

# Gas Leakage Monitoring and Alerting System

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**TEAM ID : PNT2022TMID21050**

## **Abstract**

Safety plays a critical role in today's world and it is vital that certain solutions are implemented in places of work and living. Whether it is electricity or oil and gas, working or living in hazardous conditions demand certain safety protocols.

Liquefied Petroleum Gas (LPG) is a type of natural gas liquified under extreme pressure and contained in a metal cylinder. LPG is extremely sensitive to fire and causes a great disaster if exposed to any fire source without precaution. LPG is more widely available than any other natural gas and is primarily used for cooking. Unfortunately, its broad use makes the event of gas leakage or even a blast standard. Therefore, there is a need to develop a gas leakage detection and monitoring system. The system will monitor flame and fire through flame sensor. When a fire is detected, the buzzer begins to sound. The system has been tested and it is able to monitor gas wastage, leakage and notify the user. The resulting performance indicated its effectiveness toward saving a significant portion of the wasted gas in domestic.

# **Project Report**

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## INTRODUCTION

Now a days the home safety detection system plays the important role for the security of people. Since all the people from the home goes to work on daily basis, it makes impossible to check on the appliances available at home specially LPG gas cylinder, wired circuits, Etc. Since last three years there is a tremendous hike in the demands of liquefied petroleum gas (LPG) and natural gas. To meet this excess 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 large scale in industry, heating, home appliances and motor fuel. So as to track this leakage gas, the system includes MQ6 gas sensor. This sensor senses the amount of leak gas present in the surrounding atmosphere. Through this, explosion or getting affected by the leakage of gas could be avoided.

Various commercial companies such as hotels and takeaway joints utilize flammable gases - for instance, carbon dioxide, LPG, ammonia, and so on - to deliver the best customer service possible. The use of such gases cannot be denied. However, they have also brought about a greater risk and threat to human life. With safety a primary concern, businesses dealing with gas must take certain precautions to ensure work is carried out in the most secure manner possible.

## 1.1 PROJECT OVERVIEW

<b>Project Title</b>	Gas Leakage Monitoring and Alerting Systems
<b>TEAM ID</b>	PNT2022TMID21050
<b>Team Lead</b>	Gowtham N B

<b>Problem Project will Address</b>	Unexpected Hazardous Gas Leakage from Industries which will lead to many Accidents
<b>Project Goals</b>	To Detect and Alert the industry workers
<b>Project Objectives and Scopes</b>	The objective of this work is to present the design of a cost effective automatic alarming system, which can detect liquefied petroleum gas leakage in various premises.

## **1.2 PURPOSE**

This project helps the industries in monitoring the emission of harmful gases. In several areas, the gas sensors will be integrated to monitor the gas leakage. If in any area gas leakage is detected the admins will be notified along with the location. In the web application, admins can view the sensor parameters.

## 2.LITERATURE SURVEY

### *a.Existing problem*

Gas leakage is nothing but the leak of any gaseous molecule from a stove, or pipeline, or cylinder etc. This can occur either purposefully or even unintendedly. As we are aware that these kinds of leaks are dangerous to our health, and when it becomes explosive it could cause great danger to the people, home, workplace, industry and the environment. Few of the major incidents that took place due to gas leakage include the Bhopal Disaster and the Vizag Gas leak. The Bhopal disaster is known to be the worst industrial accident ever. Approximately 45 tons of Methyl Isocyanate was leaked from this insecticide plant. Methyl Isocyanate is an organic compound and a chemical that could come from the carbamate pesticides. This colorless, poisonous and flammable liquid is something that human beings have to be away from. Vizag Gas leak was a resultant of the escape of styrene that were unattended for a long period. This colorless oily liquid can



spread in fumes. So, a detector must be made in such a way that could detect any kind of gas, fume, leak, smoke etc. However harmful and dangerous it can be, the detector could be attached with certain parameters that could help to prevent the issue.

## **b. REFERENCES**

Prof.M.Amsaveni, A.Anurupa, R.S.AnuPreetha, C.Malarvizhi, M.Gunasekaran 23 March 2015; They told in their research paper on “GSM based LPG leakage detection and controlling system” the leakage of LPG gas is detected by the MQ6 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.

**Advantages:**

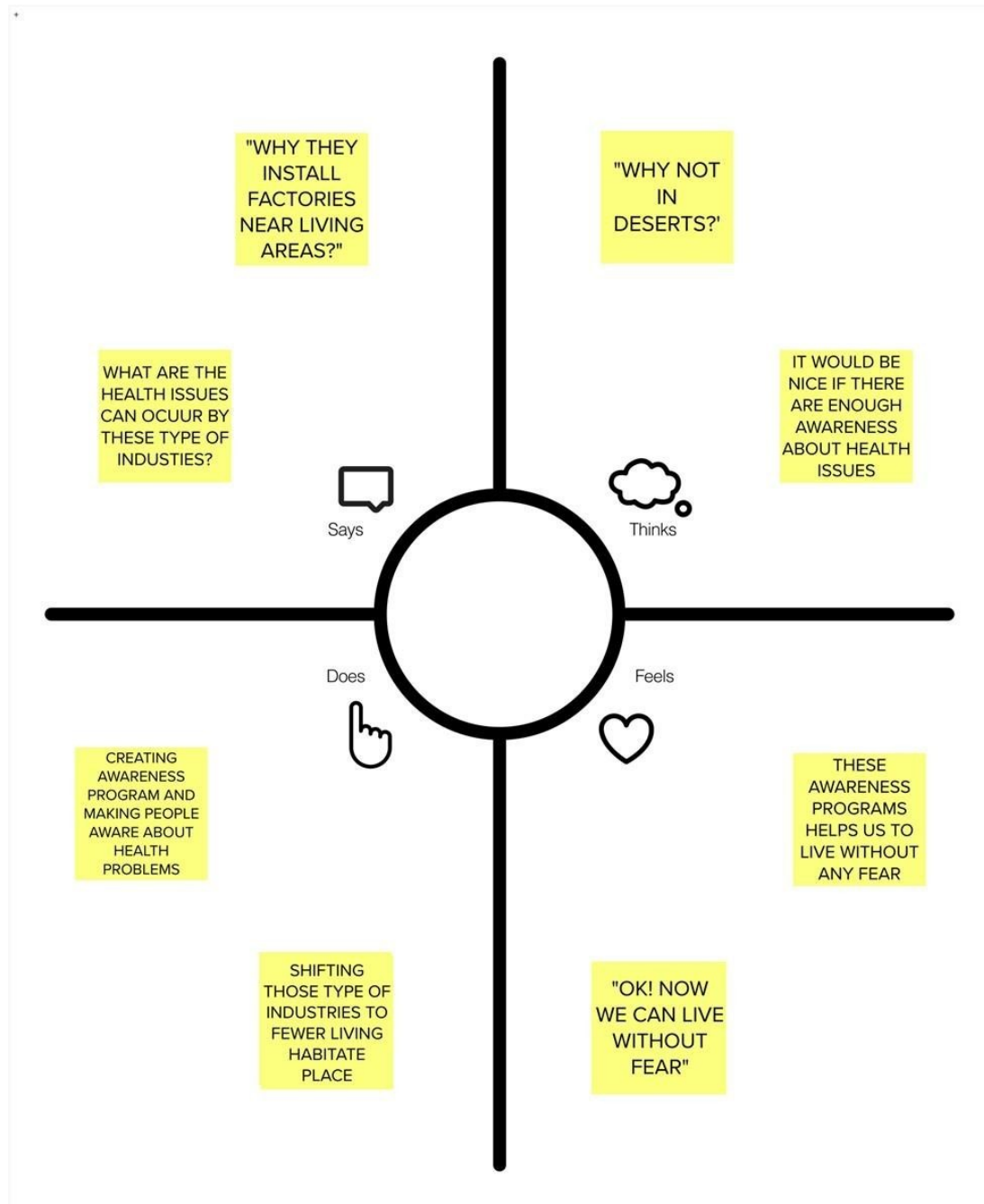
In this methodology that the system takes an automatic control action after the detection of 0.001% of LPG leakage.

**Disadvantages:**

1. System only able to send SMS and alert the user only when the mobile is ON.
2. This method looks very ordinary and old fashioned.

### 3. IDEATION & PROPOSED SOLUTION

#### a. Empathy Map Canvas



## b.IDEATION & BRAINSTORMING

Template



### Conducting a brainstorm

Executing a brainstorm isn't unique; holding a productive brainstorm is. Great brainstorms are ones that set the stage for fresh and generative thinking through simple guidelines and an open and collaborative environment. Use this when you're just kicking-off a new project and want to hit the ground running with big ideas that will move your team forward.

🕒 15 minutes to prepare

🕒 30-60 minutes to collaborate

👤 3-8 people recommended

Created in partnership with  Meta  Meta



#### 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.

🕒 15 minutes

A

##### Choose your best "How Might We" Questions

Create 5 HMW statements before the activity to propose them to the team.

B

##### Set the stage for creativity and inclusivity

Go over the brainstorming rules and keep them in front of your team while brainstorming to encourage collaboration, optimism, and creativity.

1. **Encourage wild ideas** (If none of the ideas sound a bit ridiculous, then you are filtering yourself too much.)
2. **Defer judgement** (This can be as direct as harsh words or as subtle as a condescending tone or talking over one another.)
3. **Build on the ideas of others** ("I want to build on that idea" or the use of "yes, and...")
4. **Stay focused on the topic at hand**
5. **Have one conversation at a time**
6. **Be visual** (Draw and/or upload to show ideas, whenever possible.)
7. **Go for quantity**

C

##### Interested in learning more?

Check out the Meta Think Kit website for additional tools and resources to help your team collaborate, innovate and move ideas forward with confidence.

[Open the website](#) →

### Brainstorm

Write down any ideas that come to mind that address your problem statement.

Ⓢ 10 minutes

**TIP**  
You can select a sticky note and hit the pencil (switch to sketch) icon to start drawing!



### Group ideas

Take turns sharing your ideas while clustering similar or related notes as you go. In the last 10 minutes, give each cluster a sentence-like label. If a cluster is bigger than six sticky notes, try and see if you can break it up into smaller sub-groups.

⌚ 20 minutes





### c. PROPOSED SOLUTION

#### Problem Statement(Problem to be solved)

Gas Leakage Monitoring and Alerting System for safety purpose. The Gas Leakage monitoring has a big role in industries and also at many factories where Gas manufacture is happening. This monitoring will help many Gas Leakage related accidents

#### Idea/ Solution description

The idea is the Gas Leakage detection with a Wifi connected so that the alert system will be at a quicker way through IoT. The

sensor also should be in the latest upgraded version of MQ 135 sensor. The sensor is designed in such a way that it can have a huge radius of detecting the gas leakage. The board Arduino or ESP866 Mod which has an inbuilt Wifi, so that the alert system works quick enough to alert the admin.

### Novelty / Uniqueness

The Uniqueness of this project is that it has a better accuracy than the previous version alerting systems which are available in the market. By using IoT the range of the alert system will be increased and also it is cost efficient if we built a main Hub for a large scale industries to monitoring

### Social Impact / Customer Satisfaction

It will have a great impact in society because gas leakage may lead to many problems to the people and will be affected by many diseases and also cost lives

### Business Model (Revenue Model)

The Targeted customers are Factory owners and also Gas related industries and factories.

### Scalability of the Solution

This is highly scalable since the number of accidents by Gas

Leakage is reduced and also through IoT the monitoring also can be held.

#### d. PROBLEM SOLUTION FIT

Define CS, fit into CC	<b>1. CUSTOMER SEGMENT(S)</b> <span>CS</span> Our customers Houses and residential buildings Chemical labs Industrial sectors like 1. Semiconductor manufacturing industries 2. Wastewater Treatment Plants 3. Oil & Gas 4. Chemical and 5. Mining	<b>2. JOBS-TO-BE-DONE / PROBLEMS</b> <span>J &amp; P</span> Gases have also brought about a greater risk and threat to human life. With safety a primary concern, businesses dealing with gas have to take certain precautions to ensure work is carried out in the most secure manner possible. That is where a gas detection system is necessary at accident-prone locations including households, to continuously monitor any kind of leakage - regardless of the human senses - and send an alert to the end-user. The gases are toxic in nature, resulting in human unconsciousness and even death if consumed in larger quantities. Moreover, gaseous blasts are another disaster that everyone - working in a factory or at home - would want to avoid at all costs!	<b>3. TRIGGERS</b> <span>TR</span> An explosion can occur when a gas pipe is leaking. In a confined space like a home or business, the gas will mix with the air, increasing the pressure of the space. When there is a spark or flame (even a static electricity spark might be enough) present, the gas will ignite, causing an explosion.	Explore AS, differentiate
	<b>4. EMOTIONS: BEFORE / AFTER</b> <span>EM</span> High levels of natural gas exposure can cause natural gas poisoning, which is characterized by fatigue, severe headaches, memory problems, loss of concentration, nausea, loss of consciousness, and suffocation. Burning natural gas produces nitrogen oxide, carbon monoxide, and methane. These chemicals can trigger respiratory problems, depression, and decrease the quality of your health. Talk to your doctor if you believe the gas leak is affecting your health.	<b>5. AVAILABLE SOLUTIONS</b> <span>AS</span> Various commercial companies such as hotels and takeaway joints utilize flammable gasses - for instance, carbon dioxide, LPG, ammonia, and so on to deliver the best customer service possible. The use of such gasses cannot be denied. Others 1. THE PIPELINE LEAK DETECTION METHOD OF CHOICE. 2. DISTRIBUTED TEMPERATURE & ACOUSTIC SENSING.	<b>6. CUSTOMER CONSTRAINTS</b> <span>CC</span> There is no awareness among these systems no advertising is done in this domain reachability is less in this segment Only one gas can be measured with each instrument.	
Identify strong TR & EM	<b>7. BEHAVIOUR</b> <span>BE</span> It will have a great impact in society because gas leakage may lead to many problems to the people and will be affected by many diseases. In recent years, concerns about the safety of laboratories have been caused by several serious accidents in school laboratories. Gas leaks in the laboratory are often difficult to detect and cause serious consequences.	<b>8. CHANNELS of BEHAVIOUR</b> <span>CH</span>	<b>8. CHANNELS of BEHAVIOUR</b> <span>CH</span>	Identify strong TR & EM
	<b>9. PROBLEM ROOT CAUSE</b> <span>RC</span> A gas leak refers to a leak of natural gas or another gaseous product from a pipeline or other containment into any area where the gas should not be present. Gas leaks can be hazardous to health as well as the environment. Unreliable metal-to-metal seals. Improperly installed tube fittings. Poor tubing selection/preparation	<b>8.1 ONLINE</b> customers search for products online and find buying options they look for product description and adds online based on the system	<b>8.2 OFFLINE</b> customers enquire in shops and showrooms they take a survey among the shops they gain information in latest technology.	



## **4.REQUIREMENT ANALYSIS**

### ***a.Functional requirement***

FR No.	Non-Functional Requirement	Description
NFR-1	Usability	In Industries, we use this device to avoid the fireaccidents. The device can be accessed through Wifi.
NFR-2	Security	Only authorised person can access theimportant details.
NFR-3	Reliability	Prevent from  accidents.  Avoid  falseAlarm.  It Shouldavoid the delay alert message.

FR No.	Functional Requirement (Epic)	Sub Requirement (Story / Sub-Task)
FR-1	User Registration	Registration through Form Registration through Gmail
FR-2	User Confirmation	Confirmation via Email Confirmation via OTP
FR-3	User SIGN IN	User can sign in with username and password
FR-4	Connect the NODEMCU device	Connect the NODEMCU device with application through Wifi.
FR-5	Update contact details	Update the emergency contact number.
FR-6	REALTIME MONITORING	It display the temperature level in pictorial representation using flow chart.

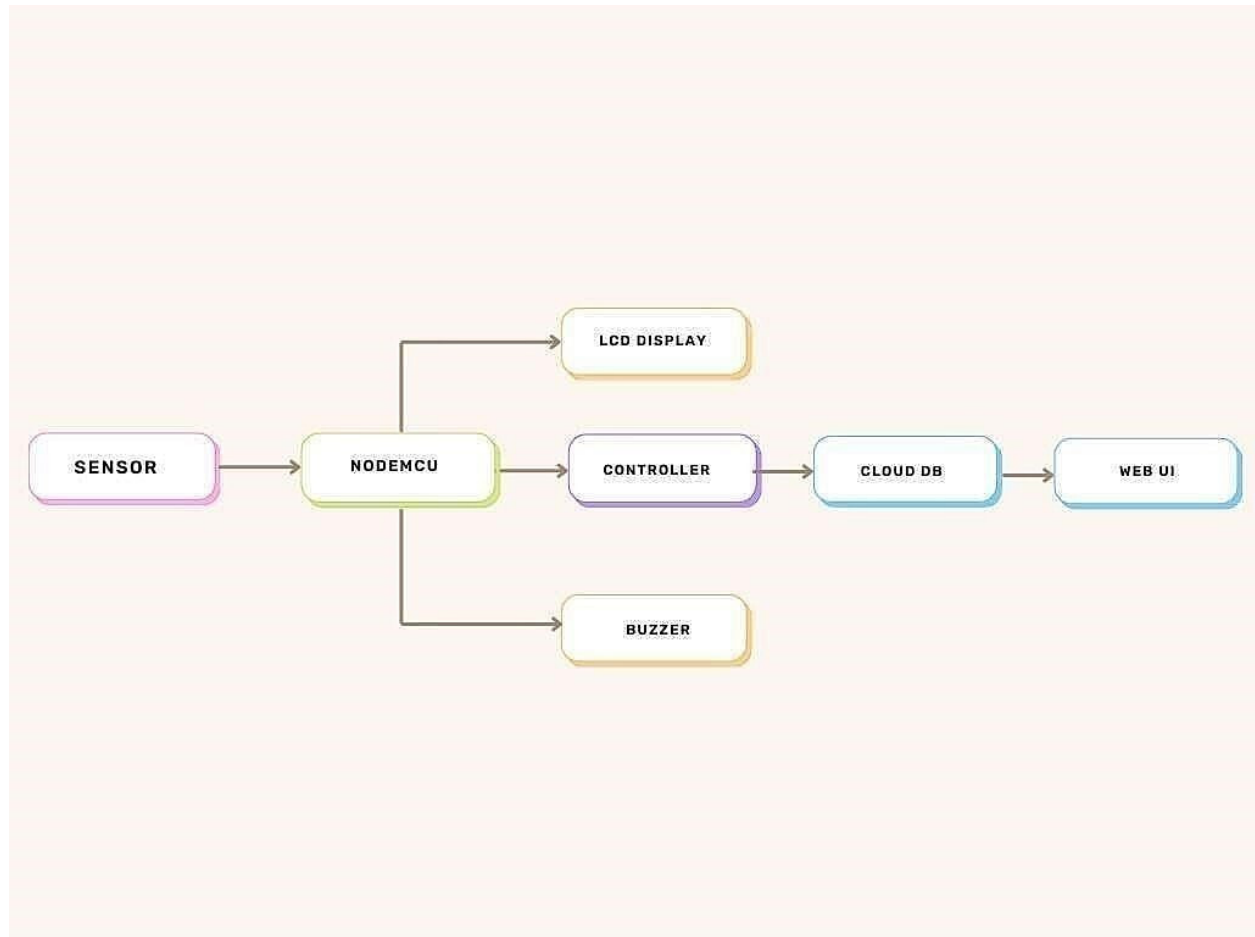
FR-6	Output	In Emergency situation, it sends alert message to emergency contact number. It sends message to fire service.
FR-7	Review and Feedback	User can share their experience about the app usage. Provide feedback

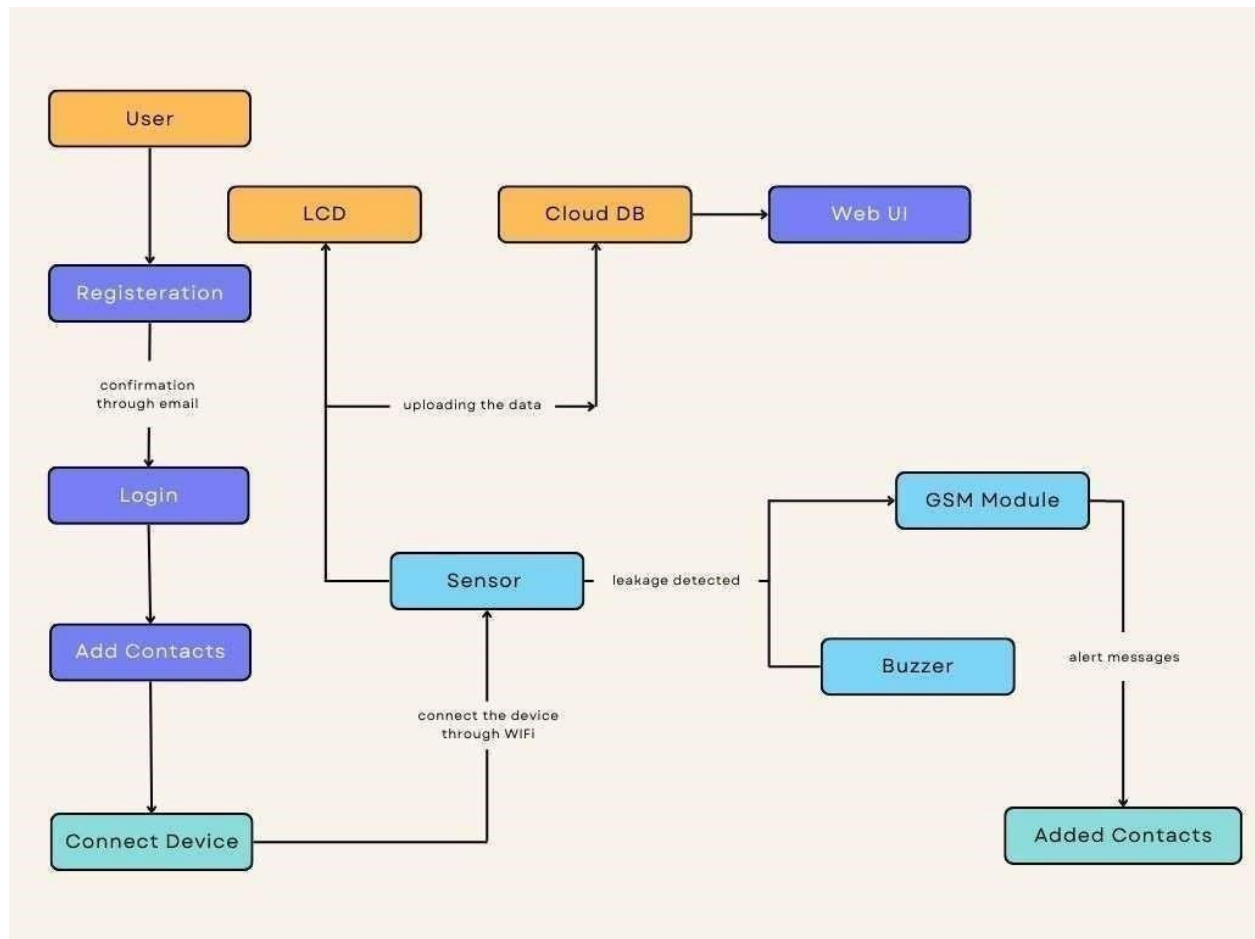
***b.Non Functional requirement***

NFR-4	Performance	In a gas usage industries, the gas is transferred from one end to another end through pipes at the time gas leakage is possible. We use this device to detect the gas leakage and gives buzzer alarm and send alert message to nearest police station and fire service department.
NFR-5	Availability	This model is used to continuously monitor and display the gas level and check the gas level is exceed or not.
NFR-6	Scalability	Lot of users can access the application at the same time without any inconvenience.

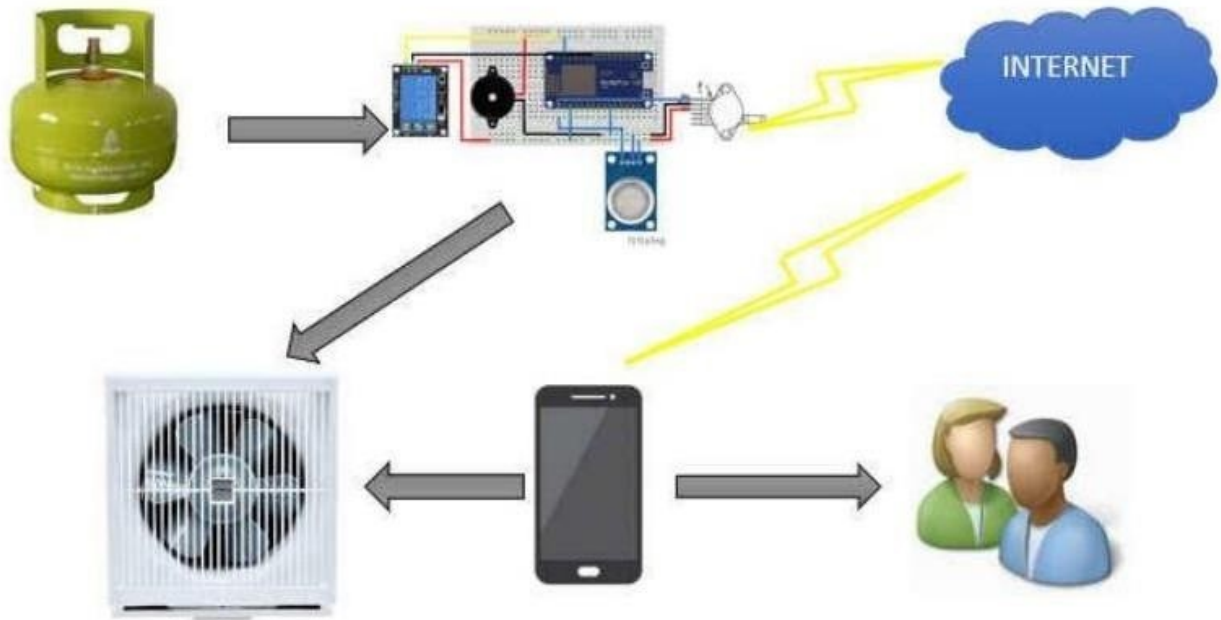
## **5.PROJECT DESIGN**

### ***a.Data Flow Diagrams***

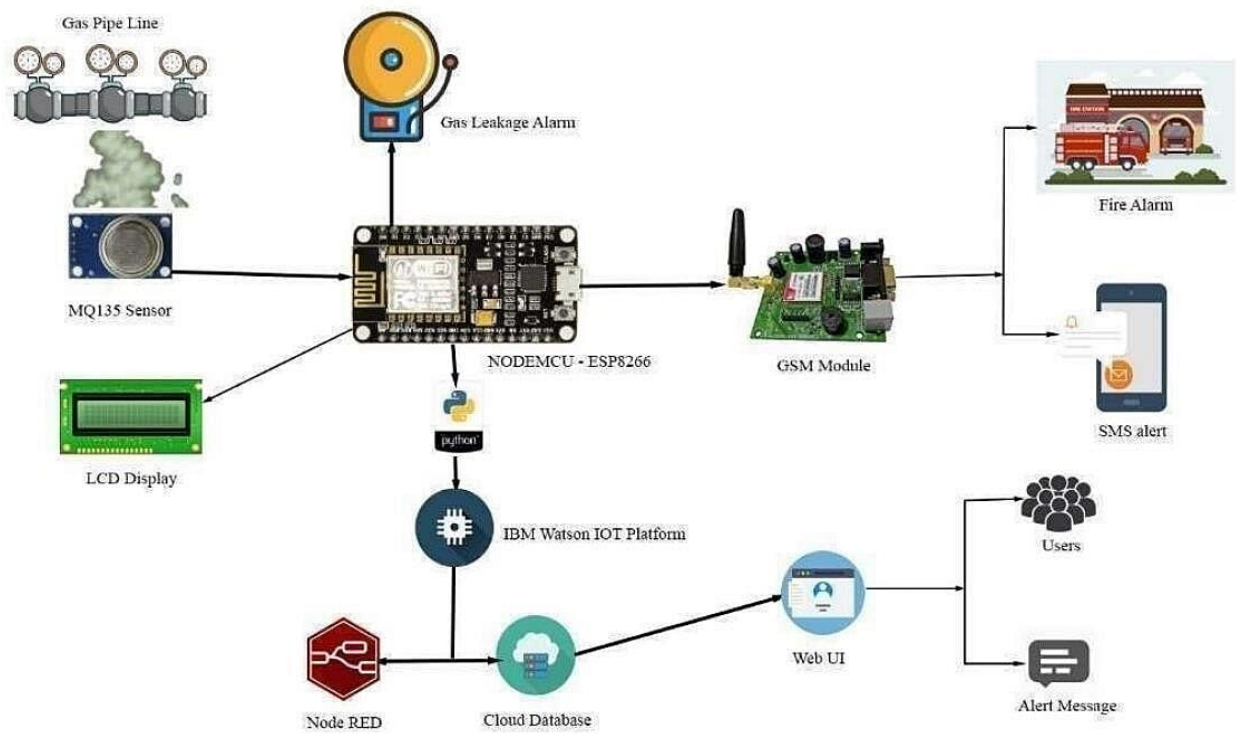




***b.SOLUTION ARCHITECTURE***



***c.TECHNICAL ARCHITECTURE***



### *e.User Stories*

User Type	Functional Requirement (Epic)	User Story Number	User Story / Task	Acceptance criteria	Priority	Release
Customer (Mobile user)	Registration	USN-1	As a user, I can register for the application by entering my email, password, and confirming my password.	I can access my account	High	Sprint-1
		USN-2	As a user, I will receive confirmation email once I have registered for the application	I can receive confirmation email	High	Sprint-1
	Login	USN-3	As a user, I can log into the application by entering email & password	I can login to my web to my email and password.	High	Sprint-1
	Dashboard	USN-4	As a user, I can login into my contact number	Only added contact number	High	Sprint-1



			account and I can add the members to send alert message	bers can receive SMS alerts.		
Custo mer (Web user)	Registrat ion	USN- 1	As a user, I can register for to creating account by entering my email, password, and confirming my password.	I can access my accoun t.	High	Sprin t-1
		USN- 2	As a user, I will receive confirmati on emailonce I have registered for the web user.	I can receive confirmati on email.	High	Sprin t-1
	Login	USN- 3	As a user, I can log into the website entering email & password	Only valid credentials must be acceptable.	High	Sprin t-1
	Dashboa rd	USN- 4	As a user, I can logininto my account and I can add the members to send alert	Only added contact numbers can receive sms alerts.	High	Sprin t-1

			message			
Administrator	Admin	USN-1	As a Admin, He/ She can add the members those who want to receive alert message.	The Admin have authority can add members and edit the details.	High	Sprint-1
		USN-2	As a Admin, He/She can monitor real time.	The admin can monitor the process by 24/7hrs.	High	Sprint-1

## **6.PROJECT PLANNING& SCHEDULING**

### ***a.Sprint Planning& Estimation***

<b>Sprint</b>	<b>Functional Requirement (Epic)</b>	<b>User Story Number</b>	<b>User Story/ Task</b>	<b>Story Points</b>	<b>Priority</b>	<b>Team Members</b>
Sprint-1	Monitoring The Gasleakage	USN-1	The Industrialist have their own industries and it not a compulsory to work because they have workers to work for them. The workers are important for the industries and as well as the family members of the workers. Hence their health is very important and	2	High	Gowtham

			must be take care of the industries. And the industries must give assurance for those workers.			
Sprint-2	Avoiding the Disaster	USN-2	We can't predict the time of disaster hence the fire services must be ready and alert all the time	1	High	Keerthick
Sprint-3	Detection of the Gas	USN-3	We have to monitor the gas 24/7 because it has high risk. The industries must have high quality pipes and proper maintenance	2	Low	Dinesh

			service once in a month. The industries must take care of all the necessary processes to avoid the gas leakage			
Sprint-4	The model is trained and tested by sample data set.	USN-4	The programmer design the model to detect the gas leakage	2	Medium	Kavya

Sprint	Total Story Points	Duration	Sprint Start Date	Sprint End Date (Planned)	Story Points Completed (as on Planned End Date)	Sprint Release Date (Actual)

***b.Sprint Delivery Schedule***

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

## **7.CODING & SOLUTIONING**

### ***a.Feature 1***

- i. This project helps the industries in monitoring the emission of harmful gases
- ii. In several areas, the gas sensors will be integrated to monitor the gas leakage

### **b.Feature 2**

If in any area gas leakage is detected the admins will be notified along with the location

- i. In the web application, admins can view the sensor parameters.

## **CODE**

```
#include  
  
<LiquidCrystal.h>  
  
LiquidCrystallcd(6,  
7, 8, 9, 10, 11); float  
gasPin = A0; float  
gasLevel;  
  
int ledPin = 2;
```

```
int buttonPin = 3;
```

```
int
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in
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5;
```



```
void
```

```
  setup(){
```

```
    pinMode
```

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    e(ledPi
```

```
    n,
```

```
    OUTPU
```

```
    T);
```

```
    pinMode
```

```
    e(button
```

```
    Pin,
```

```
    INPUT
```

```
    );
```

```
    pinMode
```

```
    e(gasPi
```

```
    n,INPU
```

```
    T);
```

```
    pinMode
```

```
    e(fan,O
```

```
    UTPUT
```

```
    );
```

```
Serial.b  
  
egin(96  
  
00);  
  
lcd.begi  
  
n(16,  
  
2);  
  
lcd.setC  
  
ursor(0,  
  
0);  
  
lcd.print  
  
("  
  
Welcom  
  
e");  
  
lcd.setC  
  
ursor(0,  
  
2);  
  
lcd.print("GASLEAKAGE SYSTEM");  
  
de  
  
la  
  
y(
```

50

0);

lc

d.

cl

ea

r(

);

}

void loop(){

// Read the value from gas

sensorand buttongasLevel =

analogRead(gasPin);

buttonState = digitalRead(buttonPin);

// call the function for gas detection and button

workgasDetected(gasLevel);

buzzer(gasLevel);

```
    exhaustFanOn(but  
    tonState);  
}
```

```
// Gas LeakageDetection & Automatic
```

```
Alarm and Fan ONvoid
```

```
gasDetected(float gasLevel){
```

```
    if(gasLe
```

```
        vel >=
```

```
        300){di
```

```
        gitalWr
```

```
        ite(buz
```

```
        zPin,HI
```

```
        GH);
```

```
        digital
```

```
        Write(l
```

```
        edPin,
```

```
        HIGH);
```

```
        digital
```

```
        Write(f
```

```
an,HIG
H);
lcd.set
Cursor(
0,0);
lcd.prin
t("GAS
:");
lcd.prin
t(gasLe
vel);
lcd.set
Cursor(
0,2);
lcd.prin
t("FAN
ON");d
elay(10
00);
lcd.clear();
```

```
}else{  
  
    digitalWrite  
  
    e(ledPin,L  
  
    OW);  
  
    digitalWrite  
  
    e(buzzPin,  
  
    LOW);  
  
    digitalWrite  
  
    e(fan,LOW  
  
    );  
  
    lcd.setCursor  
  
    or(0,0);  
  
    lcd.print("  
  
    GAS:");  
  
    lcd.print(ga  
  
    sLevel);  
  
    lcd.setCursor  
  
    or(0,2);  
  
    lcd.print("F  
  
    AN
```

```
OFF");delay
```

```
y(1000);
```

```
lcd.clear();
```

```
}
```

```
}
```

```
//BUZZER
```

```
void
```

```
buzzer(f
```

```
loat
```

```
gasLeve
```

```
l){
```

```
if(gasLe
```

```
vel>=30
```

```
0)
```

```
{
```

```
for(int i=0; i<=30; i=i+10)
```

```
{
```

```
to
```

```
ne
```

(4,

i);

de

la

y(

40

0);

no

To

ne

(4

);

de

la

y(

40

0);

}

}

}



```
// ManuallyExhaust FAN ON
```

```
void
```

```
    exhaustFanOn(i
```

```
    nt buttonState){
```

```
    if(buttonState
```

```
    == HIGH){
```

```
        digitalWrite(fan,
```

```
        HIGH);
```

```
        lcd.setCursor(0,
```

```
        0);
```

```
        lcd.print("Butt
```

```
        on State:");
```

```
        lcd.print(button
```

```
        State);
```

```
        lcd.setCursor(0,
```

```
        2);
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}

## **8.RESULTS**

This technique has been tested by leak of gas almost about sensors, MQ2 gas sensor sends the signal to the Arduino UNO after detecting the gas leakage. Arduino to other externally connected device such as LCD, buzzer. In

practice, results for are noticed by the people surrounding by the area are displayed in the LCD and buzzer sound indicate the danger to the people by making beep sound.

## **9.ADVANTAGES**

- a. Get real-time alerts about the gaseous presence in the atmosphere
- b. Prevent fire hazards and explosions
- c. Supervise gas concentration levels
- d. Ensure worker's health
- e. Real-time updates about leakages
- f. Cost-effective installation
- g. Data analytics for improved decisions
- h. Measure oxygen level accuracy
- i. Get immediate gas leak alerts

## **DISADVANTAGES**

Gas interference: Cross interference from other gases can compromise the performance of a gas sensor, altering the calibration curve will result in false or inaccurate readings.

## **10.CONCLUSION**

After this project performance, can conclude that detection of the LPG gas leakage is incredible in the project system.

Applicable usefully in the industrial and domestic purpose. In danger situations we are able to 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, 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.

## **11.FUTURE SCOPE**

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 10m radius of the rover and the sensor output data's are continuously transferred to the local server. The accuracy of sensors are 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 case of methane. Hence in the future we gonna come up with better solutions for these Problems

## **12.APPENDIX**

### **SOURCECODE**

```
#include  
  
<LiquidCrys  
  
tal.h>  
  
LiquidCryst
```



```
al lcd(6,7, 8,
```

```
9, 10, 11);
```

```
float gasPin
```

```
= A0;
```

```
fl
```

```
o
```

```
at
```

```
ga
```

```
sL
```

```
ev
```

```
el;
```

```
int
```

```
le
```

```
dP
```

```
in
```

```
=
```

```
2;
```

```
int
```

```
bu
```

tto

nP

in

=

3;

int

bu

zz

P

in

=

4;

int

bu

tto

nS

tat

e;

int

f

an

=

5;

void

  setup(

  ){

    pinM

    ode(le

    dPin,

    OUT

    PUT);

  pinM

  ode(b

  utton

  Pin,

  INPU

T);

pinM

ode(g

asPin,

INPU

T);

pinM

ode(fa

n,OU

TPUT

);

Serial

.begin

(9600

);

lcd.be

gin(1

6, 2);

lcd.se

tCurs

or(0,0

);

lcd.pr

int("

Welco

me");

lcd.setCursor(0,2);

lcd.print("GAS LEAKAGESYSTEM");

de

la

y(

50

0

);

lc

d.

cl

ea

r(

);

}

void loop(){

// Read the value from

gas sensor and button

gasLevel =

analogRead(gasPin);

buttonState = digitalRead(buttonPin);

// call the function for gas

detection and button work

gasDetected(gasLevel);

buzzer(gasLevel

);

exhaustFanOn(bu

```

    ttonState);

}

// Gas Leakage Detection&
Automatic Alarm and Fan ONvoid
gasDetected(float gasLevel){
    if(gasLevel >=
        300){
        digitalWrite(buz
            zPin,HIGH);
        digitalWrite(led
            Pin,HIGH);
        digitalWrite(fan,
            HIGH);

        lc
        d
        .
        s

```

e

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C

u

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C

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o

r

(

0

,

2

)

;

```
lcd.print("ALERT! PLEASEEVACUATE");
```

```
delay(1000);
```

```
}els
```

```
e{
```

```
digit
```

```
alWr
```

```
ite(le
```

```
dPin,
```

```
LO
```

```
W);
```

```
digit
```

```
alWr
```

```
ite(b
```

```
uzzP
```

```
in,L
```

```
OW
```

```
);
```

```
digit
```

```
alWr
```

ite(fa

n,LO

W);

lcd.s

etCu

rsor(

0,0);

lcd.p

rint("

GAS

:"");

lcd.p

rint(

gasL

evel

);

lcd.s

etCu

rsor(

0,2);

lcd.p

rint("

NOR

MA

L");d

elay(

1000

);

lcd.clear();

}

}

//BUZZER

void

buzze

r(flo

at

gasL

evel

) {

if(gas

Level

>=30

0)

{

for(int i=0; i<=30; i=i+10)

{

to

ne

(4

,i

);

de

la

y(

40

0

);

no

To

ne

(4

);

de

la

y(

40

0

);

}

}

}

// Manually Exhaust FAN ON



```
void  
    exhaustFan  
    On(int  
    buttonState  
    ){  
        if(buttonSta  
        te ==  
        HIGH){  
            digitalWrite(  
            fan,HIGH);  
            lcd.setCursor  
            r(0,0);  
            lcd.print("B  
            utton  
            State:");  
            lcd.print(but  
            tonState);  
            lcd.setCursor  
            r(0,2);
```

```
lcd.print("ALERT! PLEASE EVACUATE");
```

```
de
```

```
la
```

```
y(
```

```
10
```

```
00
```

```
0
```

```
);
```

```
lc
```

```
d.
```

```
cl
```

```
ea
```

```
r(
```

```
);
```

```
}
```

```
}
```

## **Git Hub Link:**

<https://github.com/IBM-EPBL/IBM-Project-29879-1660132174>

## **Demo Video Link:**

<https://drive.google.com/file/d/1xY8mynPRtzbziGSNljAe1sLJaQw-lcey/view>