Gas Leakage Monitoring & Alerting System

Team ID	PNT2022TMID31708
Project Name	Gas Leakage Monitoring & Alerting System

TEAM MEMBERS:

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1. INTRODUCTION

1.1 Project Overview

- 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.

1.2 Purpose

- The sensor-enabled solution helps prevent the high risk of gas explosions and affecting any casualties within and outside the premises.

- The gas sensors help detect the concentration of the gases present in the atmosphere to avoid hazardous consequences like fire breakouts

2. LITERATURE SURVEY

2.1 Existing Problem

- A prototype of a Wireless Sensor Network (WSN) to monitor and locate gas leaks of a complex indoor environment.
- The system provides constant monitoring and detection of gas leakage along with storage of data in database for predictions and analysis. The IOT components used helps in making the system much more cost effective in comparison with traditional Gas detector systems.
- "Intelligent Residential Security Alarm and Remote Control System Based On Single Chip Computer", the paper focuses on, Intelligent residential burglar alarm, emergency alarm, fire alarm, toxic gas leakage remote automatic sound alarm and remote control system, which is based on 89c51 single chipcomputer.
- The system can perform an automatic alarm, which calls the police hotline number automatically. It can also be a voice alarm and shows alarm occurred address. This intelligent security system can be used control the electrical power remotely through telephone.
- 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

2.2 References

S.NO	TITLE OF THE PROJECT	ADVANTAGES	DISADVANTAGES	RESULT
1	Internet of Things (IOT) Based Gas Leakage Monitoring and Alerting System with MQ-2 Sensor.	The gas sensors help detect the concentration of the gases present in the atmosphere to avoid hazardous consequences like fire breakouts.	It measures toxic gases in very low concentrations. It has ability to detect wide range of gases.	This paper choice of using a real time gas leakage monitoring and Sensing the output levels of gas has been clearly observed by the help of this system.
2	Gas Leakage Detection and Smart Alerting and Prediction Using IoT	Early indication helps to take preventive measures and cost efficient .The sensor enabled solution helps prevent the high risk of gas explosions and affecting any casualities within and outside the permises	Sensors are used in high risk areas Only one gas can be measured with each instrument When heavy dust , steam or fog blocks	The proposed gas leakage detector is promising in the Field of safety
3	IOT Based Gas Leakage Detection System with Database Logging, Prediction and Smart Alerting	Intrinsically Safe Low maintenance and low operating costs.	Only one gas can be measured with each instrument. When heavy dust, steam or fog blocks the laser beam, the system will not be able to take measurements.	The system provides constant monitoring and detection of gas leakage along with storage of data in database for predictions and analysis. The IOT components used helps in making the system much more cost effective in comparison with traditional Gas detector systems.

4	Internet of Things (IoT) Based Gas Leakage Monitoring and Alerting System	Get real-time alerts about the gaseous presence in the atmosphere Prevent fire hazards and explosions Supervise gas concentration levels	Cross interference from other gases can compromise the performance of a gas sensor, altering the calibration curve will result in false or inaccurate readings.	A discussion on how the aims and objectives are met is presented. An overall conclusion IOT based toxic gas detector is it has become more efficient, more applicable to today's applications and smarter..
5	Gas Leakage Detection and Smart Alerting System Using IoT	An IoT-powered gas monitoring solution works through sensors that provide accurate data regarding the presence of toxic gases in the atmosphere.	Gas sensor placement is crucial in providing the right protection for your plant and personnel. Well positioned sensors will increase plant safety. Gas density and air flow should be considered when positioning sensors.	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
6	Dangerous Gas Detection using an Integrated Circuit and MQ-9	It is a very useful system to implement in the industries or plant facilities to avoid catastrophic explosions.	All sensors drift over a period of time. Sensor drift represents a change in accuracy, and is problematic for two reasons – false alarming or worse yet, failure to alarm.	The gas sensors help detect the concentration of the gases present in the atmosphere to avoid hazardous consequences like fire breakouts.

7	Sensor-Based Gas Leakage Detector System	Cost efficient Analyse the problem in each part in gas pipelines.	Less Efficiency	An automatic gas alarm system is designed to detect the unwanted presence of fire by monitoring environmental changes associated with combustion.
8	LPG Gas Leakage Detection & Control System	System helps to resolve the gas leakage in industries	Energy consumption	A device worn by a person that measures airborne gases and provides a warning when alarm levels of hazardous gases are reached.

2.3 Problem Statement Definition

- Liquid Petroleum Gas (LPG) is a highly flammable chemical that consists of mixture of propane and butane. LPG is used for cooking at home, restaurant, and certain use for industry. They have certain weaknesses that make the gas leakage occur. The leakage of gases only can be detected by human nearby and if there are no human nearby, it cannot be detected. But sometimes it cannot be detected by human that has a low sense of smell. Thus, this system will help to detect the presence of gas leakage.

- An automatic gas alarm system is designed to detect the unwanted presence of fire by monitoring environmental changes associated with combustion. It detects a gas leak, the red LED will light up, the buzzer will activate, then the system will send a notification message stating that there has been an LPG gas leak. If no LPG gas leak is detected, the system will continue to detect the gas level through the LPG gas sensor until it detects an LPG gas leak. The tool is designed to detect gas leaks that are then legible on the LCD screen and alarm, and in certain circumstances, the buzzer will sound. This MQ-6 sensor test is performed by measuring the sensor output with the Atmega8 microcontroller when the LPG gas is detected and then writes it on the LCD screen.

- A harmful gas is detected and the amount exceeds the scale's maximum level, this will trigger the alarm. For larger buildings, such as apartment blocks or factories, gas detectors can be linked together to create a safety system that is activated when one alarm goes off.

- The sensing of toxic gases such as H2S, Methane, and CO is of great importance in any industry to avoid unwanted leakage and consequences like poisoning or explosions. The presence of these gases can be easily detected in the industrial facilities and commercial buildings with the help of IoT-powered gas monitoring solution. Moreover, a gas detector or sensor device is a crucial part to carry out safe industrial operations

PROBLEM -1:

I am	I'm trying to	But	Because	Which makes me feel
Industrial Enginner	Connect the gas pipe without leakage	It may Corroded the Pipe	It is acidic in nature	to make it Safety for workers and Environment

PROBLEM -2:

I am	I'm trying to	But	Because	Which makes me feel
Workers	Work without fear	It is dangerous gas	It is poison when it is mixture of air	Fear

PROBLEM -3:

I am	I'm trying to	But	Because	Which makes me feel
Public	Live peacefully in the surrounding of the industry	it is very difficult for us rely on industrial precaustion	We need something that monitors workers enviroment and ensure their safety as well	frightend

PROBLEM -4:

| I am	I'm trying to	But	Because	Which makes me feel
worker's family	ensure my family members safety	it is a very dangerous place	i want to track my family members' surrounding	Worried

- Gas is a molecule that is not bound, formless, invisible and can turn into search or solid at certain temperature pressures. LPG gas is one of the needs for industry and household needs, namely for cooking. LPG gas in Indonesia is the cause of many fires, a factor that often causes LPG gas fires is a damaged gas regulator.

3. IDEATION AND PROPOSED SOLUTION

Empathy Map Canvas

An empathy map is a simple, easy-to-digest visual that captures knowledge about a user's behavior and attitudes. It is a useful tool to helps teams better understand their users. Creating an effective solution requires understanding the true problem and the person who is experiencing it. The exercise of creating the map helps participants consider things from the user's perspective along with his or her goals and challenges.
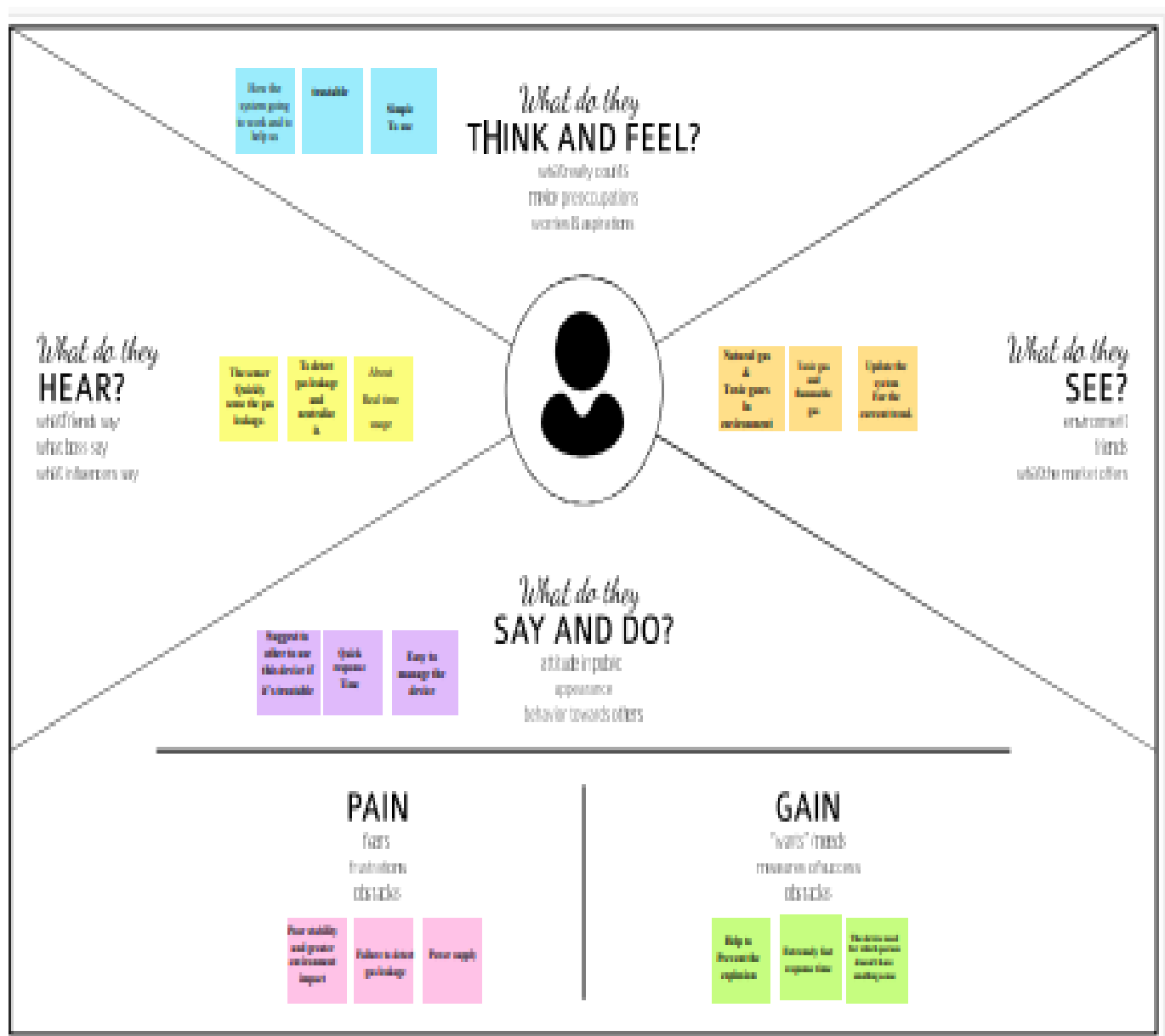
Ideation And Brainstorming

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.

Step-1: Team Gathering, 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

Share template feedback

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

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

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

Learn how to use the facilitation tools
Use the Facilitation Superpowers to run a happy and productive session.

Open article →

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

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

Key rules of brainstorming
To run an smooth and productive session

- Stay in topic.
- Defer judgement.
- Go for volume.
- Encourage wild ideas.
- Listen to others.
- If possible, be visual.

Need some inspiration?
Get a finished version of this template to kickstart your work.

Open example →

Step-2: Brainstorm, Idea Listing and Grouping

2

Brainstorm

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

⏱ 10 minutes

Robin Raja

| Using GSM for send alert system |

| Sending alert message to mai |

Rohithparthiban

| Alert gas leakage to the fre station |

| Automation of gas leakage deduction |

Jaya Chandran

| Introducing wireless gas detection system |

| Monitoring gas levels |

Vasanth

| Live alearting system |

| Monitoring the gas level in the monitor |

3

Group ideas

Take turns sharing your ideas while clustering similar or related notes as you go. Once all
sticky notes have been grouped, give each cluster a sentence-like label. If a cluster is
bigger than six sticky notes, try and see if you and break it up into smaller sub-groups.

⏱ 20 minutes

| Monitoring based on internet |

| keeping an eye on the monitor's gas level |

| It automatically switch on the exhaust fan. |

| Cloud based gas leakage monitoring |

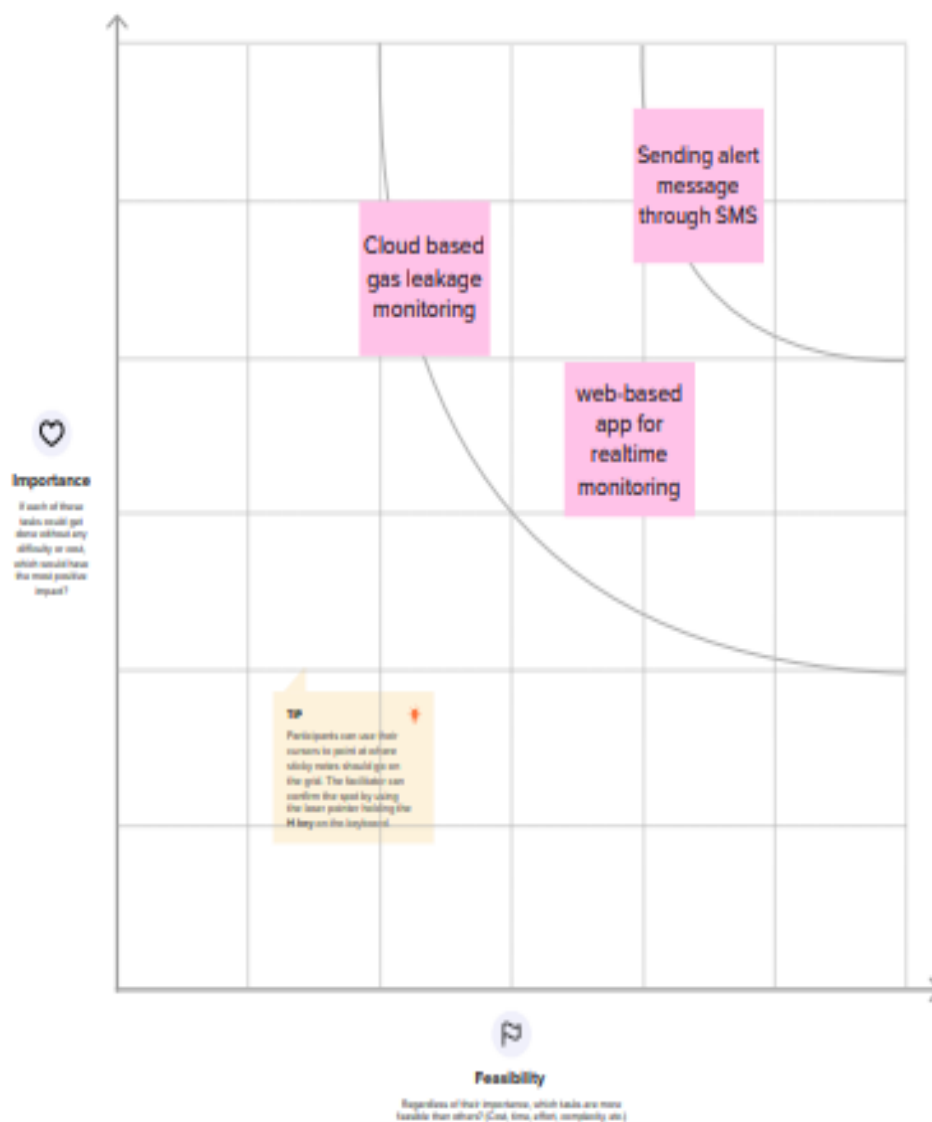| Mobile app for real-time monitoring |

| use of several sensors |

Step-3: Idea Prioritization

4

Prioritize

Your team should all be on the same page about what's important moving forward. Place your ideas on this grid to determine which ideas are important and which are feasible.

🕐 20 minutes

Importance

If each of these tasks could get done without any difficulty or cost, which would have the most positive impact?

Sending alert message through SMS

Cloud based gas leakage monitoring

web-based app for realtime monitoring

TIP

Participants can use their cursors to point at where sticky notes should go on the grid. The facilitator can confirm the spot by using the laser pointer holding the H key on the keyboard.

Feasibility

Regardless of their importance, which tasks are more feasible than others? (Cost, time, effort, complexity, etc.)

➡

After you collaborate

You can export the mural as an image or pdf to share with members of your company who might find it helpful.

Proposed Solution

S. No	Parameter	Description
1.	Problem Statement (Problemto resolved)	To ensure the safety of workers in the industries,we develop an efficient system & an application to monitor the gas pipelines continuously and detect early if there is any gas leakage in the surroundings.Generally in gas industries there are some places that are too noisy. So ,in those areas workers can't hear the siren sound when the gas leakage alerting system alerts.
2.	Idea / Solution description	• If there is any gas leakage occurs inside the′ industry, the knob of the gas pipeline will automatically closed. • The gas leakage level will be indicated by the′ LED lights: • Red – Critical • Yellow – Warning • Green - Normal • If the gas leakage is in critical level, the′ surrounding people will be notified through a siren • To detect the different harmful gases like′ methane,hydrogen sulphide,LPG,carbon monoxide etc.,by using the required sensors. • 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.

3.	Novelty / Uniqueness	Our solution not only notify the industry person′ but also notify the fire fighters Low latency′ The use of stepper motor helps to close the′ knob immediately if gas leakage is sensed′ The position of the LED displays is placed on the′ conspicuous part It has the ability to detect various type of gases,′ not just of single type. Hence the system makes more efficient.
4.	Social Impact / Customer Satisfaction	Our solution will be very helpful for the workers and the society which is associated or located nearby the industries. Our solution will prevent great disasters like Bhopal Gas Tragedy so that so many lives can be saved. Through this project the workers mental pressure will be reduced so that they can concentrate on other works or by relaxing them.

5.	Business Model (Revenue Model)	The main target of our solution is Industries so we have planned to visit industries and explain them about the benefits of our products. They can't just installed and left they needed to′ get serviced.we can make profit by servicing ,upgrading, installing devices. No one wants to destroy their factory . so it's′ assured that our product will be sold and installed in every gas industries
6.	Scalability of the Solution	Alerting system over this methods offers quick response time and sends alert to people in short period of time.So that people can evaculate as fast as they can and also the workers in the industries can fix before the explosion as fast as they can.Even when the gas leakage is more, the product sense the accurate values and alerts the workers effectively

Problem Solution fit

A complex process with numerous sub- processes, solution architecture connects business issues with technological solutions. the objectives are to

- Find the best technological solution to address current company issues.

- Describe to the project & stakeholders the software's & structure, distinction, behavior, and other features.

- Define the solution's requirements and concern , development stages, and features.

- Specifications on how the solution is defined, maintained, and delivered should be provided.

PROBLEM-SOLUTION FIT

1. CUSTOMER SEGMENT(S)	6. CUSTOMER	5. AVAILABLE SOLUTIONS
For industry owner-Ensuring the safety of workers is the main thing Sometimes it is hard to identify from which area the leakage is occurring. For homemakers-They are not able to identify whether the gas leakage is occurring due to external source or something.	1.Proper maintenance should be taken atleast once in a month and this prevents the customers from taking actions in gas Leakage problem. 2.The services can be done only by technicians, so it is difficult to set up gas leakage system in home/industries.	Usage of sensors to sense gas leakage. GSM module helps us to get notification when there is gas leakage.

2. JOBS-TO-BE-DONE / PROBLEMS	9. PROBLEM ROOT CAUSE	7. BEHAVIOUR
Jobs-to-be-done: Automatic nob closing Switching off power supply Problems: If the cylinder is not maintained properly it cause problems. Preferring cylinders under room temperature not in a hot area or cold places.	1.Sometimes sensor does not work properly which can cause the major problem. 2.It is difficult to identify difference between LPG gas and other gasses	1.Identifies the issues with the help of sensor. 2 Regular monitoring is done 3. Automatic registration when the cylinder is about to empty.

3. TRIGGERS

Identification of gas leakage will be done immediately and necessary measurements are taken incase of emergency.

4. EMOTIONS: BEFORE / AFTER

1.Customers feels safe by having this product in their environment.
2.Before, people worry about explosions and accidents occurs due to gas leakage but after using this product they can have a stress best idea.

10. YOUR SOLUTION

1. Switching on/off of any electric device should be avoided.
2. Creating shortcuts in industries to evacuate everyone in case of gas Leakage.

8.CHANNELS of BEHAVIOUR

ONLINE:

Easy way to build relationship and interaction with people is done in a proper manner.

OFFLINE:

The customers prefer to visit professionals.
The products based on gas Leakage system is less.
Returning the product is easy.

4. REQUIREMENT ANALYSIS

Functional requirement

Following are the functional requirements of the proposed solution:

FR No.	Functional Requirement (Epic)	Sub Requirement (Story / Sub-Task)
FR-1	User Registration	Registration through Form Online Payment for the service
FR-2	User Access	Access the details using web browser Access the details using mobile application
FR-3	User alert	Gets alert as an SMS message Gets alert alarm in the working area.

Non-Functional requirements

Following are the non-functional requirements of the proposed solution:

| FR NO.	Non-Functional Requirement	Description
NFR-1	Usability	The device must be usable by the customer anywhere
NFR-2	Security	Data from the sensors are stored securely and away from other data
NFR-3	Reliability	Data can be retrieved anytime and no data is discarded without customer knowledge

NFR-4	Performance	No performance delay in case of large number of data or more parameters
NFR-5	Availability	The device doesn't fail even under harsh conditions.Device continues to send parameters,even after an alert situation.
NFR-6	Scalability	Device must be capable of measuring conditions even in a larger industry

5. PROJECT DESIGN

Data Flow Diagram

A Data Flow Diagram (DFD) is a traditional visual representation of the information flows within a system. A neat and clear DFD can depict the right amount of the system requirement graphically. It shows how data enters and leaves the system, what changes the information, and where data is stored

Fig: Data Flow Diagram
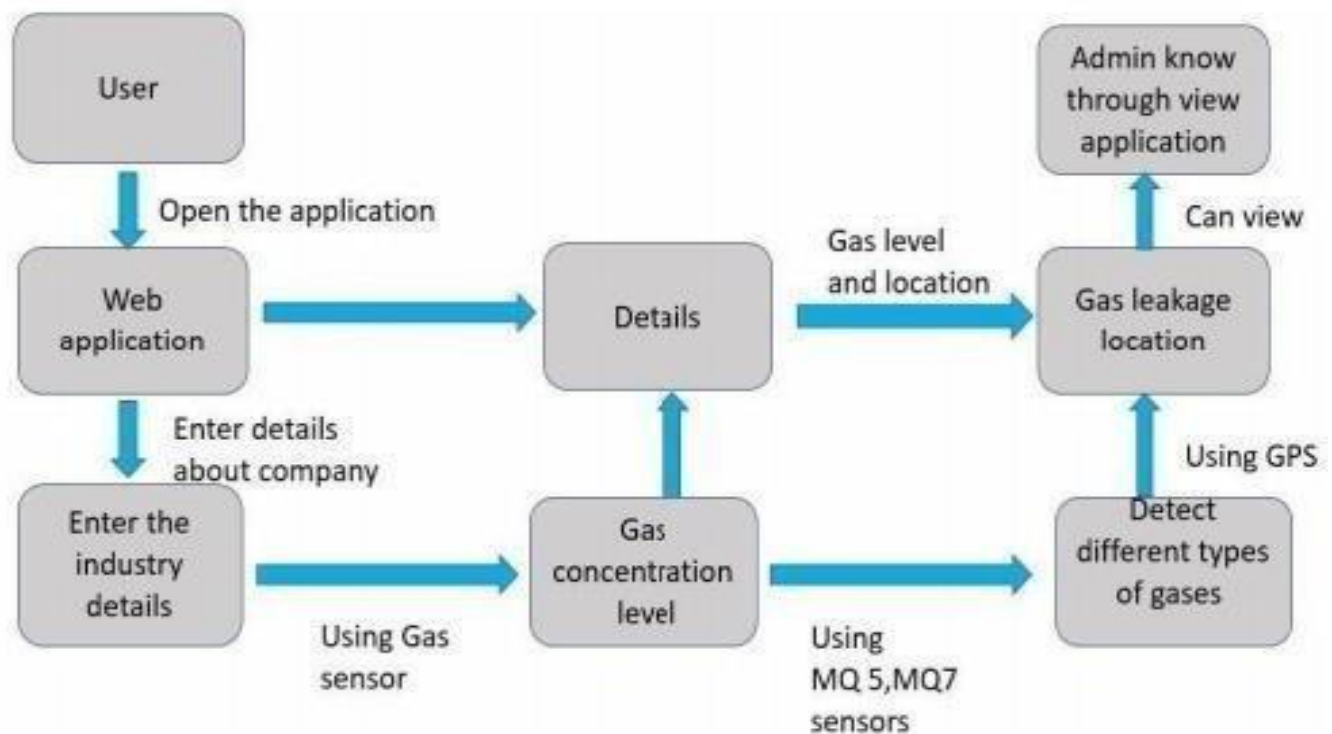
Solution & Technical Architecture

a) Solution Architecture Diagram

Solution architecture is a complex process – with many sub-processes – that bridges the gap between business problems and technology solutions. Its goals are to:

- Find the best tech solution to solve existing business problems.

- Describe the structure, characteristics, behavior, and other aspects of thesoftware to project stakeholders.

- Define features, development phases, and solution requirements.

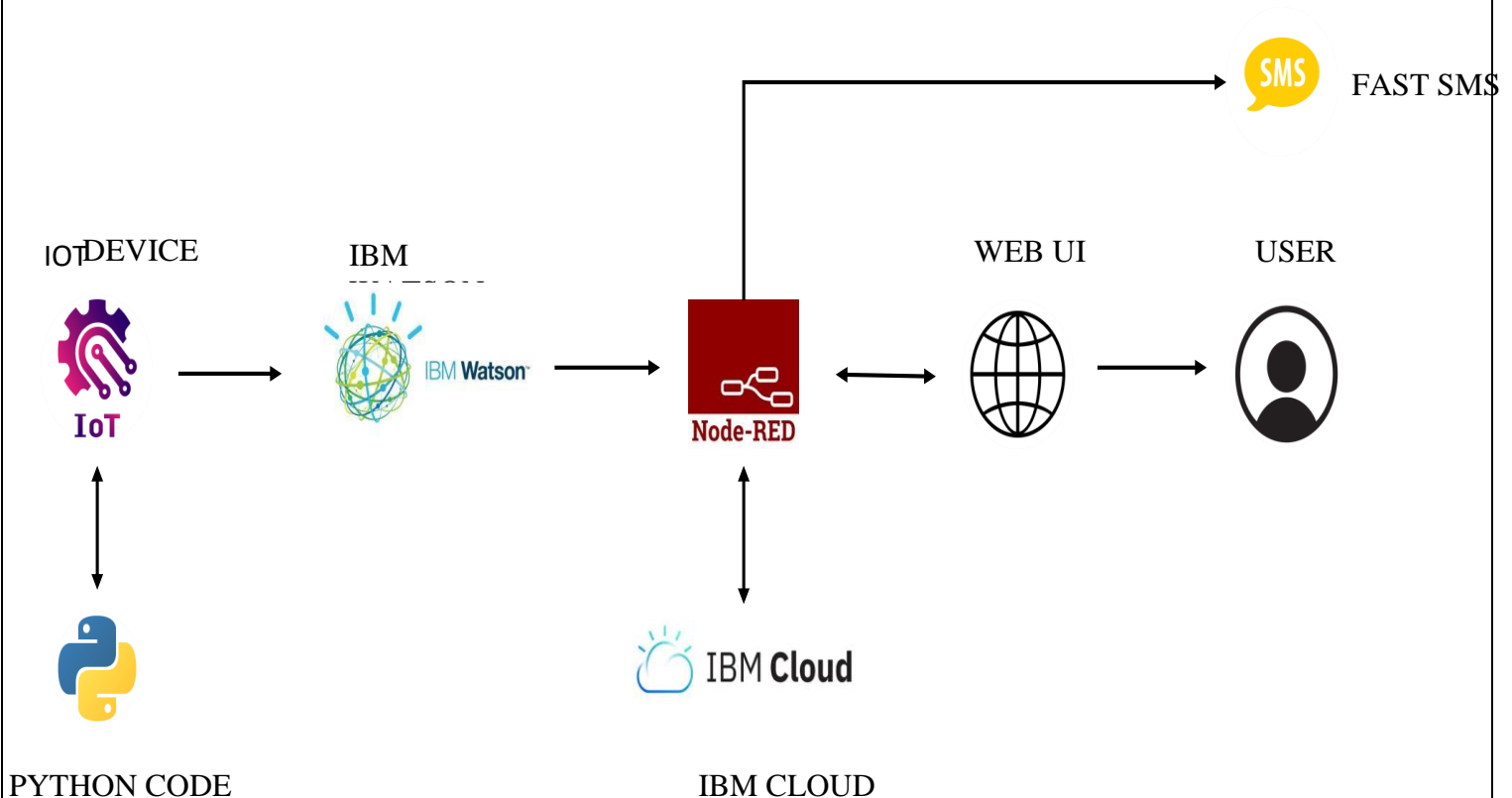- Provide specifications according to which the solution is defined, managed,and delivered.

Fig: Architecture and dataflow for better road safety
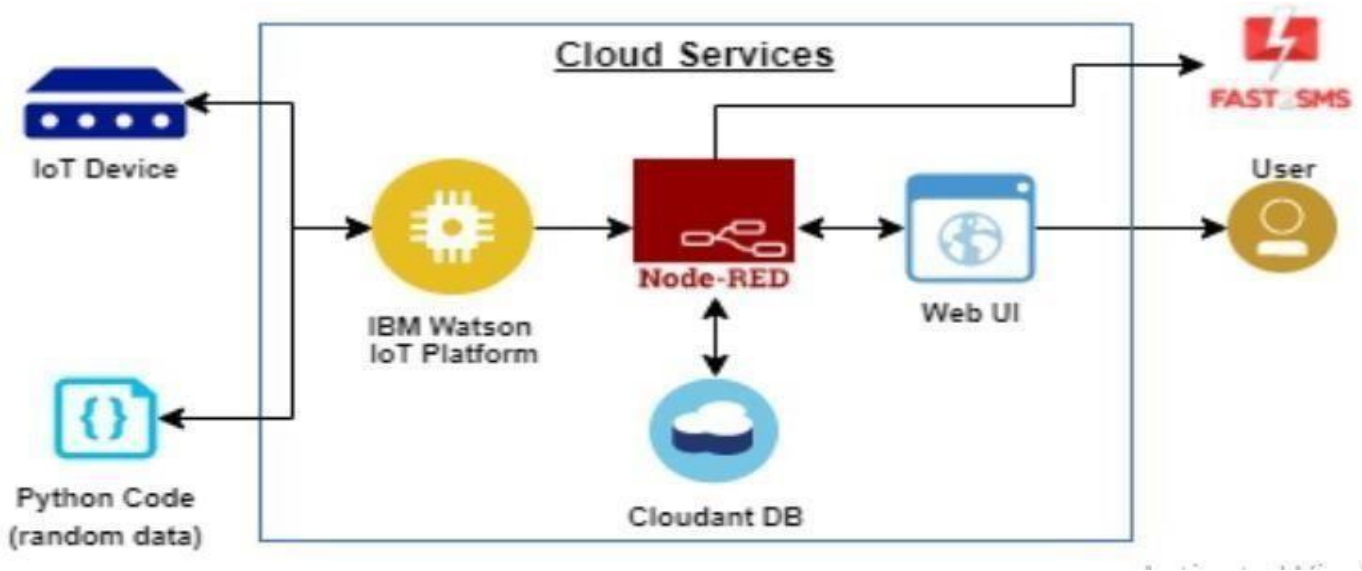
b) Technical Architecture

Fig: Technical Architecture

Table 1: Application Characteristics

S.No	Characteristics	Description	Technology
1.	Open-Source Frameworks	To develop the application interface, we use IOT Device	IOT Device
2.	Security Implemen tations	To secure the users login credentials and personal information	IBM Watson IOT platform
3.	Scalable Architecture	To scale the application database	IBM Auto scaling

4.	Availability	To make use the application and data are available 24/7	IBM Cloud load balancer
4.	Performance	To increase the performance the application in hosted in the highperformance instance	IBM instance

Table 2: Components and Technologies

S.No	Component	Description	Technology
1.	User Interface	Mobile App	**IOT Platform**
2.	Application Logic-1	Mobile App to identify the Gas leak	**Python**
3.	Application Logic-2	Gets the location of the leakage data from database	**IBM Watson IoT API Call data**
4.	Application Logic-3	Converts the Data into a text Notification and alert	**IBM Watson Assistant**
5.	Database	Incident location and kind of leakage	**MySQL**
6.	Cloud Database	Call the data IBM Cloud is used and user login credentials	**IBM DB2, IBM Cloudant**
7.	File Storage	App code and IoT credentials are stored and API keys	**IBM Block Storage**
8.	External API-1	To get the status of location of gas leak	**IBM box status API**
9.	External API-2	To get the login credentials in IBM DB2	**Username and Password API**
10.	Machine Learning Model	To convert the Gas leak location and to alert for averting Incident	**Notification alert**
11.	**Infrastructure (Server / Cloud)**	**To host the server and application**	**Cloud Foundry, Node Red**

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 / dashboard	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 & click confirm	High	Sprint-1
		USN-3	As a user, I can register for the application through OTP	I can register & access the dashboard with Facebook Login	Low	Sprint-2
		USN-4	As a user, I can register for the application through Gmail		Medium	Sprint-1
	Login	USN-5	As a user, I can log into the application by entering Login Id & password		High	Sprint-1
	Dashboard					

6. PROJECT PLANNING AND SCHEDULING

Sprint Planning And Estimation

SPRINT PLAN

1.Identify the Problem

2.Prepare a Abstract, Problem statement

3.List a required Object needed

4.Create a Code and Run it

5.Make a Prototype

6.Test with the created code and check the designed prototypes is!

7.Solution for the problem is found!!
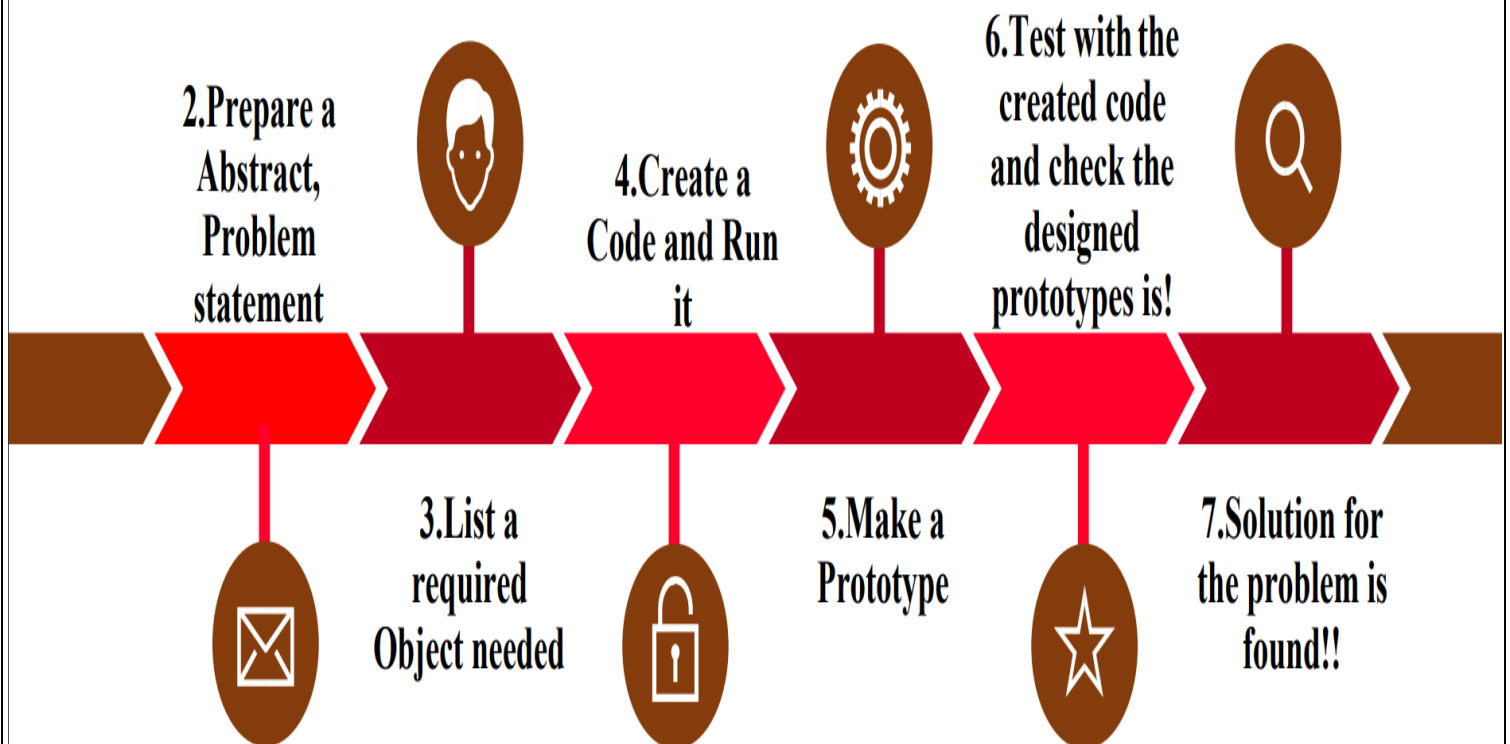
Sprint Delivery Schedule

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

7. CODING AND SOLUTION

```
#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);

}

}
```
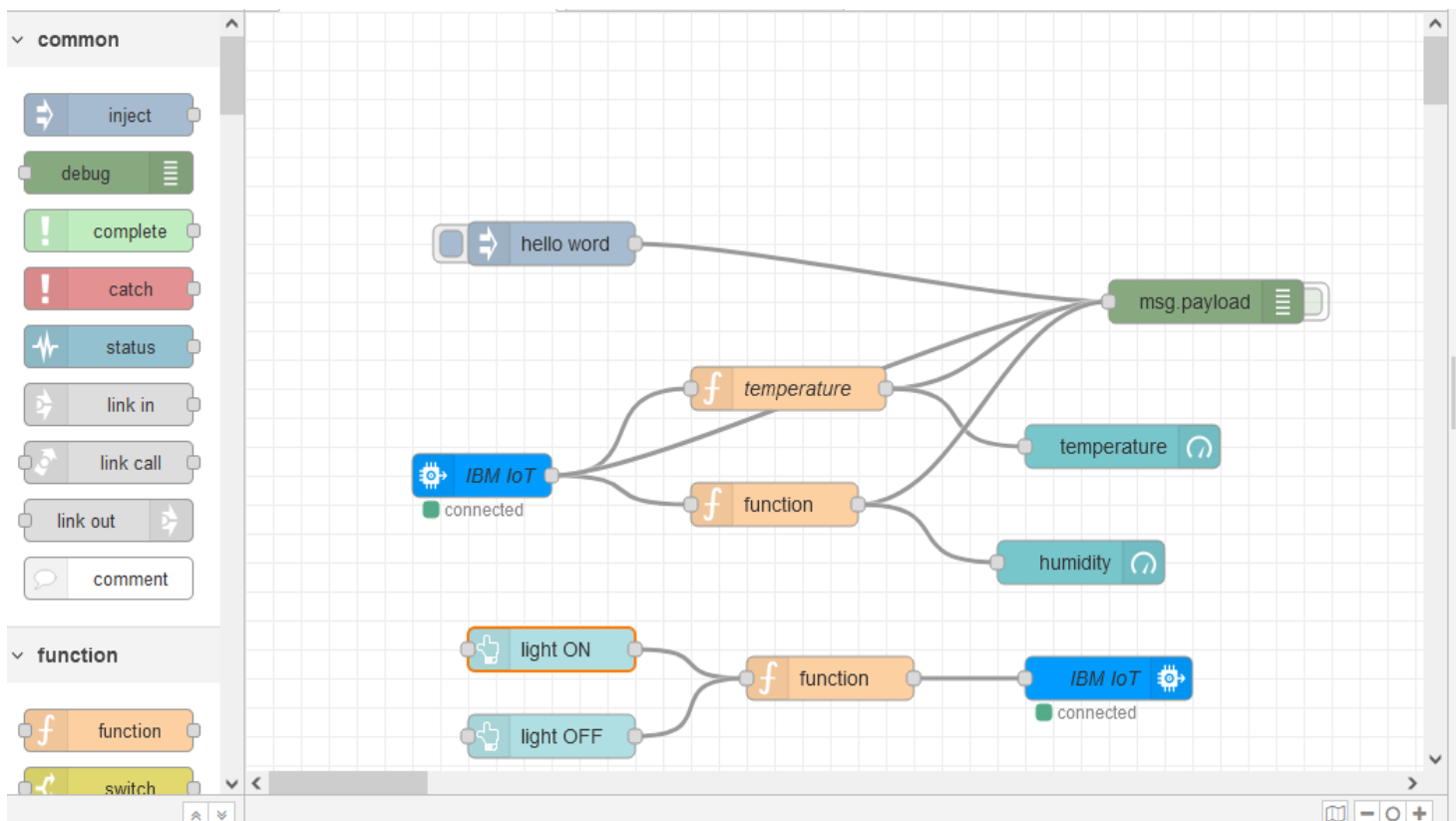
Feature 1

As stated earlier the sensing elements or the sensors are the most essential part of the whole system. Without the proper functioning of these sensing elements, the system as a whole has nothing to do with the environment. The proposed system uses a temperature sensor, humidity sensor, and gas sensor.

The temperature sensor senses the temperature level of the environment in which the system is set. This has some pre-set threshold values, above or below which it reports negative.

The humidity sensor is responsible for monitoring the humidity level of the surrounding. Again this works on the principle of threshold value maintenance.

The gas sensor, being the heart of the system, senses the presence of gas in the air around it. And if it senses the presence of any gas, it reports negative. And the system will take over further.

Feature 2

Another solid part of the prototype is its alerting system. While the sensing elements are responsible for sensing the hazardous situation, the alerting system is responsible for alerting the user with the light and buzzer. Also, the system notifies the user with a message if he/she is away.

8. TESTING

User Acceptance Testing:

User Acceptance Testing (UAT) is a type of testing performed by the end-user or the client to verify/accept the software system before moving the software application to the production environment. UAT is done in the final phase of testing after functional, integration, and system testing is done

9. RESULTS

Performance Metrics:

Performance metrics are defined as figures and data representative of an organization's actions, abilities, and overall quality. There are many different forms of performance metrics, including sales, profit, return on investment, customer happiness, customer reviews, personal reviews, overall quality, and reputation in a marketplace. Performance metrics can vary considerably when viewed through different industries.

10. ADVANTAGES AND DISADVANTAGES

o The advantages of the system are pretty much straightforward. The world now has a mechanism to detect gas leaks with great ease of accuracy. And in addition, the system manages to send messages to the users which makes the system more mobile.

o The major drawback of the system is that it highly relies on sensors and other electronic elements which are always prone to damage. So this in turn increases the sensitivity of the system as a whole. Secondly, the range of the sensor used plays a vital role in the efficiency and accuracy of the results. So that must be taken care of

11. CONCLUSION

An advantage of this simple gas leak detector is its simplicity and its ability to warn about the leakage of LPG gas. This system uses the GSM technique to send an alert message to a respective person if no one is there in the house and then gas leaks occur, the GSM module is there to send immediate messages to the respective person regarding the gas leak. The main advantage of this system is that it off the regulator knob of the cylinder automatically when gas leakage is detected. It can conclude that detection of the LPG gas leakage is incredible in the project system. Applicable usefully for industrial and domestic purposes.

12. FUTURE SCOPE

○ Leakage of any kind of gas has been a concern in recent years, whether it is in a residential setting, a business, a cafe, or a canteen. In this paper development of an
○ IoT-based gas wastage monitoring, leakage detecting, and alerting system is proposed. This paper elaborates design of such an intelligent system that will help save gas and smartly prevent accidents.

13. APPENDIX

Source Code

```
#IBM Watson IOT Platform
#pip install wiotp-sdk
import wiotp.sdk.device
import time
import random
myConfig = {
    "identity": {
        "orgId": " jwp4oi",
        "typeId": "ROHITH",
        "deviceId":"12345"
```

```python
    },
    "auth": {
      "token": "123456789"
    }
}

def myCommandCallback(cmd):
    print("Message received from IBM IoT Platform: %s" % cmd.data['command'])
    m=cmd.data['command']

client = wiotp.sdk.device.DeviceClient(config=myConfig, logHandlers=None)
client.connect()

while True:
    temp=random.randint(-20,125)
    hum=random.randint(0,100)
    myData={'temperature':temp, 'humidity':hum}
    client.publishEvent(eventId="status", msgFormat="json", data=myData, qos=0,
onPublish=None)
    print("Published data Successfully: %s", myData)
    client.commandCallback = myCommandCallback
    time.sleep(2)
client.disconnect()
```

GitHub And Project Demo Link

a) **GitHub**

   https://github.com/IBM-EPBL/IBM-Project-46868-1660794110

b) **Project Demo Link**

   https://drive.google.com/drive/folders/1JgNwAGfoKnPkxkoBJHPrk-_nbkfStEvY