

Project Report Format

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1. INTRODUCTION

The Internet of things is an emerging topic of technical, social, and economic significance. Consumer products, durable goods, cars and trucks, industrial and utility components, sensors, and other everyday objects are being combined with Internet connectivity and powerful data analytic capabilities that promise to transform the way we work, live, and play. Projections for the impact of IoT on the INTERNET and economy are impressive, with some anticipating as many as 100 billion connected IoT devices and a global economic impact of more than \$11 trillion by 2025.

The Internet of things (IoT) is an important topic in technology industry, policy, and engineering circles. This technology is embodied in a wide spectrum of networked products, systems, and sensors, which take advantage of advancements in computing power, electronics miniaturization, and network interconnections to offer new capabilities.

The large-scale implementation of IoT devices promises to transform many aspects of the way we live. For consumers, new IoT products like Internet-enabled appliances, home automation components, and energy management devices are moving us towards a vision of the “smart home”, offering more security and energy efficiency.

IoT systems like networked vehicles, intelligent traffic systems, and sensors embedded in roads and bridges move us closer to the idea of “smart cities”, which help minimize congestion and energy consumption. IoT technology offers the possibility to transform agriculture, industry, and energy production and distribution by increasing the

availability of information along the value chain of the productions using networked sensors.

1.1 Project Overview

In this paper we use IOT technology for enhancing the existing safety standards. While making this prototype has been to bring a revolution in the field of safety against the leakage of harmful and toxic gases in environment and hence nullify any major or minor hazard being caused due to them. We have used the IOT technology to make a Gas Leakage Detector for society which having Smart Alerting techniques involving sending text messages to the concerned authority and an ability performing data analytics on sensor. This system will be able to detect the gas in environment using the gas sensors. This will prevent from the major harmful problem.

1.2 Purpose

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.

2. LITERATURE SURVEY

In our daily life we may face many chances to face fire accidents because of gas leakage. This can occur in places like apartments, houses, gas industry, chemical industry, food industry, gas pump, welding shops, hospitals, schools, and college laboratories. This can be ignored by some safety measures like installing gas leakage and alert when the gas leakage

occurs. Gas leakage can cause global warming and some toxic gases are harmful to health and some gases are dreadful gases like carbon mono oxide. Some flammable gases are able to get fire and get burst easily by a single spark of fire. Some fire gases are harmful to lungs and some are harmful to asthma patients. In hospitals gases like helium oxygen are stored in a cylinder and also stored in a large sized cylinder and in some reaction harmful gases formed by reaction and the acetelyne gas used in welding is combustibile gas that can cause fire accident. To avoid these situations and to avoid these fire accidents an monitoring system must be installed everywhere. Whatever the gas leakage may be takes places they must be monitored to protect people and other workers. In this busy world people don't have time to notice & monitor everything on their own. That leads to gas leakage and it causes to fire accident by gas combustion. The gas monitoring and alerting system helps people to be aware and let them know when the gad leakage occurs. This will protect them from fire accidents. This is the most essentials system in the places where gas leakage or gas storage occurs.

2.1 Existing problem

The Proteus Design Suite is a proprietary software tool suite used primarily for electronic design automation. The software is used mainly by electronic design engineers and technicians to create schematics and electronic prints for manufacturing printed circuit boards. The circuit diagram that was designed using Proteus libraries. This system is based on Arduinio UNO R3 and MQ-6 gas sensor. When the sensor detects gas in atmosphere, it will give a digital output of 1 and if gas is not detected the sensor will give a digital output 0. Arduinio will take the sensor output as the digital input. The detector incorporates a MQ-6 sensor (with gas detection range of 300-10,000 ppm) as the LPG gas sensor. PIC16F690 microcontroller as the control unit. LCD for displaying the gas concentration, a buzzer as an alarm and a number of LEDs to

indicate the gas leakage status. The microcontroller senses the presence of a gas when the voltages signal from the MQ-6 sensor goes beyond a certain level and gives an audiovisual alarm.

2.2 References

[1] Shital Imade ,Priyanka Rajmanes,Aishwarya Gavali,Prof. V. N. Nayakwadi “GAS LEAKAGE DETECTION AND SMART ALERTING SYSTEM USING IOT”
<https://www.pramanaresearch.org/gallery/22.%20feb%20ijirs%20-%20d539.pdf>

[2]Kumar Keshamoni and Sabbani Hemanth. “Smart Gas Level Monitoring, Booking &Gas Leakage Detector over IoT”

International Advance Computing Conference IEEE, 2017.

[3]Prof . M . Amsaveni, A . Anurupa, R. S. Anu Preetha, C . Malarvizhi, M. Gunasekaran” GSM based LPG leakage detection and controlling system”the international Journal of Engineering and Science (IJES)ISSN(e):2319 -1813 ISSN (p):2319-1805 Pages 112-116 March -2015.

[4]Pal-Stefan Murvaya, IoanSileaa “A survey on gas leak detection and localization techniques”

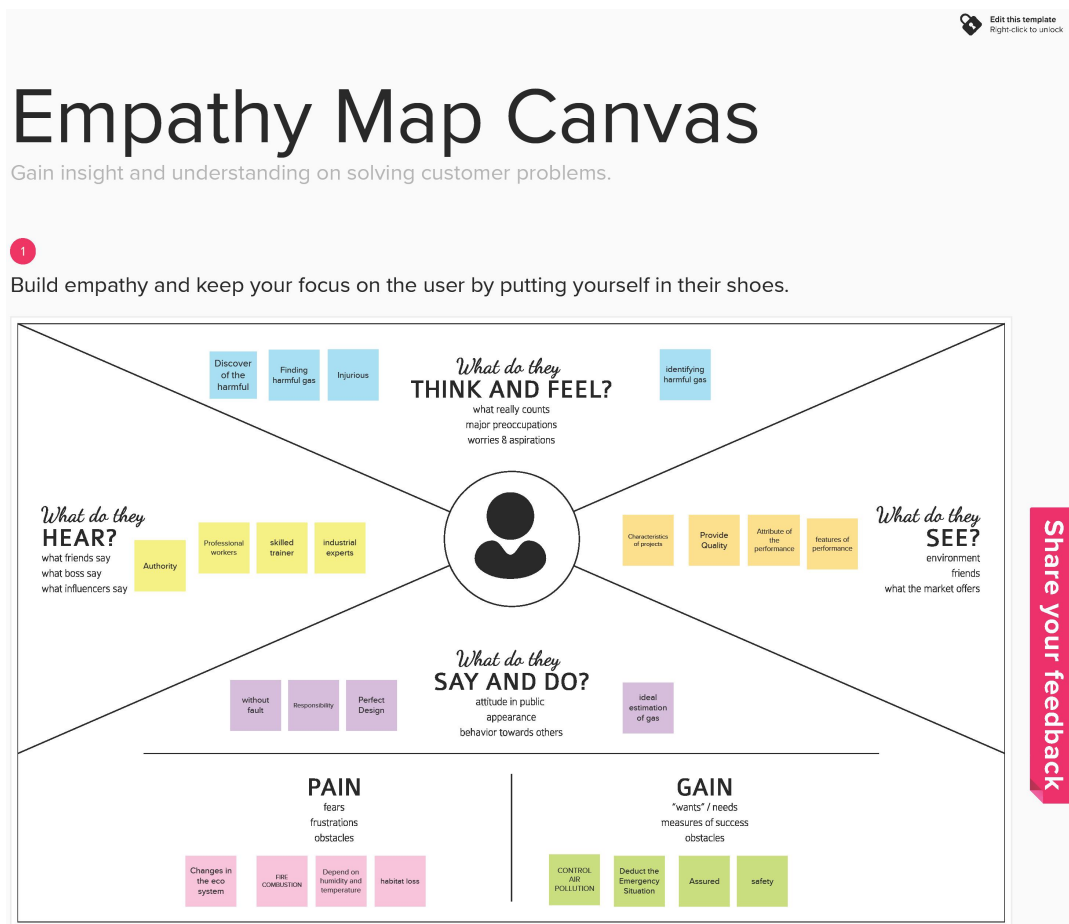
[5]Srinivasan, Leela, Jeyabharathi ,Kirithika, Rajasree “GAS LEAKAGE DETECTION AND CONTROL” Scientific Journal of impact factor(SJIF): 3.134

2.3 Problem Statement Definition

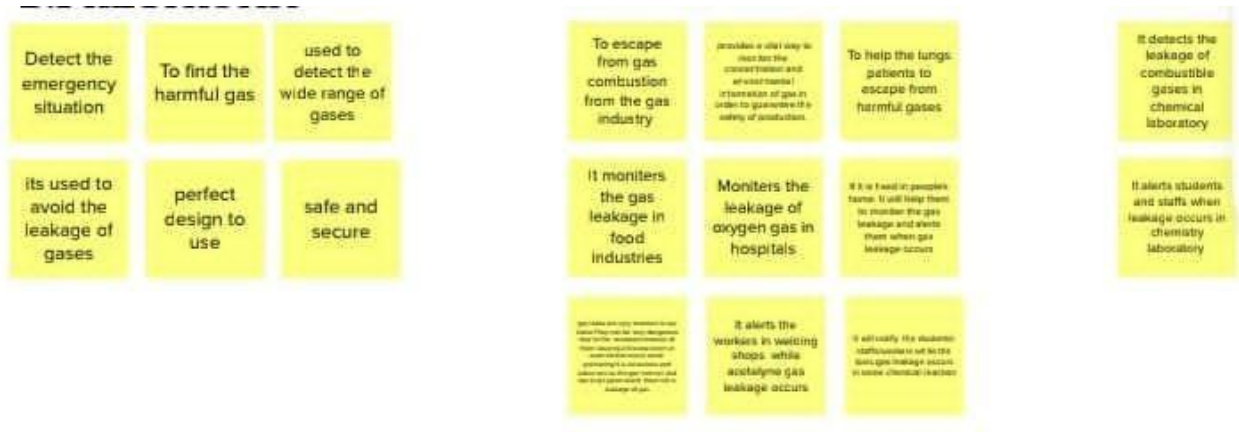
For the Internet of Things(IOT), this paper analyzes several required characteristics of the objects ,investigates key technical considerations to solve problems and illustrates enhanced services using smart objects.

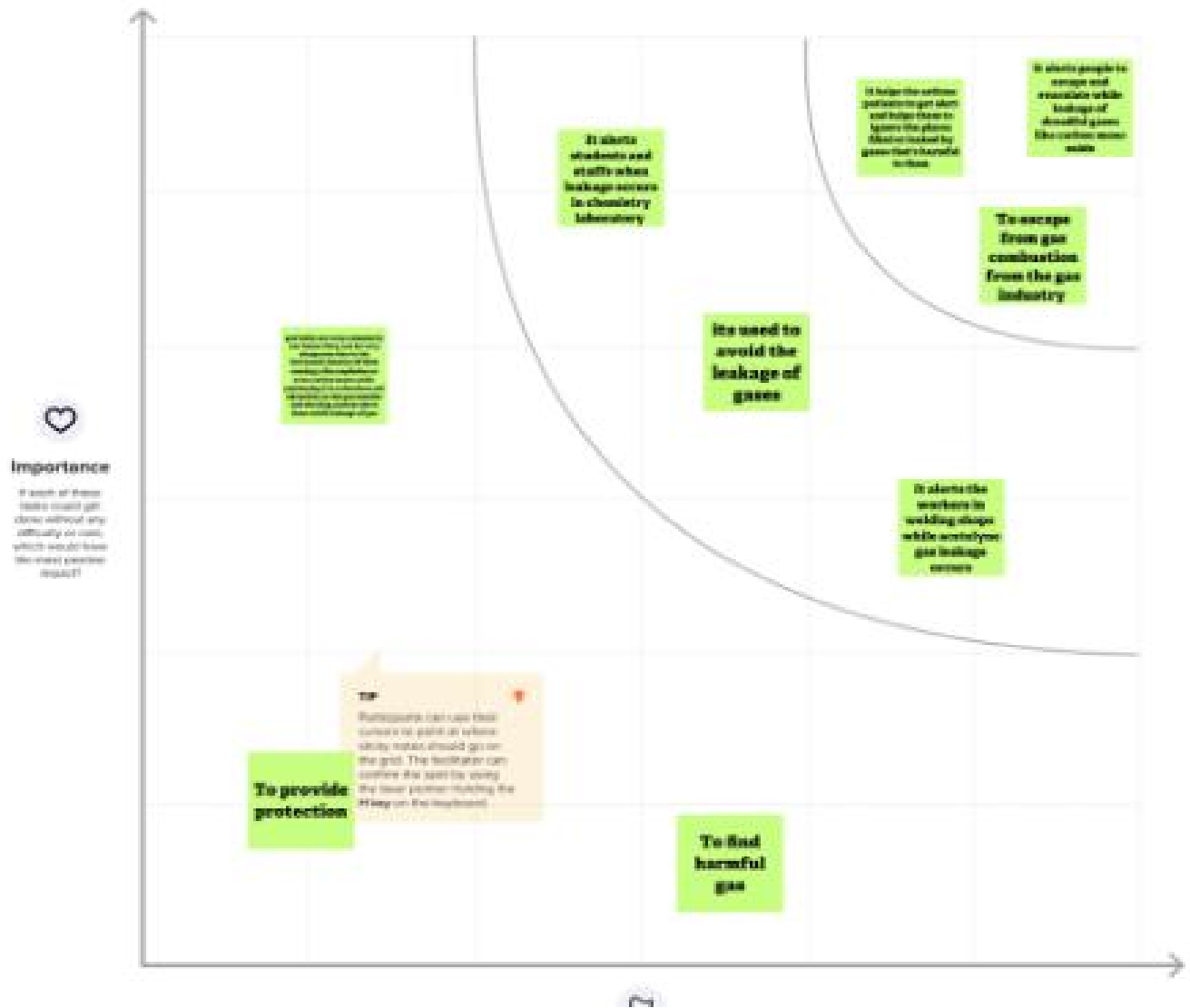
3. IDEATION &PROPOSED SOLUTION

3.1 Empathy Map Canvas



3.2 IDEATION & BRAINSTORMING





3.3 Proposed solution

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)	<p>In gas industries there are some places that are too noisy . As we already known gas can spread easily in open atmosphere . In those areas workers can't hear the siren sound when the gas leakage alerting system alerts.And also there is no way for the neighbouring people to know when the gas leakage occurs. They have to know when the gas leakage occurs to get evacuate from the area to save themselves and to escape from fire explosion which can create damage 412 miles(660km). That shouldn't be happen. It will cause a large amount of damage and causes economic crisis for those people and people would be died by explosion. To avoid the explosion during the gas leakage we can alert the workers in the noisy areas with red flash alert and send alert messages to the neighbouring areas as a full screen notifications and also to place siren at the streets of neighbouring areas. By this way we can save the people from the explosion and we can alert them while gas leakage . So that people can move to a safe area. By this way we can help them to evacuate and move to a safe place.</p>
2.	Idea / Solution description	<p>The LCD screen has three colours with " gas leaking":</p> <ul style="list-style-type: none">*red*yellow*green <p>Where the green colour indicates that there is no gas leakage occurs. Yellow colors denotes that the gas has leaked for a certain level but not the critical level. The red colour denotes that the gas has leaked for a</p>

		<p>wide range of area . So people need to evacuate.when the gas leakage reach the critical level(red colour) it'll turn on the buzzer to alert the people. When the red light turns on the red sirens in the whole factory. And also sends alert messages to the neighbouring people. Whereas the red siren wirks for the whole factory and alert messages will be send for the whole neighbouring people.</p> <p>The mq-2 gas detector works when gas volume range reaches between 200pp to 5000ppm. When the mq-2 detect the gas concentration reaches 250 and above the data will be sent to the esp32 to process the instructions. Esp32 will request authentication to the web server to communicate with the alert message gateway before the gas leak information sent to the user. Then the user will receive warning notification as a full screen notification via the number that has been registered and also the alerting siren will alert the people and the workers in the gas industries.</p>
3.	Novelty / Uniqueness	<ul style="list-style-type: none"> • Using materials that are resistant to fire lowers the risk for combustion such as stainless steel • Fix product offset problems by choosing a more stable and good load detector • The position of the LCD and LED displays is placed on the conspicuous part • Improvemnent to the position of the gas detector that neede to be placed in the area close to the gas pipes. • The gas detectors detect gas leakes and delivers the signals to the alerting system by using ESP32 <p>The OGI camera uses a unique spectral method that enables it to detect a gas compund.The filter is mounted in front of the detector amd cooled along with it to prevent any radiation exchange between the filter and the detector</p> <ul style="list-style-type: none"> •

4.	Social Impact / Customer Satisfaction	The alerting system would keep the workers safety from dangerous accidents like explosions...The alerting sound would be audible and it will alert people and keep them safe from fire explosion. The customers would feel safe and less stressed because of our alerting system. They don't need to worry all the time
5.	Business Model (Revenue Model)	Our top priority for our customer is to provide a high level safety through our product. Our AI alerts the people and the workers by siren and alerting messages. And the system is always needed to upgrade and to get serviced for a proper maintainance. We would get profit by selling and installing and upgrading our AI for the gas industries. They can't just installed and left they needed to get serviced. Because our product is most time efficient. And we can make profit by servicing ,upgrading, installing devices. And at some places some gases can freeze the sensor so that should be replaced. We can get profit forever just by upgrading and services. There is no way to face loss until there is no fuel and gas industries exist. Because there are many gas and fuel industries in this world we have a lot of customers around the world. No one wants to destroy their factory . so it's assured that our product will be sold and installed in every gas industries.

3.4 Problem Solution fit

Project title: Gas leakage monitoring and alerting system for industries.

Project design phase 1

Team id:PNT2022TMID46768

Define CS fit into CL	1. CUSTOMER SEGMENT(S) CS Gas industries Chemical industries Food industries	6. CUSTOMER LIMITATIONS CL <small>EG, BUDGET, DEVICES</small> The gas industries or the industries where the gas pipes are used/fixed. They need to monitor: *speed of gas leak *amount of gas leaks *type of gas that leaks (to know the caution/danger of the gas) So they can close the gas pipes before it spreads wider. they can open vacuum gates/tunnels to get them out of the area/industry and they can evacuate if it is too serious. So they can use product to measure the amount of gas leak and the speed of gas leaks. our product will monitor the gas leak for 24/7 and alert them when gas leak occurs. so the workers in the industries can take safety measures or evacuate.	5. AVAILABLE SOLUTIONS AS PROS & CONS Our product will alert every parts of the industry by red siren, alert sound and alert messages. We send alert messages to every neighbours near the gas industry for them to evacuate in dangerous situation. It monitors the gas leakage by thermal camera and gas sensor. It won't just alert the workers and industry it'll also alerts the people living near the industry. It also measures and indicates the speed of gas spreads and the amount of gas spreads. It also indicates the caution level in the screen so the workers can close the gas pipes before the gas spreads wider.	Explore AS differentiate
	2. PROBLEMS / PAINS PR <small>+ITS FREQUENCY</small> * To monitor oil and gas pipelines * To conduct aerial inspections to maintain asset integrity. * quality control. * ensure whether the workers in the industries didn't expose them to the toxic gases and gas emissions. * conducting routine leak detection inspections to a facility can help and prevent from unexpected incident. * if a plant maybe susceptible to gas leaks, a fixed gas detection should be implemented in the work place. * portable gas detectors should also be used to detect leaks remotely. * the most urgent problem is to be fixed is the gas pipes should be closed before the gas spreads wider to prevent from massive fire accident and it prevent from massive deaths by the fire accident.	9. PROBLEM ROOT / CAUSE RC In the industries like oil, gas, and other industries where the gas pipes are used. And the industries where the toxic and flammable gases are stored and used. In those places the gas monitoring and detecting system is required for the safety measures. Not powered gas detection system identifies and alerts. the toxic and flammable gases leaks occurs. The gases like *carbon-mono-oxide, *hydrogensulphide, *chlorine, ammonia, *chlorine trifluoride. Those gases are toxic and easily flammable gases which leads to fire accidents. They needed to be stored and they shouldn't be leaked. The common cause of the problem	6. BEHAVIOR BE <small>+ITS INTENSITY</small> In the gas industries the gas pipes and pipe lines are monitored by the alerting system. Those systems work 24/7. it monitors whether the gas is leaking or not. They alert the industry when the gas leakage occurs. By this way the industry and workers in the industry were able to stop the pipe lines and the workers and people can evacuate to a safe place when the gas spreads wider or when it cannot be fixed. The gas detection sensors will detect and alert/ notify the workers of the industry. So they can take safety measures or evacuate.	
Focus on PR, tap into BE understand RC	3. TRIGGERS TO ACT TR When the gas leaks occurs through the pipe lines or the gas containers. The gas leakage and alerting system will alert everyone in the industry. When they hear or see the alert, the	10. YOUR SOLUTION SL By our product the customer can have a high level gas monitoring system to prevent from massive gas leakage and massive fire combustion which leads to massive fire accident	8. CHANNELS OF BEHAVIOR CH <small>ONLINE</small> The company can communicate with us through online. For ordering / registering for services.	Focus on PR, tap into BE understand RC
Identify strong TR &			8. CHANNELS OF BEHAVIOR CH <small>ONLINE</small> The company can communicate with us through online. For ordering / registering for services.	Extract online & offline CH of

Identity strong TR & EM	workers will close the pipe lines . if the gas leaks wider they need to evacuate and have to move to a safe place to escape from death.	that causes massive amount of death and massive loss for the company.	
	<div>4. EMOTIONS BEFORE / AFTER EM</div> <p>Before :</p> <p>The workers were scared of gas leakage and they don't know when the gas leakage occurs. They won't feel safe</p> <p>After :</p> <p>They feel safe and secure after installing our system. They are prevented from a massive loss of the company.they can work without any scared thought's</p>		<div>OFFLINE</div> <p>We can provide services to the site. The company also can communicate through offline.</p> <div>Extract online & offline CH of file</div>

4.REQUIREMENTS ANALYSIS

4.1 Functional requirement

User Registration –Registration through gmail

Send email to the contact for the property advert. Ability to email the owner\agent for the property advert being viewed with the following. The visitors contact number, contact name, email addresses, a personalist messeage.

User Confirmation-Confirmation via email

Thank you for the registration. This email is to let you know that you has been registered. Please check if all your details are correct. If you get any information wrong, please contact us immediately .Providing your registered number. xxxxxxxx and correct information via email :abc@gmail.com

User Login-user login is the process by which on individual gains accesss yo a computer system by identifying and authenticating themselves.The user credentials are typically some form of username and a matching password the credentials themselves are sometime referred to as login.In practice ,modern secure system often requires a second factor such as email or sms confirmation for extra security.

No confirmation for delivery:

- Provide the order number
- Summarize the customer contact details
- Confirm shipping order
- Include on order summary
- Break down the cost
- Confirm the payment method and amount
- Outline the shipping method and estimated delivery date
- Let the customer know how to reach you.

Maintenance and services:

Portable and fixed gas detection system maintenance plans maintains the functionality ,lengthen the life of device,maintain the safety for itself.Once employees fully understand their instrument as well as gas hazards proper maintainance is the last method of implementing the safety.

4.2 Non –Functional requirements

1 . Usability

Usage of gas leakage monitoring and alerting system can detect leakages at homes, commercial premises and factories. GLDS detects the leakage soon after it happened and users immediate alarm on the incident, used to detect combustible, flammable and toxic gases and oxygen depletion.

2. Security

Gas leaks from equipment can become dangerous and costly, conducting routine leak detection inspection facility can help prevent unexpected incidents, avoid uncalled expenses and exposed toxic gases and emissions.

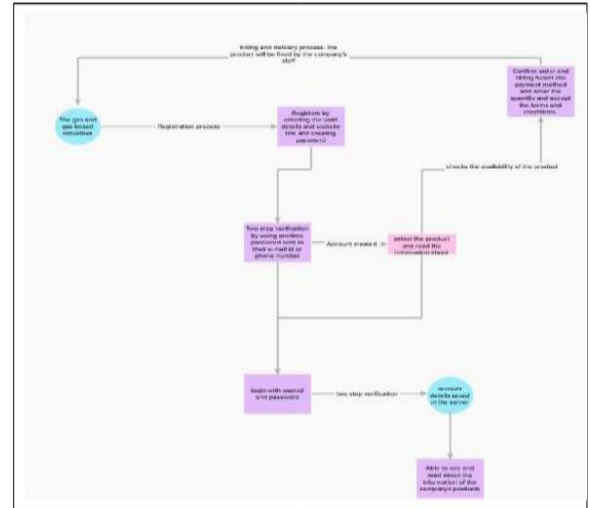
3. Reliability

It enables the computation analysis of trust among devices in order to make appropriate decisions for efficient and reliable communication among devices. It's a viable solution for the devices.

5. PROJECT DESIGN

5.1. Data flow diagrams

Example: (Simplified)



freezable.industries like chemical and fuel industries . They have to moniter every gaspipes

and gas containers. If the gas leaks they can cause fire accident and causes cancer

For example : Radon gas (a natural radioactive gas that causes lungs cancer)

Gas detectors :

Many gas hazards cannot be detected by human senses.toxic gases,oxygen

deficiency,combustible gases and vapours . all these hazardous gases pose a serious threat to

humans and a threat to industries. Which led to a heavy economic loss for the industry so the

gas detectors detects the gas when the gas leaks occurs and alert the industrial people. Some

gases are visible to thermal camera. And some gases are detected by gas sensors.

The gas

detector is a device that detects the presence of gases in an area. Often as part of a safety

system. The gas deector can sound the alarm to operates in the area where the gas leak

occurs. That leads the workers to prevent them from gas explosion (fire combustion). Advantages of gas sensors :

The gas sensor measure the toxic gases in very low

concentration. It has ability to detect wide range of gases. That helps the worlers to close the

gas pipes to avoid from the wide spread. The gas sensor should be placed in every industry

so the gas industry can escape from fire explosion. The gas detection system should be fixed in every gas and gas based industries.

USABLE :

The gas leakage and alerting system can be used in every industries where gas takes place.

The industries like :

- Gas industries
- Soda industries
- Chemical industries

- Food industries
- Fuel industries

RELIABLE :

All the products coming through the company are of great quality.

FUNCTIONAL :

Through our product the industries can feel safe and the alerting system works

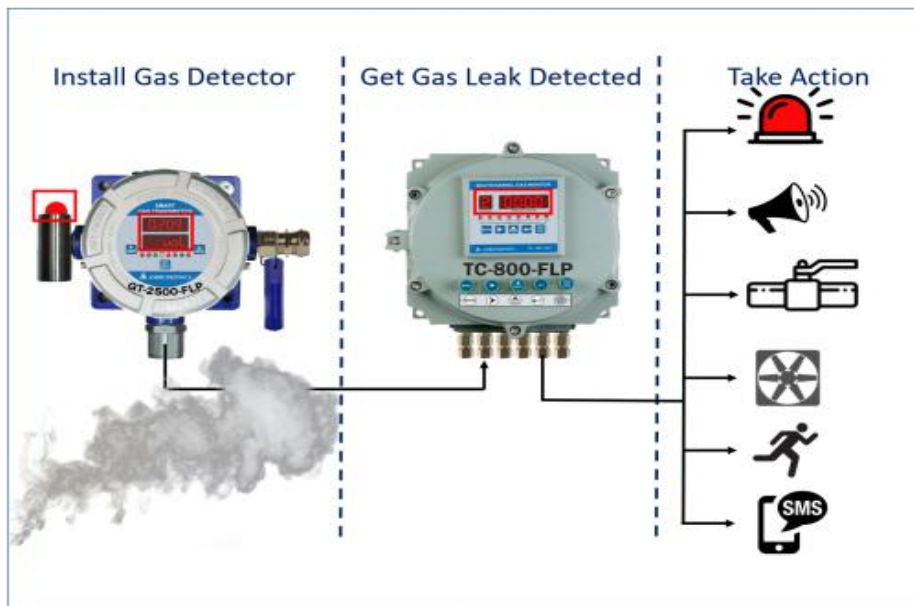
for 24/7. It alerts the people in the industries and alerts the neighbouring people living near

the industries through siren and alert messages. So they can take close the gas pipes to avoid

the disaster or they can evacuate to a safe place when situation got worse.

Alerting system:

The alerting system will alert the whole gas / gas based / chemical industry when gas leaks occurs. The sensor detect the gas and alerts the gas industry with red flash , siren, alert messages and displays the amount of gas spreaded and shows the seriousness of the gas spreads.



Minimum value product :

DESIGN :

The gas leakage and monitoring system is designed for detecting gas leaks and to alert the workers of the industry. It is designed with aurdino

Technical Architecture:

The Deliverable shall include the architectural diagram as below and the information as per the table1 & table 2

Example:

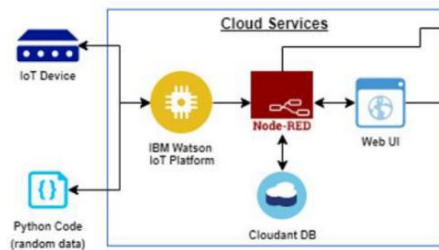
Order

process

Technical Architecture:

The Deliverable shall include the architectural diagram as below and the information as per the table 1 & table 2

Example: Order processing during emergencies for offline mode



Guidelines:

1. Include all the processes (As in application logic / Technology Block)
2. Provide infrastructural demarcation (Local / Cloud)
3. Indicate external interfaces (third party API's etc.)
4. Indicate Data Storage components / services
5. Indicate interface to machine learning models (if applicable)

S.No	Characteristics	Description	Technology
1.	Open-Source Frameworks	".Net"	".Net framework(4.7.2)
2.	Security Implementations	The gas monitoring system gives the customer the high level security and high level safety. They monitor the gas pipes whether gas leaks happens or not. When the gas leak occurs it notifies the works and the whole industry. So the workers can turnoff the gas pipe. So they can ignore the gas flow in pipes that stops the spread of gas in industry.	e.g. SHA-256, Encryptions, IAM Controls, OWASP etc.
3.	Scalable Architecture	The gas detection system can detect every types of gases. It can also measure gas in all concentration levels. It can also measure the gas even if it is less in quantity. This provides the industry a high level safety and security. And it is also a kind off prevention.	Technology used
4.	Availability	Our product will be available every day. And the sensors are able to detect every gas leaks. That leads to low cost of our peoduct. The customer don't need to fix sensors for every single type of gas. The product has embedded with several sensors. And it is available in affordable prizes too.	Technology used
5.	Performance	The performsnce of our product will be great. If it is maintained and serviced properly . The gas leakage monitoring system will works for 24/7. It monitors the gas pipe lines and have 99.9% accuracy of gas leakage . The performance will be good if it was maintained and serviced properly.	Technology used

5.3 User stories

User Type	Functional Requirement (Epic)	User Story Number	User Story / Task	Acceptance criteria	Priority	Release
Customer (Mobile user)	Registration	USN-1	As a user, I can register for the application by entering my email, password, and confirming my password.	I can access my account / dashboard	High	Sprint-1
Customer (Mobile user)	confirmation	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
Customer (Mobile user)	Sign-in	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
Customer (Mobile user)	Sign-in	USN-4	As a user, I can register for the application through Gmail	I can register and login through gmail	Medium	Sprint-1
Customer (Mobile user)	Login	USN-5	As a user, I can log into the application by entering email & password	I can login through the username/gmail and password	High	Sprint-1
Customer (Mobile user/PCuser)	Dashboard	USN-6	As a user I can see the dashboard and see the information about their products	I can access the website through my account	Medium	Sprint -2
Customer (Web user)	Website	USN-7	As a user I can see the dashboard and login page in the right top	I can access the website and place order through login my user account	High	Sprin-3
Customer Care Executive	Website	USN-8	As a user I can contact the customer care through helpline or contact number given	I can get to contact to the customercare.	Medium	Sprint-4
Administrator	Service	USN-9	I can get reply from the administrator.	The administrator will solve the issues faced by me	High	Sprint-4

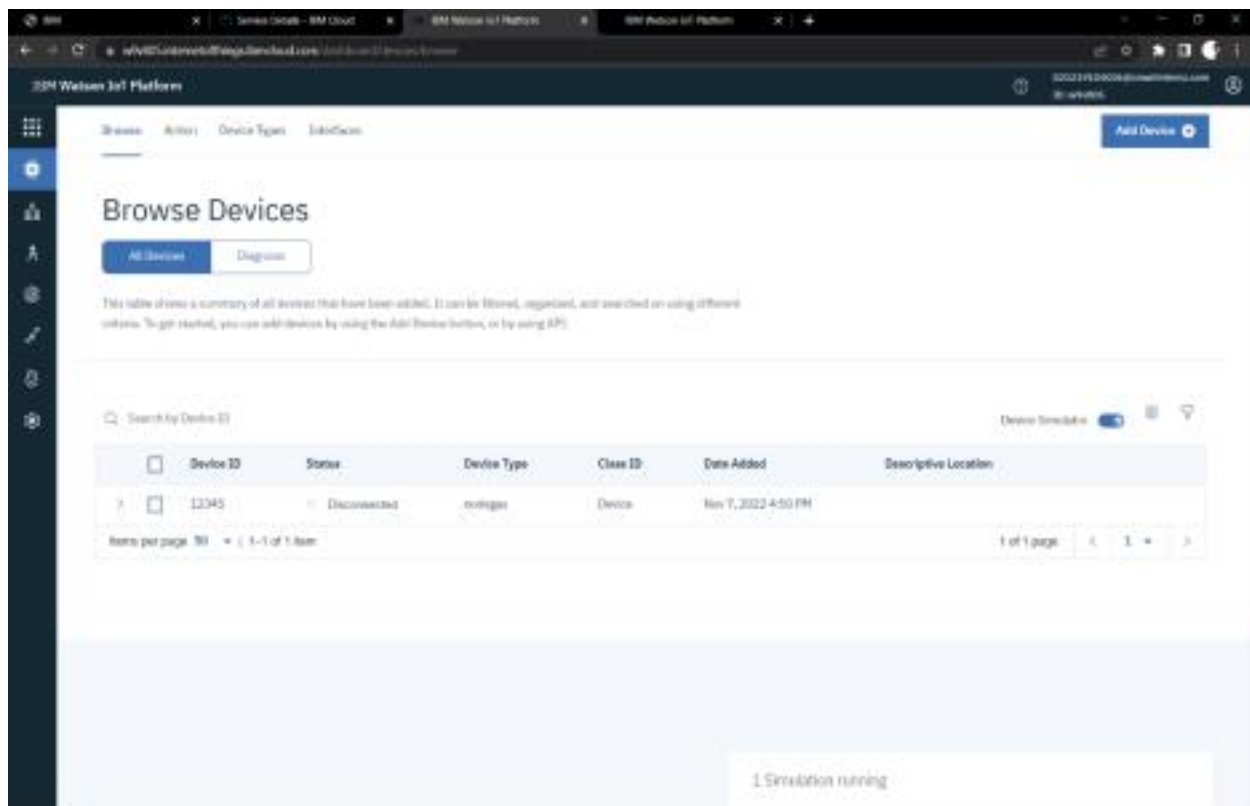
6. PROJECT PLANNING & SCHEDULING:

6.1 Sprint planning & estimation

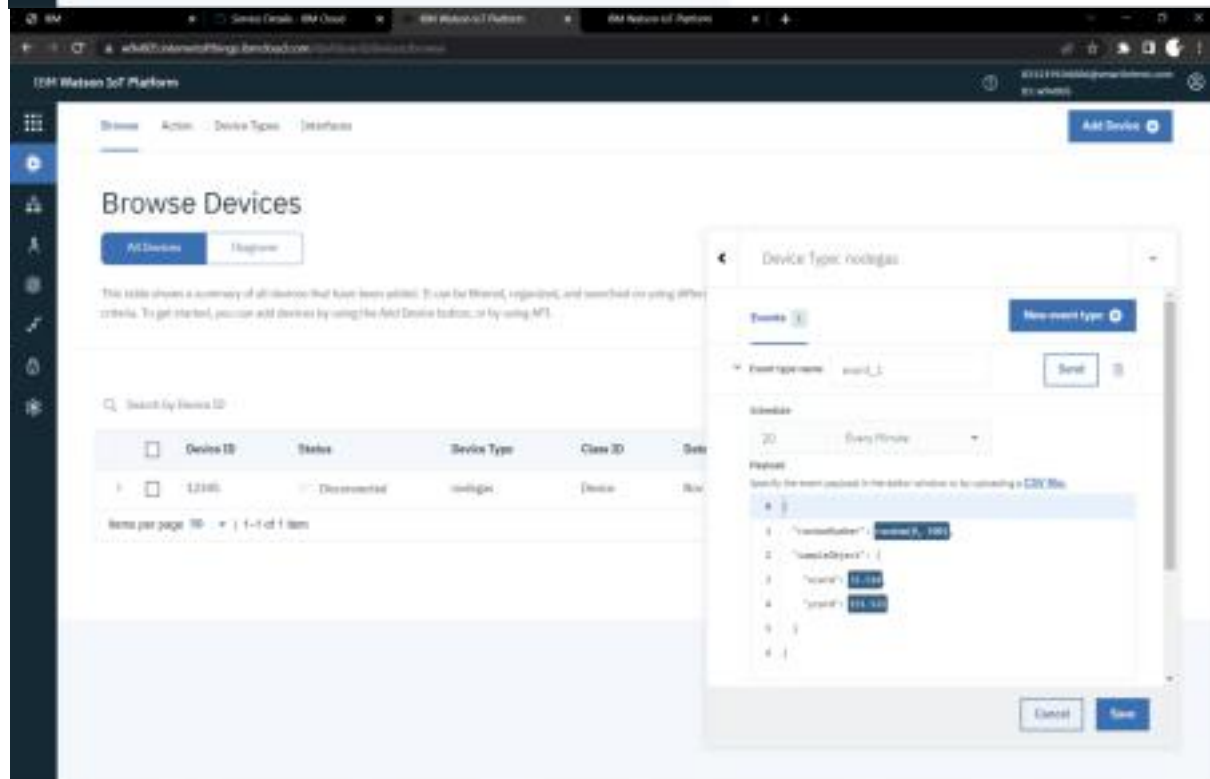
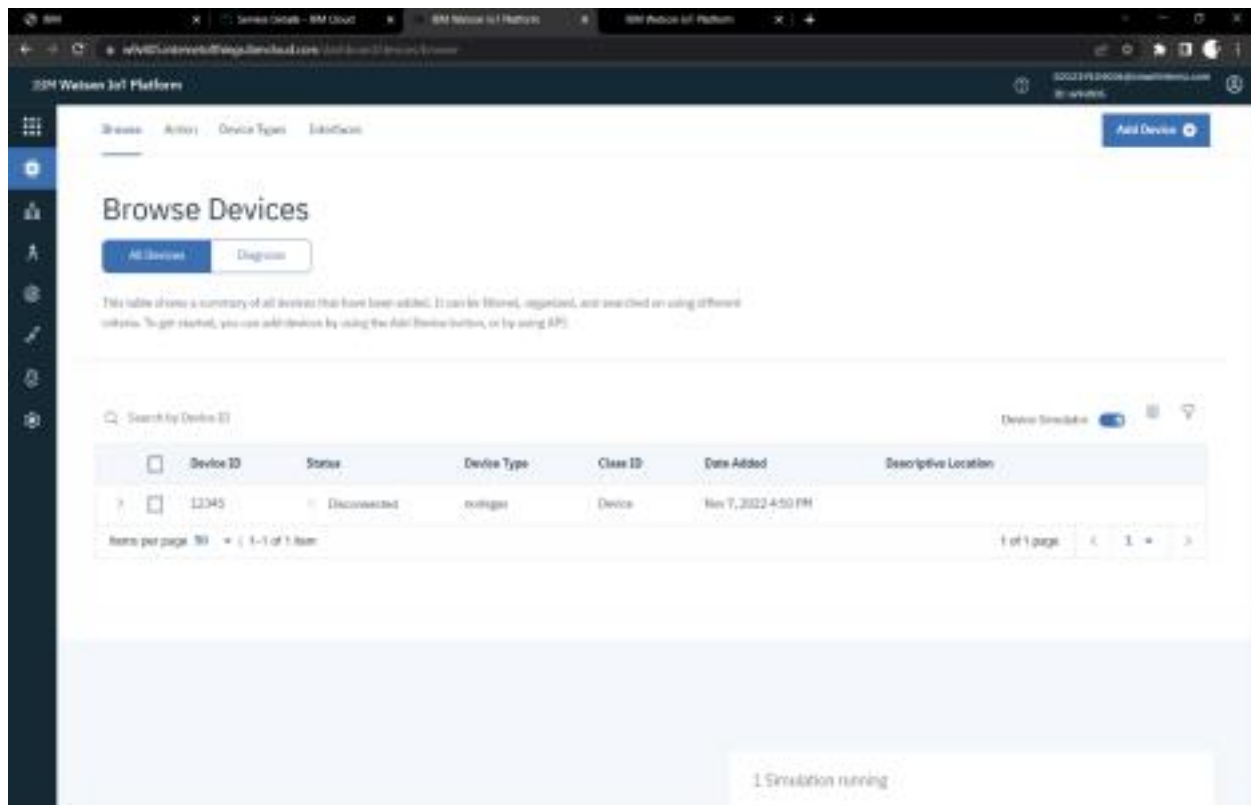
IBM Watson IOT Platform in device configuration the IBM IOT platform

Step-1:

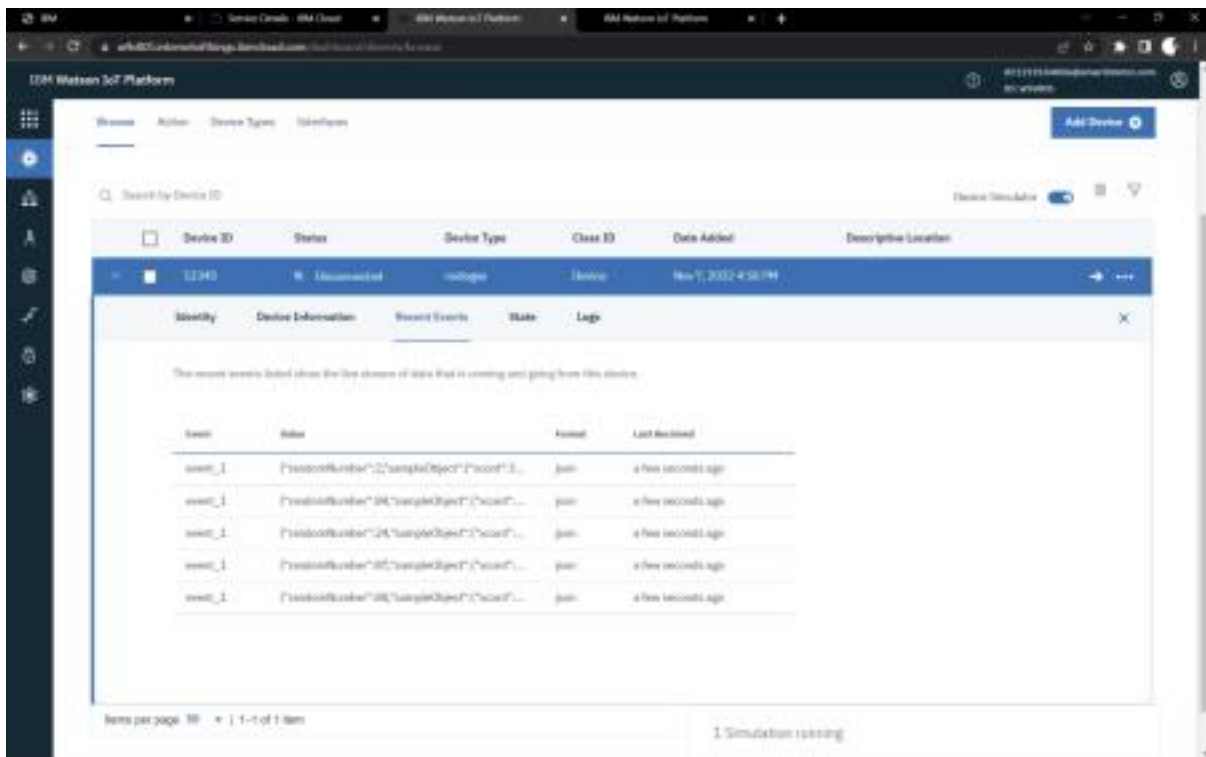
Create a device



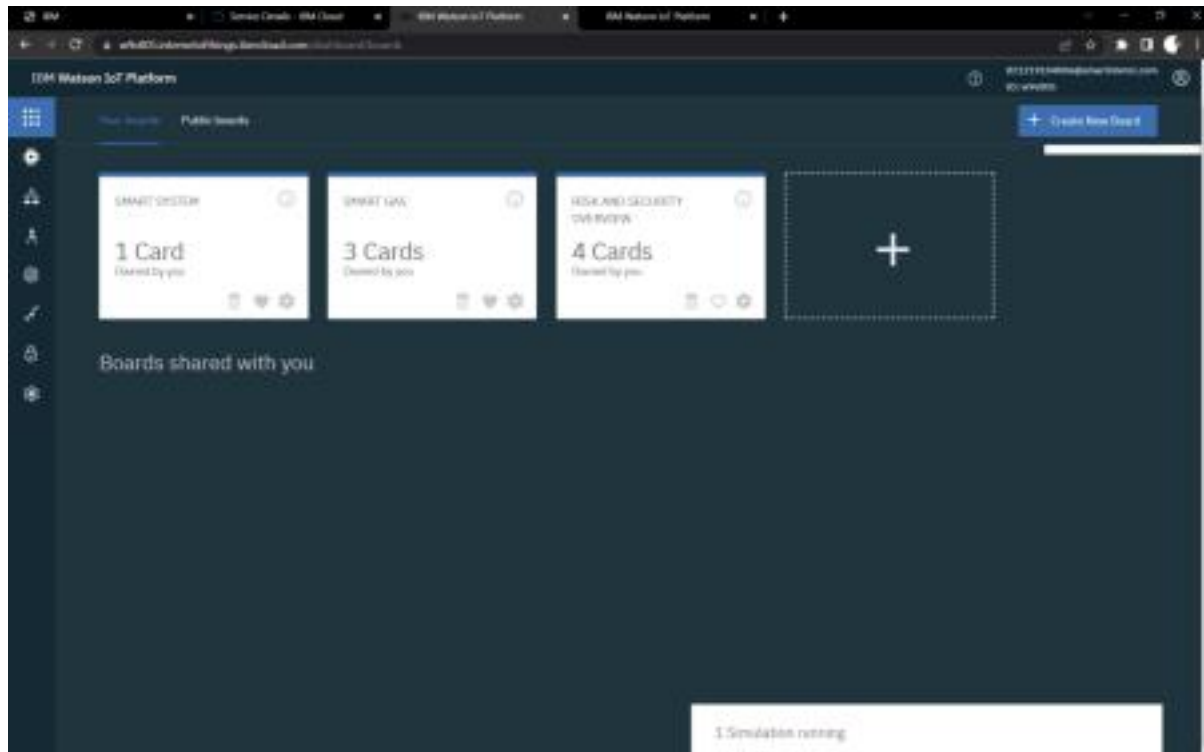
Step-2:



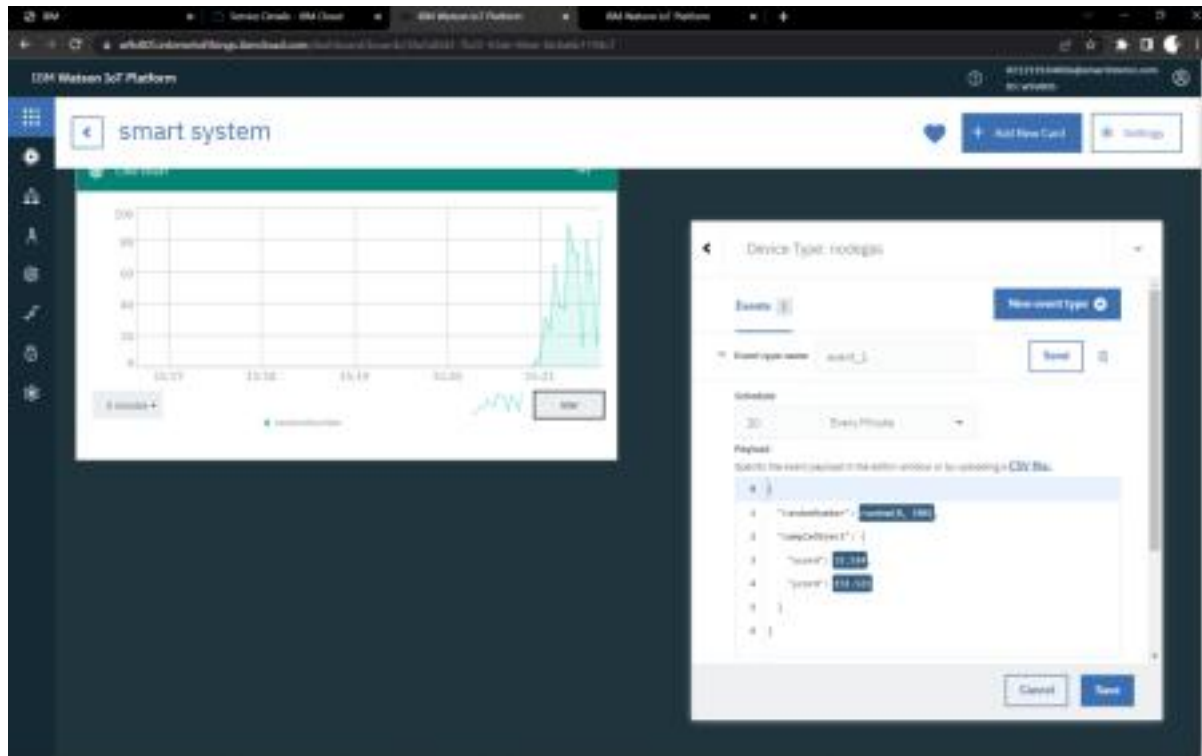
Step – 3:



Step-4:



Step-5:



SPRINT

Step-1:

```
import time
```

```
import sys
```

```
import ibmiotf.application
```

```
import ibmiotf.device
```

```
import random
```

```
#Provide your IBM Watson Device Credentials
```

```
organization = "w9v805"
```

```
deviceType = "nodegas"
```

```
deviceId = "12345"
```

```
authMethod = "token"
```

```
authToken = "12345678"
```

```
# Initialize GPIOT :
```

```
def myCommandCallback(cmd):
```

```
    print("Command received: %s" % cmd.data['command'])
```

```
    status=cmd.data['command']
```

```
    if status=="alarmon":
```

```
        print ("alarm is on")
```

```
    else :
```

```
        print ("alarm is off")
```

```
    #print(cmd)
```

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()

Connect and send a datapoint "hello" with value "world" into the cloud as

an event of type "greeting" 10 timesdeviceCli.connect()

while True:

#Get Sensor Data from DHT11

temp=random.randint(0,100)

Humid=random.randint(0,100)

```
data = { 'temp' : temp, 'Humid': Humid }

#print data

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(1)

deviceCli.commandCallback = myCommandCallback

# Disconnect the device and application from the cloud

deviceCli.disconnect()
```

output:

```
#!/usr/bin/perl
use strict;
use warnings;

my $description = "Device";
my $deviceType = "Device";
my $deviceId = "12345";
my $deviceId = "12345";
my $deviceId = "12345";

# Initialize DB
my $db = DBI->connect("dbi:mysql:device:localhost", "root", "root");

my $stmt = $db->prepare("INSERT INTO device (description, deviceType, deviceId, deviceId, deviceId) VALUES (?, ?, ?, ?, ?)");

my $data = {
    description => "Device",
    deviceType => "Device",
    deviceId => "12345",
    deviceId => "12345",
    deviceId => "12345"
};

my $count = 0;
while ($count < 1000) {
    $stmt->execute($data);
    $count++;
}

# Print the data
my $stmt = $db->prepare("SELECT * FROM device");
my $result = $stmt->fetchall_array();

print "Device Data from DB\n";
print "deviceId, description, deviceType, deviceId, deviceId\n";
print "-----\n";
foreach my $row (@$result) {
    print join(", ", @$row) . "\n";
}

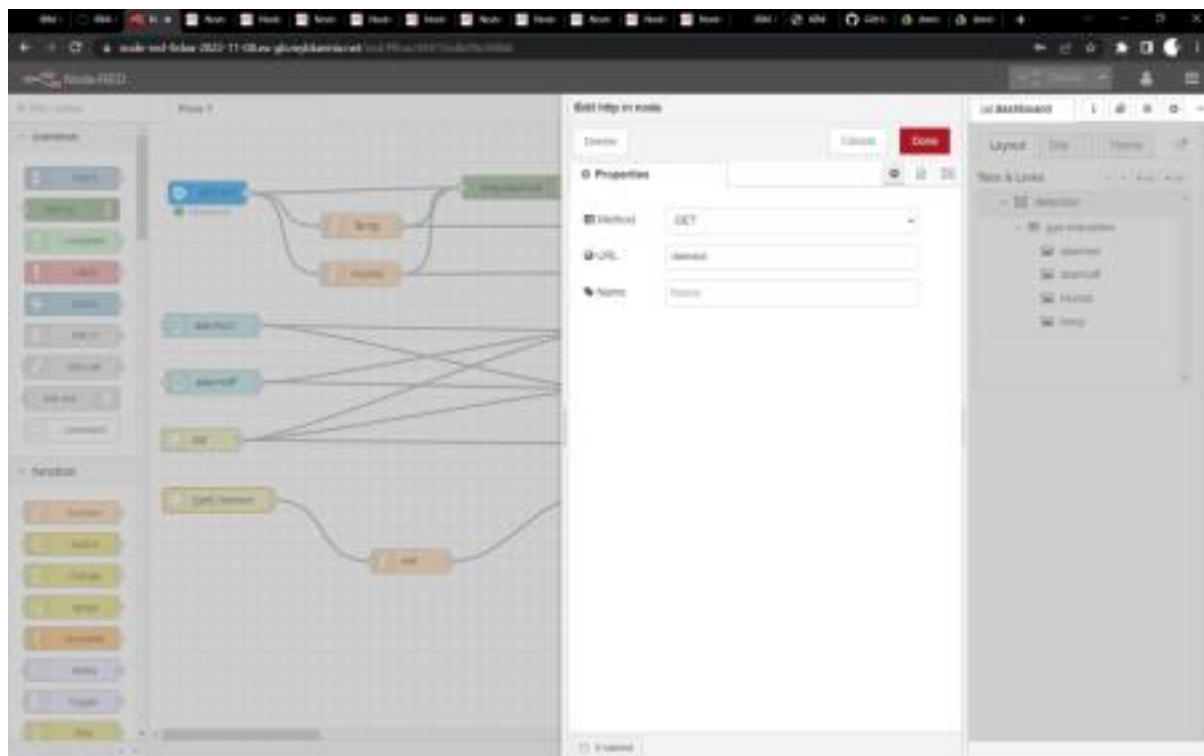
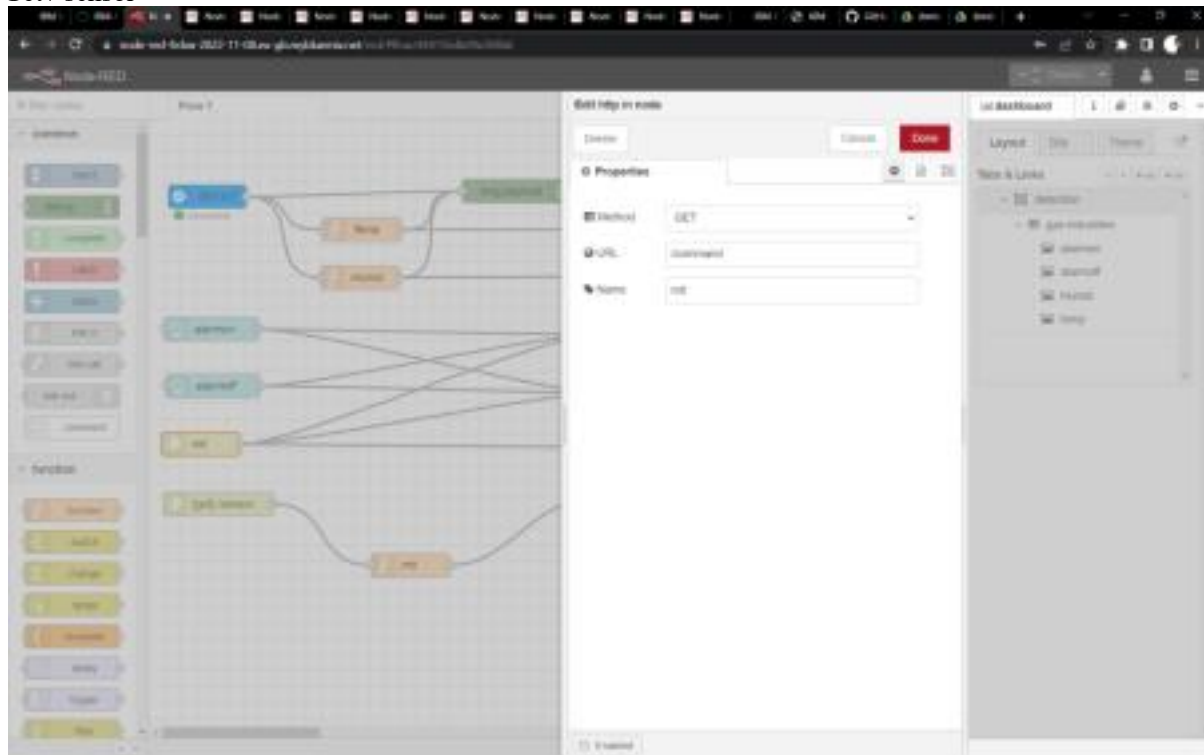
# Print the data
my $stmt = $db->prepare("SELECT * FROM device");
my $result = $stmt->fetchall_array();

print "Device Data from DB\n";
print "deviceId, description, deviceType, deviceId, deviceId\n";
print "-----\n";
foreach my $row (@$result) {
    print join(", ", @$row) . "\n";
}
```

htt

<https://node-red-frckw-2022-11-08.eu-gb.mybluemix.net/red/#flow/489156db09e308b6>

Get / sensor









1





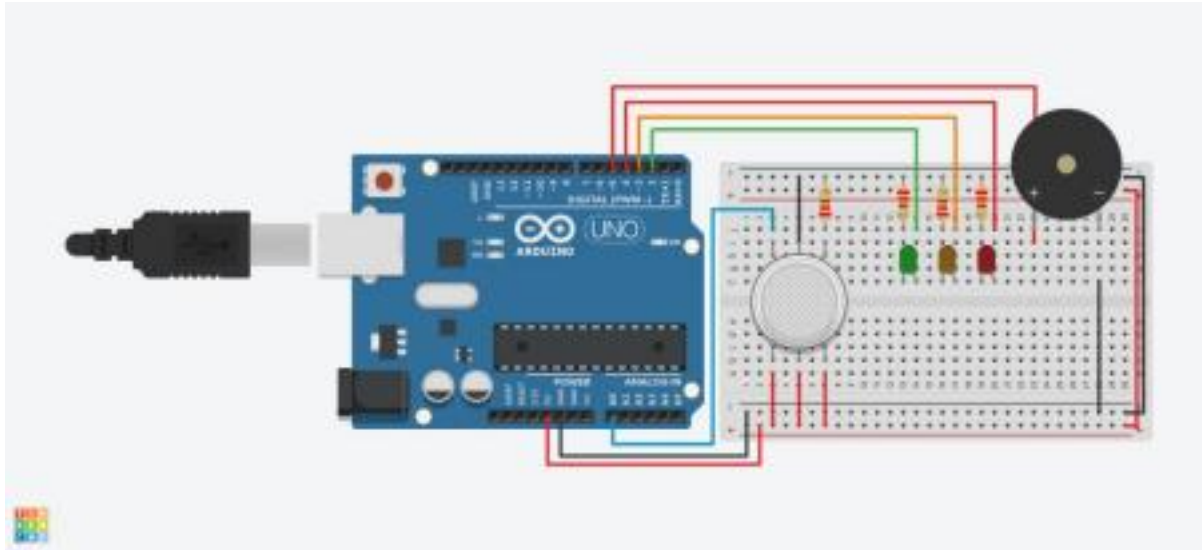
CUSTOMER JOURNEY:

Journey Steps Which step of the experience are you describing?	Registration	Onboarding	First session
Actions What does the customer do? What information do they look for? What is their context?	<div>Search to gauge the best service</div> <div>Try to create an account</div> <div>Register with email account</div> <div>The customer will need our product</div>	<div>Start with training</div> <div>Understand the company's form</div> <div>Develop the relationship for the company</div> <div>Get more information about this field</div>	<div>See our product</div> <div>Know about our product</div> <div>Knows the advantages of our product</div> <div>Check our products quality</div>
Needs and Pains What does the customer want to achieve or avoid? <i>Tip: Reduce ambiguity, e.g. by using the first person narrator.</i>	<div>Easy user interface</div> <div>Fast service</div> <div>Quick response</div> <div>Good user experience</div>	<div>The training module works because and understandable</div> <div>They can change their info if they want to</div> <div>They can create our company's form</div> <div>They can get help from help center</div>	<div>look for the product in our website</div> <div>read about our product</div> <div>read terms and conditions</div> <div>Book and place the order</div>
Customer thought	<div>to register to create an account</div> <div>search for our product</div> <div>know about our product</div> <div>do a research about our product</div>	<div>easy communication</div> <div>customer care</div> <div>healthy relationship with customer</div> <div>Stay in contact with the customer</div>	<div>worth for their money</div> <div>easy to fix and use</div> <div>Product quality</div> <div>best experience</div>
Customer Feeling What is the customer feeling? <i>Tip: Use the emoji app to express more emotions</i>			
Backstage			
Opportunities What could we improve or introduce?	<div>improving user experience with our pro model</div>	<div>reducing cost by reducing some extra features</div>	<div></div>
Process ownership Who is in the lead on this?			

7.CODING &SOLUTIONS (explain the features added in the project along with code)

1.Make a smart home with 2-3 sensors,LED,buzzer in single code and connections. Solution

```
# define GREEN 2
# define ORANGE 3
# define RED 4
# define Buzzer 5
# define Sensor A0
void setup() {
  for (int i = 2; i < 6; i++)
    pinMode(i, OUTPUT);
  Serial.begin(9600);
}
void loop() {
  for (int i = 2; i < 6; i++)
    digitalWrite(i, LOW);
  status_Indicator();
: }
void status_Indicator()
{
  int sensor_In = analogRead(A0);
  Serial.println(sensor_In);
  if ( sensor_In >=40 )
  { digitalWrite(RED, HIGH);
    digitalWrite(Buzzer,HIGH);
  }
  else if (sensor_In >=25 )
  {
    digitalWrite(ORANGE, HIGH);
  } else
  {
    digitalWrite(GREEN, HIGH);
  }
  delay(10);
}
```



```
2. int A=(input("temperature point"))
B= int (input ("Humidity point"))
if(A<30):
    print("temperature good")
else:
    print ("temperature high")
if (B<55):
    print ("humidity good")
else:
    print ("humidity high")
```

OUTPUT:

```
Python 3.10.7 (tags/v3.10.7:rc00815, Sep 2 2022; 18:00:36) [AMD64 v.100] on win32
Type "help", "copyright()", "credits()" or "help()" for more information.

>>>
===== RESTART: C:\Users\chase\AppData\Local\Microsoft\Python\Python310\python.exe =====
temperature print
pressure print
humidity print
>>>
```

3. PROGRAM:

```
from gpiozero import Button,trafficLights,Buzzer
from time import sleep

buzzer = Buzzer(15)
button = Button(21)
lighs = TrafficLights(25,8,7)

while True:
    button.wait_for_press()
    buzzer.on()
    light.green.on()
    sleep(1)
    lights.amber.on()
    sleep(1)
    lights.red.on()
    sleep(1)
    ights.off()
    buzzer.off()
```

4.Solution:

```
#include <WiFi.h>
#include <PubSubClient.h>
void callback(char* subscribetopic, byte* payload, unsigned int payloadLength);
#define ORG "ytvrds"
#define DEVICE_TYPE "nodegas"
"
#define DEVICE_ID "12345"
#define TOKEN "12345678"
String data3;
char server[] = ORG ".messaging.internetofthings.ibmcloud.com";
char publishTopic[] = "iot-2/evt/Data/fmt/json";
char subscribetopic[] = "iot-2/cmd/test/fmt/String";
char authMethod[] = "use-token-auth";
char token[] = TOKEN;
char clientId[] = "d:" ORG ":" DEVICE_TYPE ":" DEVICE_ID;
WiFiClient wifiClient;
PubSubClient client(server, 1883, callback, wifiClient);
const int trigPin = 5;
const int echoPin = 18;
#define SOUND_SPEED 0.034
long duration;
float distance;
void setup() {
  Serial.begin(115200);
  pinMode(trigPin, OUTPUT);
  pinMode(echoPin, INPUT);
  wificonnect();
  mqttconnect();
}
void loop()
{
```



```

delayMicroseconds(2);
digitalWrite(trigPin, HIGH);
delayMicroseconds(10);
digitalWrite(trigPin, LOW);
duration = pulseIn(echoPin, HIGH);
distance = duration * SOUND_SPEED/2;
Serial.print("Distance (cm): ");
Serial.println(distance);
if(distance<100)
{
    Serial.println("ALERT!!");
    delay(1000);
    PublishData(distance);
    delay(1000);
    if (!client.loop())
    {mqttconnect();
    }
}
delay(1000);
}
void PublishData(float dist)
{mqttconnect();
String payload = "{"Distance\":";
payload += dist;
payload += ",";
payload += "\"ALERT!!\":";
payload += "\"Distance less than 100cms\":";
payload += "\"";
Serial.print("Sending payload: ");
Serial.println(payload);
if (client.publish(publishTopic, (char*) payload.c_str())) {
Serial.println("Publish ok");
} else {
Serial.println("Publish failed");
}
}
void mqttconnect() {
if (!client.connected())
{ Serial.print("Reconnecting client to
");Serial.println(server);
while (!client.connect(clientId, authMethod, token)) {
Serial.print(".");
delay(500);
}
}
initManagedDevice();
Serial.println();
}
}
void wificonnect()

```

```

Serial.println();
Serial.print("Connecting to ");
WiFi.begin("Wokwi-GUEST", "", 6);
while (WiFi.status() != WL_CONNECTED)
{delay(500);
Serial.print(".");
}
Serial.println("");
Serial.println("WiFi connected");
Serial.println("IP address: ");
Serial.println(WiFi.localIP());
}

void initManagedDevice() {
if (client.subscribe(subscribetopic))
{ Serial.println((subscribetopic));
Serial.println("subscribe to cmd OK");
} else {
Serial.println("subscribe to cmd FAILED");
}
}

void callback(char* subscribetopic, byte* payload, unsigned int payloadLength)
{
Serial.print("callback invoked for topic: ");
Serial.println(subscribetopic);
for (int i = 0; i < payloadLength; i++)
{
data3 += (char)payload[i];
}
Serial.println("data: "+ data3);
data3="";
}

```

Code 2:

File Name : diagram.json

This Meta data given in IBM Watson IoT Platform

```

{
  "version": 1,
  "author": "abdulmohamedm",
  "editor": "wokwi",
  "parts": [
    { "type": "wokwi-esp32-devkit-v1", "id": "esp", "top": -4.67, "left": -112.87, "attrs": { } },
    { "type": "wokwi-hc-sr04", "id": "ultrasonic1", "top": 15.96, "left": 89.17, "attrs": { } }
  ],
  "connections": [
    [ "esp:TX0", "$serialMonitor:RX", "", [] ],
    [ "esp:RX0", "$serialMonitor:TX", "", [] ],

```



```

"esp:VIN",
"ultrasonic1:VCC",
"red",
["h-37.16", "v-178.79", "h200", "v173.33", "h100.67" ]
},
["esp:GND.1", "ultrasonic1:GND", "black", [ "h39.87", "v44.04", "h170" ] ],
["esp:D5", "ultrasonic1:TRIG", "green", [ "h54.54", "v85.07", "h130.67" ] ],
["esp:D18", "ultrasonic1:ECHO", "green", [ "h77.87", "v80.01", "h110" ] ]
}
}

```

Wokwi Link :

<https://wokwi.com/projects/347665080823841362>

Output and Simulation :

The screenshot displays the Wokwi web-based development environment. On the left, a code editor shows a C++ sketch for an ESP32. The code includes the PubSubClient library and sets up an MQTT client to connect to an IBM Watson IoT Platform. It defines an ultrasonic sensor and publishes distance readings. A logic is implemented where if the distance is less than 100 cm, an "ALERT!!" message is sent along with the distance data. On the right, the simulation window shows a virtual ESP32 board connected to an ultrasonic sensor. A status bar indicates the distance as 96.99 cm. Below the simulation, a log window shows the following sequence of events:

```

Publish ok
Distance (cm): 96.99
ALERT!!
Sending payload: {"Distance":96.99,"ALERT!!","Distance less than 100cm"}
Publish ok
Distance (cm): 96.99
ALERT!!

```

Whenever the distance is less than 100 cms send an "alert" to the IBM cloud and display in the device recent events.

IBM Watson IoT Platform

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Device Drilldown - 12345

Connection Information

Recent Events

State

Device Information

Metadata

Diagnostics

Connection Logs

Device Actions

Event	Value	Format	Last Received
Data	["Distance":96.99,"ALERTS":["Distance less than ...	json	a few seconds ago
Data	["Distance":96.99,"ALERTS":["Distance less than ...	json	a few seconds ago
Data	["Distance":96.99,"ALERTS":["Distance less than ...	json	a few seconds ago
Data	["Distance":96.99,"ALERTS":["Distance less than ...	json	a few seconds ago
Data	["Distance":96.99,"ALERTS":["Distance less than ...	json	a few seconds ago

State

This table shows a list of data points that are reported by this device.

Showing Raw Data | No Incoming Available

IBM Watson IoT Platform

Browse Action Device Types Interfaces

Browse Devices

All Devices Diagnose

This table shows a summary of all devices that have been added. It can be filtered, organized, and searched on using different criteria. To get started, you can add devices by using the Add Device button, or by using APIs.

Search by Device ID

Device Simulator

<input type="checkbox"/>	Device ID	Status	Device Type	Class ID	Date Added
> <input type="checkbox"/>	12345	Connected	esp32	Device	Nov 5, 2022 10:05 PM

Items per page 50 | 1-1 of 1 item

1 of 1 page

IBM Watson IoT Platform

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Device Drilldown - 12345

Connection Information

Recent Events

State

Device Information

Metadata

Diagnostics

Connection Logs

Device Actions

Connection Information

Basic connection information about this device.

Device ID	12345
Device Type	esp32
Date Added	Nov 5, 2022 10:05 PM
Added By	manjunathvelkaranthan@gmail.com
Connection Status	Connected
Connection Time: Nov 5, 2022 10:18 PM	
Client Address: 216.246.119.62 Insecure	

Recent Events

IBM Watson IoT Platform

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Device Drilldown - 12345

Connection Information

Recent Events

State

Device Information

Metadata

Diagnostics

Connection Logs

Device Actions

State

This table shows a list of data points that are reported by this device.

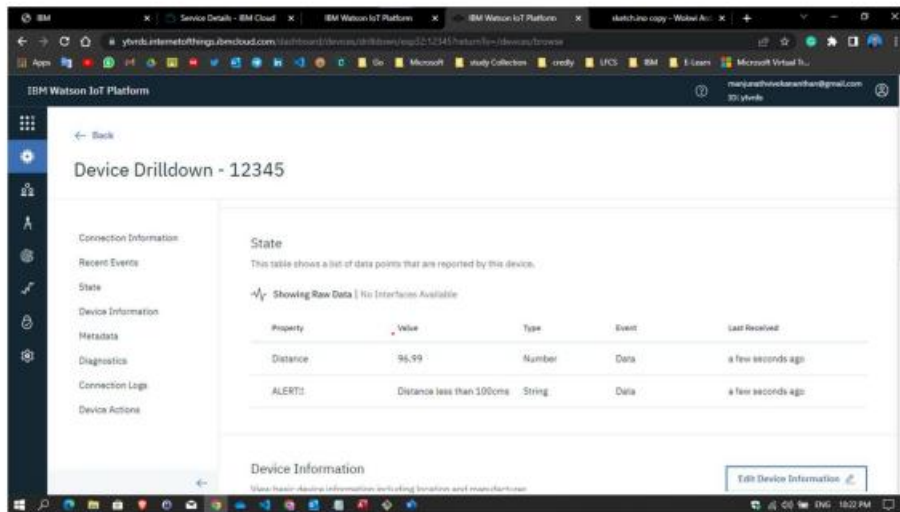
Showing Raw Data | No Interfaces Available

Property	Value	Type	Event	Last Received
Distance	96.99	Number	Data	a few seconds ago
ALERT!!	Distance less than 100cms	String	Data	a few seconds ago

Device Information

View basic device information including location and manufacturer

Edit Device Information



8.TESTING:

1. Purpose of Document

The purpose of this document is to briefly explain the test coverage and open issues of the [ProductName] 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 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

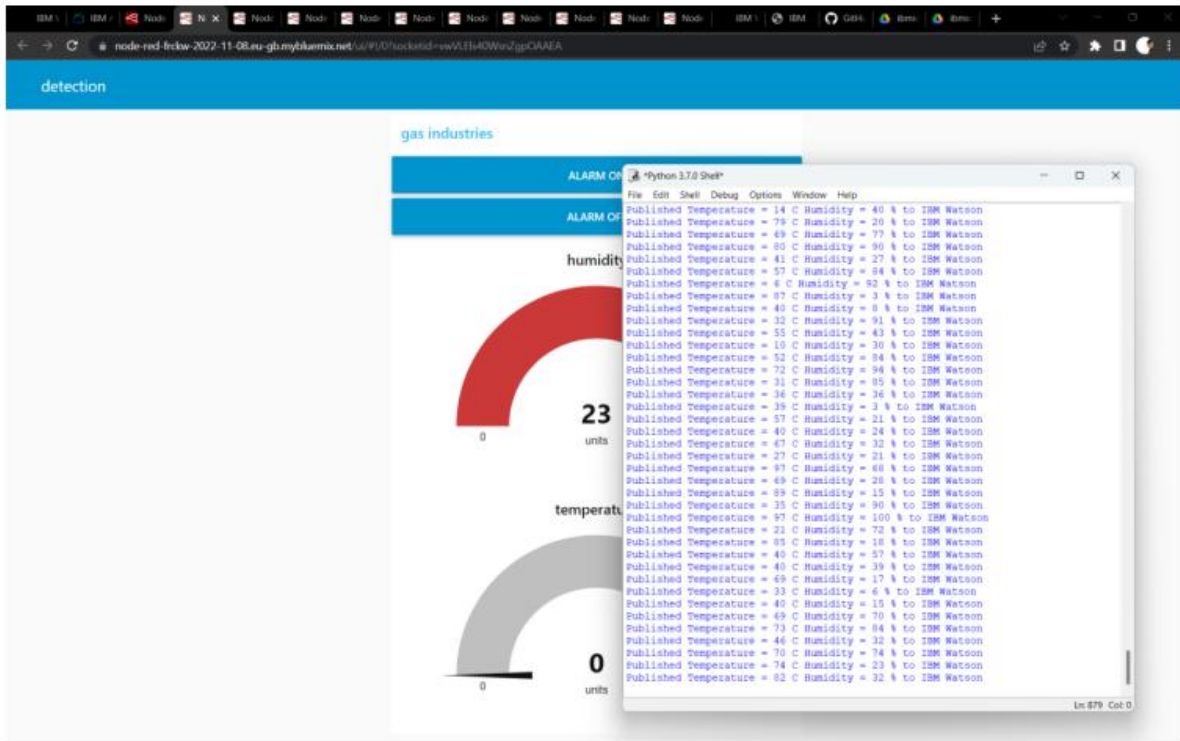
This report shows the number of test cases that have passed, failed, and untested

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

Outsource Shipping	3	0	0	3
Exception Reporting	9	0	0	9
Final Report Output	4	0	0	4
Version Control	2	0	0	2

9.RESULTS :

Step – 9:



PROJECT DEMO LINK:

<https://youtu.be/qgtfDUaXijo>

10.ADVANTAGES & DISADVANTAGES:

Advantages:

- Get real-time alerts about the gaseous presence in the atmosphere
- Prevent fire hazards and explosions
- Supervise gas concentration levels
- Ensure worker's health
- Real-time updates about leakages
- Cost-effective installation
- Data analytics for improved decisions
- Measure oxygen level accuracy

Disadvantages:

- User needs to check the LED lights for leakage.
- Installation cost can be high.

CONCLUSION

The advantage of this simple gas leak detector is its simplicity and its ability to warn about the leakage of the gas . This system uses GSM technique to send alert message to respective person if no one is there in the house and then gas leaks occurs, GSM module is there to send immediate messages to the respective person regarding the gas leak . The main advantage of this system is that it off the regulator knob of the cylinder automatically when gas leakage detected.

