PROJECT REPORT

Date	**18 November 2022**
Team id	**PNT2022TMID49514**
Project name	**Project-Gas Leakage Monitoring and Alerting System**

1.INTRODUCTION:

The Internet of things (IoT) is the system of gadgets, vehicles, and home machines that contain hardware, programming, actuators, and network which enables these things to interface, collaborate and trade information. IoT includes broadening Internet network past standard device, for example, work areas, workstations, cell phones and tablets, to any scope of generally stupid or non-web empowered physical device and ordinary articles. Installed with innovation, these gadgets can convey and connect over the Internet, and they can be remotely observed and controlled [1]. The meaning of the Internet of things has advanced because of union of numerous innovations, ongoing examination, AI, ware sensors, and implanted frameworks. Conventional fields of installed frameworks, remote sensor systems, control frameworks computerization (counting home and building mechanization), and others all add to empowering the Internet of things. A gas spill alludes to a hole of petroleum gas or different vaporous item from a pipeline or other regulation into any territory where the gas ought not be available. Since a little hole may steadily develop a hazardous convergence of gas, spills are perilous. Notwithstanding causing flame and blast dangers, holes can slaughter vegetation, including huge trees, and may discharge amazing ozone harming substances to the environment

2.LITERATURE SURVEY:

Abstract— Home security has been a major issue where crime is increasing and everybody wants to take proper measures to prevent intrusion. In addition there was a need to automate home so that user can take advantage of the technological The project is aimed at developing the security of Home against Intruders, Gas Leak and Fire. In any of the above three cases any one met while you are out of your home than the device sends SMS to the emergency no provided to it. The report consists of a background into the area of 8051 microcontroller and mobile

communication, how they are interfaced to each other and AT commands set used in communication.

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Index Terms— GSM, microcontroller, MODEM, software, mobile communication, bridge- rectifier, transformer, interfacing, SIM, LCD.

I. INTRODUCTION

The objective of this project is to detect any leakage of LPG/CNG based cars, small scale factories or in home appliances also. It will detect the leakage and will close the knob of the system to stop the supply of the gas. Stepper motor is there that could be attached with the knob and will close the supply by rotating it. For assistance and LCD of 16x2 is also there. An alarm is there also the stop the alert the user as soon as leakage is found.

Gas sensors are employed in a wide range of applications in the fields of safety, health, instrumentation etc... Common examples are domestic/commercial alarms for explosive or toxic gases, or in automotive application as gas leakage detectors for LPG powered cars and exhausts detectors inside any fuel powered truck/car. Such sensors, nowadays, are found also in applications involving air quality control systems and pollution monitoring. Today's sensors, while featuring a high sensitivity to a wide gases variety, are very compact in size and have significantly reduced their power consumption to better adapt to portable solutions. Building a system with a gas sensor is not as easy as it could appear. Despite the sensor could be treated, basically, as a variable resistor (which value depends on gas concentration in air) the practical implementation in a project should be done

considering some design rules, especially if the final circuit is a device to be used in a field where reliability is strongly
required (e.g. safety). As an example the internal elements of a sensor (heater and gas sensitive resistors) have to be constantly kept under control to avoid failures leading to a wrong alarm indication; furthermore, if the application needs to achieve a good measurement accuracy, factors like environment temperature, sensor life etc have to be taken into account. All those features and controls require introducing in the project a certain amount of external circuitry (including components like comparators, temperature sensor, spare logic etc. This project aims to show how a microcontroller can be employed to replace a lot of external components while adding extra functionalities at a cost comparable as a simple integrated comparator. In the prototype that we are going to present, the hardware and microprocessor firmware have been optimized to implement a smart LPG gas alarm (LPG stands for Liquefied Petroleum Gas) for cars running on LPG/CNG so that it can raise alarm before any fatal incident happens. Figure 1: Block Diagram of Gas Leakage System

LPG Gas Leakage Detection & Control System

Hitendra Rawat, Ashish Kushwah, Khyati Asthana, Akanksha Shivhare LPG Gas Leakage Detection & Control System www.eshancollege.com 134

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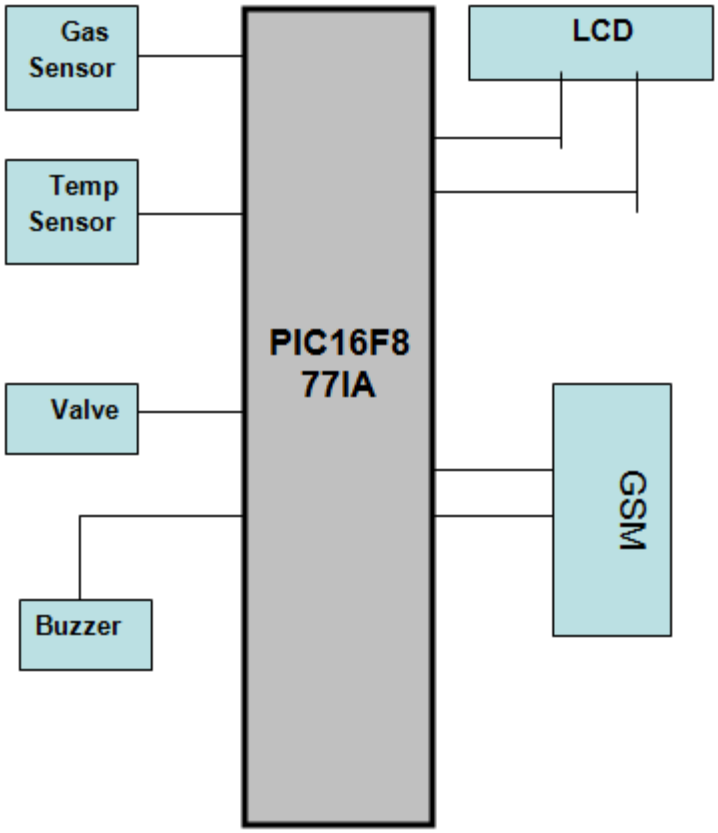

Gas Sensor
Temp Sensor
Valve
Buzzer
PIC16F877IA
LCD
GSM

II. HARDWARE IMPLEMENTATION

The block diagram of the hardware implementation of the entire system is as shown in the Figure1. In this circuit we used MQ-6 sensor for gas leakage detection. MQ-6 sensor composed by micro AL2O3 ceramic tube, Tin Dioxide (SnO2) sensitive layer, measuring electrode and heater are fixed into a crust made by plastic and stainless steel net. The heater provides necessary work conditions for work of sensitive components. The enveloped MQ-6 has 6 pin, 4 of them are used to fetch signals, and other 2 are used for providing heating current. Here MQ-6 sensor works on basics 0of combustion process, and output is given in variable voltage form, so, when LPG gas is leakage voltage at the output pin of MQ-6 is increased and we use IC2 (Op-amp LM324) as a comparator for compare the LPG leakage with respect to normal condition. Output of comparator is fed to IC1 microcontroller (ATMEL 89S8253) and corresponding coding LCD is display gas leakage and give another instruction to stepper motor via ULN2803 to turn 90o to turn off the regulator of gas tank. Temperature sensor DS18B20 is continuously communicated with Microcontroller and display temperature at LCD. If temperature is more than 50o then fire alarm is activated and display fire on LCD. PIC16F877A devices are available only in 40-pin packages. All devices in the PIC16F7X family share common architecture, with the following differences.

The main components of the system are-

1. PIC microcontroller
2. Gas sensor
3. GSM module
4. LCD
5. Power supply

1. PIC (MICROCONTROLLER)

The PIC (founded by Microchip) 16F877A is a CMOS-FLASH based High-performance 8-bit RISC Microcontroller. This powerful (200 nanosecond instruction execution) yet easy-to-program (only 35 single word instructions) microcontroller packs Microchip's powerful PIC® architecture into a 40 pin package. The PIC16F877A features 256 bytes of EEPROM data memory, self-programming, an ICD, 2 Comparators, 8 channels of 10-bit Analog-to-Digital converter, 2 capture/compare/PWM functions, the synchronous serial port can be configured as either 3-wire Serial Peripheral Interface (SPI™) or the 2-wire Inter-Integrated Circuit (I²C™) bus and a Universal Asynchronous Receiver Transmitter (USART). All of these features make it ideal for more advanced level A/D applications in automotive, industrial, appliances and consumer applications. Alternating current differ from DC in the direction of electron flow , first in one direction for a short time , then reverse direction and flow again in opposite direction for short time . The flow of electrons in one direction and then in another direction is called a cycle of AC. The number of cycles occur in one second of time is called “Cycles/Second”. In our country the standard power line frequency is 50 Hz.

Figure 2: PIN Configuration of microcontroller

2. MQ6 Sensor

They are used in gas leakage detecting equipment in family and industry, are suitable for detecting of LPG, iso-butane, propane, LNG, avoid the noise of alcohol and cooking fumes and cigarette smoke.

Figure3: MQ6 SENSOR

Structure and configuration of MQ-6 gas sensor is (Configuration A or B), sensor composed by micro AL2O3 ceramic tube, Tin Dioxide (SnO2) sensitive layer, measuring electrode and heater are fixed into a crust made by plastic and stainless

steel net. The heater provides necessary work conditions for work of sensitive components. The enveloped MQ-6 has 6 pin, 4 of them are used to fetch signals, and other 2 are used for providing heating current. National Conference on Synergetic Trends in engineering and Technology (STET-2014) International Journal of Engineering and Technical Research ISSN: 2321-0869, Special Issue www.eshancollege.com 135 www.erpublication.org

3. LCD A liquid crystal display (LCD) is a flat panel display, electronic visual display, or video display that uses the light modulating properties of liquid crystals (LCs). LCs do not emit light directly. They are used in a wide range of applications, including computer monitors, television, instrument panels, aircraft cockpit displays, signage, etc. They are common in consumer devices such as video players, gaming devices, clocks, watches, calculators, and telephones. LCDs have replaced cathode ray tube (CRT) displays in most applications. They are available in a wider range of screen sizes than CRT and plasma displays, and since they do not use phosphors, they cannot suffer image burn-in. LCDs are, however, susceptible\to image persistence. LCDs are more energy efficient and offer safer disposal than CRTs. Its low electrical power consumption enables it to be used in battery-powered electronic equipment. It is an electronically modulated optical device made up of any number of segments filled with liquid crystals and arrayed in front of a light source (backlight) or reflector to produce images in color or monochrome. The most flexible ones use an array of small pixels. The earliest discovery leading to the development of LCD technology, the discovery of liquid crystals, dates from 1888. By 2008, worldwide sales of televisions with LCD screens had surpassed the sale of CRT units. LCDs available in two models: Character LCD and Graphics LCD. The character LCD displays ASCII values and graphics LCD displays graphics. Character LCDs are available in various kinds of models. No. Of characters Lines: 8 1, 16 1, 16 2, 16 4, 20 4, 40 4,… Dots Dots: 122 32, 128 64, 240 128, 320 240… Color: Yellow, Green, Gray, Blue….Graphics LCDs are also available with different sizes and colors. Figure 4: LCD PINOUT(16*2) 4. GSM MODEM It is a wireless MODEM-just like dial-up MODEM works with GSM wireless network. The difference between dial-up MODEM and wireless MODEM is wireless MODEM sends and receives data through radio waves whereas dial-up MODEM send and receive data through a

fixed telephone line. Figure 4: GSM MODEM available in local market. 4. Power Supply Power supply unit consists of the following units: a. Step down transformer b. Rectifier unit c. Input filter d. Regulator unit e. Output filter Figure 6: +5v DC power supply for microcontroller a. *STEP DOWN TRANSFORMER:* The instrument transformer for power supply in this project is to convert AC from 230V to required low level such as 5V AC. This transformer apart from stepping down AC voltage gives isolation between power source and power supply circuitries.

b. *RECTIFIER UNIT:* In a power supply unit, rectification is normally achieved by a solid state diode. Diode contains two electrodes called the anode and the cathode. A diode has the property that will let electron flow easily in one direction. As a result when AC is applied to a diode, electrons only flow when the anode is positive and cathode is negative. Reversing the polarity of voltage applied to a diode will not permit electron flow. The various method of rectifying AC to DC or half wave, full wave and bridge rectifications. This project LPG Gas Leakage Detection & Control System www.eshancollege.com 136 www.erpublication.org

employs a full wave bridge rectifier which is most commonly used in industries. A bridge structure of four diodes is commonly used in power supply units to achieve full wave rectification. When AC voltage is applied to the primary winding of power transformer. It is stepped down to 5V AC across the secondary winding of the transformer. Normally one alteration of the input voltage will cause the polarities to reverse. Opposite end of the transformer will therefore, always be 180 degrees out of phase with each other.

For positive cycle, two diodes connected to the top winding gets positive voltage and only one diode conducts for that cycle due to forward bias. At the same time one out of the other two diodes conducts, for the negative voltage being applied from the bottom winding due to forward bias for that diode DC of frequency 100Hz.

In the next alteration the two diodes conducted from top winding and bottom winding as they are forward biased in this cycle. It is to be noted that the current flow through the load is always in one direction for each alteration of the applied AC input. This is of course, means that AC is rectified into DC. This DC output, in this case, has a ripple frequency of 100Hz, since each alternation produces a resulting output pulse, the ripple frequency or 2*50 Hz =100Hz. The output DC is not a pure DC. It is pulsating DC voltage.

c. *FILTER UNIT:* After pulsating DC has been produced by our rectifier, it must be filtered in or for it to be usable in a power supply. Filtering involves the ripple frequency. The power supply unit employed in this project used 7805 voltage regulator (for positive output voltages) and a 7905 regulator (for negative output voltages). Resistors R1 and R2 maintain line load regulation. Capacitors C2 and C4 act as high frequency suppressors. Depending on the design, it may be used to regulate one or more AC or DC voltages.

The 78xx (sometimes LM78xx) is a family of self-contained fixed linear voltage regulator integrated circuits. The 78xx family is commonly used in electronic circuits requiring a regulated power supply due to their ease-of-use and low cost. For ICs within the family, the *xx* is replaced with two digits, indicating the output voltage (for example, the 7805 has a 5 volt output, while the 7812 produces 12 volts). The 78xx line is positive voltage regulators: they produce a voltage that is positive relative to a common ground.

d. *REGULATOR UNIT*: Regulator regulates the o/p voltage constant depends on upon the regulator. The 78XX series of voltage regulator are intended to provide a fixed voltage for use with a variety of different circuits. They are available in a range of different voltages as shown below and, although only the positive variety is considered here, there is a complimentary range of negative regulators that are essentially identical. The voltage regulators are capable of providing currents of up to 1.5A with adequate heat-sinking and internal protection circuitry makes them almost indestructible. In other configurations and with extra components, these regulators can be employed as variable voltage sources or constant current sources crystal, so oscillator circuits incorporating them became known as crystal oscillators, but other piezoelectric materials including polycrystalline ceramics are used in similar circuits.

It is classified as follows:

a. Positive regulator

1) Input pin

2) Ground pin

3) Output pin

It regulates the positive voltage

b. Negative regulator

1) Ground pin

2) Input pin

3) Output pin

It regulate the negative voltage

e. *OUTPUT FILTER*: Capacitor acts as filter. The principle of the capacitor is charging and discharging. It charges in positive half cycle of the AC voltage an it will discharge in negative half cycle. So it allow only allows AC voltage and does not allow the DC voltage. This filterer fixed after the regulator.

Figure 7: Power Supply Circuit

III. CIRCUIT National Conference on Synergetic Trends in engineering and Technology (STET-2014) International Journal of Engineering and Technical Research ISSN: 2321-0869, Special Issue www.eshancollege.com 137 www.erpublication.org

Figure8: Circuit Configuration

IV. APPLICATION

a) Protection from any gas leakage in cars b) For safety from gas leakage in heating gas fired appliances like boilers, domestic water heaters c) Large industries which uses gas as their production d) For safety from gas leakage in cooking gas fired appliances like ovens, stoves etc.

V. ADVANTAGES

a) It is used in house as LPG leakage detection b) It also detects alcohol so it is used as liquor tester. c) The sensor has excellent sensitivity combined with a quick fast response time. d) The system is highly reliable, tamper-proof and secure. e) In the long run the maintenance cost is very less when Compared to the present systems. f) It is possible to get instantaneous results and with high accuracy.

VI. FUTURE SCOPE

With recent development in technology, Temperature display during periods wherein no message buffers are empty is one such theoretical improvement that is well possible. Another very interesting and significant improvement would be to accommodate multiple receiver MODEMS at different positions in the geographical area carrying duplicate SIM cards. Multilingual display can be another added variation in the project. Audio output can be introduced to make it user Friendly.

VII. CONCLUSION

In recent households, the use of LPG is taking a big troll. From the use of cylinder up to the use of petroleum pipelines. The biggest threat in using this technology is security. And our project will prove to be boom for households and industries.

2.1.Existing problem:

Home fires have been taking place frequently and the threat to human lives and properties is growing in recent years. Liquid petroleum gas (LPG) is highly inflammable and can burn even at some distance from the source of leakage. Most fire accidents are caused because of a poor-quality rubber tube or the regulator is not turned off when not in use. Therefore, developing the gas leakage alert system is very essential. Hence, this paper presents a gas leakage alert system to detect the gas leakage and to alarm the people onboard. Keywords: Liquid petroleum gas, Gas sensor, Leakage

2.2.REFERENCES

1] Artificial Intelligence – Elain Rich & Kevin Knight, Tata Mc Graw Hill, 2nd Edition. [2] The 8051 microcontroller by Kenneth J.Ayala. [3] A. Clark and R. Harun, Assessment of kalman-_lter channel estimators for an HF radio link," IEE Proceedings, vol. 133, pp. 513{521, Oct 1986.

[4] www.keil.com/forum/docs

[5] www.Atmel.com

[6]http://www.keil.com/dd/docs/datashts/atmel/at89s52_ds.pdf [7] Robert L.Boylestad and Louis Nashelsky, “Electronic Devices and Circuit Theory”, 8th Edition, 2006

2.3.Problem Statement Definition:

PROBLEM STATEMENTS:

Shobana is a software engineer

Who needs to detect gas in home.

Because gas leakage can destroy/burn the entire house if there occurs a amall flame

Karthick is a employee

Who needs know about gas leakage when he's in office

Because to avoid explotion when away from home

Sakshi is a home maker

Who needs to protect their family from gas explotion

Because there is a chance for kids to on the stove and cause gas leakage

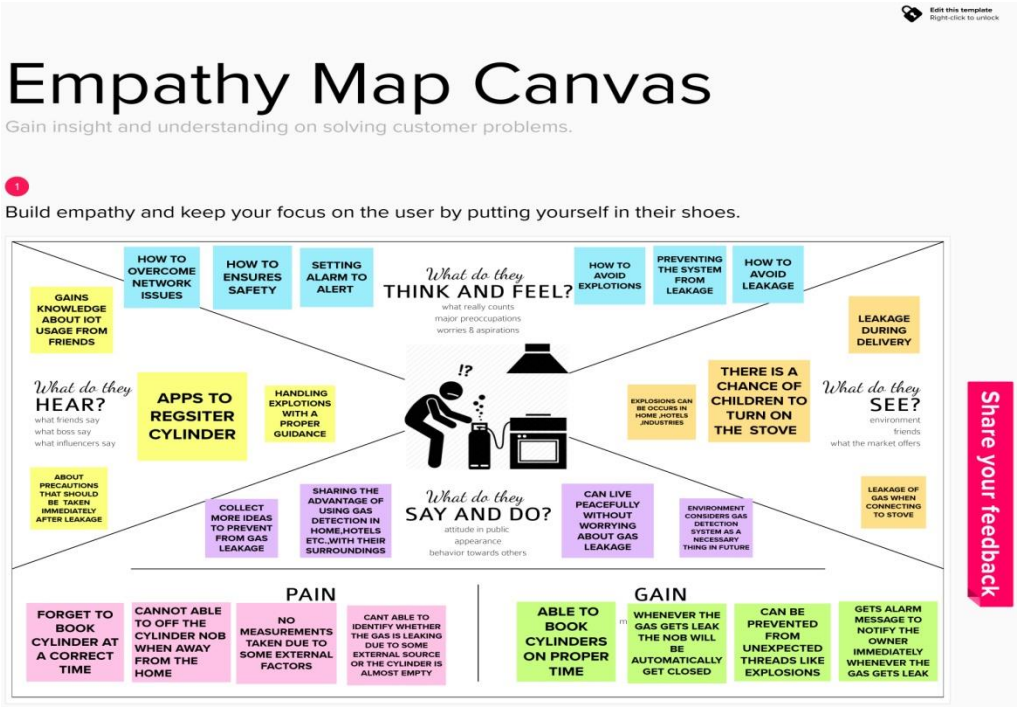
Ravi is a gas company owner

Who needs to monitor the gas leakage in the company

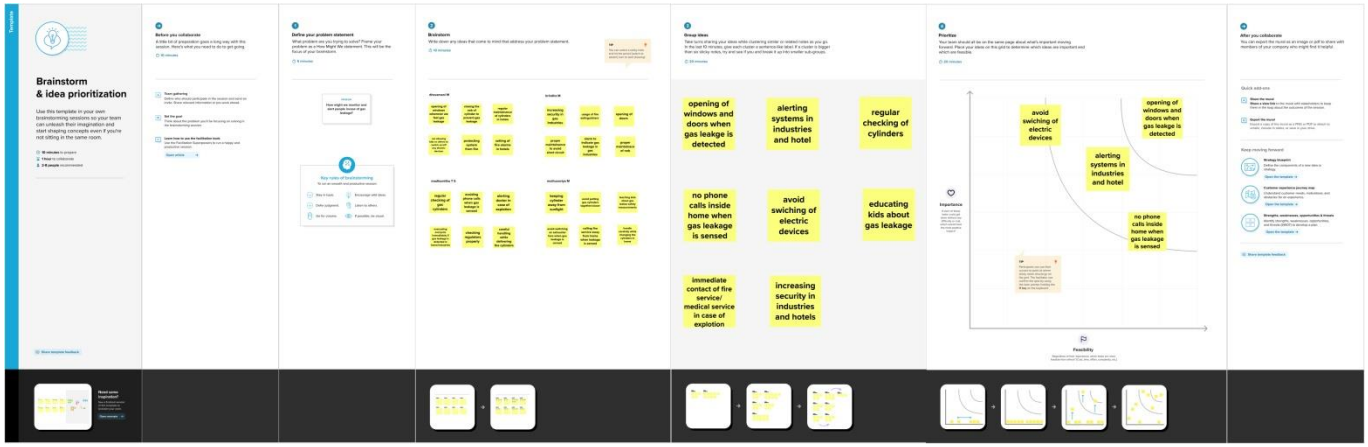
Because to avoid explosion which causes more damages around the company.

3.IDEATION AND PROPOSED SOLUTION:

3.1EMPATHY MAP:



3.2 Ideation & Brainstorming :



3.3.Proposed Solution:

Project Design Phase-I
Proposed Solution Template

Date	24 September 2022
Team ID	PNT2022TMID49514
Project Name	Project –Gas Leakage Monitoring and Alerting System
Maximum Marks	2 Marks

Proposed Solution Template:

Project team shall fill the following information in proposed solution template.

S.No.	Parameter	Description
1.	Problem Statement (Problem to be solved)	I owned a gas industry and I would like to ensure the safety of workers in my industries. I'm a homemaker and I would like to avoid explosion that occurs due to gas leakage.
2.	Idea / Solution description	Automatic closing of nob Automatic opening of doors Sensor to detect gas leakage GSM module to get notification
3.	Novelty / Uniqueness	The use of DC motor helps to close the nob immediately if gas leakage is sensed. Hence we can avoid explosion in industries/house.
4.	Social Impact / Customer Satisfaction	The customers can live freely Without worrying about gas leakage and explosions that occurs due to gas leakage.
5.	Business Model (Revenue Model)	Immediate actions are taken without any delay in case of gas leakage. Our device can be easily fixed in anywhere. Low budget and easy to buy.
6.	Scalability of the Solution	Instead of DC motors if we use Stepper motor we can able to open and close the nob automatically.

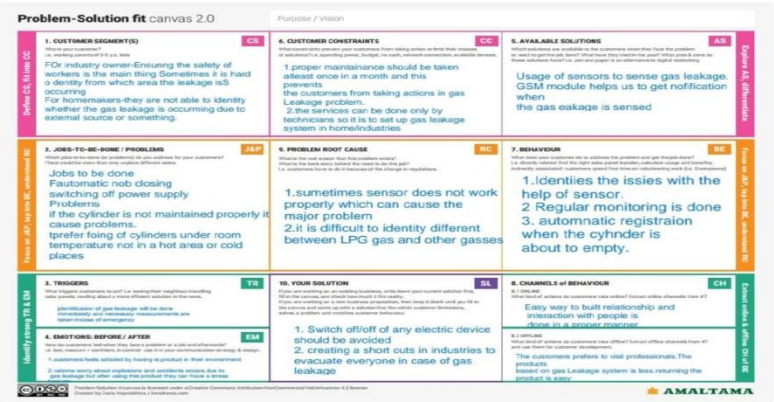
3.4.Problem solution fit:

Project Design Phase-I
Problem – Solution Fit Template

Date	01 October 2022
Team ID	PNT2022TMID49514
Project Name	Project – Gas Leakage Monitoring and Alerting System
Maximum Marks	2 Marks

Problem - Solution Fit Template:

Template: FIGURE 1



4.REQUIREMENT ANALYSIS:

4.1Functional requirements:

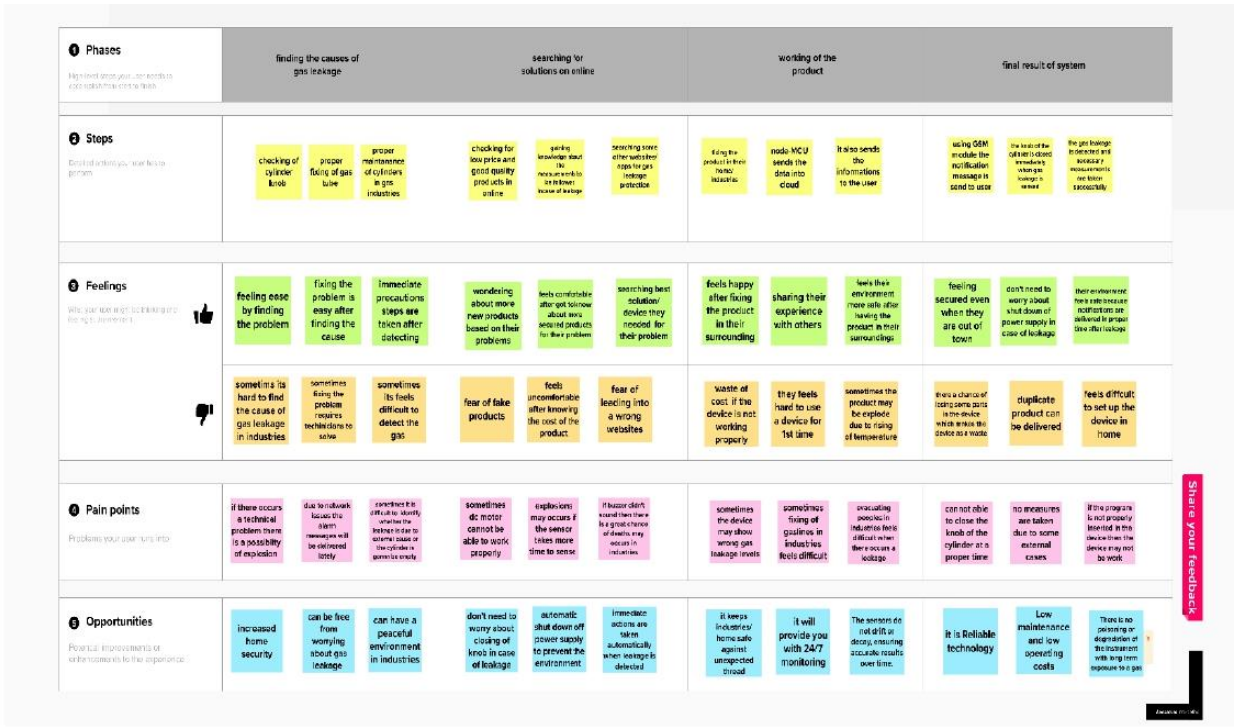
FR No.	Functional Requirement (Epic)	Sub Requirement (Story / Sub-Task)
FR-1	DC Motor	*With the help of DC motor we can automatically close the knob of the cylinder whenever gas leakage is detected.
FR-2	Sensor	*MQ6 Sensor helps us to sense/detect gas leakage level. This sensor can detect gas concentrations from 200 to 10000ppm.
FR-3	LCD Display	*LCD Display continuously shows the reading of gas level in the environment.
FR-4	Raspberry pi	*Raspberry pi receives the input light on the sensor and without any delay it starts activating the DC motor and sends notification messages to the owner.
FR-5	GSM Module	*By using GSM module we can able to alert the user by sending warning messages.
FR-6	Buzzer	*By fixing buzzers in industries we can able to alert the workers when there is a gas leakage is detected in their surroundings.

4.2.Non-Functional requirements:

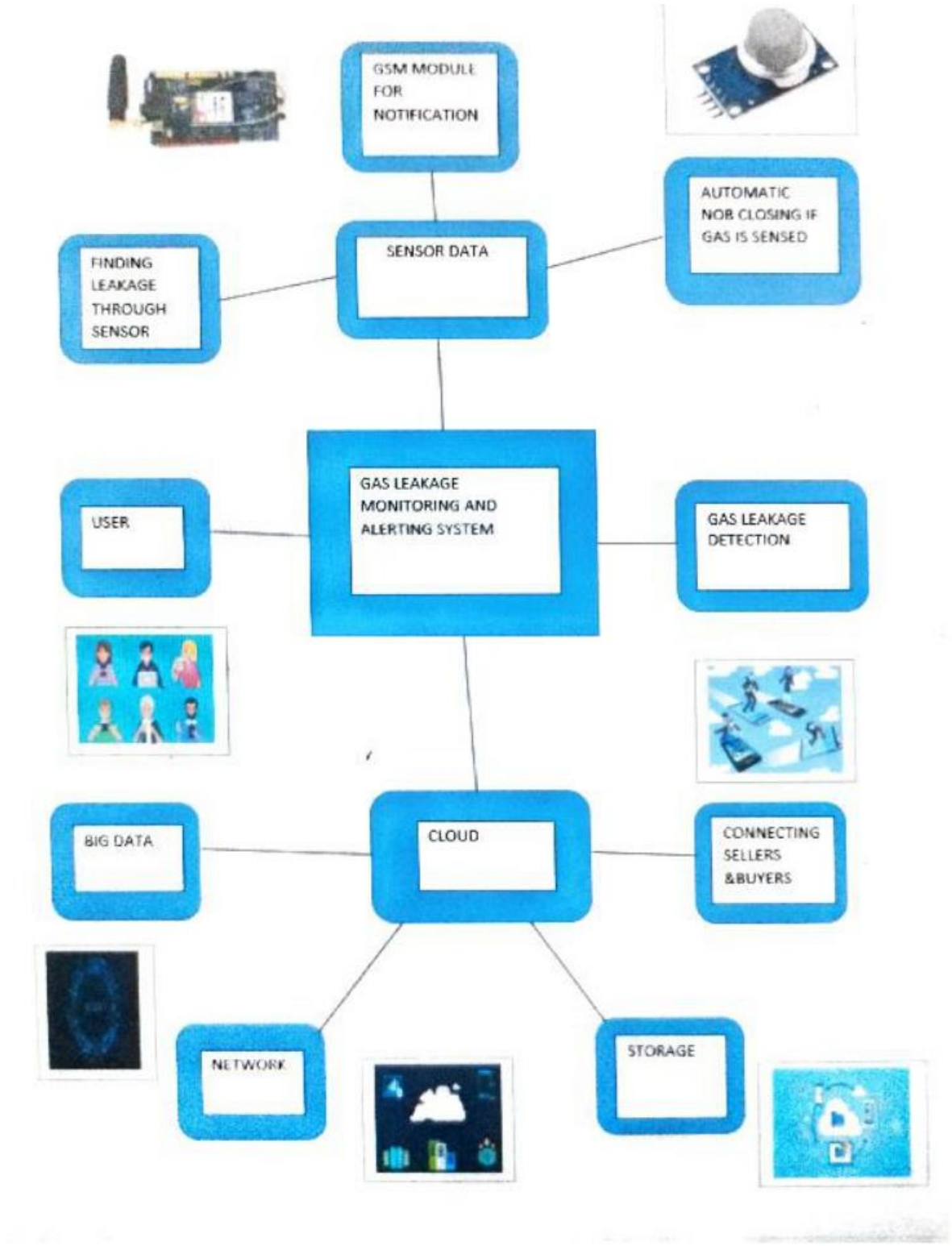
FR No.	Non-Functional Requirement	Description
NFR-1	**Usability**	*DC motor is to close the knob of cylinder in case of leakage. *Sensors to sense gas leakage and the gas level is simultaneously shown in an LCD board.
NFR-2	**Security**	* GSM module is installed to send alert notifications message to the owner of the house/industry. *Buzzer are used in industries to indicate and alert workers.
NFR-3	**Reliability**	*It helps to monitor the gas level regularly by which we can able to avoid explosions.

5.PROJECT DESIGN:

5.1.Dataflowdiagram:



5.2.Solution architecture:



5.3.Userstories:

User Type	Functional Requirement (Epic)	User Story Number	User Story / Task	Acceptance criteria	Priority	Release
Customer(family member/industry owner)	Registration	USN-1	As a user ,I can register for the device in the owners mobile application by entering my email and password	I can access my account / dashboard	High	Sprint-1
Customer(higher authority)	confirmation	USN-2	As a user I will receive confirmation message via email and once I received I can install the device in the owners place	I can receive confirmation email & click confirm	High	Sprint-1
Customer (fire service 101)	Safety measure register	USN-3	As a register I can register the application in owner/family members mobile phone	I can register & access the dashboard with Facebook Login	Low	Sprint-2
Customer (mobile user)	Mobile application	USN-4	As a user I can register by mobile application	I can register for gas detection device with owners mobile number and the alert message will be send by SMS	Medium	Sprint-1
Customer (credential)	Login	USN-5	As a user I can log into the device by entering email & password in the owner's mobile application	Mail address and passwords are default	High	Sprint-1
Customer (Web user)	Notification	USN-7	As a user when there is a critical situation regarding gas explosion the alert notification will be received through GSM module	Alert message is sent to owners mobile as an SMS	High	Sprint-1
Customer care Executive	Network Connectivity	USN-8	When there is a gas leakage is detected in the surrounding	Sensor detect the leakage and notifies the owner via message	High	Sprint-1

6.PROJECT PLANNING & SCHEDULING

6.1SprintPlanning&Estimation:

Sprint	Functional Requirement (Epic)	User Story Number	User Story / Task	Story Points	Priority	Team Members
Sprint-1	Analysing the gas leakage	USN-1	The owner who wants to save his employees or a person who wants to save their family from explosion takes necessary actions	2	High	M.dhavamani M.brindha T.S.madhumitha M.muthusoviya
Sprint-1	Preventing from explosion	USN-2	The fire officers worries about any explosions due to gas leakage which may cause many death	1	High	M.dhavamani M.brindha T.S.madhumitha M.muthusoviya
Sprint-2	To detect the gas leakage	USN-3	The owner can take necessary steps by deploying gas detectors in their surroundings	2	Low	M.dhavamani M.brindha T.S.madhumitha M.muthusoviya
Sprint-3	Testing and training of the model device	USN-4	The programmer can design an gas leakage detection model by training the dataset	2	Medium	M.dhavamani M.brindha T.S.madhumitha M.muthusoviya
Sprint-4	Alerting using buzzer	USN-5	When the gas is detected about the range then the buzzer gets start	1	High	M.dhavamani M.brindha T.S.madhumitha M.muthusoviya

6.2.SprintDeliverySchedule

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

6.3.Reports from JIRA:

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

7.1.Feature 1:

```
import time
import sys
import ibmiotf.application # IBM IoT Watson Platform Module
import ibmiotf.device
import tkinter as tk # Python GUI Package
from tkinter import ttk # Python GUI
import time
from threading import Thread


#Provide your IBM Watson Device Credentials
organization = "23g01e"
deviceType = "madhu"
deviceId = "py33"
authMethod = "token"
authToken = "madhudhava"
```

```
# Tkinter root window
root = tk.Tk()
root.geometry('350x300')  # Set size of root window
root.resizable(False, False) # root window non-resizable
root.title('Gas Leakage Monitoring And Alerting System for Industries (PNT2022TMID49514)')


# Layout Configurations
root.columnconfigure(0, weight=1)
root.columnconfigure(1, weight=3)


# Temperature and Humidity sliders initialization
current_gas = tk.DoubleVar()
current_temp = tk.DoubleVar()



# slider - temperature and humidity functions
def get_current_gas(): # function returns current gas level value
    return '{: .2f}'.format(current_gas.get())

def get_current_temp():  # function returns current temperature value
    return '{: .2f}'.format(current_temp.get())




def slider_changed(event): # Event Handler for changes in sliders
    print('--------')
    print('Gas Level: {: .2f} , Temperature: {: .2f} '.format(current_gas.get(),current_temp.get()))
```

```
    print('--------')
    gas_label.configure(text=str(get_current_gas()) +" ppm")  # Displays current gas level as label content
    temp_label.configure(text=str(get_current_temp()) +" °C")  # Displays current temperature as label content



# Tkinter Labels

# label for the gas level slider
slider_gas_label = ttk.Label(root,text='Set Gas Level:')
slider_gas_label.grid(column=0,row=0,sticky='w')


#  Gas Level slider
slider_gas = ttk.Scale(root,from_=200,to=2000,orient='horizontal', command=slider_changed,variable=current_gas)
slider_gas.grid(column=1,row=0,sticky='we')


# current gas level label
current_gas_label = ttk.Label(root,text='Current Gas Level:')
current_gas_label.grid(row=1,columnspan=2,sticky='n',ipadx=10,ipady=10)


# Gas level label (value gets displayed here)
gas_label = ttk.Label(root,text=str(get_current_gas()) +" ppm")
gas_label.grid(row=2,columnspan=2,sticky='n')


# label for the temperature slider
slider_temp_label = ttk.Label(root,text='Set Temperature:')
slider_temp_label.grid(column=0,row=12,sticky='w')
```

```
#  temperature slider
slider_temp = ttk.Scale(root,from_=0,to=100,orient='horizontal',
command=slider_changed,variable=current_temp)
slider_temp.grid(column=1,row=12,sticky='we')


# current temperature label
current_temp_label = ttk.Label(root,text='Current Temperature:')
current_temp_label.grid(row=16,columnspan=2,sticky='n',ipadx=10,ipady=10)


# temperature label (value gets displayed here)
temp_label = ttk.Label(root,text=str(get_current_temp()) +" °C")
temp_label.grid(row=17,columnspan=2,sticky='n')




def publisher_thread():
    thread = Thread(target=publish_data)
    thread.start()

def publish_data():
    # Exception Handling
    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()  # Connect to IBM Watson IoT Platform

    while True:
        temp = int(current_temp.get())
        gas_level = int(current_gas.get())

        # Send Temperature & Humidity to IBM Watson IoT Platform
        data = {'gas_level' : gas_level, 'temperature': temp, }

        def myOnPublishCallback():
            print("Published Gas Level = %s ppm" % gas_level, "Temperature = %s C" % temp,  "to IBM Watson")

        success = deviceCli.publishEvent("event", "json", data, qos=0, on_publish=myOnPublishCallback)
        if not success:
            print("Not connected to IoTF")
        time.sleep(1)

publisher_thread()

root.mainloop() # startup Tkinter GUI

# Disconnect the device and application from the cloud
deviceCli.disconnect()
```

8.TESTING :

8.1.TestCases:

Test case ID	Feature Type	Component	Test Scenario
LoginPage_TC_OO1	Functional	Home Page	Location Test Case
LoginPage_TC_OO1	UI	Home Page	Industrial Test Case
LoginPage_TC_OO2	Functional	Login page	Gas sensing Test Cases
LoginPage_TC_OO3	Functional	Login page	Temperature Test Cases

8.2.User Acceptance Testing:

1. Purpose of Document

The purpose of this document is to briefly explain the test coverage and open issues of the **Gas Leakage monitoring and Alerting system** project at the time of the release to User Acceptance Testing (UAT).

2. Defect Analysis

This report shows the number of resolved or closed bugs at each severity level, and how they were resolved

Resolution	Severity 1	Severity 2	Severity 3	Severity 4	Subtotal
By Design	10	4	2	3	20
Duplicate	1	0	3	0	4
External	2	3	0	1	6
Fixed	11	2	4	20	37
Not Reproduced	0	0	1	0	1
Skipped	0	0	1	1	2
Won't Fix	0	5	2	1	8
Totals	24	14	13	26	77

3. Test Case Analysis

This report shows the number of test cases that have passed, failed, and untested

Section	Total Cases	Not Tested	Fail	Pass
Print Engine	7	0	0	7
Client Application	51	0	0	51
Security	2	0	0	2

9.RESULTS:

9.1.**Performance Metrics:**

			NFT - Risk Assessment						
S. No	Project Name	Scope \ featur e	Function al Changes	Hardwar e Changes	Softwar e Change s	Impact of Downti me	Load/ Volum e Chang es	Risk Score	Justi- fication
1	Gas leakage monitori ng and alerting system	New	low	Changes	Moderat e	low	>5 to 10%	ORANG E	we have improve the scalabilit y, stability and speed of the system.

10.ADVANTAGES:

a) It is used in house as LPG leakage detection
b) It also detects alcohol so it is used as liquor tester.
c) The sensor has excellent sensitivity combined with a quick fast response time.
d) The system is highly reliable, tamper-proof and secure.
e) In the long run the maintenance cost is very less when Compared to the present systems.
f) It is possible to get instantaneous results and with high accuracy.

DISADVANTAGES:

A)Battery life is short which is a concern.

B)Sometimes it should inaccurate data.

C)Some gadgets will be expensive for the middleclass parents

11.CONCLUSION:

In recent households, the use of LPG is taking a big troll. From the use of cylinder up to the use of petroleum pipelines. The biggest threat in using this technology is security. And our project will prove to be boom for households and industries.

12.FUTURE SCOPE:

Android App:

The idea behind the Android app has been derived from having an automated bot to respond to text message responses from the user. It will provide the user with predefined response options at just the click of a button. The user doesn't need to memorize the specific keywords to send. Also, the bot will be pre-programmed to present the user with a set of predefined keyword options such as "automatic ON/OFF buttons", "SOS," etc.. This android app provides mote interface to the user which help to understand easily. The main idea in this android app is to provide keyword

13.APPENDIX:

```
import time
import sys
import ibmiotf.application # IBM IoT Watson Platform Module
import ibmiotf.device
import tkinter as tk # Python GUI Package
from tkinter import ttk # Python GUI
import time
from threading import Thread


#Provide your IBM Watson Device Credentials
organization = "23g01e"
deviceType = "madhu"
deviceId = "py33"
authMethod = "token"
authToken = "madhudhava"


# Tkinter root window
root = tk.Tk()
root.geometry('350x300')  # Set size of root window
root.resizable(False, False) # root window non-resizable
root.title('Gas Leakage Monitoring And Alerting System for Industries (PNT2022TMID49514)')
```

```
# Layout Configurations
root.columnconfigure(0, weight=1)
root.columnconfigure(1, weight=3)


# Temperature and Humidity sliders initialization
current_gas = tk.DoubleVar()
current_temp = tk.DoubleVar()



# slider - temperature and humidity functions
def get_current_gas(): # function returns current gas level value
    return '{: .2f}'.format(current_gas.get())

def get_current_temp():  # function returns current temperature value
    return '{: .2f}'.format(current_temp.get())




def slider_changed(event): # Event Handler for changes in sliders
    print('--------')
    print('Gas Level: {: .2f} , Temperature: {: .2f} '.format(current_gas.get(),current_temp.get()))
    print('--------')
    gas_label.configure(text=str(get_current_gas()) +" ppm")  # Displays current gas level as label content
    temp_label.configure(text=str(get_current_temp()) +" °C")  # Displays current temperature as label content
```

```
# Tkinter Labels

# label for the gas level slider
slider_gas_label = ttk.Label(root,text='Set Gas Level:')
slider_gas_label.grid(column=0,row=0,sticky='w')


#  Gas Level slider
slider_gas = ttk.Scale(root,from_=200,to=2000,orient='horizontal',
command=slider_changed,variable=current_gas)
slider_gas.grid(column=1,row=0,sticky='we')


# current gas level label
current_gas_label = ttk.Label(root,text='Current Gas Level:')
current_gas_label.grid(row=1,columnspan=2,sticky='n',ipadx=10,ipady=10)


# Gas level label (value gets displayed here)
gas_label = ttk.Label(root,text=str(get_current_gas()) +" ppm")
gas_label.grid(row=2,columnspan=2,sticky='n')


# label for the temperature slider
slider_temp_label = ttk.Label(root,text='Set Temperature:')
slider_temp_label.grid(column=0,row=12,sticky='w')


#  temperature slider
slider_temp = ttk.Scale(root,from_=0,to=100,orient='horizontal',
command=slider_changed,variable=current_temp)
slider_temp.grid(column=1,row=12,sticky='we')
```

```
# current temperature label
current_temp_label = ttk.Label(root,text='Current Temperature:')
current_temp_label.grid(row=16,columnspan=2,sticky='n',ipadx=10,ipady=10)



# temperature label (value gets displayed here)
temp_label = ttk.Label(root,text=str(get_current_temp()) +" °C")
temp_label.grid(row=17,columnspan=2,sticky='n')




def publisher_thread():
    thread = Thread(target=publish_data)
    thread.start()

def publish_data():
    # Exception Handling
    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()  # Connect to IBM Watson IoT Platform

    while True:
        temp = int(current_temp.get())
        gas_level = int(current_gas.get())
```

```
        # Send Temperature & Humidity to IBM Watson IoT Platform
        data = {'gas_level' : gas_level, 'temperature': temp, }

        def myOnPublishCallback():
            print("Published Gas Level = %s ppm" % gas_level, "Temperature = %s C" % temp,  "to IBM Watson")

        success = deviceCli.publishEvent("event", "json", data, qos=0, on_publish=myOnPublishCallback)
        if not success:
            print("Not connected to IoTF")
        time.sleep(1)

publisher_thread()

root.mainloop() # startup Tkinter GUI

# Disconnect the device and application from the cloud
deviceCli.disconnect()
```

GitHub:

https://github.com/IBM-EPBL/IBM-Project-20707-1659761167

Project Demo Link:

https://drive.google.com/file/d/1grAvTbCAU6Hwb9FhkwaWdEzUn8iQKXf4/view?usp=drivesdk