KONGUNADU COLLEGE OF ENGINEERING AND TECHNOLOGY

DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

HX 8001-PROFESSIONAL READINESS FOR INNOVATION, EMPLOYABILITY AND ENTREPRENEURSHIP

VISUALIZING AND PREDICTING HEART DISEASES WITH AN INTERACTIVE DASH BOARD

NALAIYA THIRAN PROJECT REPORT 2022

Submitted by

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Team ID: PNT2022TMID13514

NOVEMBER 2022

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CHAPTER 1

1.INTRODUCTION

INTERNET OF THINGS

The Internet of Things (IoT) is a reducing automation and analytic system that utilizes machine learning, sensing, connectivity, electronic, cloud messaging, and other components to create entire solutions for products or services. Iot devices have improved performance, control, and transparency. Distinct IoT echo systems have various workings (architecture). However, the principles of how they perform are analogous. Devices such as smartphones, smart watches, other electronic appliances which system keeps with the IoT platform are the initial step in the IoT's overall working process. Platforms gather and analyse information from various devices and platforms, and use apps to send the most valuable data to devices.

1.1 PROJECT OVERVIEW:

Internet - of - things Gas Leak Monitoring and Warning System is a collection of connected, vehicles, and appliances that more together, programming, actuators, and a network, allow people to interact, work collectively, and share data. IoT includes expanding the Internet's network outside standard gadgets such tables, workstations, phones, and tablets to any number of usually stupid or web-unaware material things and everyday objects. These devices are equipped with innovation, allowing them to communicate and connect and over Internet, as well as being tracked and controlled from the a distant . A combination of variables has enhanced the significance of the Internet of things.

1.2 PURPOSE

Prevent fire hazards and explosion.

Rapid material oxidation, called ire, resulting in the emission of heat, light, and a range of chemical products. The fire triangle outlines the requirements that need to be fulfilled before such a fire can start: flammable substance, oxygen, and burn energy

Any material that really can undergo an exothermic oxidation process must be recognized as flammable.Ensure worker’s health

Ensure the wellbeing of the workforce

A gas leak not just to increases the prospect of a flammable explosion but also presents a danger to the long-term safety and health of workers. Gas poisoning may cause respiratory, dizziness, nosebleeds, or ringing in the ears, among many other symptoms.

Poisoning with carbon monoxide may occur through workplace gas leaks that just go unnoticed for a long period of time. When gas burns incompetently, carbon monoxide is released. Signs

for carbon monoxide poisoning includes nausea, fatigue of the limbs, and pain in the lungs and chest. These symptoms are risky and, over term, may end in hospitalisation or even death.

Get immediate gas leak Notify

Oxygen depletion and hazardous, flammable, and combustible gases can all be detected using gas detectors. This type of equipment is frequently used in industry and is used on sites such oil rigs to keep a close eye on production line and trying to cut technologies such photovoltaic cells. They might be used in fighting flames.

Real-time updates about leaking

Data leakage is defined as "happensing whenever data set contains relevant data, yet reliable data is not accessible when the models are utilized for predictions." This provides great performance on the training dataset and perhaps even the validation accuracy, but poor production performance.

Harmful Gas Monitoring

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

Fire Hazard Prevention

To minimize potentially hazardous consequences like fire incidents, the gas sensors assist in monitoring the concentration of the gases that seem to be present in the atmosphere. Furthermore, it is a vital means of protecting the equipment and plant personnel from fire hazards. It effectively uncovers the presence of toxic gas like propane and methane and informs the plant authorities, preventing an unexpected ignition of the tower's components. Furthermore, a gas monitoring incorporates gas analyzers to provide alerts the about temperature rise. This enables the management to stop fire hazards explosions straight away.

Oxygen Level Tracking

Since several pitmen died during mining explorations owing to a scarcity of oxygen, sensing the presence of gases is essential for carrying out industries. Workers in mines or closely packed industrial facilities could endure nausea, brain injury, or even death as a of a sudden drop in oxygen levels. By maintaining proper oxygen levels that ensure the best performance of the employees, a gas monitoring system significantly benefits the industries. This system also gives out real-time alerts while oxygen levels were falling, offering users a plenty time to take the precautionary measures or exit the building before your health is negatively affected.

CHAPTER 2

2. LITERATURE SURVEY

TITLE: SENSOR BASED GAS LEAKAGE DETECTOR SYSTEM

AUTHOR: Neha Chourasia, 2Papiha Ajmire, et al.,

YEAROFPUBLICATION: 2022

Gas is identified utilizing semiconductor sensors. This takes use of an MQ6 semiconductor sensor. The MQ-6 gas sensor's sensitive element is SnO2, which has a higher conductance in clean air. The sensor conductivity rises with the increasing fuel concentration when the target combustible gas is introduced. The MQ6 gas sensor responses to natural gas and has great sensitivity to propane, butane, and LPG. The sensor is flexible and cheap, and it has the capability to detect a variety different combustible gases, notably methane. The spectrum of gas concentrations the MQ-6 can detect is 200 to 10,000 ppm. The output from the sensor is an audio resistance.

The Arduino and the MQ-6 gas sensor act as the system's basis. The sensor will produce a digital output of 1 when it detects gas in the atmosphere and a digital output if 0 if no gas is detected. The sensor output will be used as digital input by Arduino. The buzzer will start to sound as well as the LCD will flash "Gas detected: Yes" if the sensor output is high. The buzzer won't tune and the LCD will display "Gas detected: No" if the sensor output is low. The buzzer typically includes a series of switches or sensors that are connected to a control unit that determines which button is pushed or whether a specified period of time has elapsed. required. Table 1 lists the list of required hardware opponents, quantity and price in Bangladeshi Taka. The gas detector system is very cheap and it will cost only 917 BD Taka. The device is portable, light weight, user friendly and efficient with multi-functional features. In Figure 2, some important The Arduino and the MQ-6 gas sensor serve as the system's base. The sensor will produce a digital output of 1 when it detects gas in there and a digital output if 0 if no gas is detected. The sensor

output will be used as digital input by Arduino. The buzzer will start to sound as well as the LCD will flash "Gas detected: Yes" if the sensor output is high. The buzzer won't tune and the LCD will show "Gas detected: No" if the sensor output is low. The buzzer generally contains a number of switches or sensors that also are connected to a control unit that determines which key is pushed or whether a predetermined amount of time has elapsed.

The approximately 400 different types of scent receptors found within the human nose enable us to perceive about 1 trillion different smells. Yet, the bulk of us remain unable to identify what type of gas is in the atmosphere. As a consequence, there are several sensors to precisely monitor atmospheric gas concentration. The most common method for building an IoT-powered system and identifying the various toxic gases present around an industrial plant is to use gas detection sensors. By safeguarding them against unexpected threats like explosions, it helps the businesses and refineries.TITLE: Efficient Gas Leakage Detection and Control System using GSM Module

AUTHOR: A. Anurupa, M. Gunasekar an B. Et al.,

YEAROFPUBLICATION: 2021

Both for home and industrial uses, liquid petroleum gas is used. LPG consists primarily of the highly flammable chemicals butane and propane. It produces zero odor and fires in the air sans generating smoke. Due to the increasing price of gas and diesel, LPG is now used as a fuel in vehicles. This gas's leakage is a very significant matter. Because the gases are heavier than air, these do not disperse easily and might induce suffocation when taken in. Blasts be produced through fuel leaks in the air. In this scenario, a high security system is required and necessary. The process of detecting potentially hazardous gas leaks with sensors is termed as gas leakage detection. Sensing components are placed in its presence to keep records of that too.

The leakage of gas in environment is monitored using MQ2 sensor which has 4 pins and provides either digital or analog output. ARM microcontroller subsequently receives the signal that the gas sensor has already sent. The microcontroller then enables the GSM, which sends the SMS to the specified mobile numbers, and sends the activation signal to the outside

attached devices like the buzzer, exhaust fan, LCD, and other devices. The objective is to collect data from the sensor, specifically the gas leakage level (MQ2), and transmit it to the microcontroller. An connection to external devices was supplied by microcontroller. It works as a network having control over the sensor which gives updates on gas leakage in structures. Gas sensor MQ2, an ARM LPC41028 processor, GSM, and an LCD are the foundation of the suggested gas leakage system. Gas sensor MQ2 and GSM module are implemented using ARM, which is affordable, portable, and simple to be using. It detects gas leaks and informs customers over SMS when one arises. The experimental work has been carefully performed. This improved the project's reliability and login

TITLE: Arduino based gas leakage detection system using IOT

AUTHOR: Pratiksha W, Smita W, Nikita H, Sonali W, Inamdar. S.A

YEAROFPUBLICATION: 2022

The abbreviation for the this type of energy is LPG. Oil and gas were removed from of the rock. Due to the high burnability, LPG should be switched on and off when close solenoid sources and in an exposed area to make sure that the all operations can be carried out in a safe. LPG gases are more steaming than air, so precautions should be taken in storing LPG to prevent any run in sinking to the bottom and building up in an area that is low-truth and difficult to disperse. The naturally occurring phenomena of LPG gas, an alkane, and it has no scent. While there is a run, we sometimes notice a small smell that comes from such a distinct agent. At the time the gas leaves, this chemical is put to the gas.

This paper explains a MQ-5 sensor implementation. Over several uses, gas leakage is recognized to use the MQ5 sensor. The breakdown in the LCD is also constantly visible on the handset. The MQ6 sensor measures the gas concentration and gives an analogue value that can be transformed into a digital signal via an internal A to Convertor. By employing the same digital measure, the paper allows the customer to set the low, medium, and hazardous levels of leakage. Two thresholds are employed to discriminate between the strength values, and three classes are generated as a result.

The major benefits of LPG gas leak are it often causes accidents that result in property loss, product damage, and human injury. Our frame's main purpose is to employ a gas sensor to distinguish between gas found in dwellings and other domestic sources. The person will receive the message after being identified.

This device is used to detect gas that is already on the market and is typically used in many locations, such as industries where there are many chances of detonation, which may result in great destruction and the loss of manpower; homes, where the LPG gas is used most frequently in our daily lives and inevitably where it can detect the leakage of LPG gas; and cars, where the

majority of vehicles In 1910, Dr. Walter Snelling was the first to introduce LPG gas. It consists of both household and industrial propane. Due to the area's high volcanic activity, LPG leaks frequently cause accidents. As a result, it's important to understand and stop gas leaks. There are numerous techniques to differentiate between gas detectors. Based on the type of gas they detect, the automation that powers the sensor's output, and the elements that have an impact on the sensor's power, they are divided into groups (semiconductors, oxidation, catalytic, photoionization, infrared, etc.). We use a variety of devices in our daily lives for a variety of functions, and the majority of them have the ability to release any kind of gas or chemical into the air while they are in use.

Microcontrollers, relays, LCDs, and a buzzer power the sensors. This voltage regulation sector is in charge of reducing the transmitted signal and converting alternating current to direct current. A gas leak can be found using the sensors. Here, the MQ-2 sensor is detecting the airborne LPG concentrations. The reaction time is extremely quick, and the gases between 200 and 10,000 ppm may be distinguished. The sensors' output would be an analogue power. The transition from an analogue resistor to voltage is handled by a sequential communication circuit. That voltage was reported by the microcontroller. Using a 12-bit Analog to Digital converter, this analogue voltage is converted to digital form. In a gas detection system with sophisticated technology

The MQ 2 sensor is utilised in the observation of gases and is capable of picking up numerous gases. When a gas leak is discovered, the sensor transmits a signal to the Arduino UNO, where other hardware components are linked, for further processing. It transmits the signal to the LCD with Arduino UNO so that it can display the alarm message "LPG" When a threat is detected, the buzzer should turn on to warn nearby individuals and cut off the main power source. The power source for the exhaust fan, which removes the toxic gas from the environment, is provided by a relay powered by 5V. Even the application's container will take the message via the GSM module.

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TITLE: Gas Leakage Detection and Prevention Kit Provision With IOT

AUTHOR: Sugitha S, Monika A, et al.,

YEAROFPUBLICATION: 2020

People might forget to take all the necessary precautionary measures while cooking and leave the stove's burner on or the regulator knob open, which could be dangerous; the severity of the act significantly increases when this carelessness is noticed in industrial parks with the gas plants or engines. Today, as people's lives have to move quickly, their attention has become divided into multiple areas. A explosion, property loss, fatality, material waste, and the list goes on if any flammable material is present at the site and comes into touch with the gas. Industries, automobiles (such as cars, buses, and other vehicles), as well as locations where they are handled, are the main sectors that are constantly in danger.

This system is a tiny version for safety facilitation as it includes numerous mini-features of mega relevance and contains a USP of automatic gas shutting feature, which is of big importance in the event that there is no human assistance in the area of leaking. There are numerous instances of fatal accidents caused by gas leaks; most recently, a fatal accident occurred in the village of Attayampatti, which is around 25 kilometres from Salem. Incidents like this strengthen the necessity for such systems.

In numerous papers on gas leakage detection, gas sensors are utilised to both detect leaks and send users an alert via SMS utilising GSM. The Internet of Things (IoT), a new concept in cloud computing, is used in this paper to alert users. The IoT is a network of physical devices, vehicles, home appliances, and other items embedded with electronics, software, sensors, actuators, and network connectivity that allow these objects to connect and exchange data.

The Internet of Things (IOT) is a network of physical objects, including vehicles, home appliances, and other items embedded with electronics, software, sensors, actuators, and connectivity, which enables these objects to connect and exchange data. This concept is relevant for the communication between mobile and email with the gas sensor.

using a prefixed gas sensor to monitor and assess the exceeding threshold value. When the

threshold values are crossed, the programme is run, and the MCU tells the buzzer* to sound and warn the nearby residents. Along with this, the MCU also sends an email (using the IOT[3][4][5] idea) to those who are concerned about the gas leak and leaves a message on the needy person's mobile phone. All of these actions are started by the MCU and carried out under its supervision. Additionally, the stepper motor is started rotating by the MCU. LCD, exhaust fan, and relay all turn on in response to the MCU (as inscribed over the RAM of MCU) This part supports the most crucial work. This module links our devices and MCU.

They discussed their investigations on the gas pipeline system's leakage point analysis and leakage detection. They provided several models that utilised the SCADA I/F Model: Every 30 seconds, the SCADA system transmits the data collected from a pipeline system to the transient simulation model. With SCADA, this module communicates. Every 30 seconds, dynamic metrics including pressure, flow, and temperature are gathered.

TITLE: Gas Leakage detection and alerting system using IOT for home and Industrial safety

AUTHOR: **R . SUDHA , S. ARUN PRASAD**

YEAROFPUBLICATION: 2020

In this study, we employ the MQ-6 semiconductor sensor to find flammable gas. This gas sensor is constructed of sulphur nitride. In clean air, this sensor's conductivity is reduced. The output of this sensing component then decreases. The microcontroller will determine the gas outflow by monitoring this low signal. The microcontroller currently activates the LED and buzzer. After a brief delay, it also turns on a fan to expel gas and keeps sending texts to your mobile number with the subject "GAS LEAKAGE."

The prototype they have suggested shows a small mobile robot that can find gas leaks in dangerous areas. When there is a gas leakage in a certain location, the robot promptly reads the data and sends it to an Android mobile device using Bluetooth. They create an Android app for smartphones with Android operating systems that can immediately receive data from robots over Bluetooth.

They suggested that there are numerous leak detection methods available for gas pipelines. Since their initial proposal, certain strategies have been refined, and some new ones have been developed as a result of improvements in sensor production and computational power. Each detection technique does, however, have benefits and drawbacks. Each category of leak detection techniques has some benefits and drawbacks in common. For instance, all external procedures that require detection from outside the pipeline using visual observation or portable detectors can find extremely small leaks and their location, but the detection process takes a very lengthy time.

They discussed their investigations on the gas pipeline system's leakage point analysis and leakage detection. They provided several models that utilised the SCADA I/F Model: Every 30 seconds, the SCADA system transmits the data collected from a pipeline system to the transient

simulation model. With SCADA, this module communicates. Every 30 seconds, dynamic metrics including pressure, flow, and temperature are gathered.

By creating a device with sensors attached to a Node MCU, this paper seeks to address this issue. Continuous area monitoring is done by the device. The Android-based smart phone is used to display the data that the gas sensor sends to Node MCU as a warning to the user. In addition to LPG gas, hazardous gases from air conditioners and refrigerators escape into homes. Users of this gadget will be able to stop mishaps from happening because of dangerous gas leaks, helping accidents to be prevented.

With the aid of sensors, electronics, software, and connection, physical objects can communicate through the networking of "things" known as the Internet of Things (IoT). These systems don't need any human interaction, and the iot-based gas detection system is no different. It doesn't need anyone's attention. An LPG gas sensor is used by an IOT and Arduino based LPG leakage detection system to detect the gas. In his project, LPG gas sensor connecting with Arduino is used. This sensor sends a signal to the Arduino microcontroller. The LCD, buzzer, and IOT module are all connected to the microcontroller (ESP8266). Utilizing an ESP8266 chip, an IOT LPG leakage detector project is put into action.

Utilize the Wi-Fi network to establish TCP/IP connections and transmit data. These sensors collect data, which is then transmitted to the IOT. The data is subsequently transmitted to a website using the IOT module. When a gas leak is discovered, the buzzer activates and an LCD message reading "Leakage detected" appears. The Wi-Fi module needs to be linked to a Wi-Fi zone or a hotspot in order for this LPG gas leak detection and smart alerting project to function. Additionally, this project is carried out without the IOT module. We have utilised a GSM module in place of the IOT module, which triggers an SMS.

Passive Infrared (PIR)-based sensors are the most frequently utilised sensors. While large-scale deployment of camera or sonar-based monitoring networks incurs significant deployment costs and maintenance overhead, CO2-based detection sensors are slow to detect changes in occurrences. They also raise privacy concerns because they detect more than is necessary. We

promote the selective placement of high precision gas sensors only in regions with insufficient opportunistic context sources. Each soft sensor gives an indication of a gas leak, and supervised learning algorithms combine these indications to infer scenarios and, ultimately, occupancy rates. Through a pilot study, we report system accuracy of up to, showing that this technique can allow context-aware applications in smart buildings with few or no extra sensors.

Our effort will continue to be focused on expanding the framework to include more sensors, resolving privacy issues, and further researching unsupervised approaches. For managing and handling sensor data, an Android application can be created. The data from the sensors is controlled by the Blynk application. TheBlynk application can contain a variety of data and library files. We may install the necessary file using Arduino software and create control for the sensors by downloading it.

EXISTING SYSTEM:

Gas leakage is a significant issue in the industrial sector, residential buildings, and gas-powered vehicles like CNG (Compressed Natural Gas) buses and cars in the aforementioned areas where the usage of gas has become a significant source of energy in our day (STET, 2012). The problem of liquefied petroleum gas leaking has been so terrible that it has caused considerable harm, including the death of people and the destruction of property worth millions of dollars all over the world. The disastrous pipeline explosion that occurred in many locations of Nigeria caused many deaths, numerous injuries, and property devastation

The most popular fuel used in Nigerian homes and businesses is gas, hence certain precautions must be taken to guard against events and mishaps like asphyxia and explosions linked to its use. Due to the odorlessness of these chemicals, ethyl mercaptans is added as an odorant to give LPG a potent scent so that when a leak occurs, it can be detected. LPG is a highly flammable gas made up of a mixture of butane (C4H10), propane (C3H8), buthylene, and another hydrocarbon present in small quantities.

To prevent explosions, more dependable and effective gas leak detection equipment must be installed in homes, businesses, and cars that use LPG because some people have poor senses of perception in situations where there is just a little amount of gas leaking. LPG leakage can occur for a number of reasons, including pipe leaks, improperly fixed hoses, whistling or hissing sounds coming from the cylinder, and improperly fitted valves.

There are various methods of detecting gas leaks, including the LPG detector, which only sounds an alarm when there is a leak. The present LPG detectors might yet be improved so that a microcontroller could activate the alarm and send an SMS message to the necessary individuals. The main goal of the paper is to develop a device that can detect LPG leakage as a safety precaution and automatically send an SMS to the appropriate personnel and activate an alarm right away after a gas leak is detected in order to prevent gas waste and explosion, which could cause property damage and other calamities.

The goal of this work is to create a system that uses an Arduino Uno microcontroller to monitor gas leakage in an enclosed system. An alarm system is used to warn those in the area of the leakage, and SMS messages are sent to the property owner or a safety organisation to help prevent further damage.

ADVANTAGES:

- ✓ There is no interference from other gases because of the laser's extremely tiny 0.3 nm line width.
- ✓ Response times range from 1 to 2 seconds. This enables process measurements to be made with great precision and control.
- ✓ Path lengths of up to 1 km can be measured thanks to the concentrated, powerful laser light at the absorption wavelength.
- ✓ A narrow gas plume has a lower possibility of eluding detection

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2.1 PROBLEM STATEMENT DEFINITION

Date	27 September 2022
Team ID	PNT2022TMID13514
Project Name	Gas Leakage Monitoring and Alerting System for Industries
Maximum Marks	2 Marks

CUSTOMER PROBLEM STATEMENT:

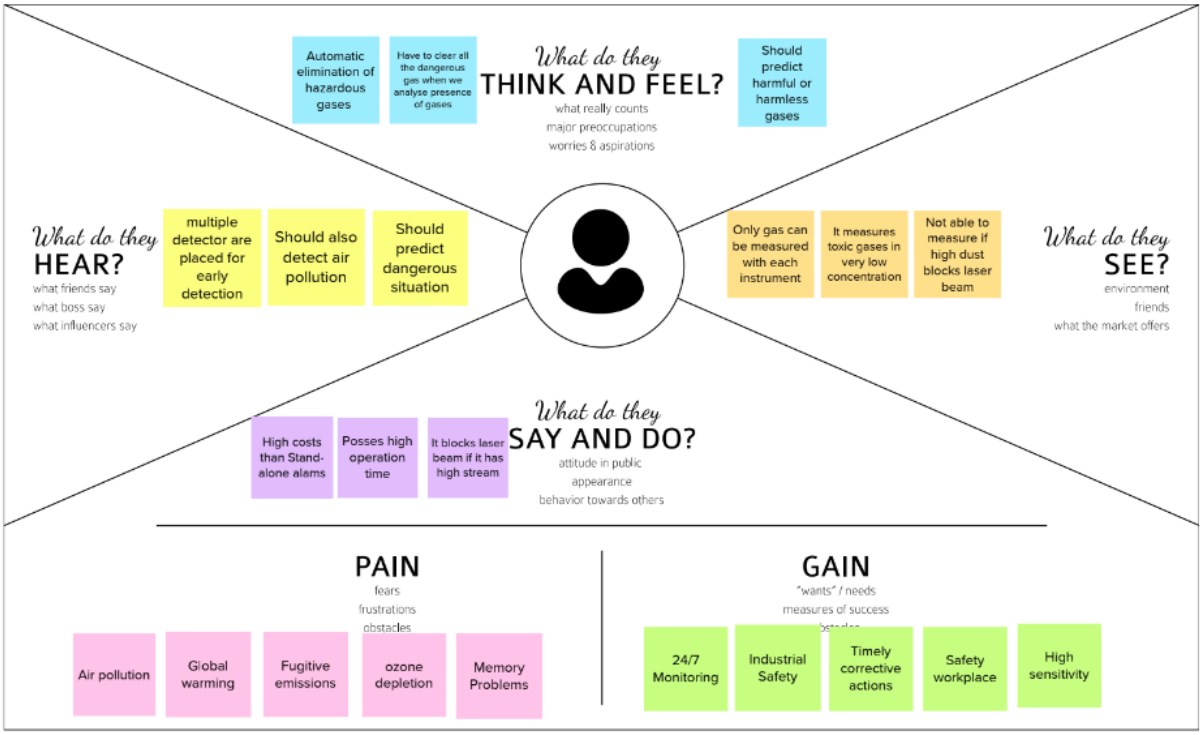
Problem Statement (PS)	I am	I'm trying to	But	Because,	Which makes me feel
PS-1	**gas leakage detector**	**detect gas leakage**	**small amount of gases also leads to fire or explosion**	**they are flammable and act as high source of ignition**	**Dizziness and irregular breathing if incase of low level gas leak**

Reference link:
https://miro.com/app/board/uXjVPSrlrFg=/#tpicker-content

CHAPTER 3

IDEATION & PROPOSED SOLUTION

3.1 EMPATHY MAP CANVAS



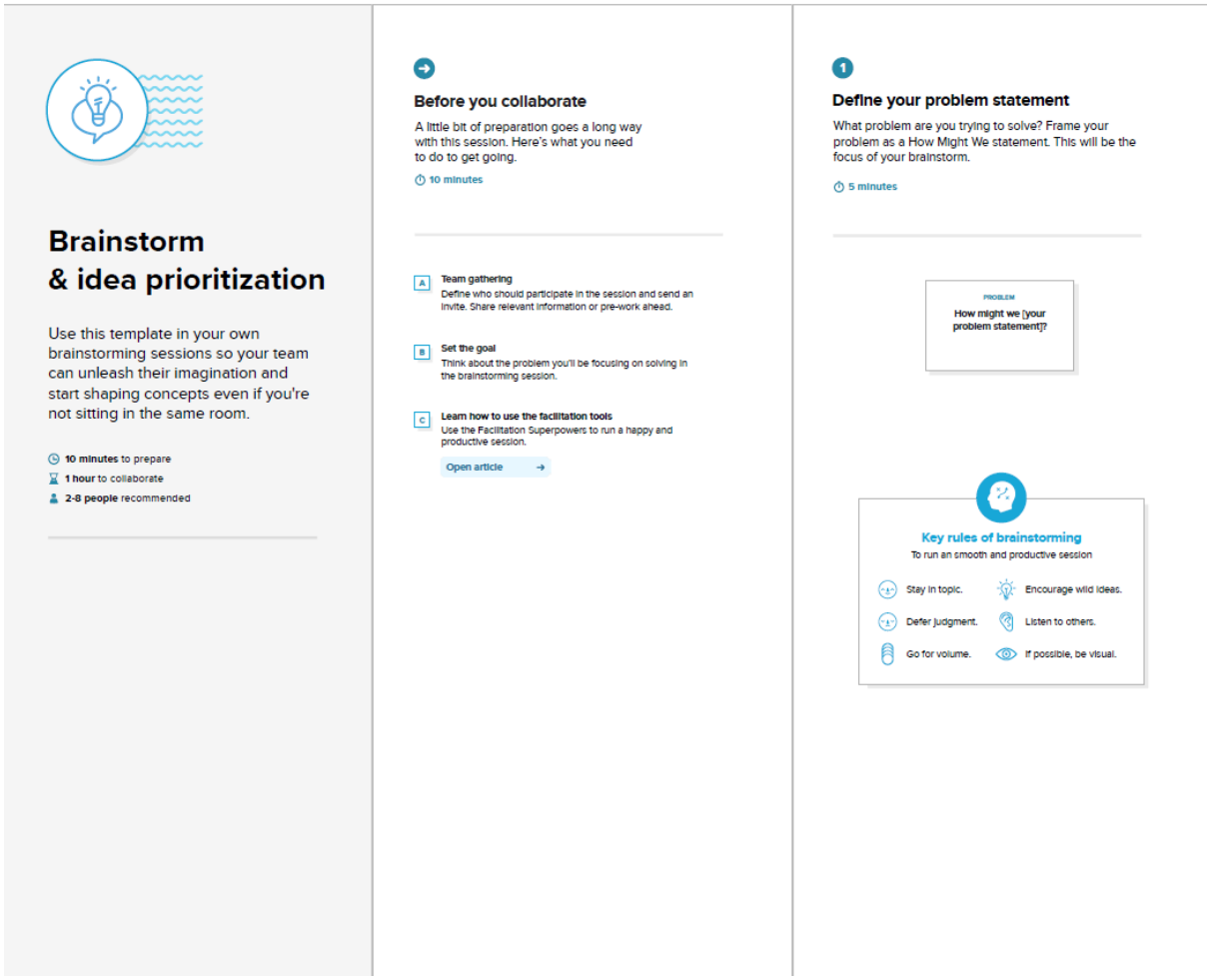
Reference link:
https://app.mural.co/t/kongunaducollegeofengineerin3789/m/kongunaducollegeofengineerin3789/1663757309128/8b99218f76c12adbbe29b93c4c538ed674c14186?sender=uba71285b929105ef73099476

3.2 IDEATION AND BRAIN STORMING

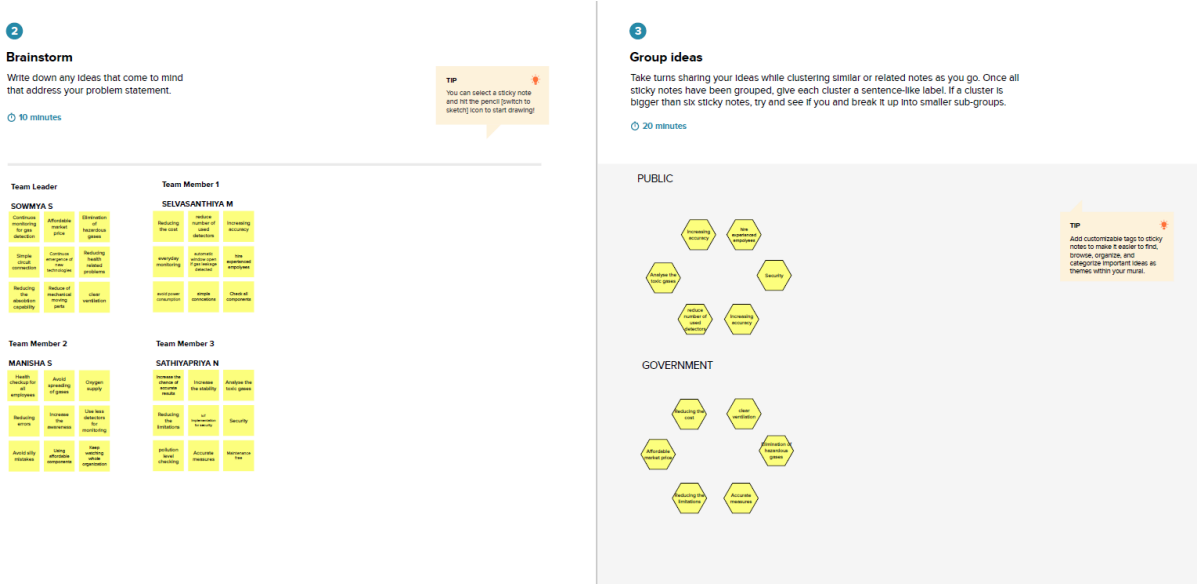
Ideation Phase
Brainstorm&Idea Prioritization

Date	19 September 2022
Team ID	PNT2022TMID13684
Project Name	Analytics for hospital's health-care data
Maximum Marks	4 Marks

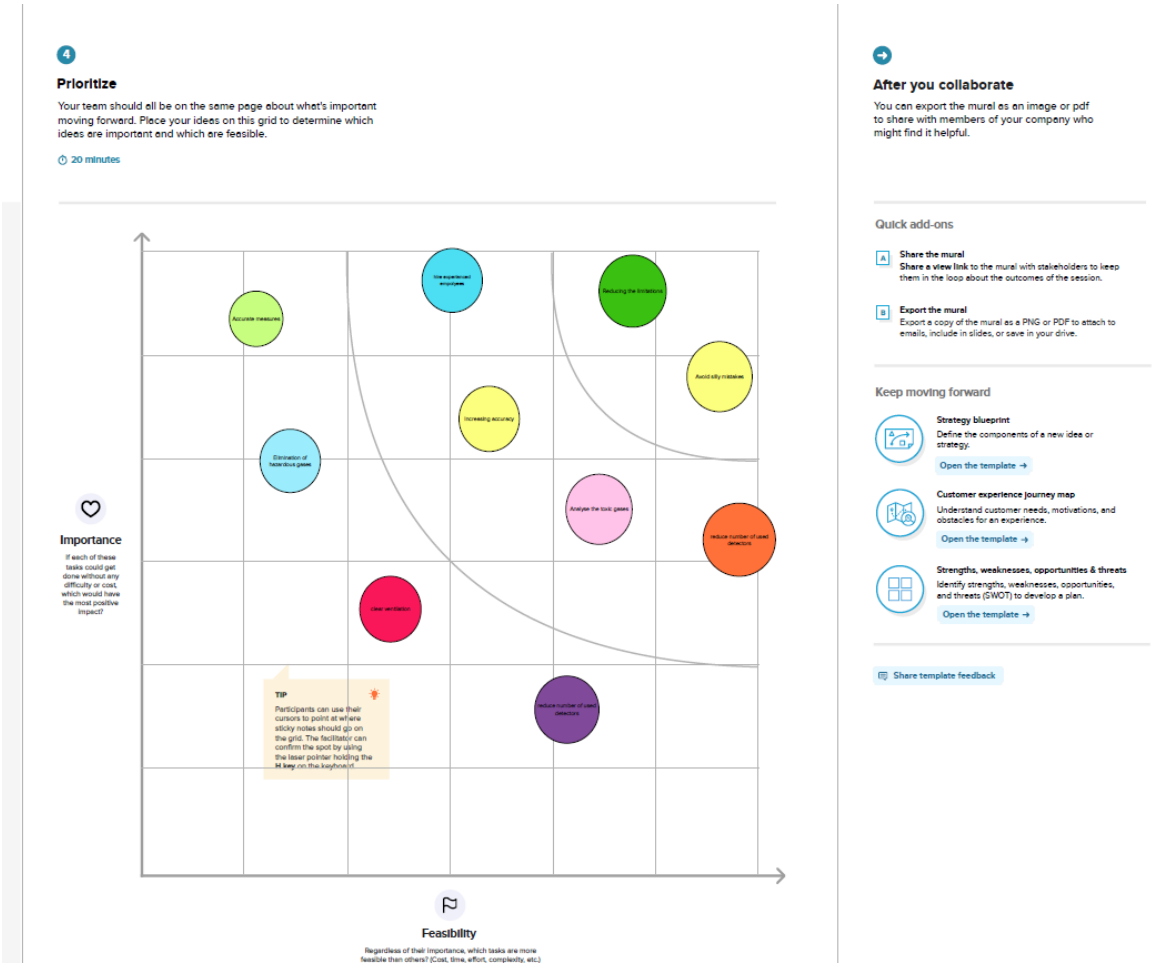
Step-1: Team Gathering, Collaboration and Select the Problem Statement



Step-2: Brainstorm, Idea Listing and Grouping



Step-3: Idea Prioritization

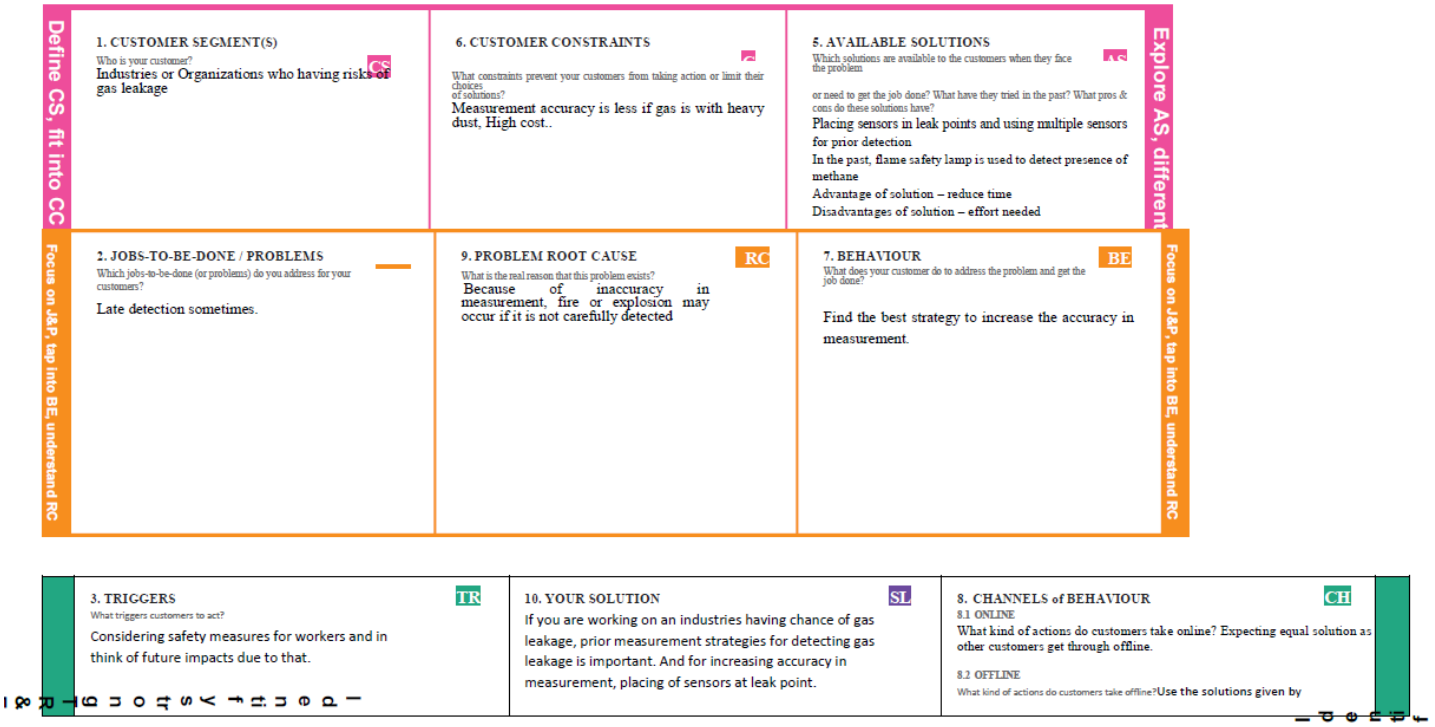


3.3 PROPOSED SOLUTION

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

S.No.	Parameter	Description
1.	Problem Statement (Problem to be solved)	The leakage of gases only can be detected by human nearby and if there are no human nearby, it cannot be detected. But sometimes it cannot be detected by human that has a low sense of smell. Thus, this system will help to detect the presence of gas leakage.
2.	Idea / Solution description	If the system detects the level of gas in the air that exceeds the safety level it will activate the alarm which includes the buzzer to alert the users at industries of the abnormal condition and to take any necessary action.
3.	Novelty / Uniqueness	Reducing the cost of the gas leakage detector and increasing the accuracy percentage.
4.	Social Impact / Customer Satisfaction	These leaks cause safety threats and secondary accidents for those working in industry and the environment
5.	Business Model (Revenue Model)	The gas detector market is forecast to reach $2.96 billion by 2025, growing at a CAGR of 4% during 2019-2025.
6.	Scalability of the Solution	A wide range of industrial fixed gas detectors featuring flexible integration, simple installation, user-friendly operation

3.4 PROBLEM SOLUTION FIT



CHAPTER 4
REQUIREMENT ANALYSIS

4.1 FUNCTIONAL REQUIREMENTS

FR No.	Functional Requirement (Epic)	Sub Requirement (Story / Sub-Task)
FR-1	Concern	It checks impurities simultaneously Gives alert message if gas leakage detected
FR-2	User Notification	Alert notification via message Alert notification via call
FR-3	Security	Safety is a key. Because, safety equipments effectively guard against toxic gases
FR-4	Accuracy	In emergency situation, accuracy should should not be falter. So, It should notify employees.

4.2 NON-FUNCTIONAL REQUIREMENTS

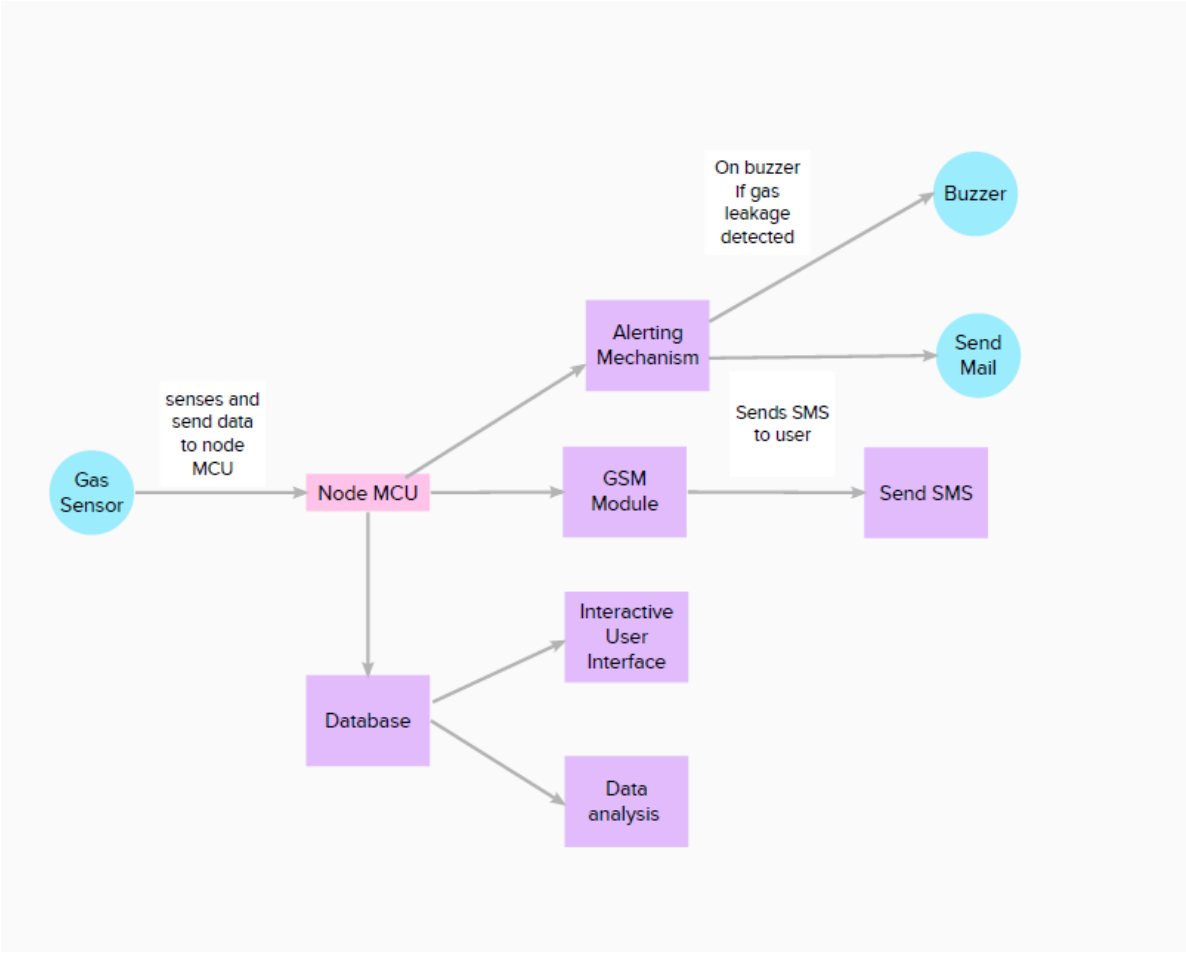
FR No.	Non-Functional Requirement	Description
NFR-1	**Usability**	Easily handled in industries and semiconductor devices.
NFR-2	**Security**	Personal protective equipment enclosing the testing area so non-essential personnel cannot enter
NFR-3	**Reliability**	Reliable gas monitor will keep employees safe for long term.
NFR-4	**Performance**	Gas leakage detection Triggering real time alarms
NFR-5	**Availability**	System functionality available with all features and with all operations
NFR-6	**Scalability**	This product is needed for more users like industries and organizations.

CHAPTER 5

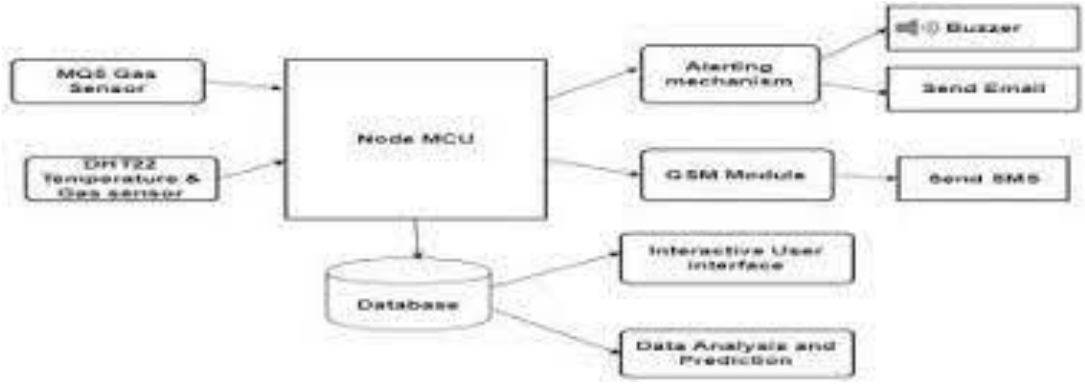
5. PROJECT DESIGN

A data flow diagram can show the information flows through a process. This includes data input/output, data storage, and various sub processes through which data moves. DFDs are created using standardized symbols and notations to describe various entities and their relationships.

5.1 DATA FLOW DIAGRAM



5.2 SOLUTION&TECHNICALARCHITECTURE



Gas leaks can result in a variety of health problems, thus it is important to warn against such catastrophes at work by putting in place a safety system that can provide users an early warning. The creation of a wireless sensor network for LPG gas leak detection is discussed in this study. A gas sensor, an XBee, and an Arduino Nano microcontroller are all part of the suggested design. The sensor node will locate the precise location of the sensor node by collecting data on gas leakage as well as detecting a minute concentration of the gas based on the voltage output of a sensor. Data from the gas sensor is transmitted via XBee to the monitoring system and shown on the LabVIEW GUI.

As a communication tool between the microcontroller unit and mobile phone unit, a GSM module was used. Any remote location could install the system, and any mobile device that supports SMS service may operate it. The system's dependability and productivity are its main considerations, and they have an impact on the decisions made when designing the hardware and software for the system.

5.4USER STORIES

A "user narrative" is a casual, generic explanation of a software feature written from the perspective of the client or end user. A user narrative explains how a piece of work will give the client a specific of a value.

6.1 SPRINT DELIVERY SCHEDULE

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	Low	Sprint-2
		USN-4	As a user, I can register for the application through Gmail	I can register & access the dashboard with Gmail Login	Medium	Sprint-1
	Login	USN-5	As a user, I can log into the application by entering email & password	I can access my account / dashboard	High	Sprint-1
	Dashboard	USN-6	Uploading data	I can be able to upload my dataset	High	Sprint 2
Customer (Web user)		USN-7	Working with data	I can be able to access my dashboard	High	Sprint 2
Customer Care Executive		USN-8	Visualization	I can be able to view the visual attrition rate of my dataset	High	Sprint 3
Administrator		USN-9	Working with dashboard	I can be able to view the various views of the attrition rate	High	Sprint 3
		USN-10	Asking Help / feedback	I can be able to ask help if I can face any issues or problems while using the webpage	Medium	Sprint 4
		USN-11	Managing the database	I can assure that my data is in secure state	High	Sprint 4

CHAPTER 6
6. PROJECT PLANNING & SCHEDULING
6.2 SPRINT PLANNING & ESTIMATION

Project Tracker, Velocity & Burndown Chart: (4 Marks)

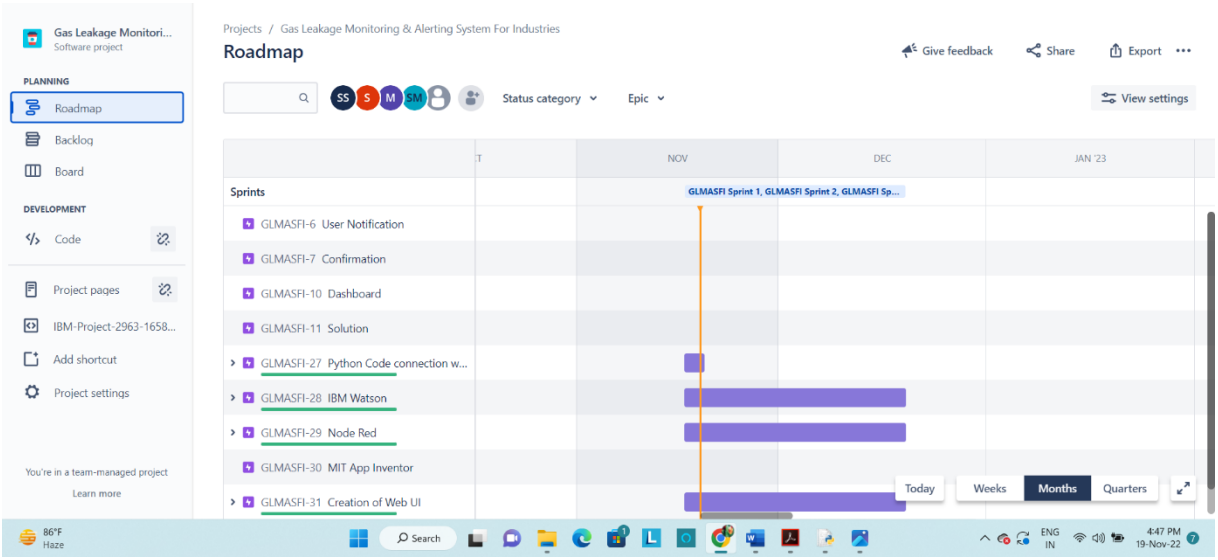
Sprint	Total Story Points	Duration	Sprint Start Date	Sprint End Date (Planned)	Story Points Completed (as on Planned End Date)	Sprint Release Date (Actual)
Sprint-1	20	6 Days	24 Oct 2022	17 Nov 2022	4	19 Oct 2022
Sprint-2	20	6 Days	31 Oct 2022	17 Nov 2022	4	19 Nov 2022
Sprint-3	20	6 Days	07 Nov 2022	17 Nov 2022	8	19 Nov 2022
Sprint-4	20	6 Days	14 Nov 2022	17 Nov 2022	2	19 Nov 2022

6.1 SPRINT DELIVERY SCHEDULE

Sprint	Functional Requirement (Epic)	User Story Number	User Story / Task	Story Points	Priority	Team Members
Sprint-1	Python Code connection with IBM cloud	USN-1	Python code is created for getting the gas leakage values and prerequisites.	1	High	SOWMYA S
		USN-2	Python code is linked with the IBM cloud	3	High	SELVASANTHIYA M
Sprint-2	IBM Watson	USN-3	Watson device connection with output	3	High	SATHIYAPRIYA N
		USN-4	Watson dashboard creation	1	High	SELVASANTHIYA M
Sprint-3	Node red	USN-5	Node-red flow	5	Low	MANISHA S
		USN-6	Node-red dashboard	3	High	SATHIYAPRIYA N
Sprint-4	Web UI and Fast SMS	USN-7	Creation of web UI and fast SMS	2	Medium	SOWMYA S

6.2 REPORTS FROM JIRA

Jira helps teams plan, assign, track, report, and manage work and brings teams together for everything from agile software development and customer support to start-ups and enterprises.



CHAPTER 7

CODING &SOLUTION

7.1 FEATURE 1

Platforms for serverless computing offer developers a quick approach to create APIs without servers. REST API for activities can be generated automatically with Cloud Functions. Additionally, operations performed by Cloud Functions can be linked to a preferred API Management tool such as IBM API Connect or another.

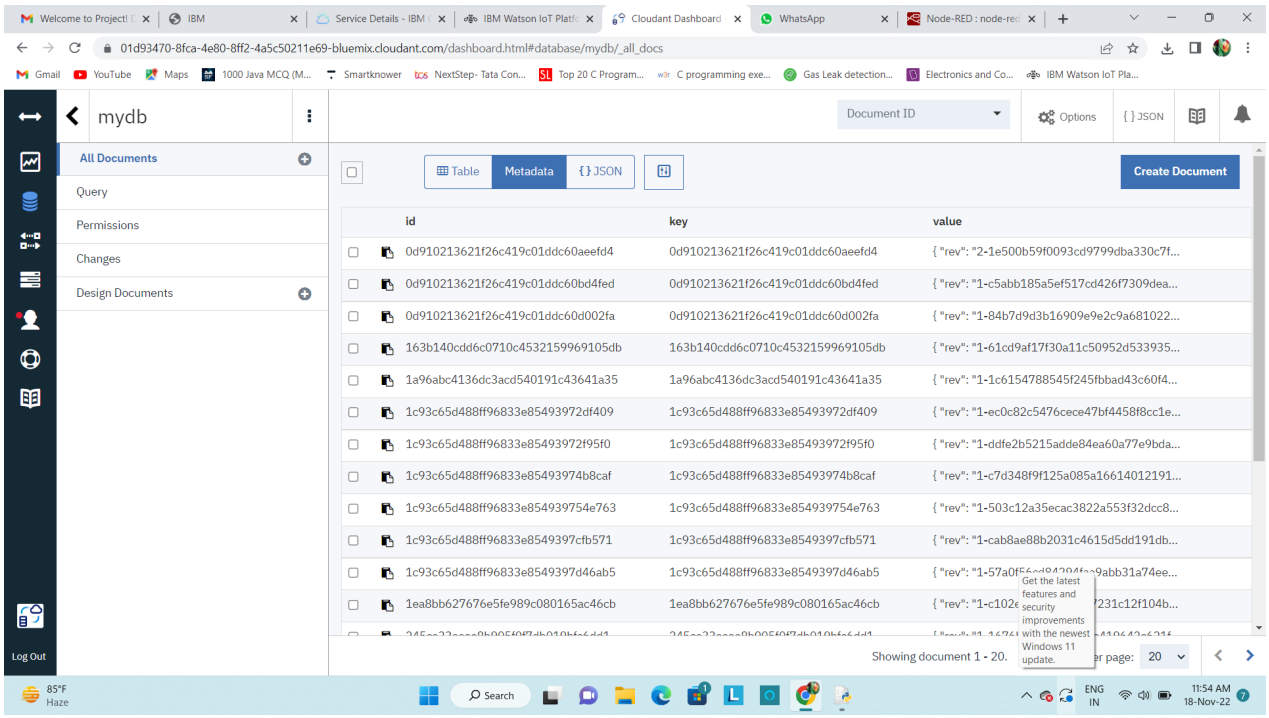
7.2 FEATURE 2

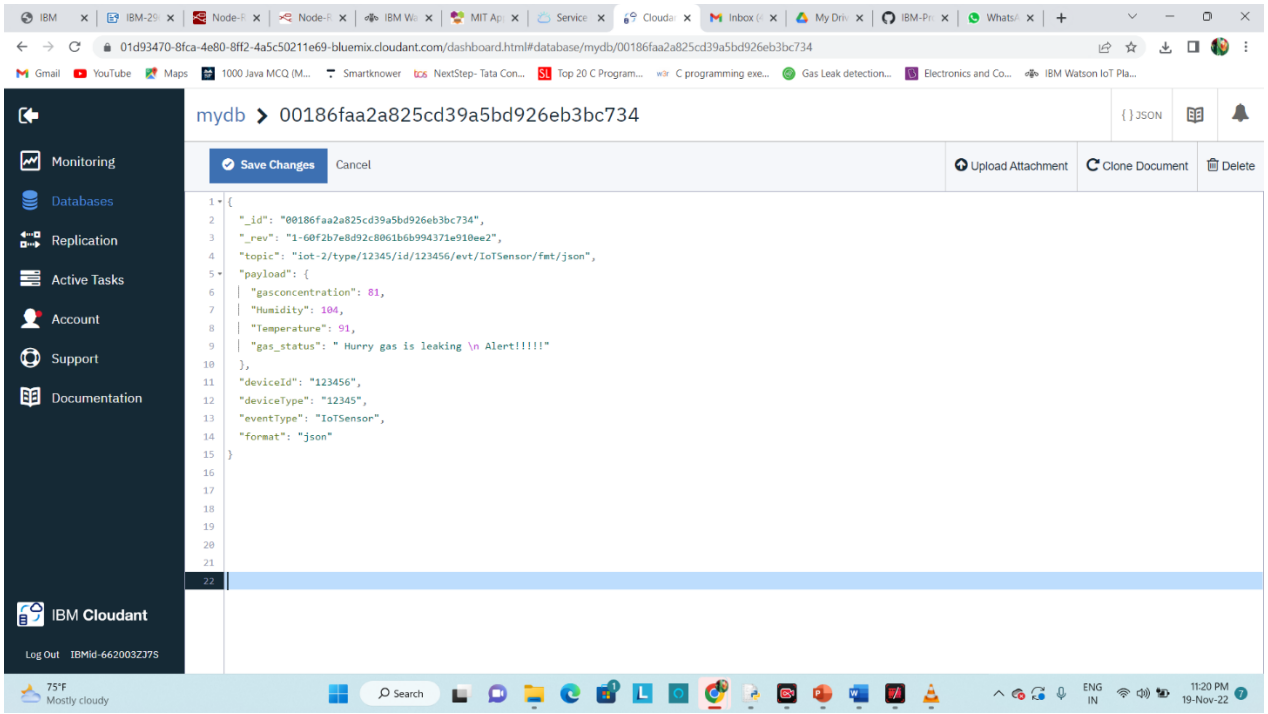
Node-RED is a programming tool for tying new and intriguing connections between physical components, APIs, and web services. With the help of the extensive selection of nodes in the palette that can be deployed to its runtime with a single click, it offers a browser-based editor that makes it simple to wire up flows.

- The deploy button is located in the editor window's header, which also contains the main menu and, if user authentication is enabled, the user menu.
- The nodes that are available for use are displayed in the palette on the left.
- The central workstation, where flows are developed.
- The right-hand sidebar

7.3 DATABASE SCHEMA

Database:





CHAPTER 8

TESTING

8.1 TEST CASES

A test case's objective is to ascertain whether various system features operate as anticipated and to check that the system complies with all applicable standards, recommendations, and user requirements. The act of creating a test case can also assist in identifying flaws or problems in the system.

8.2 USER ACCEPTANCE TESTING

User Acceptance Testing is a critical phase of any project and requires significant participation by the end user. It also ensures that the system meets the functional requirements. All test cases are run at this point to ensure that the program is right and complete.

The test must be completed successfully before the program can be accepted by the customer. The customer formally approves the delivery of this system after customer workers have checked that the preliminary production statistics load is correct and that the test suite has been achieved with perfect results.

CHAPTER 9

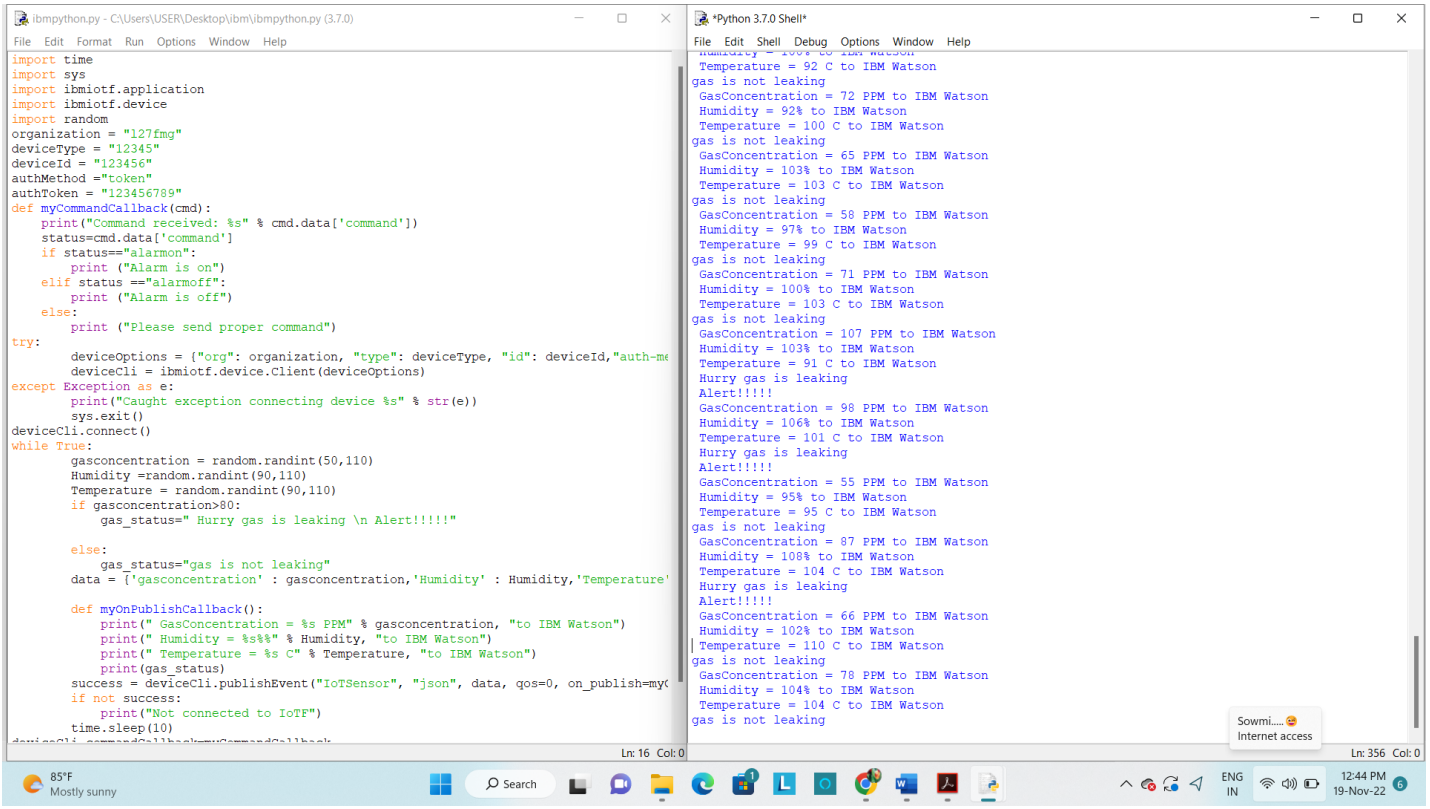
RESULTS

9.1 PERFORMANCE METRICS

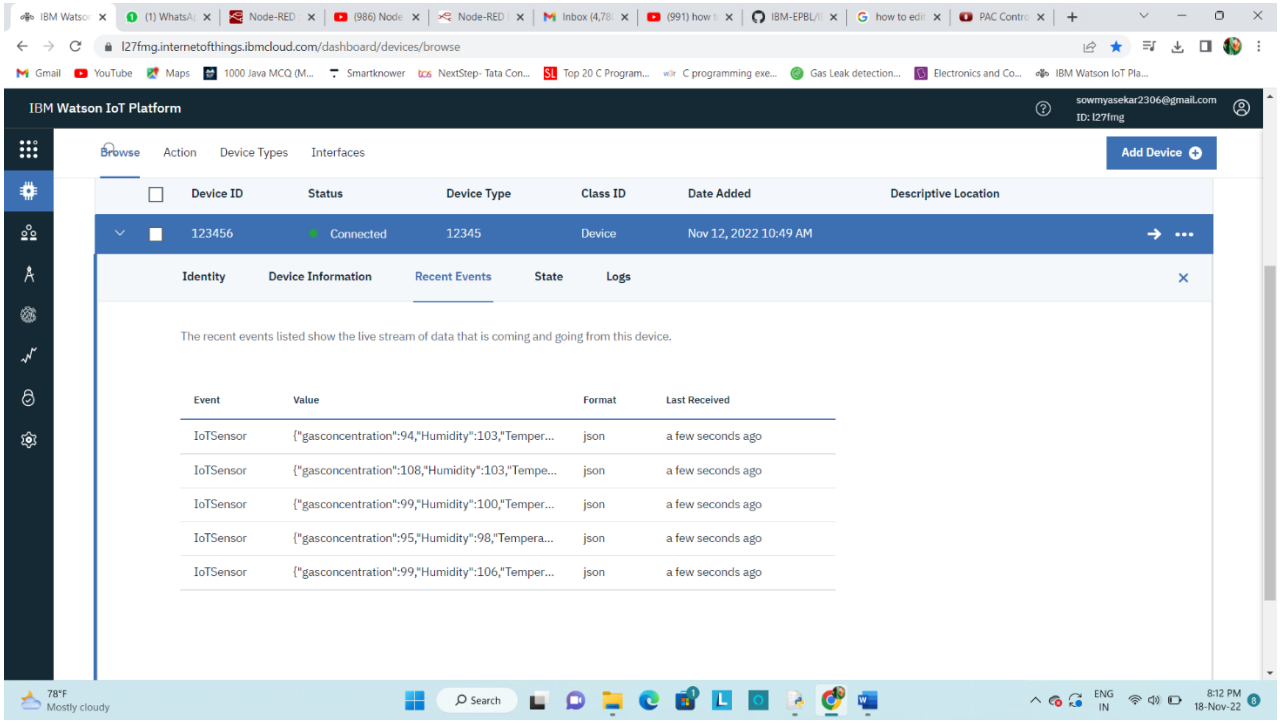
9.1.1 PYTHON CODE:

Python code is created for detecting the gas leak value, humidity and temperature value in order to know the status of gas leakage for the purpose of safeguarding the workers in industries.

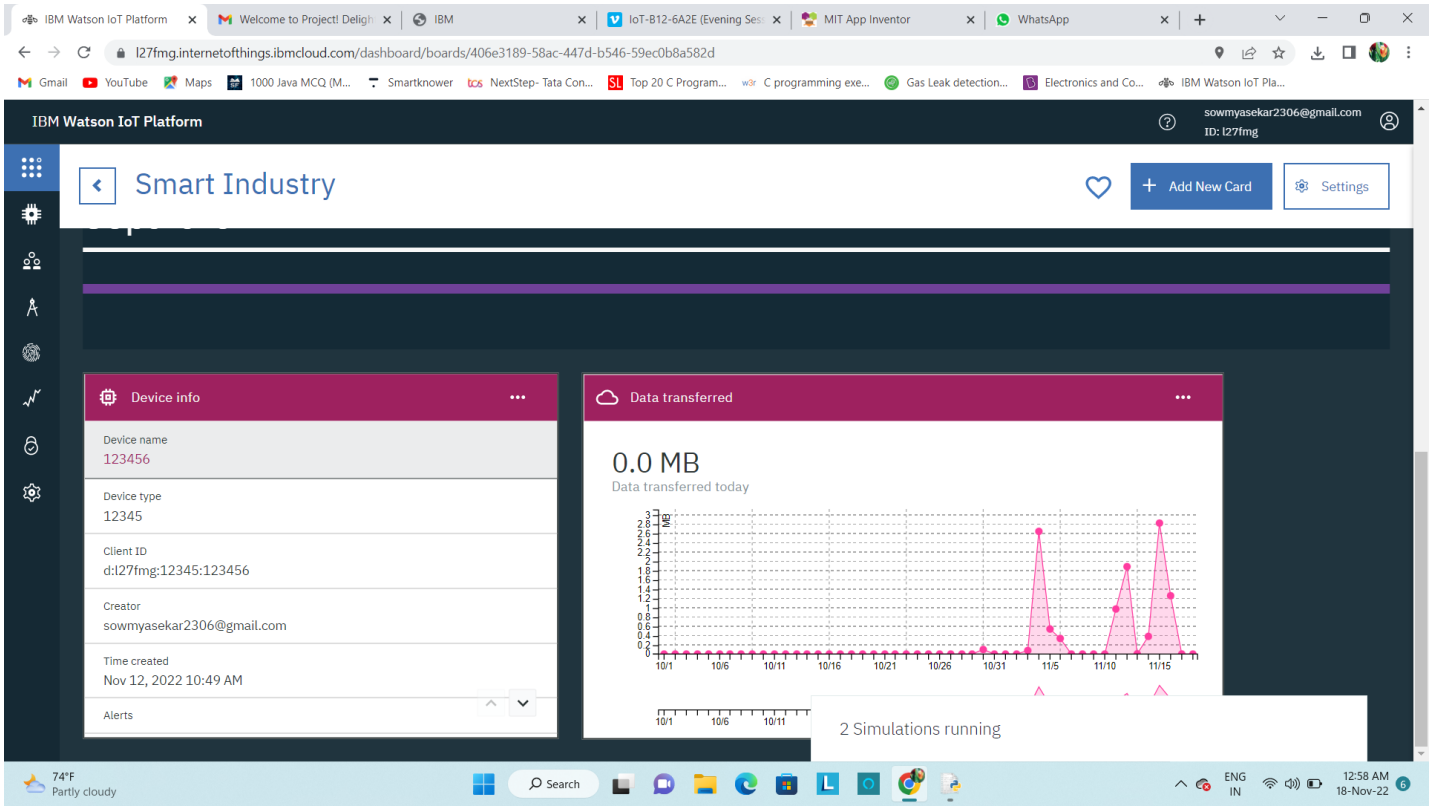
PYTHON CODE OUTPUT:

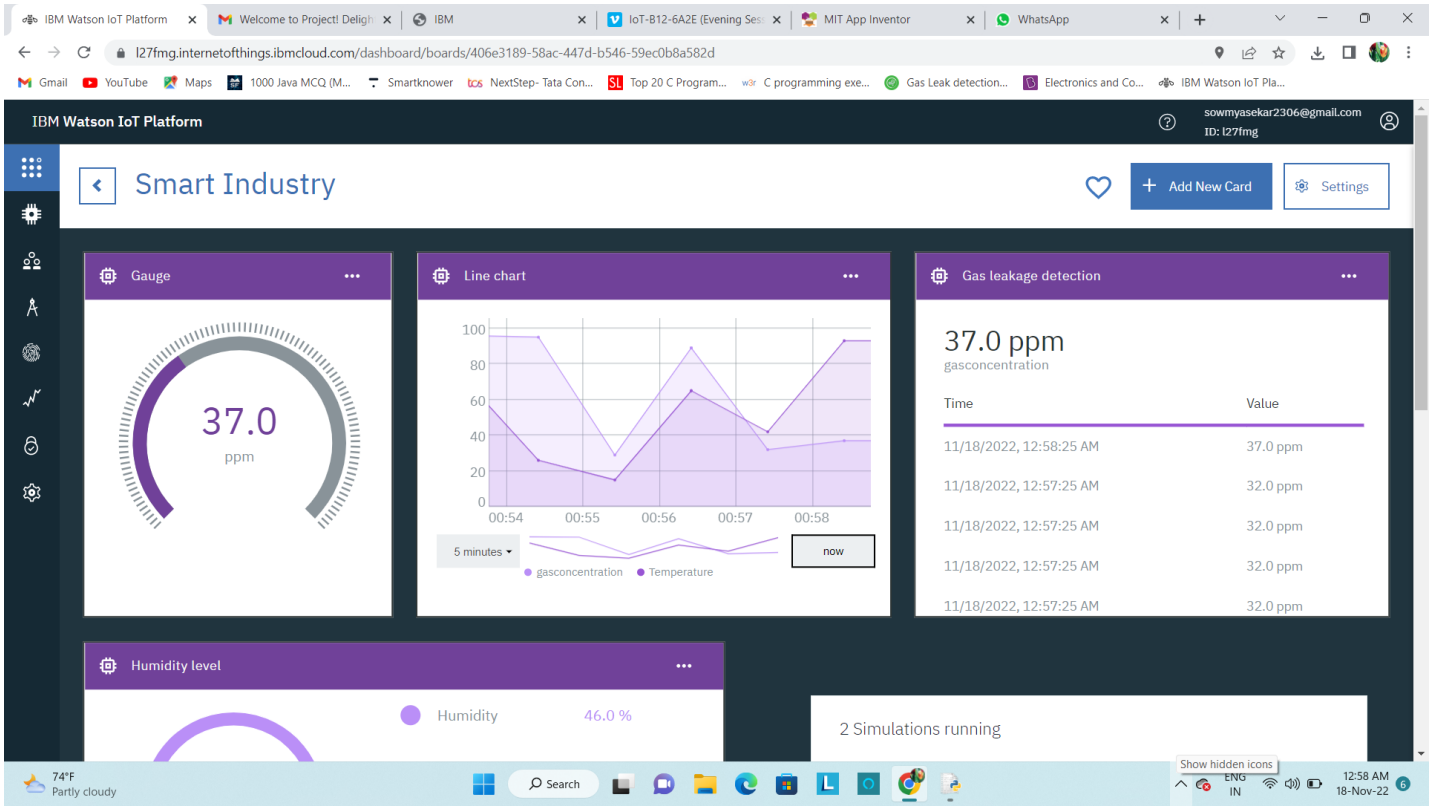


9.1.2 Watson Output:



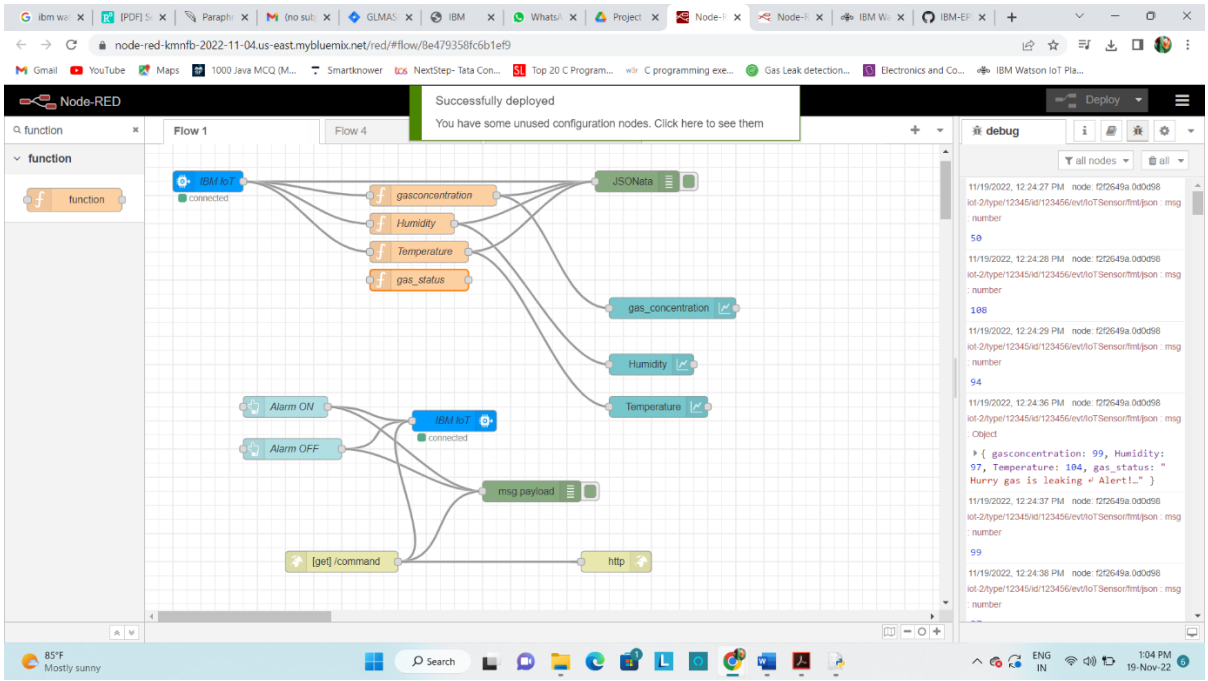
9.1.3 IBM Watson Dashboard:





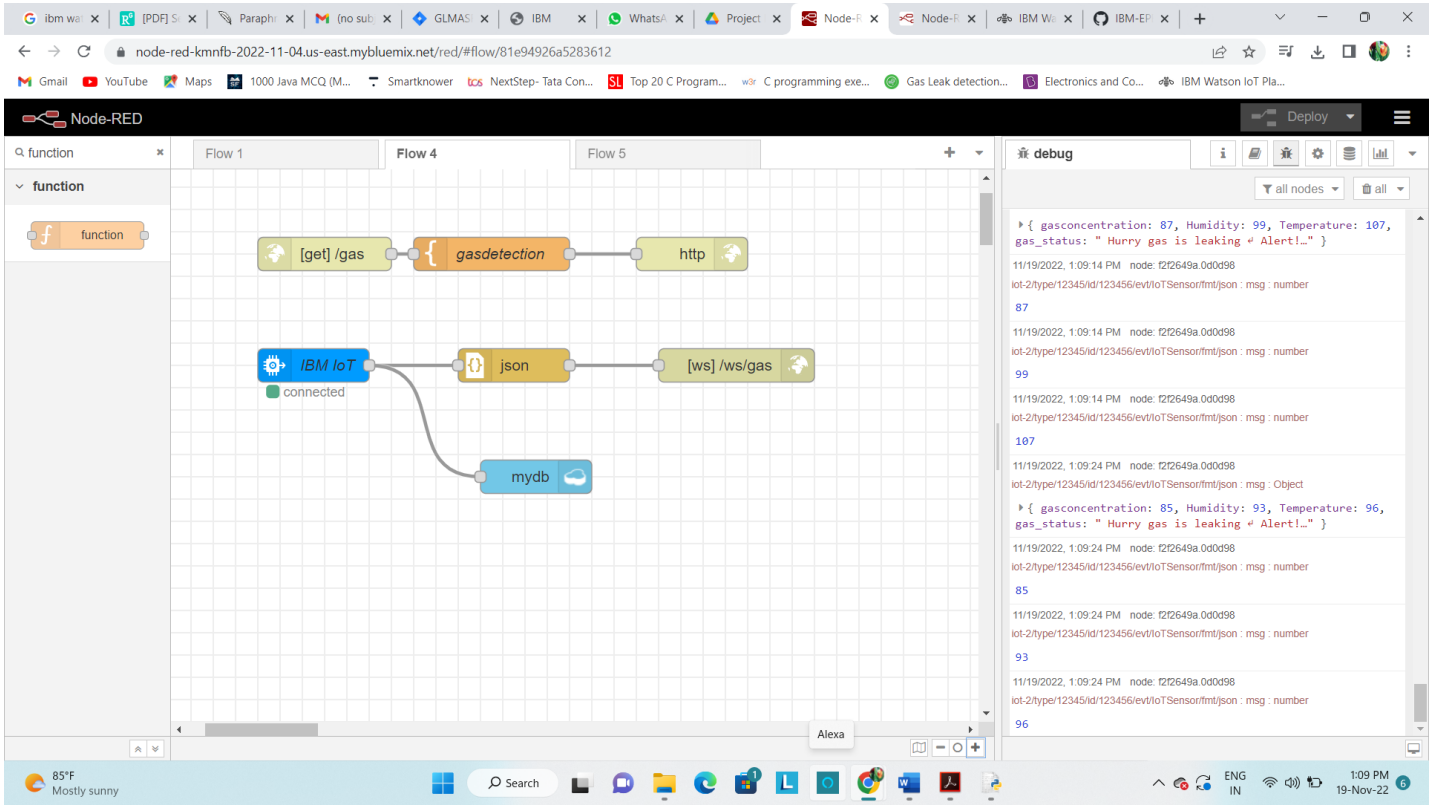
9.1.4 NODE-RED:

Node-RED is a flow-based visual programming tool that was initially created by IBM for the Internet of Things to connect hardware components, APIs, and online services.



NODE-RED DASHBOARD :

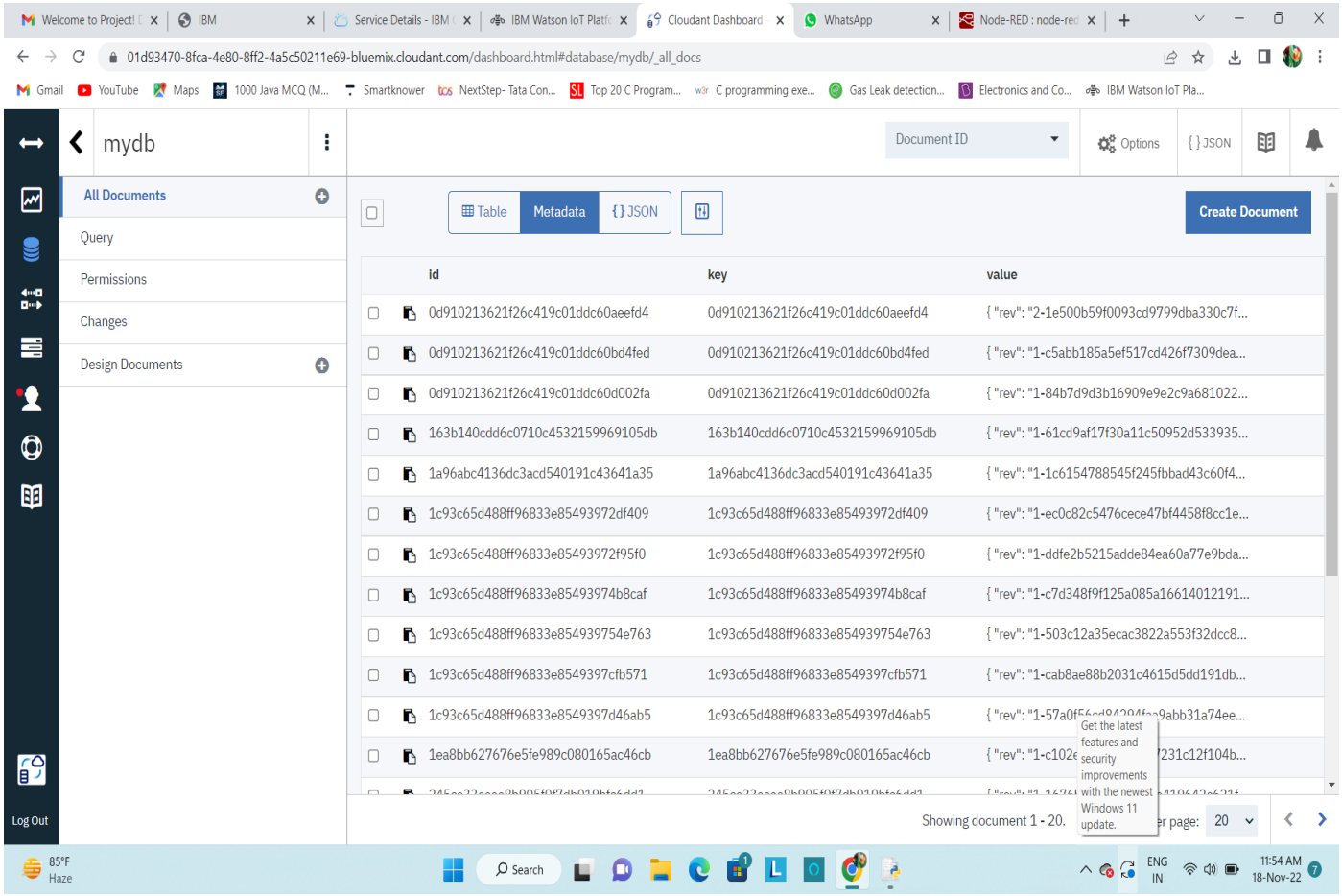
The Node-RED Dashboard is a group of nodes that lets you build a web dashboard that communicates with your flow directly. Inject nodes can be swapped out for buttons using the various nodes, and data can now be sent directly to a web component like a gauge or table rather than having to first print it to the debug.



9.1.6 CLOUDANT:

With autonomous serverless scaling of throughput capacity and storage, IBM Cloudant is a fully managed JSON document database.

IBM Cloud Functions is a polyglot functions-as-a-service (FaaS) programming platform for creating lightweight code that scales on demand. It is based on Apache OpenWhisk.


Welcome to Project!
IBM
Service Details - IBM
IBM Watson IoT Platfc
Cloudant Dashboard
WhatsApp
Node-RED : node-red
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YouTube
Maps
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CHAPTER 10

10.1 ADVANTAGES

- ✓ There is no ‘poisoning’ or degradation of the instrument with long term exposure to a gas.

- ✓ Can easily be conformed to be ‘Intrinsically Safe’.

- ✓ Low maintenance and low operating costs. • Reliable technology.

10.2 DISAVANTAGES

- ✓ Only one gas can be measured with each instrument.
- ✓ When heavy dust, steam or fog blocks the laser beam, the system will not be able to take measurements. This is also the case when a person or vehicle blocks the path.

CHAPTER 11

CONCLUSION

After this project performance, can conclude that detection of the LPG gas leakage is incredible in the project system. Applicable usefully in the industrial and domestic purpose. In danger situations we are able to save the life by using this system. An alert is indicated by the GSM module. A sensor node senses gas like CO2, oxygen, propane. The estimated range of transmission and consumption of power is obtained. The simple procedures and Arduino UNO Micro controller area used to build the sensor.

Gas detectors can be used **to detect combustible, flammable and toxic gases, and oxygen depletion**. This type of device is used widely in industry and can be found in locations, such as on oil rigs, to monitor manufacturing processes and emerging technologies such as photovoltaic. They may be used in firefighting.

If you want a gas leak detector that fits in the palm of your hand, pick up the **Techamor Y201**. This is an affordable option for confirming whether there are any leaks present in your home or office space. The device includes a sensor tip for detecting natural gas, methane, propane, gasoline, and other flammable gases.

CHAPTER 12

FUTURE SCOPE

In this paper, we use IOT technology to raise the bar for current safety regulations. The goal of creating this prototype was to revolutionise environmental safety by eliminating any major or minor hazards brought on by the release of toxic and harmful gases into the environment. We have used the IOT technology to develop a Gas Leakage Detector for society which having Smart Alerting approaches involving sending text message to the concerned authority and an ability conducting data analytics on sensor. Using gas sensors, this system will be able to identify any gases present in the surrounding area. This will prevent form the major harmful proble. It will shield against the main harmful issue. This straightforward gas leak detector's simplicity and capacity to issue warnings are its two main advantages. This will shield us from the main harmful issue. The advantage of this simple gas leak detector is its simplicity and its ability to warn about the leakage of the LPG gas . A mobile gas sensing robot can be constructed to sense the leakage of gas through pipelines as the robot can move on a track which is situated along the length of pipeline.

ADVANTAGES:

I. Receive real-time notifications regarding the presence Prevent fire hazards and explosions
II. Monitor the levels of gas concentration
III. Observe worker health
IV. Current information about leaks

13.1 SOURCE CODE

```
import time
import sys
import ibmiotf.application
import ibmiotf.device
import random
organization = "l27fmg"
deviceType = "12345"
deviceId = "123456"
authMethod ="token"
authToken = "123456789"
def myCommandCallback(cmd):
    print("Command received: %s" % cmd.data['command'])
    status=cmd.data['command']
    if status=="alarmon":
        print ("Alarm is on")
    elif status =="alarmoff":
        print ("Alarm 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:
        gasconcentration = random.randint(90,110)
        Humidity =random.randint(90,110)
        Temperature = random.randint(90,110)

        data = {'gasconcentration' : gasconcentration,'Humidity' : Humidity,'Temperature'
```

```
:Temperature}

        def myOnPublishCallback():
            print(" GasConcentration = %s PPM" % gasconcentration, "to IBM Watson")
            print(" Humidity = %s%%" % Humidity, "to IBM Watson")
            print(" Temperature = %s C" % Temperature, "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()
```

13.2 GITHUB & PROJECT DEMO LINK

Github Link:

https://github.com/IBM-EPBL/IBM-Project-2963-1658488855

PROJECT DEMO LINK:

https://youtu.be/uj6OytoHFfs