



KONGUNADU COLLEGE OF ENGINEERING AND TECHNOLOGY

GAS LEAKAGE MONITORING AND ALERTING SYSTEM

DOMAIN NAME: INTERNET OF THINGS

SUBMITTED BY,

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In partial fulfillment for the award of the degree

Of

BACHELOR OF ENGINEERRING

In

Electronics and communication Engineering

NOVEMBER 2022

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1 INTRODUCTION

Gas leakage causes a variety of accidents that result in both material loss and human injuries. IoT refers to a growing network of physical objects linked by various sensors and internet access. Despite their high level of precision, standard gas leak detection systems miss a few critical details when alerting the public to a leak. As a result, we developed a Gas Leakage Detector using IoT technology, which includes Smart Alerting approaches such as a buzzer and display to the appropriate authority, as well as the ability to predict hazardous situations. Liquid petroleum gas (LPG), which is widely used at home and in the workplace. We intend to develop an examination system that identifies IOT, which is an expanding network of physical devices that are linked. As a result, we used IoT technology to create a Gas Leakage Detector with Smart Alerting techniques such as a buzzer and display to the appropriate authority, as well as the ability to predict hazardous situations. Liquid petroleum gas (LPG), which is widely used in the home and at work. In this project, we decided to create an examining system that detects LPG gas leaks and protects the work noticed. Sensors in the project are used to detect gas leaks and immediately turn on the buzzer for the danger. The usage of the gas brings great problems in the domestic as well as working places. The inflammable gas such as Liquidized petroleum gas (LPG), which is excessively used in the house As a result, we used IoT technology to create a Gas Leakage Detector with Smart Alerting techniques such as a buzzer and display to the appropriate authority, as well as the ability to predict hazardous situations. Liquid petroleum gas (LPG), which is widely used in the home and at work. In this project, we decided to create an examining system that detects LPG gas leaks and protects the work noticed. Sensors in the project are used to detect gas leaks and immediately turn on the buzzer for the danger. The use of gas

causes significant problems in both the home and the workplace. The inflammable gas, such as liquid petroleum gas (LPG), which is widely used in the home and at work.

1.1 Project Overview

The process of detecting potentially hazardous gas leaks using sensors is known as gas leak detection. A sensor used to detect the gas leakage and it will display the amount of hazardous gas in the industries it will give alert message to the worker and test the pressure and humidity level of air.

1.2 Purpose

The main purpose of this project is to detect the gas leakage occurring in industries using sensor and alert them by mobile application.

1. LITERATURE SURVEY

Gas leakage detection and alert system using IOT, Uma Karanje & 2020

This advantage of this project is its simplicity and its ability to warn about the leakage of the LPG gas. This system uses GSM technique to send the alert message to respective person if no one is there in the house.

Detection of Gas Leakage and Automatic Alert System using Arduino, Juhi Chaudhary and Anurag Mishra & 2020

The primary objective of this basic gas leakage detector is its effortlessness and its capacity to caution its owner about the spillage of the LPG gas. The other preferred standpoint of this framework is its audio cautioning system.

Gas leakage detection and alerting system using Arduino Uno, Syeda Bushra Shahewaz and Chandra Rajendra Prasad & 2020

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.

Gas Leakage Detection Using GSM Module & Arduino with SMS Alert, Mr. Sivaprasad Lebaka & 2022

The leakage of the gas causes destructible impact to the lives and as well as to the heritage of the people. So, the system consists of Alarm unit which is Buzzer gives an audible sign of the presence of LPG volume.

2.1 Existing problem

The current issue is that it only detects gas leaks and issues an alarm, but in our project, we will add a messaging method to alert people when they are not inside the industries. If a gas leak occurs at night when no one is present, it is dangerous to the environment. To address this issue, we have proposed sending a message to any workers, managers, or owners of the industry.

2.2 References

- Shrivastava, A., Prabhaker, R., Kumar, R., & Verma, R. GSM based gas leakage detection system. International Journal of Emerging Trends in Electrical and Electronics (IJETEE- ISSN: 2320-9569), 2013; 3(2):42-45.

- Hema, L. K., Murugan, D., & Chitra, M. WSN based Smart system for detection of LPG and Combustible gases. In National Conf. on Architecture, Software systems and Green computing-2013.
- Ramya, V., & Palaniappan, B. Embedded system for Hazardous Gas detection and Alerting. International Journal of Distributed and Parallel Systems (IJDPS), 2012; 3(3):287-300. 4.Priya, P. D., & Rao, C. T. Hazardous Gas Pipeline Leakage Detection Based on Wireless Technology. International Journal of Professional Engineering Studies, India, 2014; 2(1).
- Jero, S. E., & Ganesh, A. B. 2011, March. PIC18LF4620 based customizable wireless sensor node to detect hazardous gas pipeline leakage. In 2011 International Conference on Emerging Trends in Electrical and Computer Technology (pp. 563-566). IEEE.
- Anusha, O., & Rajendra prasad, C. H. Experimental investigation on road safety system at crossings. International Journal of Engineering and Advanced Technology, 2019; 8(2):214–218.
- Ramu, M., & Prasad, C. R. Cost effective atomization of Indian agricultural system using 8051 microcontrollers. International journal of advanced research in computer and communication engineering, 2013; 2(7):2563-2566.

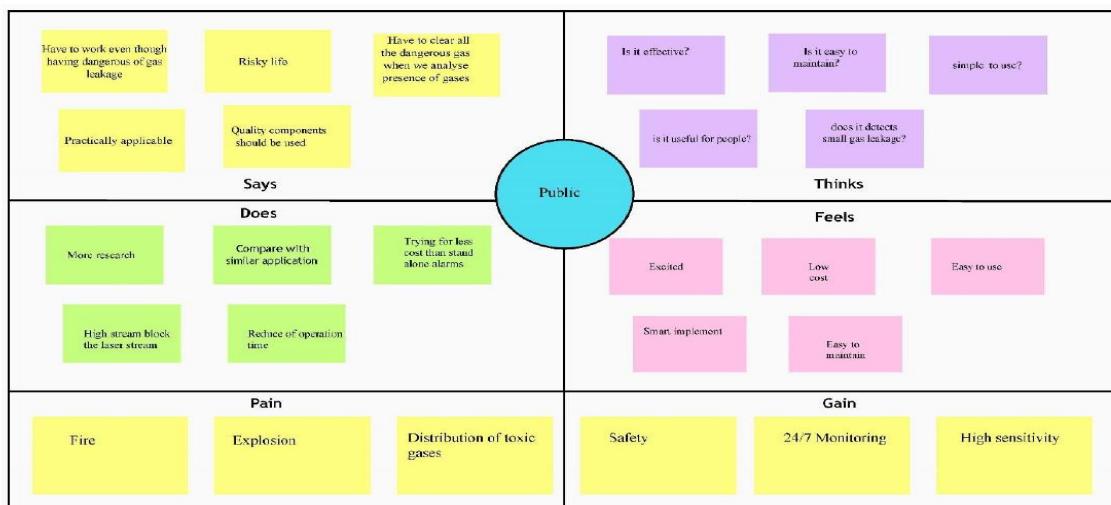
2.2 Problem Statement Definition

In most of the industries gas leakage will occur and cause severe damage to the people who work in the industries. They have certain flaws that cause the gas leakage. Gas leakage can only be detected if there is a human nearby, and if there is no human nearby, it cannot be detected. However, it is not always detectable by humans with poor senses of smell. As a result, this system will aid in detecting the presence of gas leakage. Furthermore, gas leaks can cause fires, which can result in serious injury or death, as well as the destruction of human property. This system was created by using IoT to provide real-time responses to the user.

3. IDEATION & PROPOSED SOLUTION

3.1 Empathy Map Canvas

EMPATHY MAP:



3.2 Ideation & Brainstorming

Brainstorm & idea prioritization

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

2 Brainstorm
Who does your idea affect or could potentially affect?

3 Prioritize
You have 60 seconds to list as many ideas as possible. In the next 10 minutes, you must prioritize a minimum of 5 ideas. You can also group them into categories by color. If you are working in groups, list one idea per person and then discuss and prioritize.

4 Prioritize
You have 60 seconds to list as many ideas as possible. In the next 10 minutes, you must prioritize a minimum of 5 ideas. You can also group them into categories by color. If you are working in groups, list one idea per person and then discuss and prioritize.

PROBLEM:
The Aim of the project is to avoid leakage of gas and alert the people.

TEAM LEADER: KIRUTHIKA B
TEAM MEMBER 1: MAHASHEE S

PROVIDE A SOLUTION GAS LEAKAGE	REDUCE MAN POWER	QUALITY IN MAINTENANCE	DAY TO DAY MAINTAIN
DAY TO PROTECT LATER ENVIRONMENT	AVOID GAS LEAKAGE	AVOID USING CHEMICALS IN AIR	LOW COST

TEAM MEMBER 2: MANISHA K
TEAM MEMBER 3: LATHA V

KEEP WORKERS ALWAYS ALERT	PROVIDE BRIEF DETAILS TO WORKERS	MORE HELPFUL FOR PEOPLE	TIME MANAGEMENT
AVOID DELAYS	CREATING AN AUTOMATION IN CHECKING	REDUCE COMPLAINTS	QUALITY ANALYST

JOB SEEKERS:

JOB RECRUITERS:

Personal Skills: TRANSFERABLE SKILLS WORK RELATED

10 minutes to prepare
10 minutes to prioritize
20 people recommended
10 minutes to prioritize

3.3 Proposed Solution

S. No.	Parameter	Description
1.	Problem Statement (Problem to be solved)	A gas detector can sound an alarm to operates in the area where the leakage is occurring, giving them the opportunity to leave.
2.	Idea / Solution description	It not only detects the toxic gases but also identify changes in the air quality.
3.	Novelty / Uniqueness	The uniqueness of the project is, it gives alarm when any leakage occur.
4.	Social Impact / Customer Satisfaction	It really helpful to prevent the risk of high explosions.
5.	Business Model (Revenue Model)	The cost of the product is low and the overall size is small.
6.	Scalability of the Solution	It will continuously detect if there is any gas leakage in home or industries. It really helps people in a effective manner.

3.3 Problem Solution fit

Define CS, fit into CC	<p>1. CUSTOMER SEGMENT(S) CS</p> <p>The purpose of this system is to detect gas leakage, neutralize it, and prevent the explosion. Gas leakage could happen due to improper regulator installation or the hose is broken. This detection should not work in just one location because gas can leak at the gas regulator and its hose.</p>	<p>6. CUSTOMER CONSTRAINTS CC</p> <p>If there is a problem in sensor it may causes severe damages to both the workers and company, sometimes signals may be interrupted.</p>	<p>5. AVAILABLE SOLUTIONS AS</p> <p>Gas leaks from equipment can become dangerous and costly. Conducting routine leak detection inspections to a facility can help prevent unexpected incidents, avoid uncalled expenses, reduce air pollution, and ensure workers are not overly exposed to toxic gases and emissions.</p>	Explore AS, differentiate
Focus on J&P, tap into BE, understand RC	<p>2. JOBS-TO-BE-DONE / PROBLEM J&P</p> <p>In the event of a gas leak or suspected leak. If leak is indoors, open all windows and doors, to disperse the gas. In the case of cylinders, disconnect the cylinder and move it outdoors to an open area. If the leak cannot be stopped or a significant leak has occurred, evacuate the premises.</p>	<p>9. PROBLEM ROOT CAUSE RC</p> <p>The reason for arrival of this project is to detect the gas leakage and alert the workers to avert the problems on gas leakage.</p>	<p>7. BEHAVIOUR BE</p> <p>Choosing the right instrumentation, installation scheme and service plan for monitoring hazardous toxic or flammable gases can go a long way to avert threats to people, property and your company's bottom line.</p>	Focus on J&P, tap into BE, understand RC
Identify strong TR & EM	<p>3. TRIGGERS TR</p> <p>By installing this project we can trigger companies by seeing their neighbour companies make the utilization of technology more useful and reading about a more efficient solution in the news.</p> <p>4.EMOTIONS: BEFORE / AFTER EM</p> <p>Workers felt happy and feel secure after if the device works.</p>	<p>10. YOUR SOLUTION SL</p> <p>We provide a good device to the workers and we work based on workers review.</p>	<p>8. CHANNELS OF BEHAVIOUR CH</p> <p>ONLINE: workers may provide review and rating for the system. OFFLINE: Workers may provide a valuable resource and contribution to the organisation</p>	Identify strong TR & EM

4 REQUIREMENT ANALYSIS

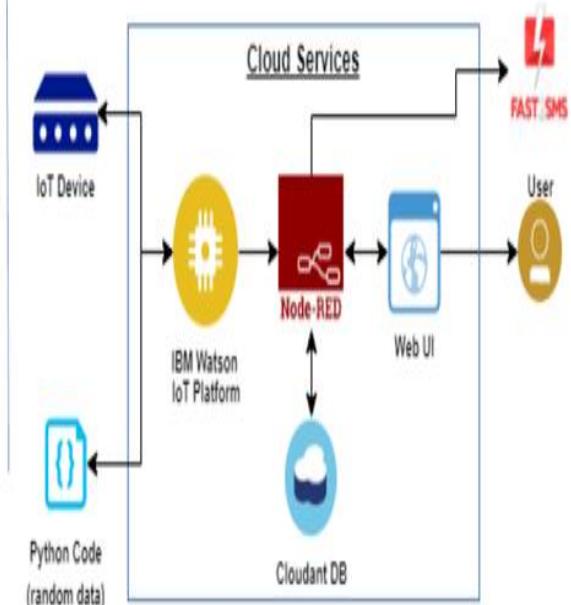
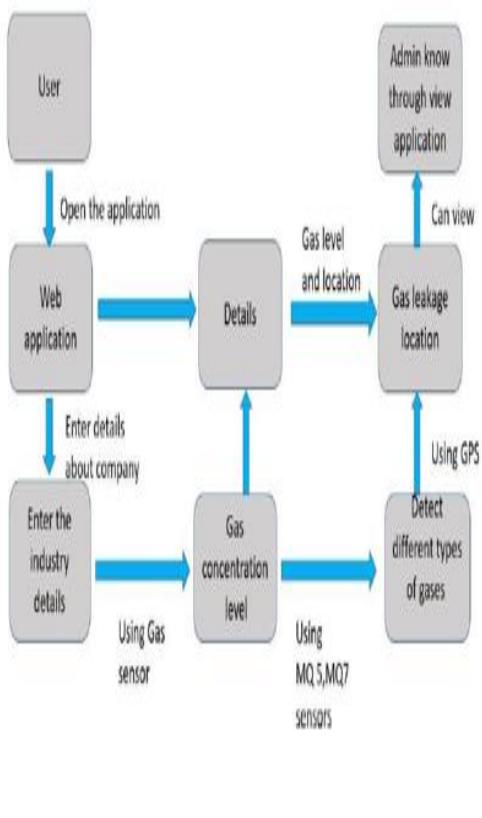
4.1 Functional requirement

Functional Requirements

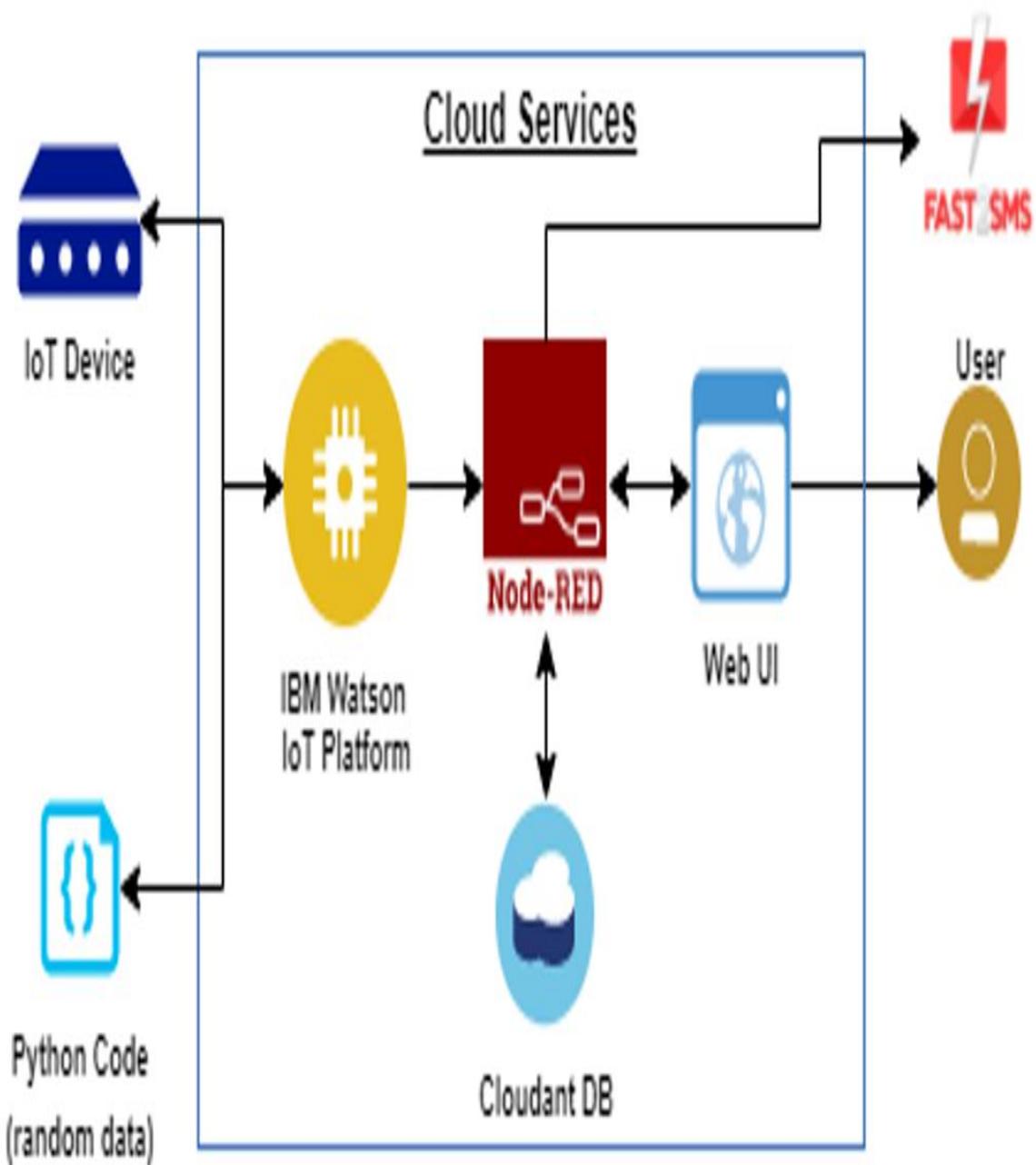
FR No.	Functional Requirement (Epic)	Sub Requirement (Story / Sub-Task)
FR-1	User Registration	Registration through Form Registration through Gmail Registration through LinkedIn
FR-2	User Confirmation	Confirmation via Email Confirmation via OTP
FR-3	User Access	Should be able to Access the current as well as the previous data.
FR-4	User Security	Application should be secured and also it should have two step verification.
FR-5	Performance	Application should be able to access huge amount of data and provide information in a span of time
FR-6	Display	The Application should display the information in same page and there should be a download option

5 PROJECT DESIGN

5.1 Data Flow Diagrams



5.2 Solution & Technical Architecture



6 PROJECT PLANNING & SCHEDULING

6.1 Sprint Planning & Estimation

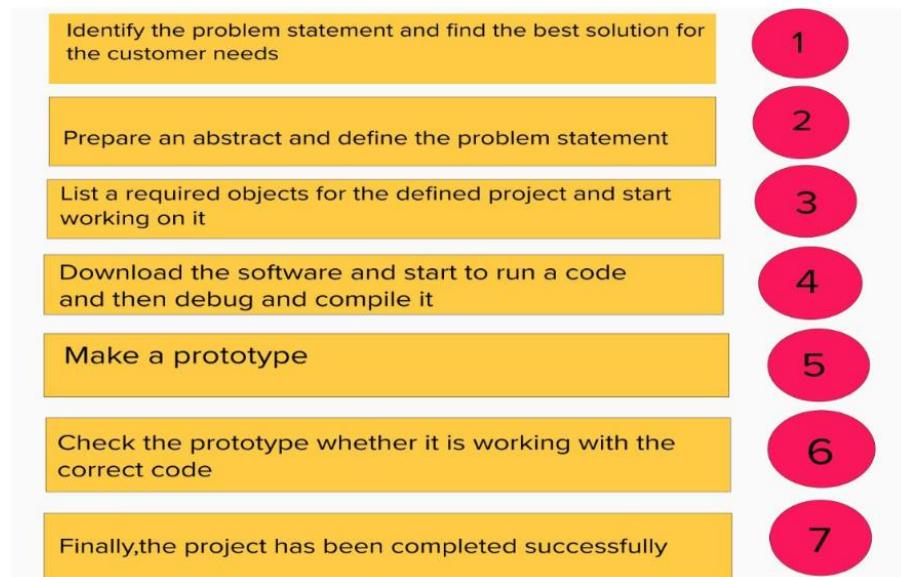
Product Backlog, Sprint Schedule, and Estimation (4 Marks)

Use the below template to create product backlog and sprint schedule

Sprint	Functional Requirement (Epic)	User Story Number	User Story / Task	Story Points	Priority	Team Members
Sprint-1	Objective	USN-1	As a system, the gas sensor should detect the gas	8	High	Mahashree, Keerthana
Sprint-1	Features	USN-2	As a system, the gas sensor values should be displayed in a LCD screen	2	Low	Mahashree, keerthana
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	Manisha,Keert hana
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	Latha,Mahashr ee
Sprint-2	Focus	USN-5	As a system, it should send the location where the gas is detected	8	High	Latha Manisha
Sprint-2	Focus	USN-6	As a system, it should also send the alerting SMS to the registered phone number	2	Low	Mahashree,Manis ha

Sprint	Functional Requirement (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	Latha,Mahas hree
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	Mahashree, keerthana
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	Manisha,Ke ethana
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	Manisha, Keerthana
Sprint-3	Data Transfer	USN-11	As a cloud system, the IBM cloud should send the data to NodeRed	2	Medium	Mahashree,k eerthana
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	Latha,Mahashr ee
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	Manisha,Keert hana
Sprint-4	Registration	USN-14	As a user, I must first register my email and mobile number in the website	2	High	Mahashree,ke ethana

6.2 Sprint Delivery Schedule



6.3 Reports from JIRA

The screenshot shows the Jira Software interface with the following details:

- Project:** Gas Leakage monitoring and alerting system
- View:** Roadmap
- Planning:** Roadmap (selected), Backlog, Board, Reports
- Development:** Code
- Epics:** GLMAS-1 Objective, GLMAS-2 Feature, GLMAS-3 Dashboard, GLMAS-4 Login, GLMAS-13 focus, GLMAS-14 Data Transfer, GLMAS-15 focus, GLMAS-17 Fea
- Sprints:** GLMAS Sprint 1, GLMAS...
- Timeline:** NOV, DEC, JAN '23
- Filter:** Status category, Epic
- Actions:** Share, Export, View settings
- Bottom Navigation:** Today, Weeks, Months (selected), Quarters, Quickstart, Show all

Screenshot of Jira Software Backlog page for the "Gas Leakage monitoring and alerting system" project.

Left Sidebar:

- Planning: Roadmap, Backlog (selected), Board, Reports
- Development: Code, Project pages, Add shortcut, Project settings
- You're in a team-managed project, Learn more

Top Bar:

- Jira Software, Your work, Projects, Filters, Dashboards, People, Apps, Create
- Search bar, Insights button

Content Area:

Backlog

Issues without epic

- Objective:** GLMAS-9 As a system the gas sensor should detect the gas (OBJECTIVE) - DONE
- Feature:** GLMAS-11 As a user i can access the dashboard and make use of available resources (DASHBOARD) - DONE
- Dashboard:** GLMAS-10 As a system the gas leakage should be displayed on the LCD screen (FEATURE) - DONE
- Login:** GLMAS-12 As a user i can login to the web application (LOGIN) - DONE

+ Create issue

Sprint 1: GLMAS Sprint 1 3 Nov ~ 19 Nov (4 issues)

Sprint 2: GLMAS Sprint 2 5 Nov ~ 8 Nov (2 issues)

Complete sprint, Quickstart buttons

Screenshot of Jira Software Burndown chart page for the "Gas Leakage monitoring and alerting system" project.

Left Sidebar:

- Reports: Back to project, Overview, Burnup report, Sprint burndown chart (selected), Cumulative flow diagram, Cycle time report, Deployment frequency report
- You're in a team-managed project, Learn more

Top Bar:

- Jira Software, Your work, Projects, Filters, Dashboards, People, Apps, Create
- Search bar, Insights button

Content Area:

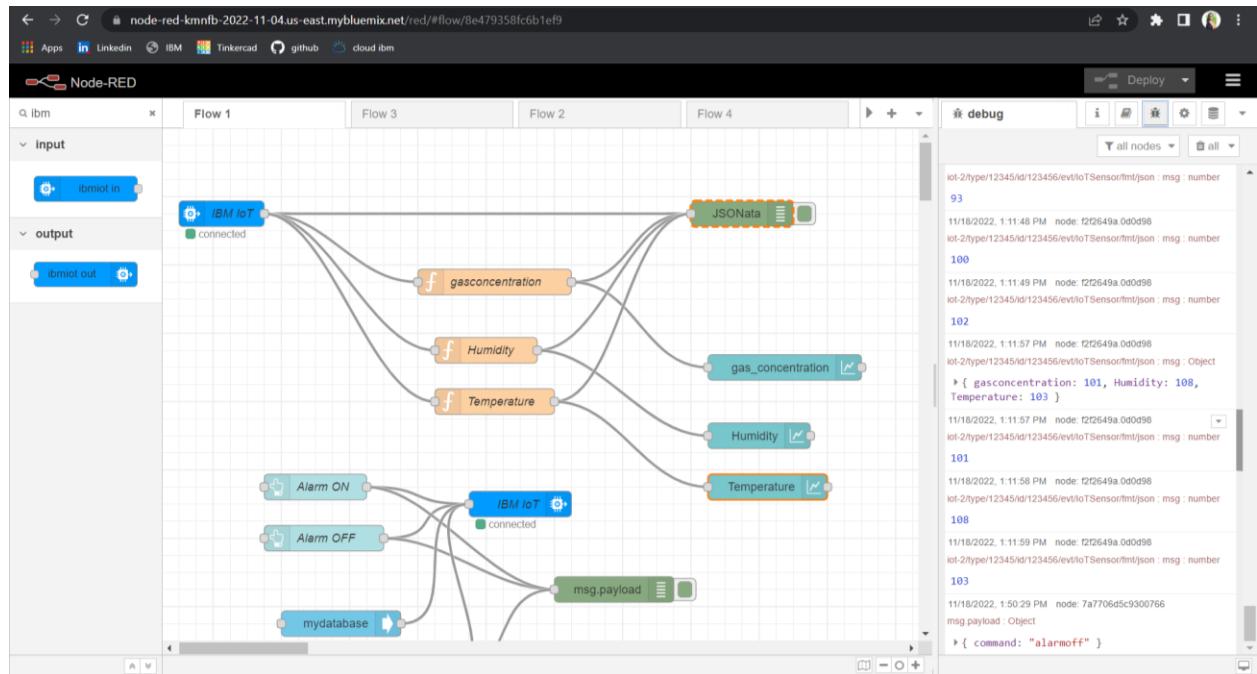
Remaining work: Number of story points left to complete this sprint

Guideline: Ideal burn rate

Report: GLMAS Sprint 1 *Issue added after sprint start

7. CODING & SOLUTIONING (Explain the features added in the project along with code)

7.1 Feature 1(Node-Red)



7.1 Feature 2(IBM Watson Iot platform)

```
import time  
import sys  
import ibmiotf.application  
import ibmiotf.device  
import random  
organization = "0vvv7i"  
deviceType = "12345"  
deviceId = "12"
```

```

authMethod ="token"
authToken = "12345678"

def myCommandCallback(cmd):
    print("Command received: %s" % cmd.data['command'])
    status=cmd.data['command']
    if status=="lighton":
        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-method": authMethod, "auth-token"
    :authToken}

    deviceCli = ibmiotf.device.Client(deviceOptions)
except Exception as e:
    print("Caught exception connecting device %s"str(e))
    sys.exit()

deviceCli.connect()

while True:
    temp=random.randint(90,110)
    Humid=random.randint(60,100)
    data = {'temp' : temp,'Humid' :Humid}

    def myOnPublishCallback():

        print("Published Temperature = %s C" % temp, "Humidity
        =%s %%" % Humid, "to IBM Watson")

```

```

success =deviceCli.publishEvent("IoTSensor", "json", data,
qos=0, on_publish=myOnPublishCallback)

if not success:

    print("Not connected to IoTF")

    time.sleep(10)

deviceClid.commandCallback=myCommandCallback

deviceCli.disconnect()

```

The screenshot shows two windows side-by-side. On the left is a code editor window titled 'gasleakage.py - C:/Users/User/Desktop/gasleakage.py (3.7.0)'. It contains Python code for a device client. On the right is a terminal window titled 'Python 3.7.0 Shell' showing the execution of the script.

```

gasleakage.py - C:/Users/User/Desktop/gasleakage.py (3.7.0)
File Edit Format Run Options Window Help
import time
import sys
import ibmiotf.application
import ibmiotf.device
import random
organization = "0vvv7i"
deviceType = "12345"
deviceId = "10"
authMethod = "token"
authToken = "12345678"
def myCommandCallback(cmd):
    print("Command received: %s" % cmd.data['command'])
    status=cmd.data['command']
    if status=="lighton":
        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-method": authMethod}
    deviceCli = ibmiotf.device.Client(deviceOptions)
except Exception as e:
    print("Caught exception connecting device %s" % str(e))
    sys.exit()
deviceCli.connect()
while True:
    temp=random.randint(90,110)
    Humid=random.randint(60,100)
    data = {"temp" : temp, "Humid" : Humid}
    def myOnPublishCallback():
        print("Published Temperature = %s C" % temp, "Humidity =%s %%" % Humid, "to IBM Watson")
    success = deviceCli.publishEvent("IoTSensor", "json", data, qos=0, on_publish=myOnPublishCallback)
    if not success:
        print("Not connected to IoTF")
        time.sleep(10)
deviceCli.commandCallback=myCommandCallback
deviceCli.disconnect()

```

The terminal window shows the script's output:

```

*Python 3.7.0 Shell*
File Edit Shell Debug Options Window Help
Python 3.7.0 (v3.7.0:1bf9cc5093, Jun 27 2018, 04:59:51) [MSC v.1914 64 bit (AMD64)] on win32
Type "copyright", "credits" or "license()" for more information.
>>>
=====
RESTART: C:/Users/User/Desktop/gasleakage.py =====
2022-11-18 12:00:05,573 ibmiotf.device.Client   INFO  Connected successfully: d:0vvv7i:12345:12
=====
RESTART: C:/Users/User/Desktop/gasleakage.py =====
2022-11-18 12:01:06,306 ibmiotf.device.Client   INFO  Connected successfully: d:0vvv7i:12345:12
Published Temperature = 96 C Humidity =84 % to IBM Watson
Published Temperature = 100 C Humidity =90 % to IBM Watson
|
```

The screenshot shows the IBM Watson IoT Platform interface. At the top, there is a navigation bar with links to Apps, LinkedIn, IBM, Tinkercad, GitHub, and cloud.ibm. On the right side of the header, the user's email (mahashree4189@gmail.com) and ID (0ww7i) are displayed, along with a help icon and a profile icon.

The main content area has a dark header bar with the text "IBM Watson IoT Platform" and a "Back" button. Below this, the title "Device Drilldown - 12" is centered. To the left of the main content, there is a vertical sidebar with icons and labels for various device management sections: Device Credentials, Connection Information, Recent Events, State, Device Information, Metadata, Diagnostics, Connection Logs, and Device Actions. The "Recent Events" section is currently selected.

The "Recent Events" section contains a heading "Recent Events" and a sub-instruction: "The recent events listed show the live stream of data that is coming and going from this device." Below this, a table lists four recent events:

	Event	Value	Format	Last Received
IoTSensor	{"temp":95,"Humid":81}		json	a few seconds ago
IoTSensor	{"temp":99,"Humid":72}		json	a few seconds ago
IoTSensor	{"temp":100,"Humid":90}		json	a few seconds ago
IoTSensor	{"temp":96,"Humid":84}		json	a few seconds ago

Below the event table, there is a "State" section with a sub-instruction: "This table shows a list of data points that are reported by this device." To the right of this instruction, a box displays the message "3 Simulations running".

8 TESTING

8.1 Test Cases

testing project [Protected View] - Excel

Mahashree S

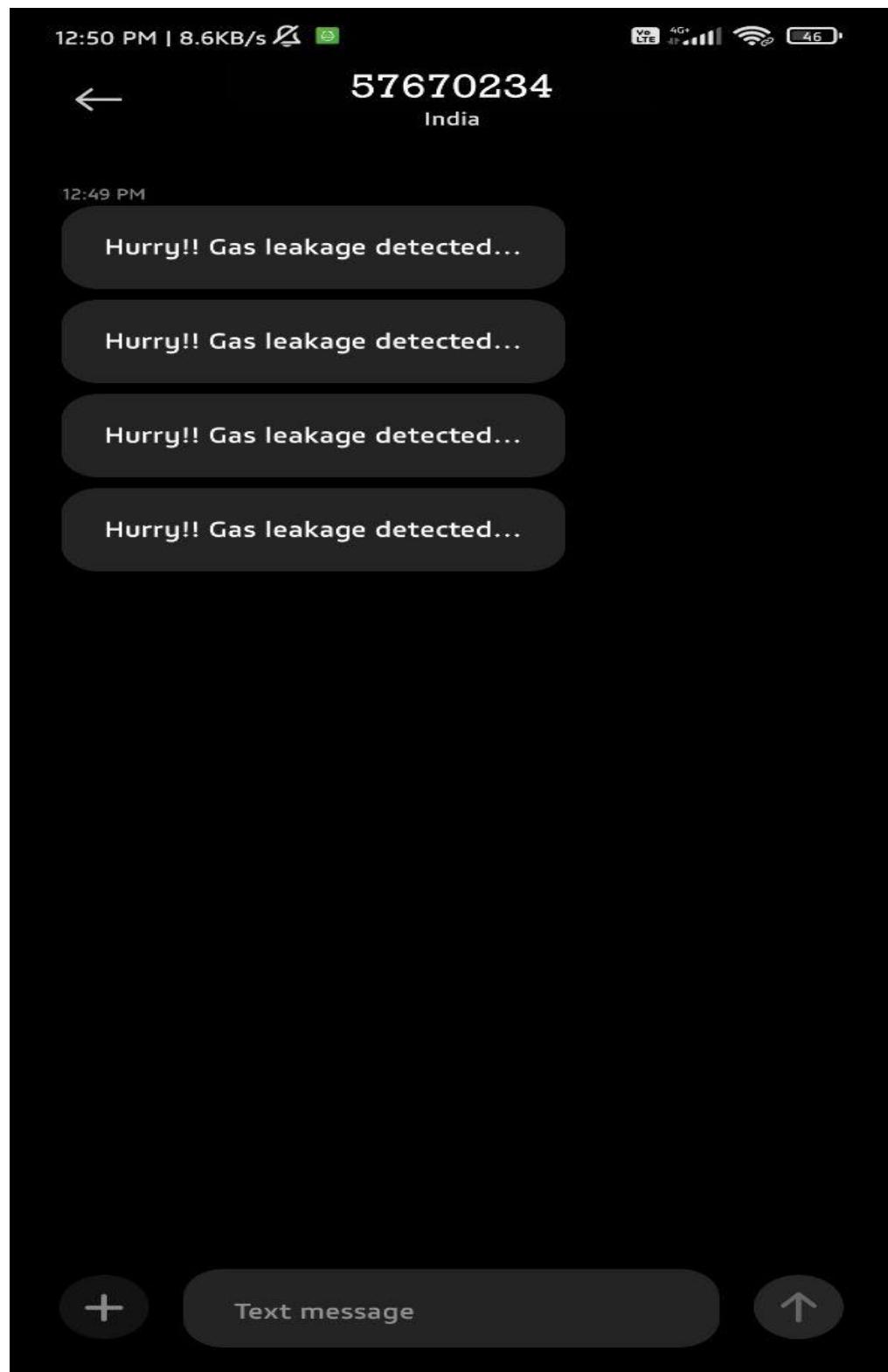
PROTECTED VIEW Be careful—files from the Internet can contain viruses. Unless you need to edit, it's safer to stay in Protected View.

Enable Editing

MAHASHREE S										K	L	M
	B	C	D	E	F	G	H	I	J	K	L	M
4	TESTCASE	TEST SCENARIO	TEST STEPS	INPUTS	EXPECTED OUTPUT	ACTUAL OUTPUT	TEST RESULT	TEST COMMENTS	BUG ID	TESTED BY		
5	IBM WATSON IOT PLATFORM	To check whether the ibm watson is get connected	login to ibm watson iot platform	id ,password	it should get login to the watson page	it has been logged in to the login page	PASS	GOOD		KEERTHANA B		
6		check whether it has the separate organization id		new id	it should shows the organization id	separate organization id has been shown	PASS	GOOD		MAHASHREE S		
7		check whether team mates are get connected		team mates id	it should shows the all the team members name ,id	it is showing all the team members	PASS	GOOD		MANISHA K		
8		check whether separate device name ,id ,authentication token generated		device name , type	new device should be created	new device has been created	PASS	GOOD		LATHA V		
9		to check whether it is showing output		device code and input	it should shows device gets connected and should show the output	its showing that device gets connected and output are satisfied	PASS	GOOD		MAHASHREE S		
10	PYTHON IDLE	to check the connection is established in Cloud	to check whether the Temperature and humidity are shown	gas leakage	it shoudl show the gas leakage	it show the ph value for the input	PASS	GOOD		KEERTHANA B		
11		to check whether gas leakage		Temperature & humidity	it should show temperature & humidity	it show the temperature & humidity value for input	PASS	GOOD		MANISHA K		
12	NODE-RED	to check whether node-red is connected and shows the output	login in to node-red	id , password	it should get login to the node-red page	its get entered into the login page	PASS	GOOD		MAHASHREE S		
13		check whether all the necessities are imported and connected		nodes	it should not show any error on nodes	it is not showing any errors	PASS	GOOD		KEERTHANA B		
14		check whether all the nodes ar connected		node connection	blocks should gets connected	blocks has been connected	PASS	GOOD		MAHASHREE S		
15		check whether the output are shown in node-red		output found or not	output should be obtained	output has been obtained	PASS	GOOD		LATHA V		
16	SMS APPLICATION	check whether the outputs are shown in	check whether the login is created	id,password	get the SMS application	installed the SMS application	PASS	GOOD		MANISHA K		
17		connect the app to web page		Project created	the new project is created	the new project is created	PASS	GOOD		KEERTHANA B		
18		it alert the user		create app	it should created	it is created successfully	PASS	GOOD		MAHASHREE S		
19		check whether the output to the user		collaborate SMS app with we	it should collaborate	it is created successfully	PASS	GOOD		LATHA V		
20		check whether the gas leakage		send user	it should get input from cloud	it has been connected and provide output	PASS	GOOD		MAHASHREE S		
21	TESTING	check entire process	check watson is connected	watson	iot watson should produce its output	iot watson has producing its output	PASS	GOOD		MAHASHREE S		
22		check node-red is connected		node red	node-red should produce its output	node red has been producing its output	PASS	GOOD		KEERTHANA B		
23		check whether python is connected		python IDLE	python should gets connected	python has been connected	PASS	GOOD		MANISHA K		
24		check whether details are shown		SMS application	details in SMS application should be shown	details in SMS application should be shown	PASS	GOOD		MAHASHREE S		
25												
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Ready

8.2 User Acceptance Testing



9 RESULTS

9.1 Performance Metrics



10 ADVANTAGES & DISADVANTAGES

The benefits of this project include cheap maintenance, low running costs, and dependable technology.

The major downside is that cross interference from other gases can impair a gas sensor's function, and changing the calibration curve can result in erroneous or incorrect results. Component failure: Your gas detectors, like anything else, are subject to wear and strain.

11 CONCLUSION

Finally, we concluded that our project detects gas leaks in industries and sends alarm messages using a web application. It detects changes in temperature, pressure, and humidity in the air, and if any of these changes occur, it displays the gas level and sends an alarm message. This is beneficial to the employees and helps to prevent accidents.

12 FUTURE SCOPE

In this study, we employ IOT technologies to improve on current safety requirements. The goal in creating this prototype was to bring about a revolution in the field of safety against the leaking of dangerous and poisonous gases in the environment and thereby eliminate any big or small threat created by them. We employed IOT technology to create a Gas Leakage Detector for society, which includes Smart Alerting strategies such as sending text messages to the appropriate authorities and the capacity to do data analytics on the sensor.

APPENDIX

13.1 Source Code

```
import time  
import sys  
import ibmiotf.application  
import ibmiotf.device
```

```

import random
organization = "0vvv7i"
deviceType = "12345"
deviceId = "12"
authMethod ="token"
authToken = "12345678"
def myCommandCallback(cmd):
    print("Command received: %s" % cmd.data['command'])
    status=cmd.data['command']
    if status=="lighton":
        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-method":authMethod,"auth-token":authToken}
    deviceCli = ibmiotf.device.Client(deviceOptions)
except Exception as e:
    print("Caught exception connecting device %s" % str(e))
    sys.exit()
deviceCli.connect()
while True:
    temp=random.randint(90,110)
    Humid=random.randint(60,100)
    data = { 'temp' : temp,'Humid' :Humid}

```

```

def myOnPublishCallback():

    print("Published Temperature=%s C" % temp, "Humidity =%s
%%" % Humid, "to IBM Watson")

    success =deviceCli.publishEvent("IoTSensor", "json", data, qos=0,
on_publish=myOnPublishCallback)

    if not success:

        print("Not connected to IoTF")

        time.sleep(10)

deviceClid.commandCallback=myCommandCallback

deviceCli.disconnect()

```

GitHub:<https://github.com/IBM-EPBL/IBM-Project-1615-1658402713>

Project Demo Link: <https://youtu.be/dCpXCwc3s5E>