



**IBM PROJECT**  
**GAS LEAKAGE MONITORING AND ALERTING**  
**SYSTEM FOR INDUSTRIES**

**Batch:** B4-4M6E

**Team ID:** PNT2022TMID24443

**Team Leader:** ESWARAVAKA SUMANTH

**Team Members:**

- ▶ PONUGOTI MOHAN KRISHNA
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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 integration of gas sensors helps in monitoring 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:**

Inhaling concentrated gas can lead to asphyxia and possible death. To overcome these disasters, we designed a system for monitoring and alerting the leakage of those harmful gases. This makes the industrialists get rid of the fear of any disasters caused by the gases.

## **2. LITERATURE SURVEY**

### **2.1 Existing Problem:**

This scheme is meant to fulfill the daily needs of the people. In our country 40 percent people die due to gas explosion at home. That number keeps growing. Even pregnant women and small children are affected. Using a GSM module and a mobile phone, the Gas Leakage Monitor is used to find, intimate leaks. The buzzer and LED are then activated after the gas leak is detected using a bracket sensor. When the designated time has passed, it will automatically turn off.

### **2.2 References:**

[1] Shital Imade, Priyanka Rajmane, Aishwarya Gavali, V. N. Nayakwadi "Review paper on- LPG Gas leakage detection using IOT": IJIRS –International Journal of Innovative Research & Studies, Volume 8, Issue 2, Feb 2018 IJIRS: ISSN NO: 2319-9725. [2] Gas Leakage Detection Based on Arduino And Alarm Sound, Rhonnel S. Paculan, Israel Carino, International Journal of Innovative Technology and Exploring Engineering (IJITEE) Vol 8, April 2019. [3] Dr. Chetana Tukkoji, Mr. Sanjeev Kumar, "Review paper on- LPG Gas leakage detection using IOT": IJEAST –International Journal of Engineering Applied Science & Technology, Volume 4, Issue 12, April 2020 IJEAST (online): 603-609. [4] Sanjoy Das, Sahana S, Soujanya K Swathi M C, "Gas leakage detection and prevention using IoT", International Journal of Scientific Research % Engineering Trends. Vol 6, Issue 3, May-June 2020, ISSN (online): 2395-566X. [5] Amatul Munnaza, Rupa Tejaswi, Tarun Kumar Reddy, Saranga Moahan "IoT Based Gas Leakage Monitoring System", Journal of Xi'an University of Architecture & Technology, Vol 12, ISSN No: 1006-7930, Issue 5, 2020. [6] B. F. Alshammari, M. T. Chughtai, "IoT Gas leakage detector and warning generator". Engineering and Technology and Applied Science Research Volume 10, Issue August 2020 .6142-6146. [7] Gas Leakage Detection and Prevention System, Shreyas

Thorat, Neha Tonape, International Journal of Trendy Research, Vol 4, Issue 7, Dec 2020, ISSN NO: 2582-0958. [8] Rohan KH1, Navanika Reddy, Pranamy Maddy, Sachit Girish, Dr. Badari Nath K “IOT based gas leakage detection and Alerting system”: JRP Publications, Vol. 1(1), pp. 002- 006, February 2021. [9] D. Surie, O. Laguionie, T. Pederson, “Wireless sensor networking of everyday objects in a smart home environment”, Proceedings of the International Conference on Intelligent Sensors”, Sensor Networks and Information Processing ISSNIP- 2008, pp. 189 – 194. REFERENCE: [10] J. Tsado, O. Imoru, S.O. Olayemi, “Design and construction of a GSM based gas leak Alert system”<sup>l</sup>, IEEE Transaction, IRJEEE Vol. 1(1), pp. 002-006, September, 2014. [11] M. Eisenhauer, P. Rosengren, P. Antolin, “A Development Platform for Integrating Wireless Devices and Sensors into Ambient Intelligence Systems”, pp.1- 3. [12] Harshada Navale, Prof. B.V.Pawar, “Arm Based Gas Monitoring System”. International Journal of Scientific & Technology Research Volu me 3, Issue 6, June 2014. [13] Byeongkwan Kang, Sunghoi Park, Tacklim Lee and Sehyun Park, "IoT based Monitoring System using Tri-level Context Making Model for SmartHome Services", 2015 IEEE International Conference on Consumer Electronics (ICCE), 2015. [14] Abhishek, P. Bharath, “Automation of lpg cylinder booking and leakage monitoring system,” International Journal of Combined Research and Development (IJCRD), pp. 693–695, 2016

### **2.3 Problem statement definition:**

This device does not get damaged very quickly, and if it does get damaged, water is the main reason for it. This device is easily damaged by water. Therefore, this device should be installed in a place where water does not go. This installation will not damage the device, if the device does, an example is water.

This tool is considered to be one and very safe for the users. My members are trusted. My members' invention is considered very safe for this country and its people and their families. Absence of this tool makes women in our country nervous by the spread of gas in their kitchen and is considered to be a sign of some accident. It is also proud to think of this project for people's lives only to eliminate this fear.

## **3. IDEATION & PROPOSED SOLUTION:**

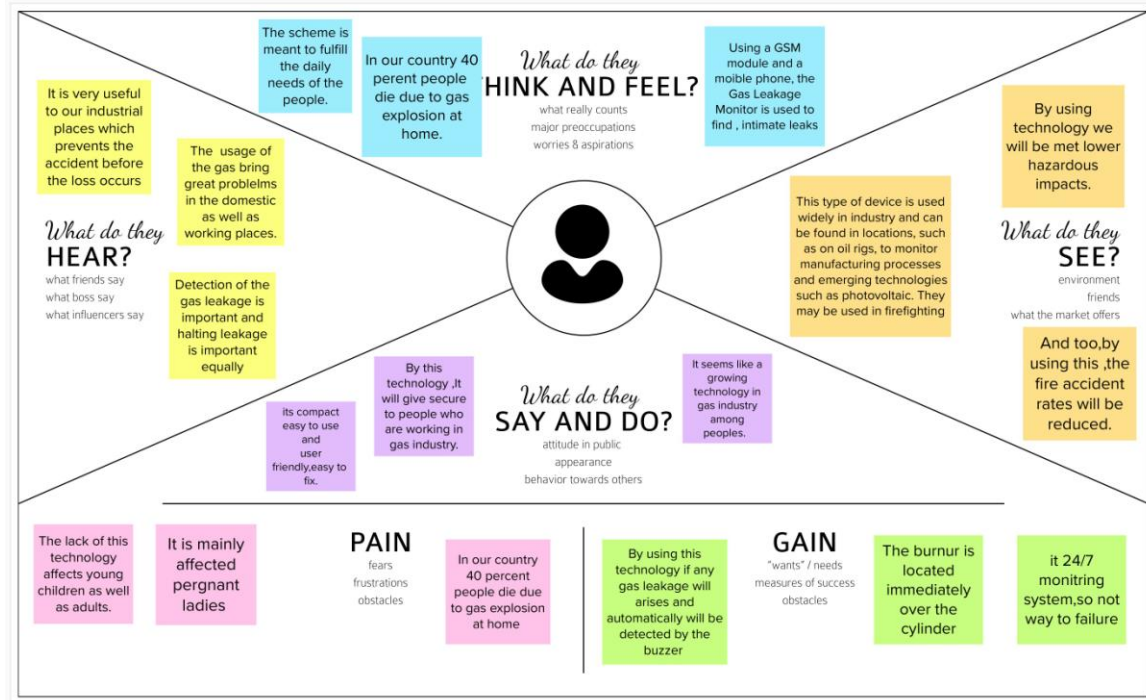
### **3.1 Empathy Map Canvas:**

# Empathy Map Canvas

Gain insight and understanding on solving customer problems.

1

Build empathy and keep your focus on the user by putting yourself in their shoes.



## 3.2 Ideation & Brainstorming:



## 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



#### A Team gathering

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



#### B Set the goal

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



#### C Learn how to use the facilitation tools

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

[Open article](#) →



### 1 Define your problem statement

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

🕒 5 minutes

#### PROBLEM

We are trying to prevent the gas leakage explosion in household things as well as industrial fields



#### Key rules of brainstorming

To run a smooth and productive session



Stay in topic.



Encourage wild ideas.



Defer judgment.



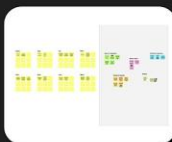
Listen to others.



Go for volume.



If possible, be visual.



#### Need some inspiration?

See a finished version of this template to kickstart your work.

[Open example](#) →

## Brainstorm & Idea prioritization

Use this template to your own brainstorming sessions as your team can capture their imagination and brainstorming concepts when it's all bubbling in the same room.

- Brainstorming
- Teamwork
- Brainstorming

### Before you collaborate

1. The first step is to prepare your ideas and thoughts. Make sure you have a clear idea of what you want to do.

2. Brainstorming

3. Teamwork

4. Brainstorming

### Define your problem statement

1. The first step is to define your problem statement. This is a clear statement of the problem you are trying to solve.

2. Brainstorming

3. Teamwork

4. Brainstorming

### Brainstorm

1. The first step is to brainstorm ideas. This is a process of generating a large number of ideas without criticism or judgment.

2. Brainstorming

3. Teamwork

4. Brainstorming

### Group ideas

1. The first step is to group ideas. This is a process of organizing ideas into categories or groups.

2. Brainstorming

3. Teamwork

4. Brainstorming

### Prioritize

1. The first step is to prioritize ideas. This is a process of ranking ideas based on their importance or feasibility.

2. Brainstorming

3. Teamwork

4. Brainstorming

### After you collaborate

1. The first step is to implement your ideas. This is a process of putting your ideas into action.

2. Brainstorming

3. Teamwork

4. Brainstorming

### Timeline

1. The first step is to create a timeline. This is a visual representation of the sequence of events or tasks over time.

2. Brainstorming

3. Teamwork

4. Brainstorming

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4. Brainstorming

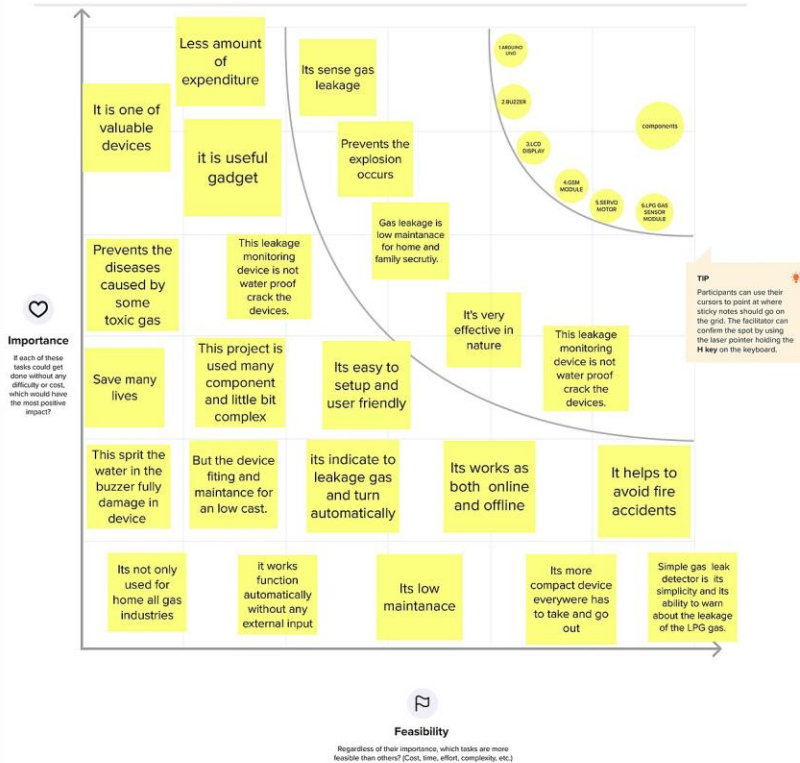


4

**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



5

**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.

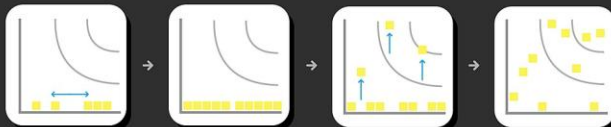
**Quick add-ons**

- A Share the mural**  
Share a view link to the mural with stakeholders to keep them in the loop about the outcomes of the session.
- B Export the mural**  
Export a copy of the mural as a PNG or PDF to attach to emails, include in slides, or save in your drive.

**Keep moving forward**

- Strategy blueprint**  
Define the components of a new idea or strategy.  
[Open the template →](#)
- Customer experience journey map**  
Understand customer needs, motivations, and obstacles for an experience.  
[Open the template →](#)
- Strengths, weaknesses, opportunities & threats**  
Identify strengths, weaknesses, opportunities, and threats (SWOT) to develop a plan.  
[Open the template →](#)

[Share template feedback](#)



### **3.3 Proposed Solution:**

<b>S.NO</b>	<b>Parameter</b>	<b>Description</b>
<b>1.</b>	Problem Statement (Problem to be solved)	This monitoring is used to prevent fire accidents due flammable gas leakage in house from cylinders, industries, hospitals, hotels etc.
<b>2.</b>	Idea / Solution description	This monitoring system uses cloud and iot based hard wares and sensors. The sensors in the system detects flammable gaseous components in the environment and temperature using iot system and send indication via alarms and lights.
<b>3.</b>	Novelty / Uniqueness	The uniqueness of this system is that it uses cloud due to this, the alarm can be to the person via sms to his mobile when he is not in home.
<b>4.</b>	Social Impact / Customer Satisfaction	It helps in many ways to the society it prevents fire accidents due careless handle of gas cylinders . this is a real-time systems so it is faster and accidents can be prevented very easily.
<b>5.</b>	Business Model (Revenue Model)	This is a cloud based real time system ,that collects the data from the environment very quickly i.e. temperature, humidity and oxygen composition. using

		sensors and indicate via alarms and lights.
6.	Scalability of the Solution	Accuracy. Low cost. Less maintenance. Reliability.

### **3.4 Problem Solution Fit:**

## **Project Design Phase-I - Solution Fit**

**Project Title:** Gas Leakage Monitoring and Alerting System

**Team ID:** PNT2022TMID24443

#### **TEAM MEMBERS :**

- 1) ESWARAVAKA SUMANTH (TEAM LEADER).
- 2) PONUGOTI MOHAN KRISHNA
- 3) POLAMREDDY DHANUSH
- 4) PALLAMALA CHANDRASEKHAR

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

## 4. REQUIREMENT ANALYSIS

### 4.1 Functional Requirement:

FR No.	Functional Requirement (EPIC)	Sub Requirement (Story / Sub-Task)
FR-1	Create cloud account	Registration through Form Registration through G mail Registration through Link

FR-2	User Confirmation	Confirmation via Email Confirmation via OT
FR-3	User Login	User Login Via Mail id And Password
FR-4	Cloud registration	Connect the hardware device
FR-5	Connect to mobile	Connect the cloud with the mobile phone
FR-6	Connect Hardware	Connect hardware to the gas cylinders or in the wall

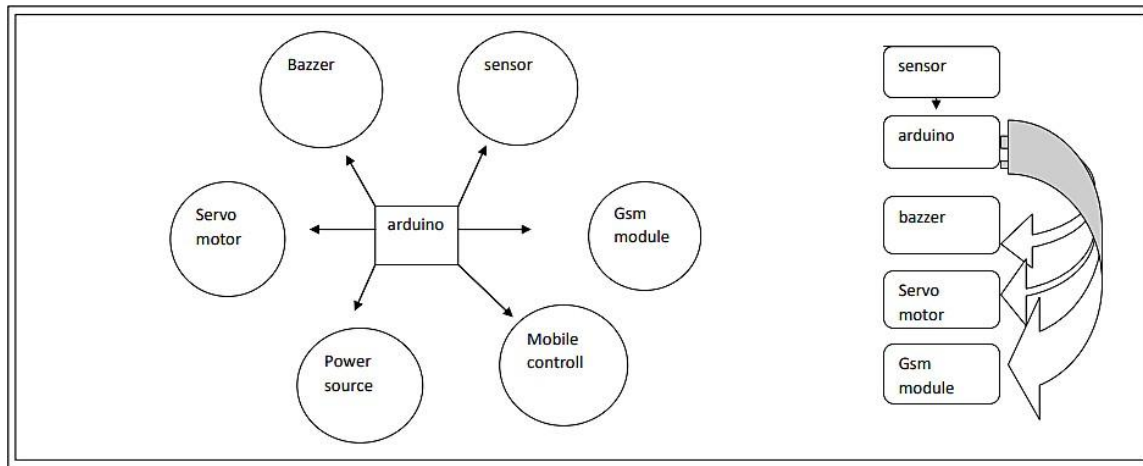
#### **4.2 Non-functional Requirements:**

<b>FR No.</b>	<b>Non-Functional Requirement</b>	<b>Description</b>
NFR-1	Usability	<ul style="list-style-type: none"> <li>● It is user friendly</li> <li>● Easy to handle</li> <li>● Process is simple</li> </ul>
NFR-2	Security	<ul style="list-style-type: none"> <li>● The device is highly secure.</li> <li>● Privacy is maintained</li> </ul>
NFR-3	Reliability	<ul style="list-style-type: none"> <li>● The device is more reliable</li> <li>● The device is more trustable in tough conditions</li> </ul>
NFR-4	Performance	<ul style="list-style-type: none"> <li>● The performance is more accurate.</li> <li>● It is a real time application</li> </ul>
NFR-5	Availability	<ul style="list-style-type: none"> <li>● It can be available easily.</li> <li>● It requires very few hardware components.</li> </ul>
NFR-6	Scalability	<ul style="list-style-type: none"> <li>● Less maintenance.</li> <li>● Low cost.</li> <li>● Compact.</li> </ul>

### **5. PROJECT DESIGN:**

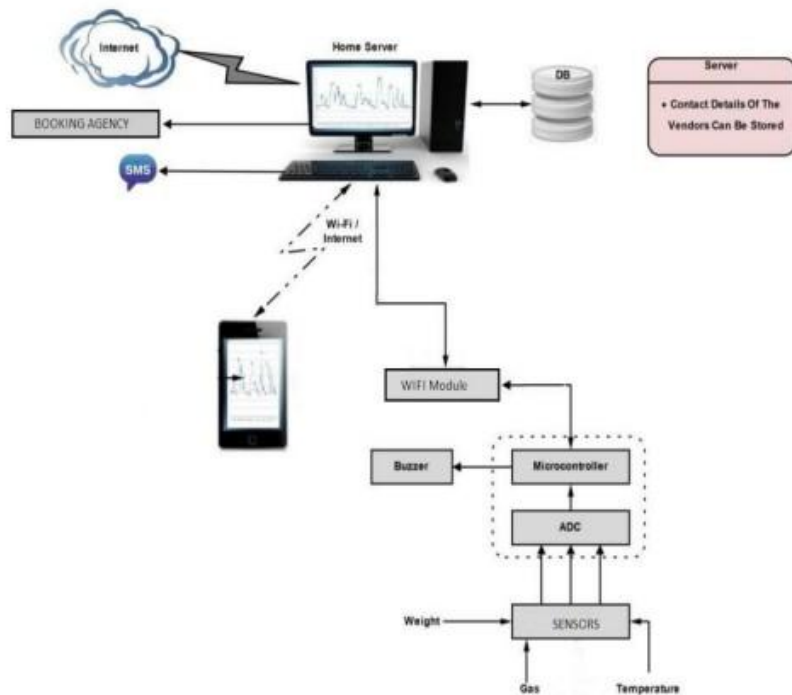
#### **5.1 Data Flow Diagrams:**

Data Flow Diagram:



## 5.2 Solution & Technical Architecture:

Solution Architecture Diagram:



## 5.3 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 Facebook	I can register & access the dashboard with Facebook Login	High	Sprint-2
		USN-4	As a user, I can register for the application through Gmail	I can access by message	Medium	Sprint-1
	Login	USN-5	As a user, I can log into the application by entering email & password	No need to login mail id	High	Sprint-1
Customer (Web user)	Dashboard					
Customer Care Executive	Registeraion	USN-1	User want to use sim card and gsm module	Message reciver for arduino connected sim	High	Sprint-1
		USN-1	Sensor and module	All component is connected to	High	Sprint-1



				arduino		
Administrator	DATA	USN-1	What is Main component in this project	Arduino	High	Sprint-2
power	Dc	USN-1	How much power is required	9v is enff	High	Sprint-1

## **6. PROJECT PLANNING AND SCHEDULING:**

### **6.1 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	Data Preparation & Data Visualization	USN-1	As a user, I provide Safety to the customers	5	High	SUMANTH.E
Sprint-1		USN-2	As an Analyst, I collect the data & Provide meaningful insights through IBM Cloud	3	High	P.CHANDRASEKHAR
Sprint-2	Dashboard	USN-3	As a user, I want to make sure the safe environment.	3	High	P.MOHAN KRISHNA
Sprint-2		USN-4	As an Analyst, I will upload the data in IBM Cloud to create a interactive dashboard	3	Medium	P.DHANUSH
Sprint-3	Report	USN-5	As a user, I want to secure the lives and data of each	3	Medium	E.SUMANTH

			employee that report a particular event			
Sprint-3		USN-6	As an Analyst, I will use IBM Cloud to generate a report	3	Medium	p.mohan krishna
Sprint-4	Story	USN-7	As a user, I can only understand the Analysis in animated presentation of dataset	5	Medium	p.chandrasekhar
Sprint-4		USN-8	As an Analyst, I use IBM to create an animated presentation (Story) of the dataset	3	High	p.dhanush

## **6.2 Sprint Delivery Schedule:**

Sprint	Total Story Points	Duration	Sprint Start Date	Sprint End Date (Planned)	Story Points Completed (as on Planned End Date)	Sprint ReleaseDate (Actual)
Sprint-1	5	6 Days	24 Oct 2022	24 Oct 2022	5	29 Oct 2022
Sprint-2	5	6 Days	31 Oct 2022	05 Nov 2022	5	05 Nov 2022
Sprint-3	5	6 Days	07 Nov 2022	12 Nov 2022	5	12 Nov 2022
Sprint-4	5	6 Days	14 Nov 2022	19 Nov 2022	5	15 Nov 2022

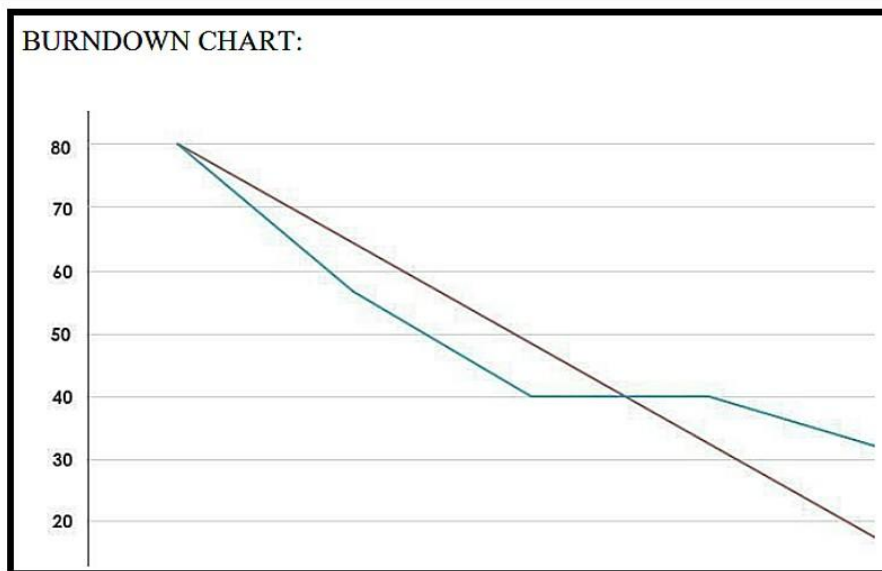
### **Velocity:**

We have an 6-day sprint duration, and the velocity of the team is 4 (points per sprint). To

I

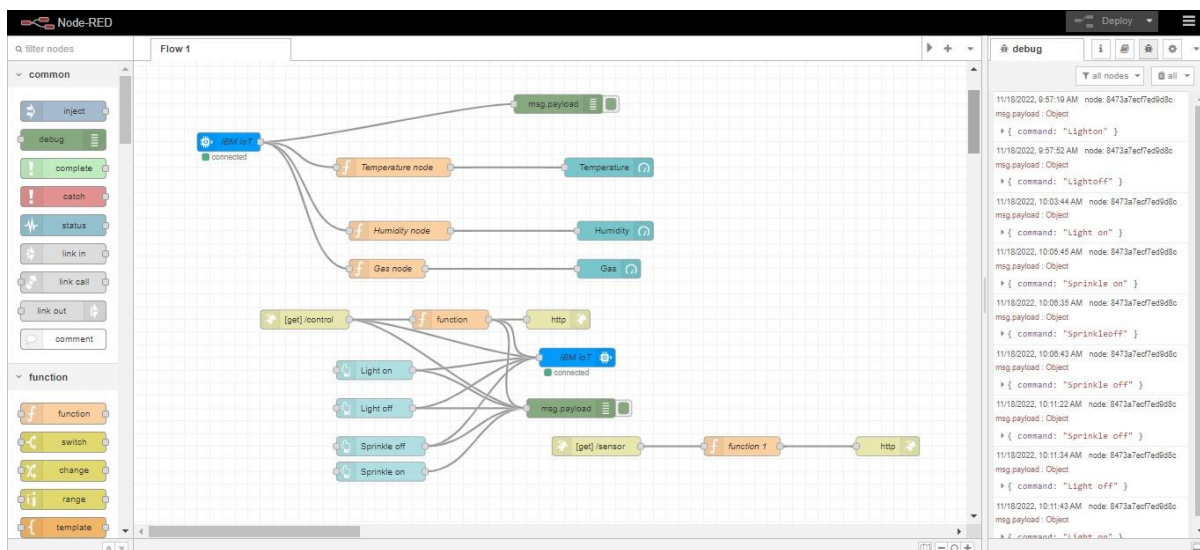
calculate the team's average velocity (AV) per iteration unit (story points per day)

$$AV = \frac{\text{SPRINT DURATION}}{\text{VELOCITY}} = \frac{6}{4} = 1.5$$



## 7. CODING AND SOLUTIONING:

### 7.1 Feature 1(Node Red Output)



## 7.2 Feature 2: (Python Output)

The screenshot shows a Windows desktop environment. On the left, a text editor window titled 'new python code.py' displays a Python script. The script includes a GPIO initialization, a command callback function, and a loop that generates random temperature, humidity, and gas data, publishing it to an IoT cloud. On the right, a 'Python 3.7.0 Shell' terminal window shows the execution output. It displays a successful connection to the IBM Watson IoT platform and a continuous stream of published sensor data (Temperature, Humidity, Gas) to the device 'Weather1234'.

```

new python code.py - C:\Users\AZIZ MRK\OneDrive\Desktop\new python code.py (3.7.0)
File Edit Format Run Options Window Help

authToken = "XeJFia7_0@t90@eq_?"

# Initialize GPIO
def myCommandCallback(cmd):
    print("Command received: %s" % cmd.data['command'])
    status=cmd.data['command']
    if status=="lignon":
        print ("led is on")
    elif status == "lightoff":
        print ("led is off")
    else :
        print ("please send proper command")

try:
    deviceOptions = {"org": organization, "type": deviceType, "id": deviceId, "auth":
deviceCli = ibmiotf.device.Client(deviceOptions)
#.....

except Exception as e:
    print("Caught exception connecting device: %s" % str(e))
    sys.exit()

# Connect and send a datapoint "hello" with value "world" into the cloud as an event of
deviceCli.connect()

while True:
    #Get Sensor Data from DHT11
    temp=random.randint(0,110)
    Humid=random.randint(0,100)
    gas=random.randint(0,100)

    data = { 'temp': temp, 'Humid': Humid, 'gas': gas }
    #print data
    def myOnPublishCallback():
        print ("Published Temperature = %s C" % temp, "Humidity = %s %" % Humid, "Gas = %s %" % gas)

    success = deviceCli.publishEvent("IoTSensor", "json", data, qos=0, on_publish=myOnPublishCallback)
    if not success:
        print("Not connected to IoT")
    time.sleep(10)

```

```

Python 3.7.0 Shell
File Edit Shell Debug Options Window Help

Type "copyright", "credits" or "license()" for more information.
>>>
===== RESTART: C:\Users\AZIZ MRK\OneDrive\Desktop\new python code.py =====
2022-11-19 00:02:56,974 ibmiotf.device.Client INFO Connected successfully
lly: d:Spy6q9:Weather_now:Weather1234
Published Temperature = 94 C Humidity = 77 % gas = 77 % to IBM Watson
Published Temperature = 91 C Humidity = 98 % gas = 75 % to IBM Watson
Published Temperature = 101 C Humidity = 69 % gas = 85 % to IBM Watson
Published Temperature = 102 C Humidity = 76 % gas = 92 % to IBM Watson
Published Temperature = 104 C Humidity = 63 % gas = 94 % to IBM Watson
Published Temperature = 97 C Humidity = 69 % gas = 71 % to IBM Watson
Published Temperature = 107 C Humidity = 78 % gas = 99 % to IBM Watson
Published Temperature = 91 C Humidity = 68 % gas = 83 % to IBM Watson
Published Temperature = 108 C Humidity = 64 % gas = 92 % to IBM Watson
Published Temperature = 107 C Humidity = 92 % gas = 95 % to IBM Watson
Published Temperature = 103 C Humidity = 94 % gas = 92 % to IBM Watson
Published Temperature = 92 C Humidity = 99 % gas = 83 % to IBM Watson
Published Temperature = 101 C Humidity = 90 % gas = 81 % to IBM Watson
Published Temperature = 101 C Humidity = 74 % gas = 85 % to IBM Watson
Published Temperature = 94 C Humidity = 92 % gas = 78 % to IBM Watson
Published Temperature = 98 C Humidity = 99 % gas = 95 % to IBM Watson
Published Temperature = 102 C Humidity = 98 % gas = 78 % to IBM Watson
Published Temperature = 108 C Humidity = 85 % gas = 72 % to IBM Watson
Published Temperature = 93 C Humidity = 90 % gas = 88 % to IBM Watson
Published Temperature = 97 C Humidity = 77 % gas = 92 % to IBM Watson
Published Temperature = 103 C Humidity = 88 % gas = 94 % to IBM Watson
Published Temperature = 93 C Humidity = 89 % gas = 87 % to IBM Watson
Published Temperature = 95 C Humidity = 81 % gas = 100 % to IBM Watson
Published Temperature = 93 C Humidity = 100 % gas = 82 % to IBM Watson
Published Temperature = 90 C Humidity = 64 % gas = 88 % to IBM Watson

===== RESTART: C:\Users\AZIZ MRK\OneDrive\Desktop\new python code.py =====
2022-11-19 00:07:04,988 ibmiotf.device.Client INFO Connected successfully
lly: d:Spy6q9:Weather_now:Weather1234
Published Temperature = 0 C Humidity = 28 % gas = 7 % to IBM Watson
Published Temperature = 39 C Humidity = 86 % gas = 55 % to IBM Watson
Published Temperature = 41 C Humidity = 47 % gas = 39 % to IBM Watson
Published Temperature = 34 C Humidity = 4 % gas = 98 % to IBM Watson
Published Temperature = 32 C Humidity = 15 % gas = 100 % to IBM Watson

```

## 8. TESTING:

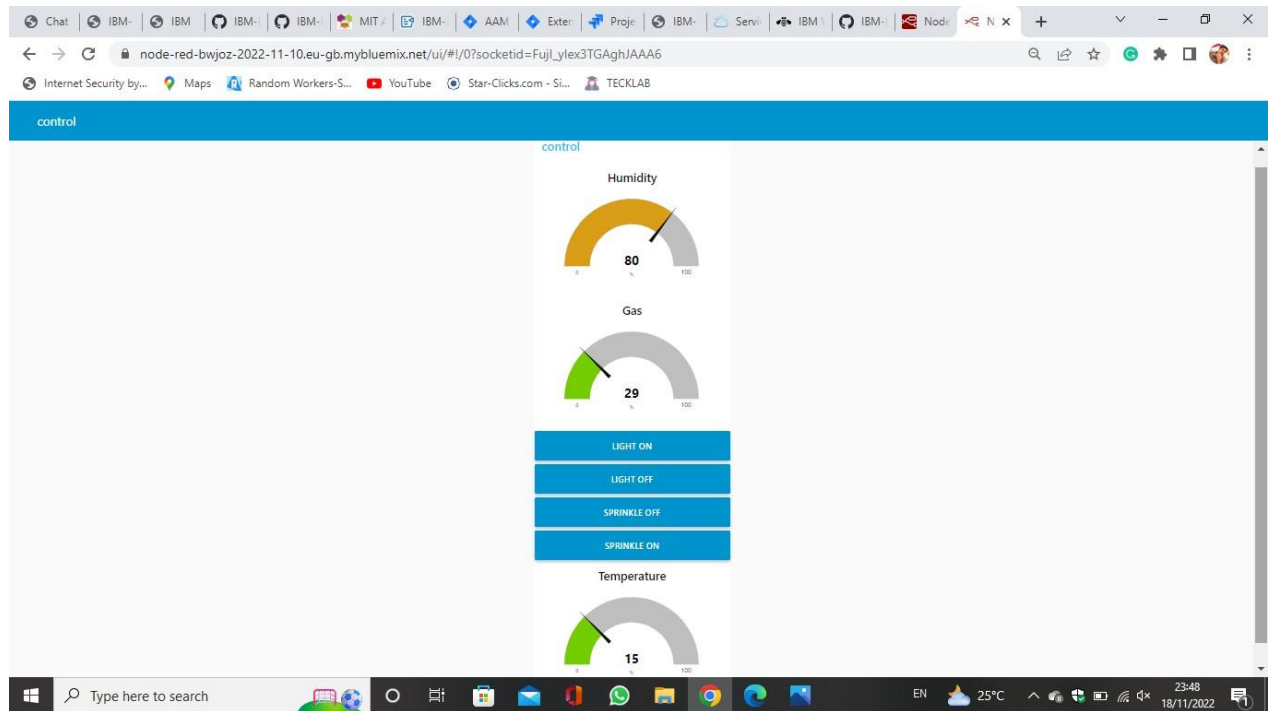
### 8.1 Test cases:

### 8.2 User Acceptance Testing:

## 9. RESULTS:

### 9.1 Performance Testing: \_

## 10. WEB APPLICATION DASHBOARD:



## **11. ADVANTAGES AND DISADVANTAGES**

### **Advantages:**

- Detect the concentration of the gases
- The sensor-enabled solution helps prevent the high risk of gas explosions and affecting any casualties within and outside the premises.
- Get real-time alerts about the gaseous presence in the atmosphere
- Prevent fire hazards and explosions
- Ensure worker's health
- Real-time updates about leakages
- Cost-effective installation
- Measure oxygen level accuracy
- Get immediate gas leak alerts

**Disadvantage:**

- Get immediate gas leak alerts
- When heavy dust, steam or fog blocks the laser beam, the system will not be able to take measurements

**12. MOBILE APPLICATION:**

A screenshot of a mobile application interface titled "Gas Leakage Detection and Aleting". The interface displays three monitoring metrics: "Monitoring Layout Temperature" with a value of 80, "Humidity" with a value of 19, and "Gas" with a value of 68. Each metric is shown with a label and a corresponding numerical value in a white box. Below the monitoring data, there are four colored buttons: a green button labeled "Light on", a red button labeled "Light off", a cyan button labeled "Sprinkle on", and a yellow button labeled "Sprinkle off". The top status bar shows the time as 10:09, data usage as 1.6KB/s, and battery level as 50%.

### **13. CONCLUSION:**

Gas leakage leads to severe accidents resulting in material losses and human injuries. Gas leakage occurs due to poor maintenance of equipment and inadequate awareness of the people. Hence, gas leakage detection is essential to prevent accidents and to save human lives. This paper presented LPG leakage detection and alert system. This system triggers buzzer and notification to alert people when gas leakage is detected. This system is basic yet reliable.

### **14. FUTURE SCOPE:**

Major cities of India are pushing Smart Home application, gas monitoring system is a part of SmartHome application. Enhancing Industrial Safety using IoT. This system can be implemented in Industries, Hotels and wherever the gas cylinders are used. This system can be used in industries involving applications such as Furnace, Boilers, Gas welding, Gas cutting, Steel Plants, Metallurgical industries, Food processing Industries, Glass Industries, Plastic industries, Pharmaceuticals, Aerosol manufacturing. As hospitals require to provide maximum possible safety to patients, this system can be used to keep track of all the cylinders used in it. Some of the cylinders used are Oxygen cylinder, Carbon dioxide cylinder, Nitrous oxide cylinder. As many students are naive the risk of causing accidents is high. Hence, our system can also be used in schools, colleges. Many colleges have well established labs including chemistry lab and pharmaceutical labs where gas burners are used. Several medical equipment requires gas cylinders.



**15. APPENDIX:**

**Source Code:**

- [Source code](#)

**GitHub and Project Demo Link:**

- [GitHub link](#)
- [Project Demo Link](#)