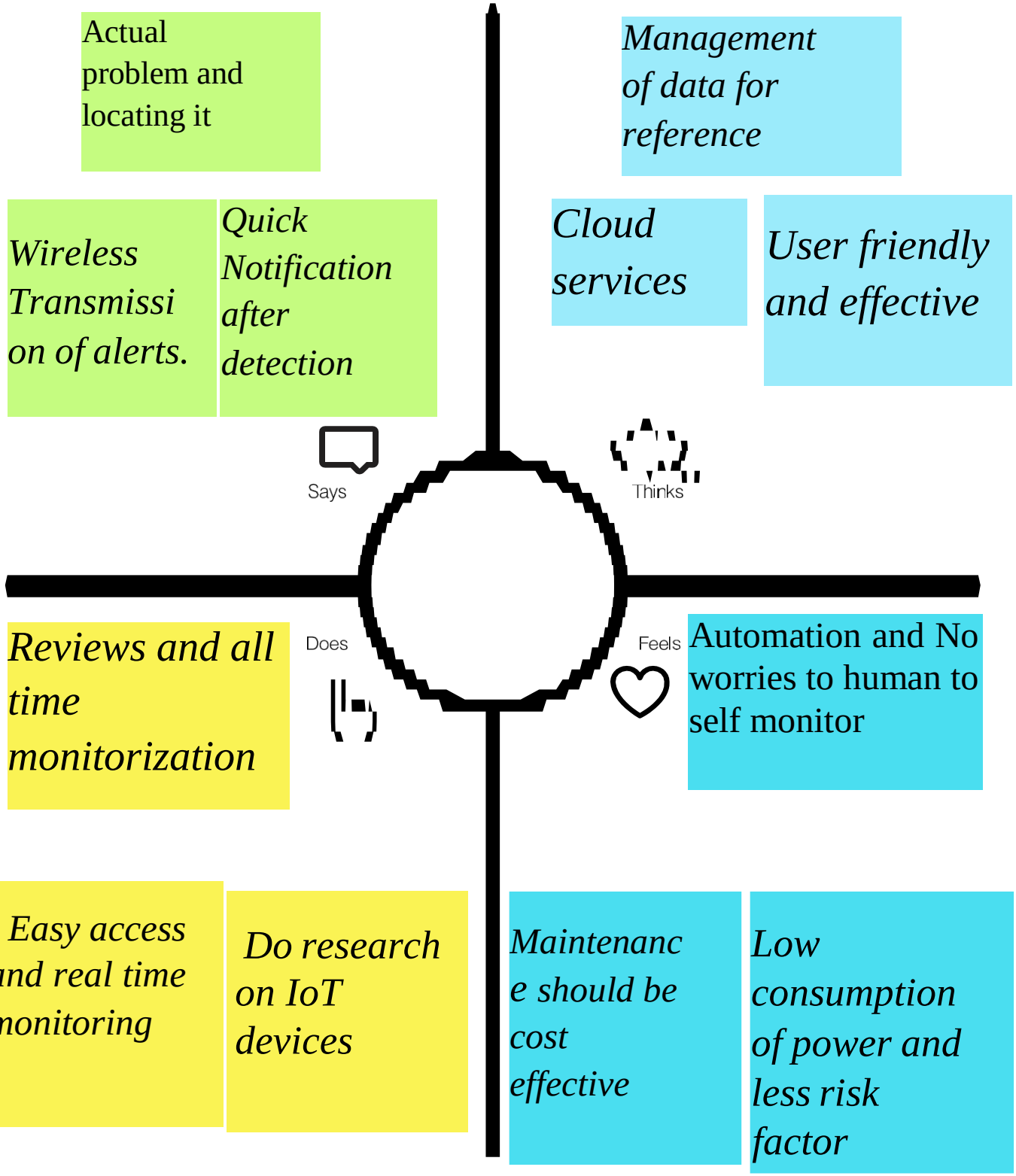
**Problem Statement Definition**:


| Problem Statement (PS) | I am (Customer) | I am tryingto | But | Because | Which makes me feel |
|---|---|---|---|---|---|
| PS-1 | Industr-ialist | Monitor gas leakagein the industry | I have no efficient system for monitoring | High cost and Complicated process of Installing | Disappointed |
| PS-2 | Industr-ialist | Controlthe gas leakage | Also, the installation process is too complicated | The number of sensors is unpredictable and the positioning of equipment is improper | Frustrated |

## 3.IDEATION & PROPOSED SOLUTION:

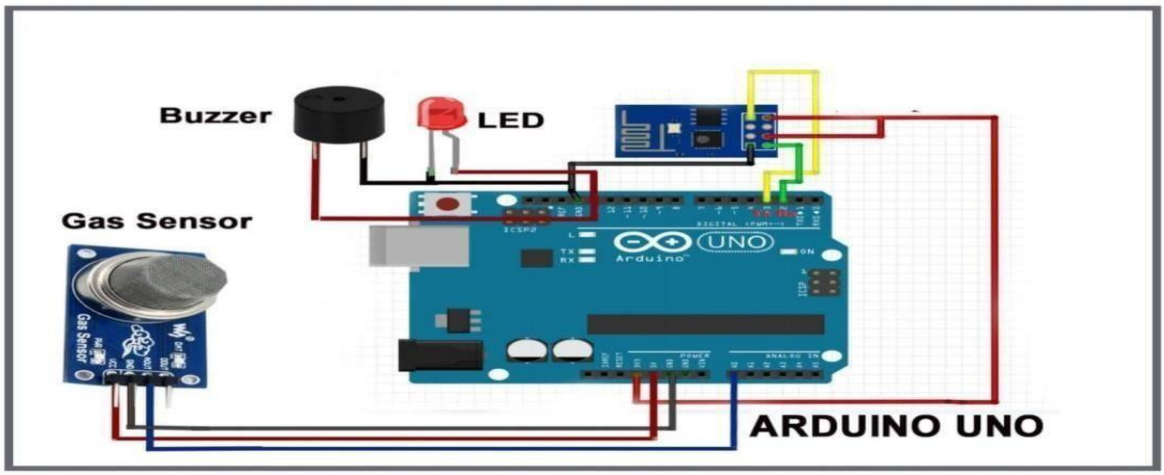
**Empathy Map Canvas:**

Build empathy and keep your focus on the user.



**Ideation & Brainstorming:**

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, CO2, CO, and CH4. This system will not only 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.




In this paper, we use IOT technology for enhancing the existing safety standards. While making this prototype has been to bring a revolution in the field of safety against the leakage of harmful and toxic gases in the environment and hence nullify any major or minor hazard being caused due to them.

**Proposed Solution:**

| S.No | Parameter | Description |
|---|---|---|
| 1. | Problem Statement (Problem to be solved) | ○ Gas Leakage Monitoring and Alerting System. |
| 2. | Idea / Solution description | ○ Using a variety of sensor, the environmental parameters such as concentration of the gas can be monitored in real time<br>○ If the concentration of gas reaches hazardous level an alert message can be sent to the user. |
| 3. | Novelty / Uniqueness | ○ Device being developed can monitor a wide range of gases that are highly used in industries. ○ Apart from notifying the user, Safety personnel are also notified in case of |

| | | |
|---|---|---|
| | | emergencies.<br>o User friendly in nature. |
| 4. | Social Impact / Customer Satisfaction | o As the device is small, it is easy to install them in various locations based on necessity. |
| 5. | Business Model (Revenue Model) | o Device can be obtained by paying for the subscription.<br>o It can be yearly or monthly.<br>o Based on the term of subscription 5 – 8% discount shall be made available. |
| 6. | ***Scalability of the Solution*** | o In future more variety of gas can also be monitored, by adding the necessary sensor and monitoring the data obtained from it. |

# PROBLEM SOLUTION FIT

| 1. ***CUSTOMER SEGMENT(S)*** | 2. ***JOBS-TO-BE-DONE / PROBLEMS*** | 3. ***TRIGGERS*** |
|---|---|---|
| •Industrialists<br>•Engineers<br>•Safety Control Personals | •Capability of the device to withstand a harsh environment is questionable.<br>•Due to network issues data could not be always uploaded to the cloud. | •Usage of the device is portrayed in the news.<br>•In real-life situations, the device has helped in saving several individuals. |

| | | |
|---|---|---|
| ***4. EMOTIONS: BEFORE/AFTER***<br>•Before the action is taken, the user feels deceived and cheated.<br>•After the problem is resolved, the user feels the sincerity of the developers. | 5***. AVAILABLE SOLUTIONS***<br>•Upgrading to a premium network plan.<br>•Availing of network connection from a reliable Service provider. | 6. ***CUSTOMER CONSTRAINTS***<br>•Network Connection Complexity in Installation |
| 7. ***BEHAVIOUR***<br>•Harsh environment is prevailing only in the certain industry; thus, the frequency of the said problem is low. In such a case the customer complains multiple times to get attention.<br>•Network issue is very common as most of the industries are in the countryside. Here the contact both the developers and the service providers | ***8. CHANNELS OF BEHAVIOUR***<br>8.1 ONLINE<br>•E-Mail to developers<br>•Online Community<br>8.2 OFFLINE<br>•Complaint Letters | 9. ***PROBLEM ROOT CAUSE***<br>•Quality of the material using which the device is made up of plays a vital role in the capability of the device to work in harsh environments.<br>•Location of the device installation and the network plan used by the user is the cause of the Network issue. |

***10. YOUR SOLUTION***

- Network strength must be boosted in the device
- Device can be manufactured with multiple standards based on the environment.

## 4.REQUIREMENT ANALYSIS

### Functional requirement:

Arduino UNO is the main unit of the system which performs the following tasks. Signal conditioning of the Arduino UNO is done by the output signal of the sensor, provided input to Arduino. The detection results are displayed on LCD. Indicates the people of danger in the workplace, factory, and home. Buzzer activity with a beep(siren) sound is made. Also, send alert SMS to the in charge of the plant whose number is saved in a SIM card by using a GSM modem. The SMS received depends upon the leak of gas in the detection area of the sensor.

**Non-Functional requirements:**

Data Gathering:

Using multiple sensors, we are going to gather the necessary data.

Data Store:

Collected data is stored in Cloud and Necessary databases.

Data Analysis:

Data from the store must be analyzed for raising alerts in case of necessity.

Data Monitoring:

Gathered data must be displayed to the user for monitoring.

**Requirements:**

**Components Required:**

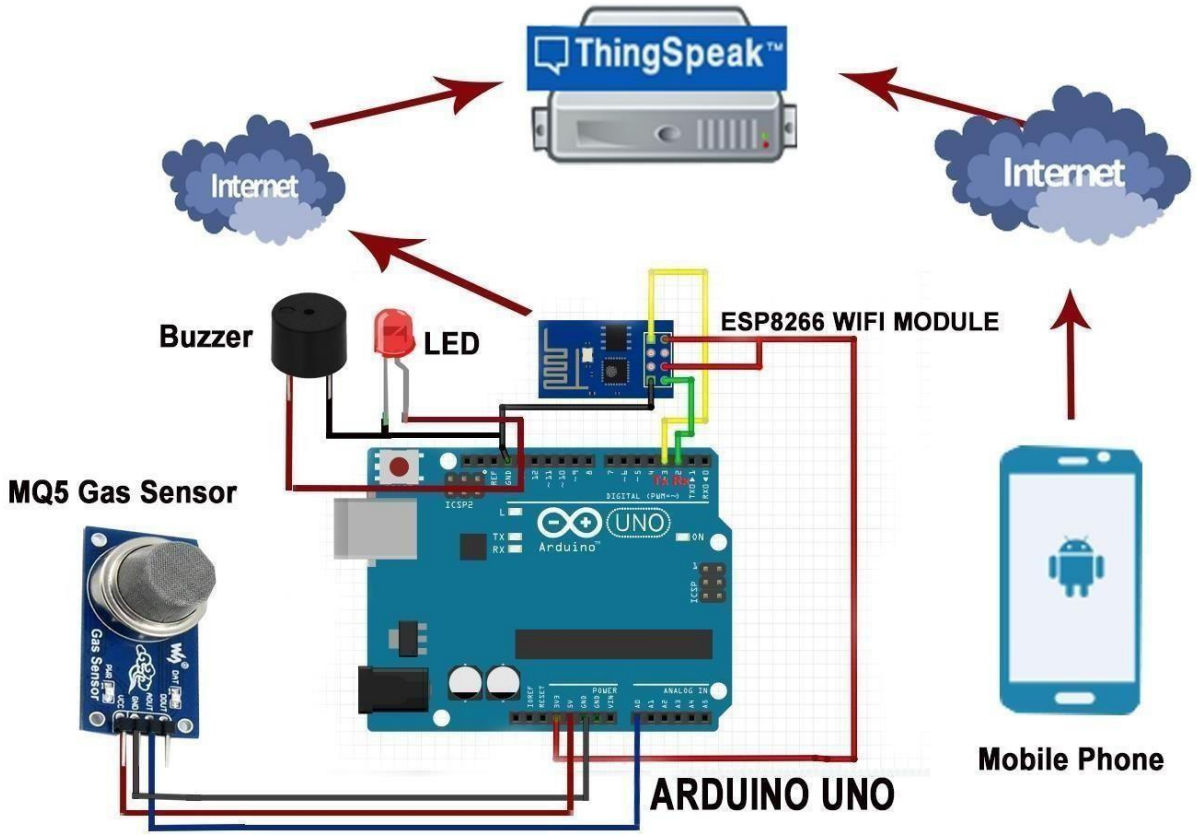
The design of a sensor-based automatic gas leakage detector with an alert and control system.

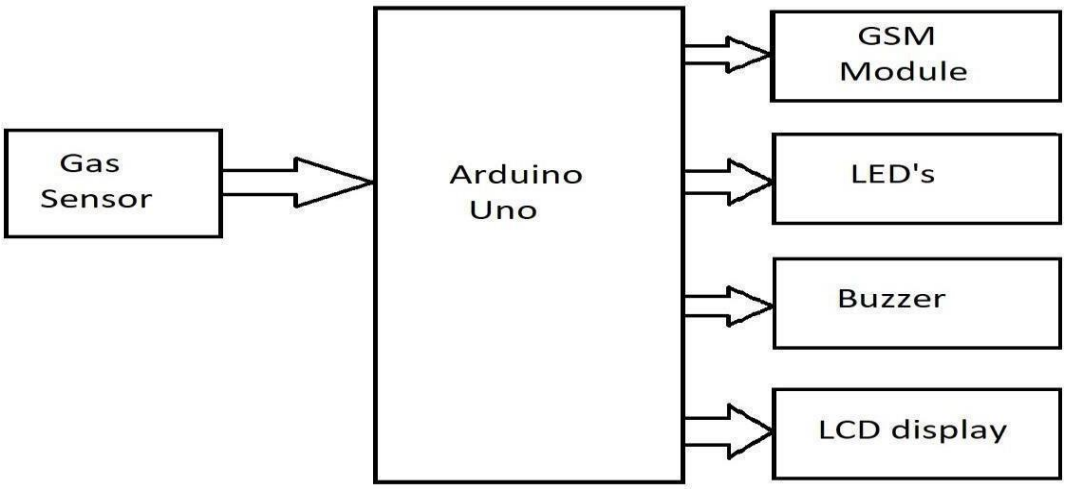
Arduino UNO board plays a important role in it. As, it act as the Microcontroller, each and every command is processed by this.

| 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 |

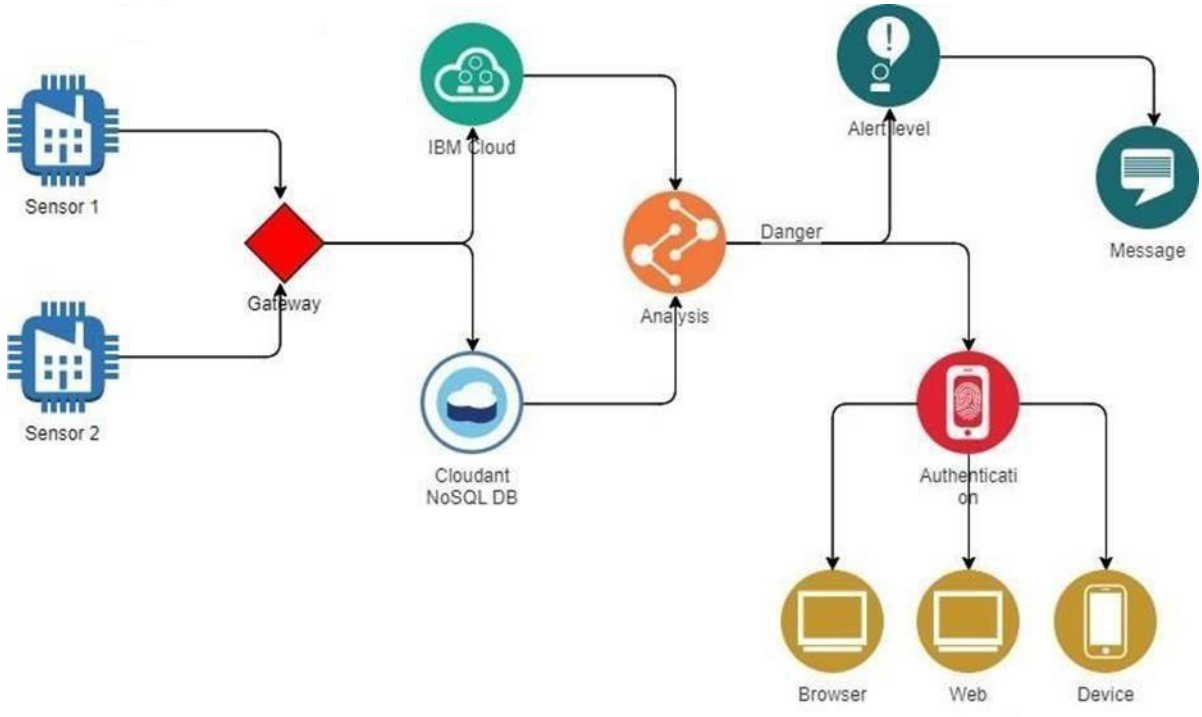
## 5.PROJECT DESIGN

### Data Flow Diagrams:






## Solution & Technical Architecture:



## 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

## SPRINT PLANNING AND ESTIMATION

1. ANALYZE THE PROBLEM
2. PREPARE An ABSTRACT, PROBLEM STATEMENT
3. LIST A REQUIRED OBJECT NEEDED
4. CREATE A PROGRAM CODE AND RUN IT
5. MAKE A PROTOTYPE TO IMPLEMENT
6. TEST WITH THE CREATED CODE AND CHECK THE DESIGNED PROTOTYPE IS
7. SOLUTION FOR THE PROBLEM IS FOUND

| **Sprint** | Functional Requirement (Epic) | User Story Number | User Story / Task | Story Points | Priority | Team Members |
|---|---|---|---|---|---|---|
| Sprint-1 | Objective | USN-1 | As a system, the gas sensor should detect the gas | 8 | High | Karthik |
| Sprint-1 | Features | USN-2 | As a system, the gas sensor values should be displayed in a LCD screen | 2 | Low | Judson |
| Sprint-1 | Features | USN-3 | As a system, as soon as the detected gas reaches the threshold level, the red color LED should be turned ON. | 5 | High | Lalith |
| Sprint-1 | Features | USN-4 | As a system, as soon as the detected gas reaches the threshold level, the siren should be turned ON. | 5 | High | Nithish |
| Sprint-2 | Focus | USN-5 | As a system, it should the send the location where the gas is detected | 8 | High | Karthik |
| Sprint-2 | Focus | USN-6 | As a system, it should also send the alerting SMS to the registered phone number | 2 | Low | Lalith |

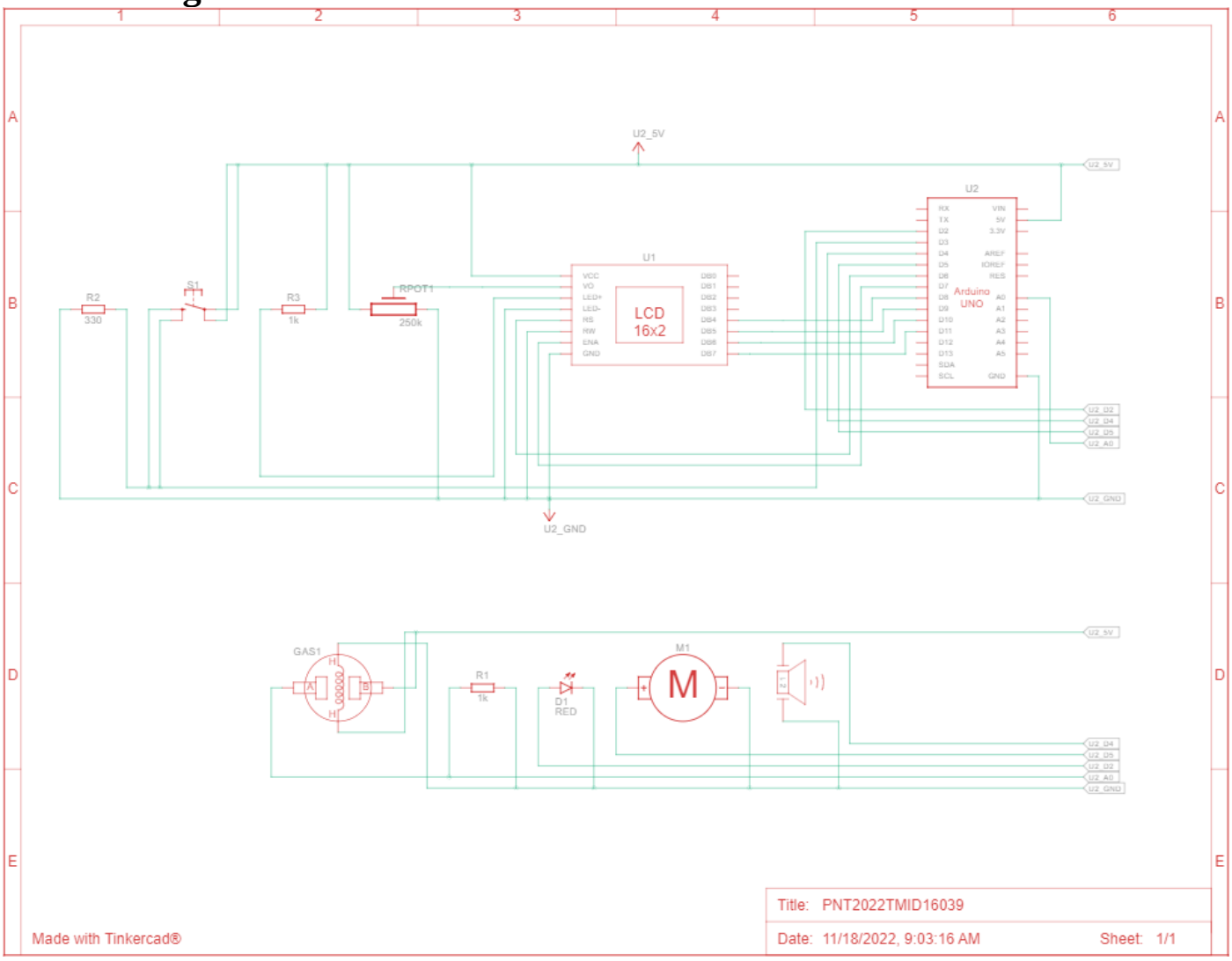
| Sprint | Functional Requirent (Epic) | User Story Number | User Story / Task | Story Points | Priority | Team Members |
|---|---|---|---|---|---|---|
| Sprint-2 | Features | USN-7 | As a system, the gas leakage pipe should be closed automatically once there it attains the threshold value | 5 | Medium | Nithish |
| Sprint-2 | Features | USN-8 | As a system, it will indicate that the gas leakage pipe is closed in the LCD screen and send SMS to the registered mobile number. | 5 | Medium | Judson |
| Sprint-3 | Data Transfer | USN-9 | As a program, it should retrieve the API key of the IBM cloud to send the details of the system. | 2 | Low | Nithish |
| Sprint-3 | Data Transfer | USN-10 | As a system, it should send the data of sensor values along with latitudes and longitudes to the IBM cloud | 5 | Medium | Karthik |
| Sprint-3 | Data Transfer | USN-11 | As a cloud system, the IBM cloud should send the data to NodeRed | 2 | Medium | Lalith |
| Sprint-3 | Data Transfer | USN-12 | As a system, it should collect the data from the NodeRed and give it to the backend of the mit app. | 3 | Medium | Nithish |
| Sprint-3 | Data Transfer | USN-13 | As an application, it should display the details of the gas level and other details to the user through the frontend of the mit app. | 8 | High | Judson |
| Sprint-4 | Registration | USN-14 | As a user, I must first register my email and mobile number in the website | 2 | High | Karthik |

| **Sprint** | Functional Requirement (Epic) | User Story Number | User Story / Task | Story Points | Priority | Team **Members** |
|---|---|---|---|---|---|---|
| Sprint-4 | Registration | USN-15 | As a user, I must receive confirmation mail and SMS on registration | 2 | Medium | Nithish |
| Sprint-4 | Login | USN-16 | As a user, I can login into the web application through email and password. | 3 | High | Judson |
| Sprint-4 | Dashboard | USN-17 | As a user, I can access the dashboard and make use of available resources. | 2 | Medium | Lalith |
| Sprint-4 | Focus | USN-18 | As a user, I must receive an SMS once the leakage is detected. | 5 | High | Karthik |
| Sprint-4 | Allocation | USN-19 | As an admin, I must receive information about the leakage along with location and share exact location and route to the person. | 3 | High | Lalith |
| Sprint-4 | Allocation | USN-20 | As an admin, I must allot particular person to look after the leakage in a particular location. | 3 | High | Judson |

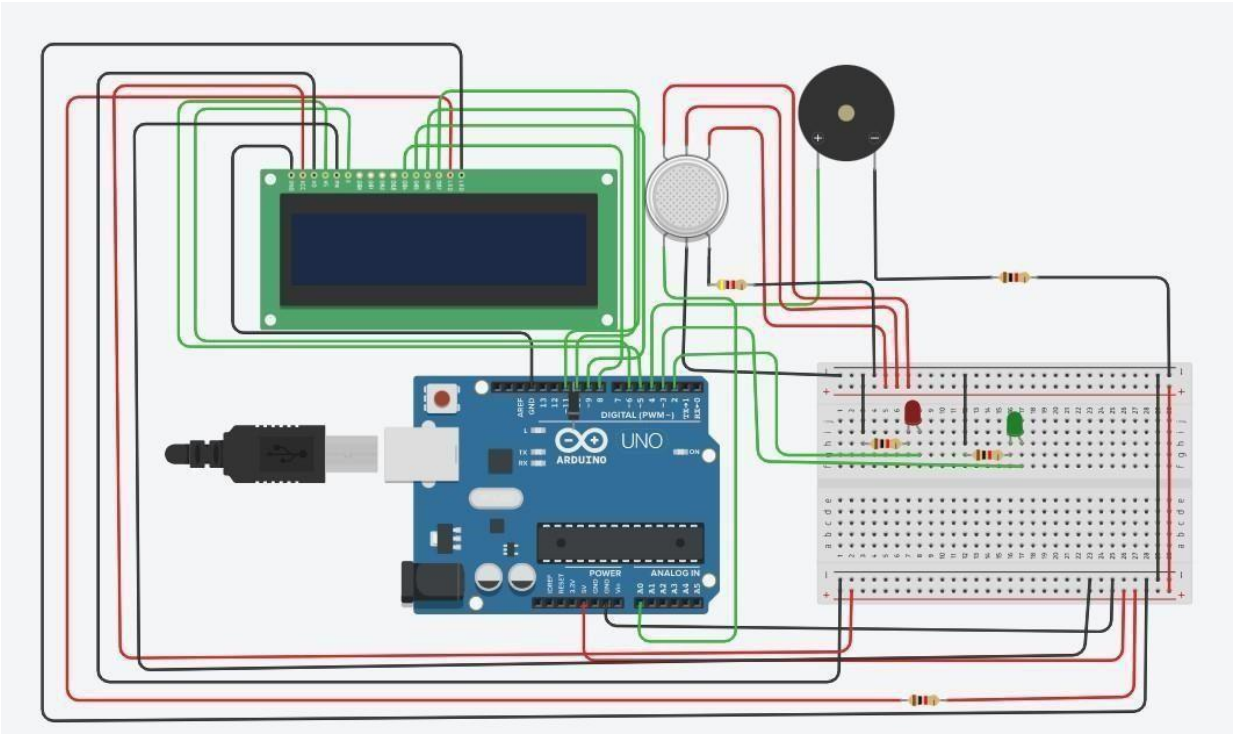
## 6.2Sprint Delivery Schedule:

| TITLE | DESCRIPTION |
|---|---|
| Literature Survey & Information Gathering | Literature survey on the selected project & gathering information by referring the, technical papers, research publications etc. |
| Prepare Empathy Map | Prepare Empathy Map Canvas to capture the user Pains & Gains, Prepare list of problem statements |
| Ideation | List the by organizing the brainstorming session and prioritize the top 3 ideas based on the feasibility & importance. |

# Circuit Diagram:



# SCHEMATIC DIAGRAM



## 7.CODING AND SOLUTIONING

### Feature 1

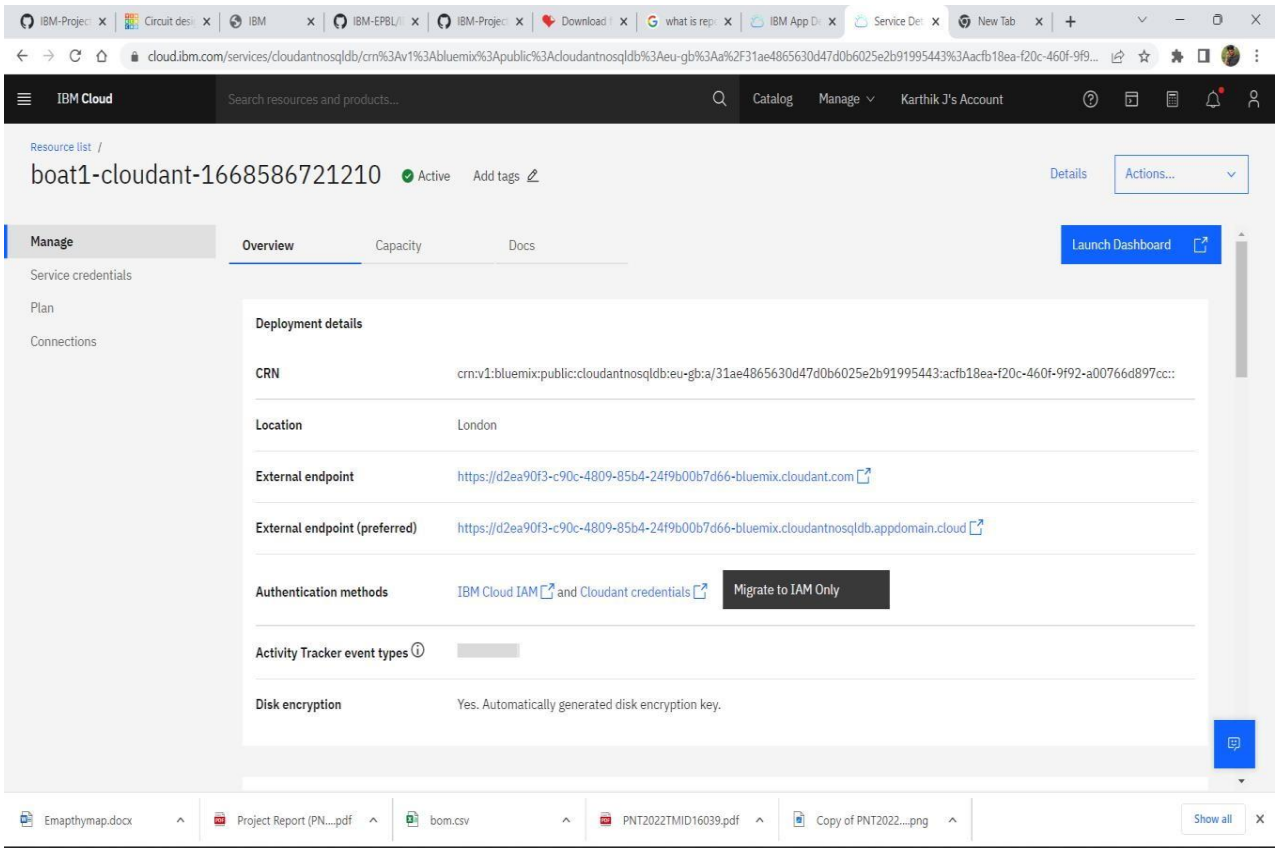
If any gas leakage is detected by the sensor, it sends signal to the entire module and the Buzzer added in our system gives signal as an alarm sound to alert people in the place.
Code for this is given below in 13.Appendix.

### Feature 2

The data represented previously will be stored in the IBM cloud as entire database is connected with our app.
We have created our device with these specification listed below:

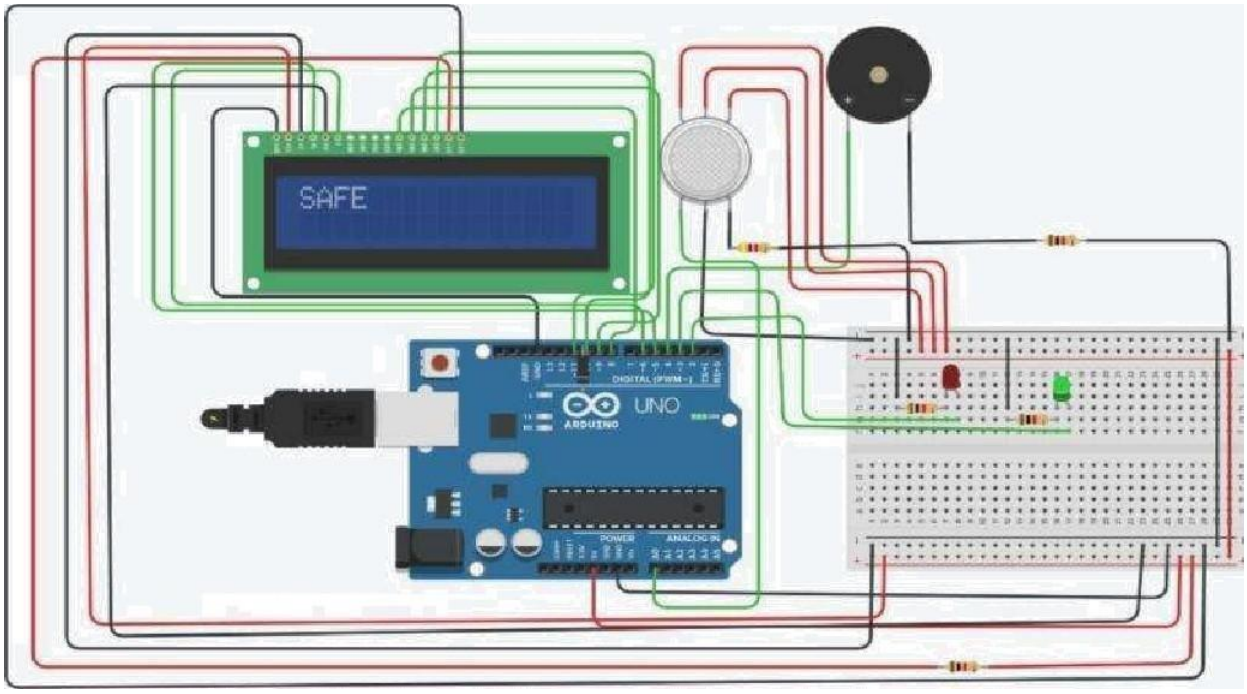
Organization ID:
u98d7c
Device Type:
ESP8266
Device ID:
12345
Authentication Method:
use-token-auth
Authentication Token:
123456789

# DATABASE SCHEMA



## 8.TESTING

As every connections are made and verified, the entire module is simulated to check its working.
The sensor keeps on detection if any gas leakage is there. If there is no leakage is happened no alert signals are sent.

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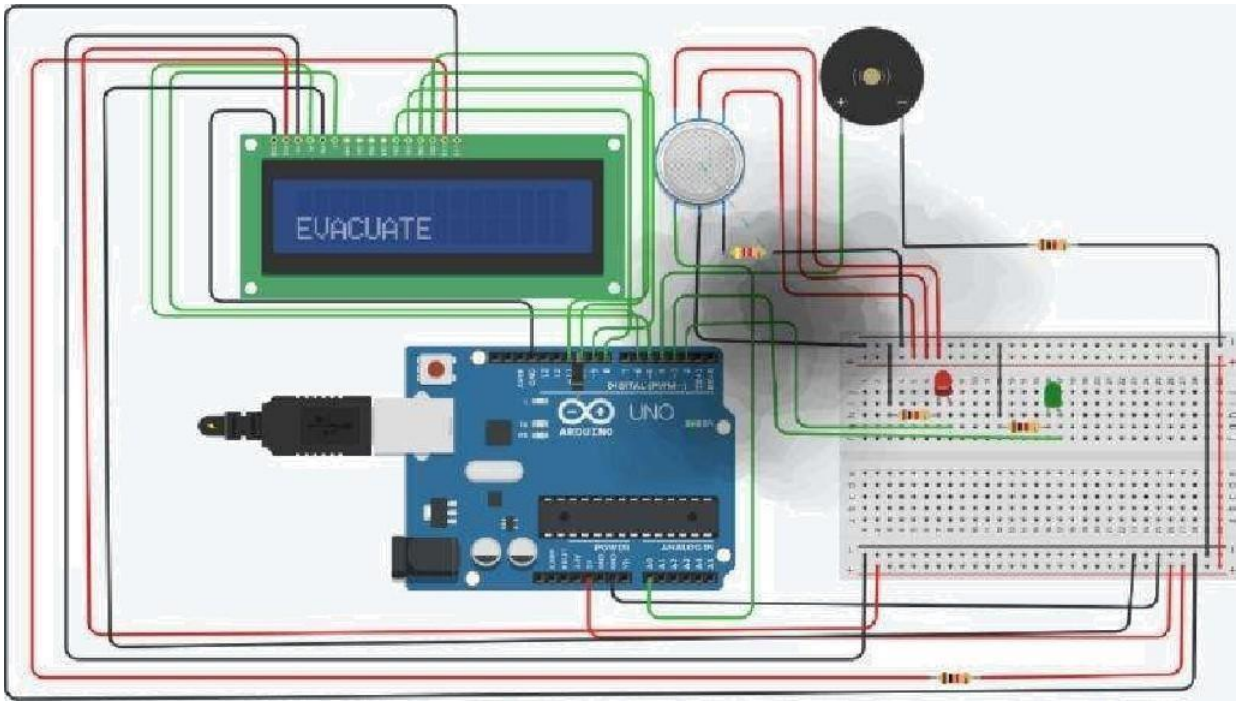
## 9.RESULTS

If any gas leakage is detected the buzzer goes ON and alert signals are sent to the consent devices.



## 10.ADVANTAGES

1. The gas detectors can be used for the detection of combustible, flammable and poisonous gases and for loss of oxygen, and also to detected a gas leak or other pollutants.

2. It makes the area where the leak occurs an warning sound and instructs operators to leave the area.

3. Provides alerts at faster rate and stores the prior data for references.

4. Manual monitoring is not necessary as we use smart solutions for detection.

## DISADVANTAGES

1. If any technical issue and detection failure causes Poor stability and greater environmental impact.

2. The output parameters cannot be determined. Therefore, it should not be used in places where accurate measurement is required.

3. Only one gas can be measured with each instrument.

4. When heavy dust, steam or fog blocks the laser beam, the system will not be able to take measurements. This is also the case when a person or vehicle blocks the path.

## 11.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 CO2, 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.

## 12.FUTURE SCOPE

We propose to build the system using an MQ6 gas detection sensor and interface it with an Arduino 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 agas leakage. The microcontroller processes this signal and a message is displayed on the LCD to alert the user

## 13.APPENDIX

**Source**

**Code:**

```
#include <LiquidCrystal.h>
LiquidCrystal lcd(5,6,8,9,10,11);

int redled = 2;
int greenled = 3;
int buzzer = 4;
int sensor = A0;
int sensorThresh = 100;

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("PLEASE 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);
 }

}
```

## GitHub & Project Demo Link:

Github Link: https://github.com/IBM-EPBL/IBM-Project-30261-1660142964

Simulation Link: https://www.tinkercad.com/things/46FXXfQKIyD-copy-of-pnt2022tmid51246/editel?sharecode=lfzb8aBOaU4GF40NC9YmvY1Vrxru3Rx_5b6kzfefmpc