ABSTRACT

Gas leakages resulting into fatal inferno has become a serious problem in household and other areas where household gas is handled and used. Gas leakage leads to various accidents resulting in financial loss as well as human injuries and loss. work aims at designing a system that detects gas leakage and alerts these describer through alarm and status display besides turning off the gas supply valve as a primary safety measure. The shutting off of the supply valve stops further gas flow to the cooker to prevent. The system more like a first Aid, automatically uses a normally closed solenoid valve for the shutting off of the gas valve before calling for help via visual display and audible alarm to those within the environment.

The system is an intelligent system, as it does not create nuisance by continuously sounding alarm but the alarm stops beeping once the concentration of the gas in the atmosphere after leakage goes below the set point and opens the valve again for operations. This work will minimize losses occasioned by explosions due to gas leakages and improve safety of life. Gas leakage is a major problem with industrial sector, gas powered vehicles like CNG, LPG cars. One of the preventive methods to stop accident associated with the gas leakage is to install gas leakage detection kit at vulnerable places.

LIST OF ABBREVATIONS

ARM	**A**dvanced **R**ISC **M**achine
BSS	**B**ase **S**tation **S**ubsystem
CNG	**C**ompressed **N**atural **G**as
FDN	**F**ixed **D**ailing **N**umber
GPRS	**G**eneral **P**acket **R**adio **S**ervice
GSM	**G**lobal **S**ystem for **M**obile **C**ommunication
ISDN	**I**ntegrated **S**ervice **D**igital **N**etwork
IDE	**I**ntegrated **D**evelopment **E**nvironment
LCD	**L**iquid **C**rystal **D**isplay
LPG	**L**iquefied **P**etroleum **G**as
MS	The **M**obile **S**tation
NSS	**N**etwork and **S**witching **S**ubsystem
RISC	**R**educed **I**nstruction **S**et **N**umber
SIM	**S**ubscriber **I**dentity **M**odule **C**ard
SMS	**S**hort **M**essage **S**ervice
TDMA	The **T**ime **D**ivision **M**ultiple **A**ccess

1. INTRODUCTION

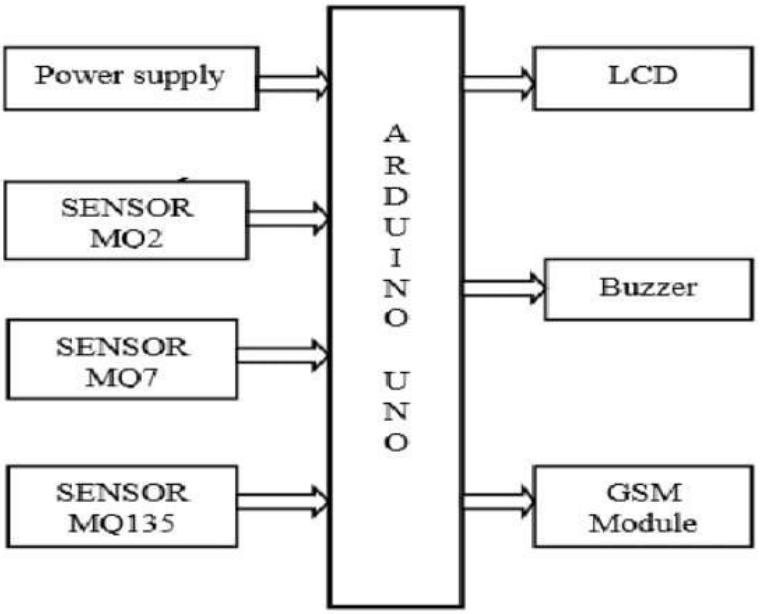
The use of liquefied petroleum gas (LPG) is rapidly increasing in developing countries like Nigeria, India, Bangladesh, Nepal, South Africa as It produces low smoke and less soot. The LPG is a flammable mixture of hydrocarbon gases like propane and but Gas pipelines are safe but they are prone to gas leakage due to mishandling, accidents and over filling of the gas cylinder. Explosions resulting from domestic cooking gas leakage can be fatal causing loss of property and injuries or even deaths.

A number of research papers have been published on gas to leakage security system in which gas sensors are used to detect gas leakage and a response circuit is caused to initiate an alert procedure and/or take action to avert an incident. One such method detects gas leakage and sends SMS to the householder. This does not make provision for halting further gas leakage. Another method not only detects gas leakage but also beep and turns off main power and gas supplies, and send an SMS. GSM module is used which alert the user by sending an SMS. This has broader focus beyond kitchen gas leakages. Another approach uses a smart security phone attached gas leakage sensor that senses leakage and sounds an alert alarm as well as sending a SMS to the home owner and emergency services.

1.1 PROPOSED METHOD

The gas leakage detection and alerting system. Arduino UNO (Atmega-328) the main unit of the system which performs the following tasks. A signal conditioning of the Arduino UNO is done by output signal of the sensor, provided input to Arduino. The detection results displayed on LCD. Indicates the people of danger in work place, factory, home. Buzzer activity with beep(siren) sound is made. Also send alert SMS to the in charge of the plant whose number is saved in SIM card by using GSM modem. The SMS received depends upon the leak of gas in the detection area of the sensor.

1.2 PURPOSE



Methodology is the systematic, theoretical analysis of the methods applied to a field of study. It comprises the theoretical analysis of the body of methods and principles associated with a branch of knowledge. Typically, it encompasses concepts such as paradigm, theoretical model, phases and quantitative or qualitative techniques. A methodology does not set out to provide solutions—it is therefore, not the same as a method. Instead, a methodology offers the theoretical underpinning for understanding which method, set of methods, or best practices can be applied to a specific case. Through a methodology, we are achieving the knowledge about planning, design, and implementation and testing.

2. PROBLEM SLOVING

2.1 EXISTING PROBLEM

There are different classes of leakage detection which have been used to monitor the leakage, several criteria are classified into their classification, some of which are critical principles and abilities needed from humans. The detection is classified into three, which are automated detection, manual detection, and semi-automated detection. Automated Detection involves monitoring of detecting leakage without the help of the operator, once the detector device is installed and been connected to the display of the personnel in charge and can be automatically shut down from the display unit. (SCADA); Manual Detection - These are methods in which the device can only be operated by humans. Like thermal imager or light detection and ranging (Lidar) devices; Semi- automated detection– solutions that necessitate a certain amount of input or assistance in carrying out certain tasks (e.g. statistical or digital signal processing methods). The technology used in leakages detection can be classified into two categories which are, Direct method and the Indirect method The direct method is making use of a handheld detector by the patrol team along the pipeline and in the aspect of the very long pipeline, the airplane mounted optical imaging device is used along the pipeline for measuring gas emanation for fast result

2.2 REFERANCE

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

[2] Hema, L. K., Murugan, D., & Chitra, M. WSN based Smart system for detection of LPG and Combustible gases. In National Conf. on Architecture, Software systems and Green computing-2013.

[3] Ramya, V., & Palaniappan, B. Embedded system for Hazardous Gas detection and Alerting. International Journal of Distributed and Parallel Systems (IJDPS), 2012; 3(3):287-300.

[4] Priya, P. D., & Rao, C. T. Hazardous Gas Pipeline Leakage Detection Based on Wireless Technology. International Journal of Professional Engineering Studies, India, 2014; 2(1).

[5] Jero, S. E., & Ganesh, A. B. 2011, March. PIC18LF4620 based customizable wireless sensor node to detect hazardous gas pipeline leakage. In 2011 International Conference on Emerging Trends in Electrical and Computer Technology (pp. 563-566). IEEE.

[6] Anusha, O., & Rajendra prasad, C. H. Experimental investigation on road safety system at crossings. International Journal of Engineering and Advanced Technology, 2019; 8(2):214–218

2.3 PROBLEM STATEMENT DEFINITION

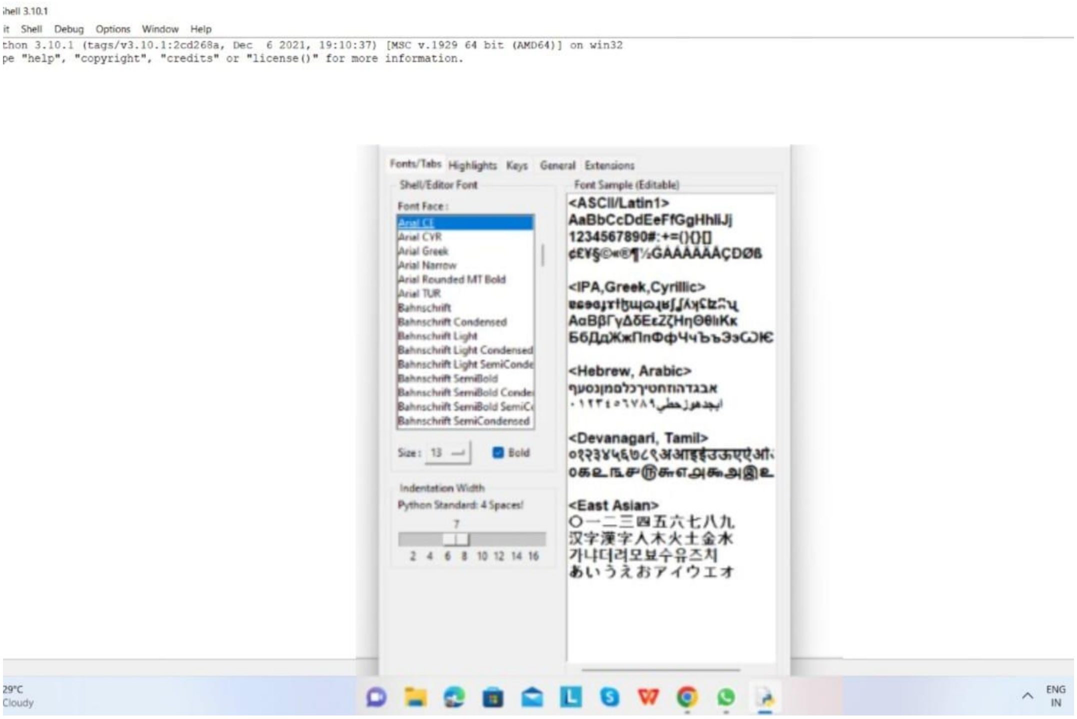
This technique has been tested by leak of gas almost about sensors, MQ2 gas sensor sends the signal to the Arduino UNO after detecting the gas Leakage. Arduino to other externally connected device such as LCD, buzzer and GSM send vigorous signals. SMS is sent by GSM module to the provided mobile number as a result. In practice, results for are noticed by the people surrounding by the area are displayed in the LCD and buzzer sound indicate the danger to the people by making beep sound.

3. PREREQUISITFS

3.1 CLOUD SERVICES

IBM Watson IoT Platform connects devices, ingests device data and transforms that data into meaningful insights. Watson IoT Platform and its additional add on services enable Clients to capture data for devices, equipment, and machines, to explore this data, and to discover insights on this data that drive better decision making. Watson IoT Platform provides a pre grated foundation for industry solution and Client applications built on IoT data. IBM Watson IoT Platform is made up of three fundamental services: Connection Service, Analytics Service, and Block chain Service. All three services have a nonproduction package for proofs of concept and pilot work, as well as a production package for full production deployment. IBM Watson IoT Platform Connection Service capabilities include: • Connection of a wide spectrum of IoT devices IoT device registration and management User Registration, setup, and authentication Ability to create alerts Security with TLS authentication support, access control group for devices &gateways Data Lifecycle Management Solution administration for deployment and device groupings Additionally: Analytics Service enable to enrich, augment and interact with raw data Block chain Service enable to connect with Block chain enabled networks. Node-RED Service: Node-RED is a flow base development tool for visual programming developed originally by IBM for wiring together hardware devices, APIs and online services as part of the Internet of Things. Node-RED provides web browser -based flow editor, which can be used to create JavaScript functions. Elements of applications can be saved or shared for re-use. The runtime is built on Node.js. The flows created in Node-RED are stored using JSON. Since version 0.14, MQTT nodes can make properly configured TLS connections.

3.2 SOFTWARE



Shell 3.10.1
it Shell Debug Options Window Help
thon 3.10.1 (tags/v3.10.1:2cd268a, Dec 6 2021, 19:10:37) [MSC v.1929 64 bit (AMD64)] on win32
pe "help", "copyright", "credits" or "license()" for more information.
Fonts/Tabs Highlights Keys General Extensions
Shell/Editor Font
Font Sample (Editable)
Font Face :
Arial CE
Arial CYR
Arial Greek
Arial Narrow
Arial Rounded MT Bold
Arial TUR
Bahnschrift
Bahnschrift Condensed
Bahnschrift Light
Bahnschrift Light Condensed
Bahnschrift SemiBold
Bahnschrift SemiCondensed
Size : 13
Bold
Indentation Width
Python Standard: 4 Spaces!
2 4 6 8 10 12 14 16
<ASCII/Latin1>
AaBbCcDdEeFfGgHhIiJj
1234567890#:+=(){}[]
<IPA,Greek,Cyrillic>
<Hebrew, Arabic>
<Devanagari, Tamil>
<East Asian>
〇一二三四五六七八九
汉字漢字人木火土金水
가냐더려모뵤수유즈치
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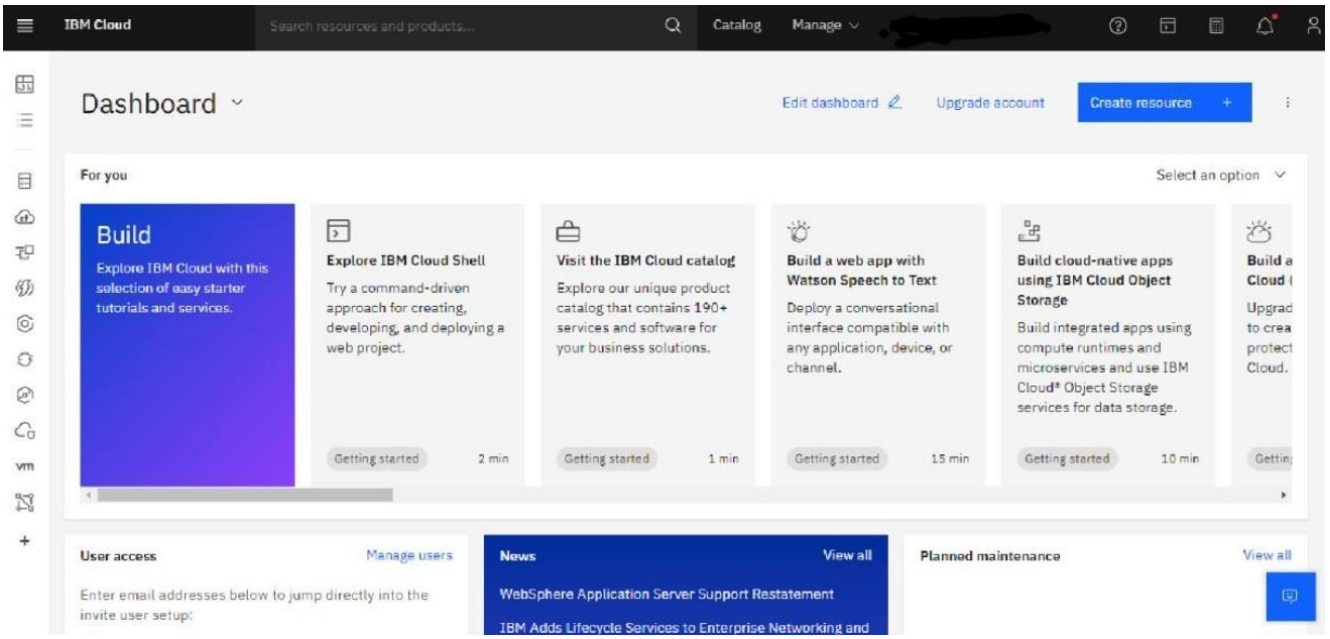
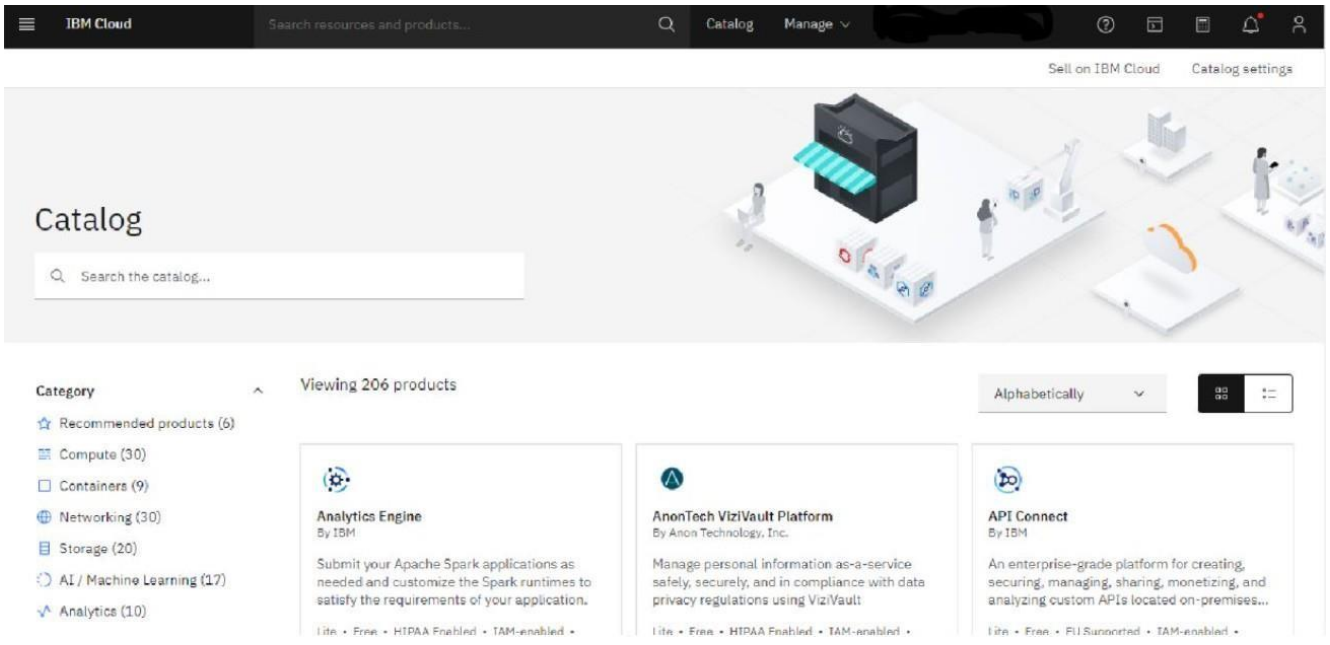
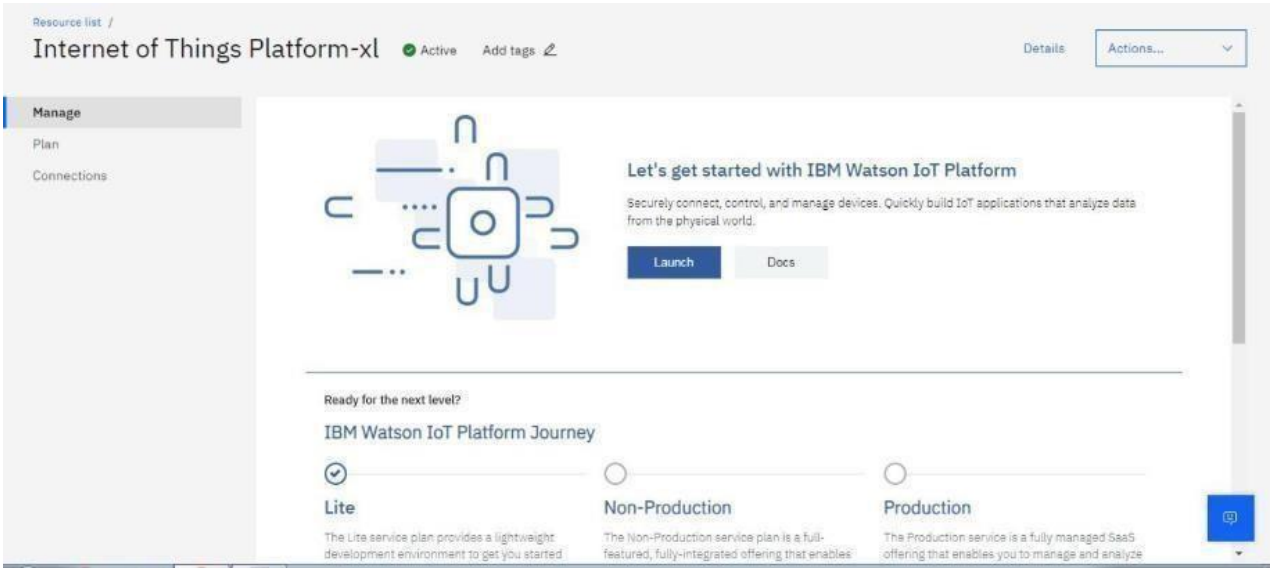
IN

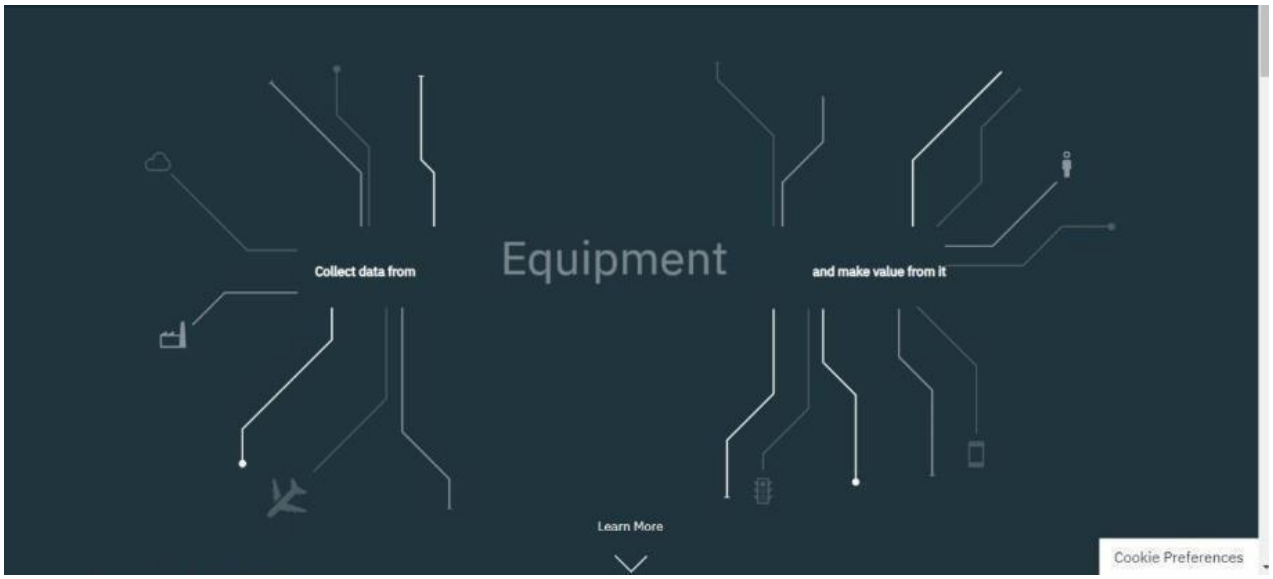
4. CREATE AND CONFIGURE CLOUD SERVICE

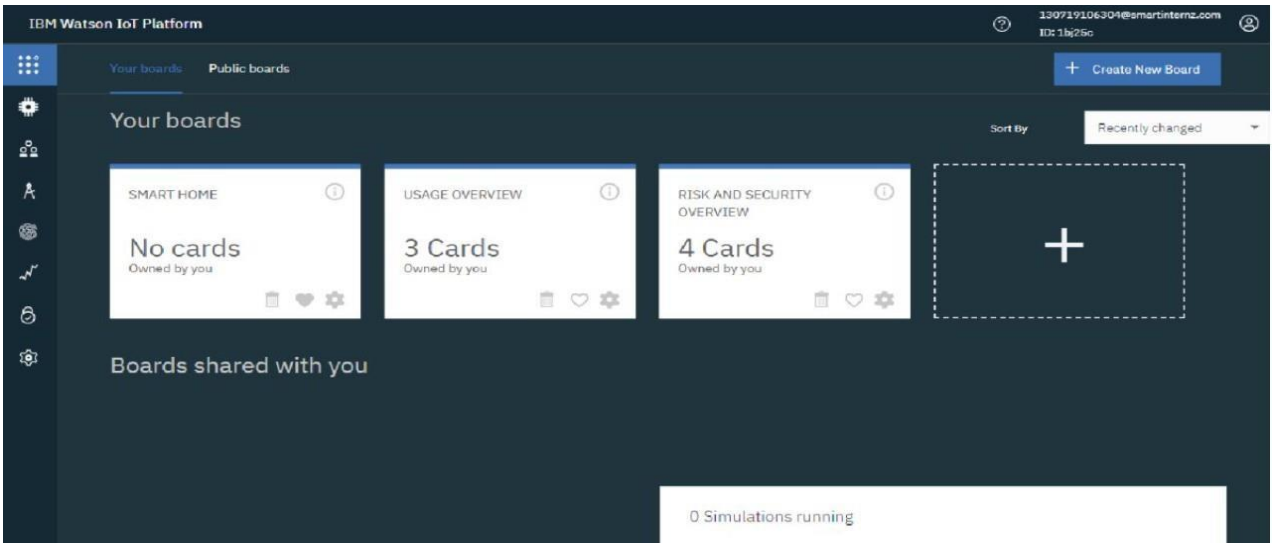
4.1 CREATE IBM WATSONIOT PLATFORM AND DEVICE

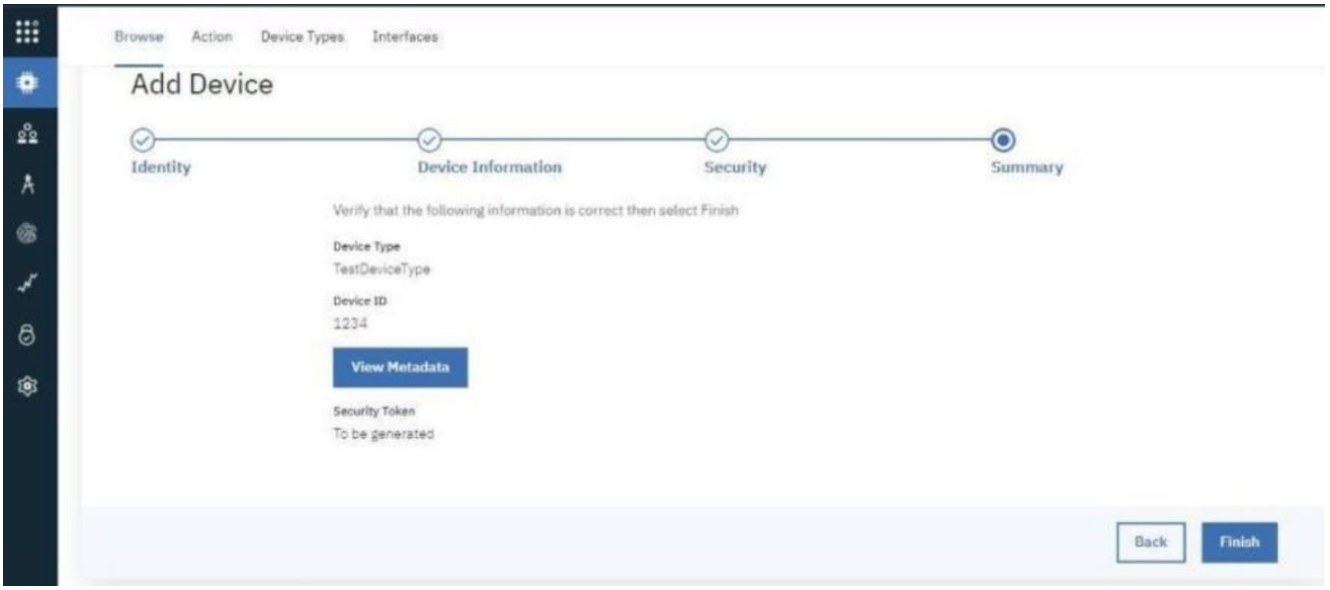


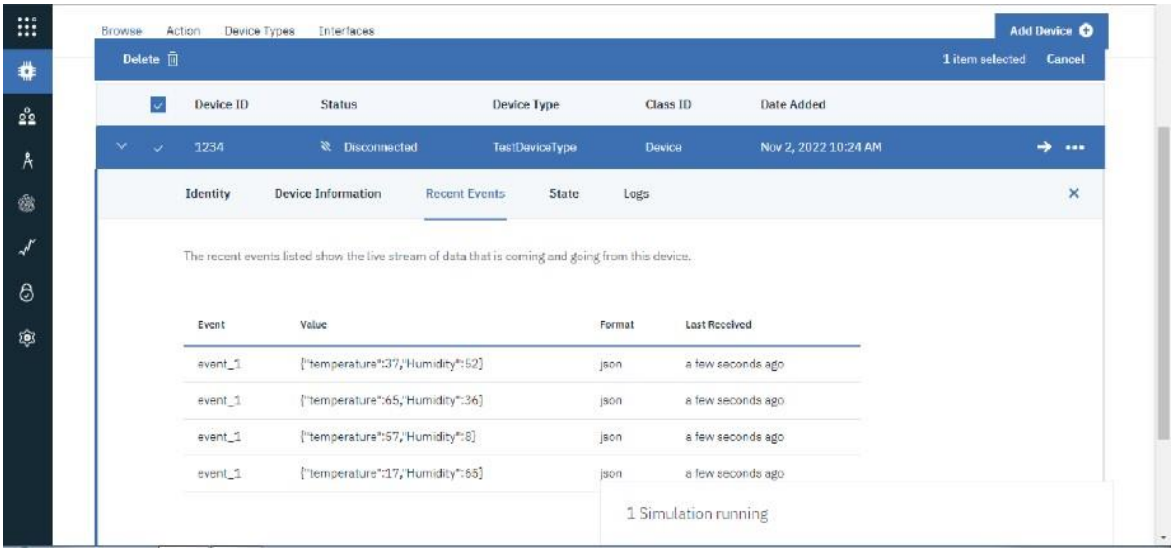


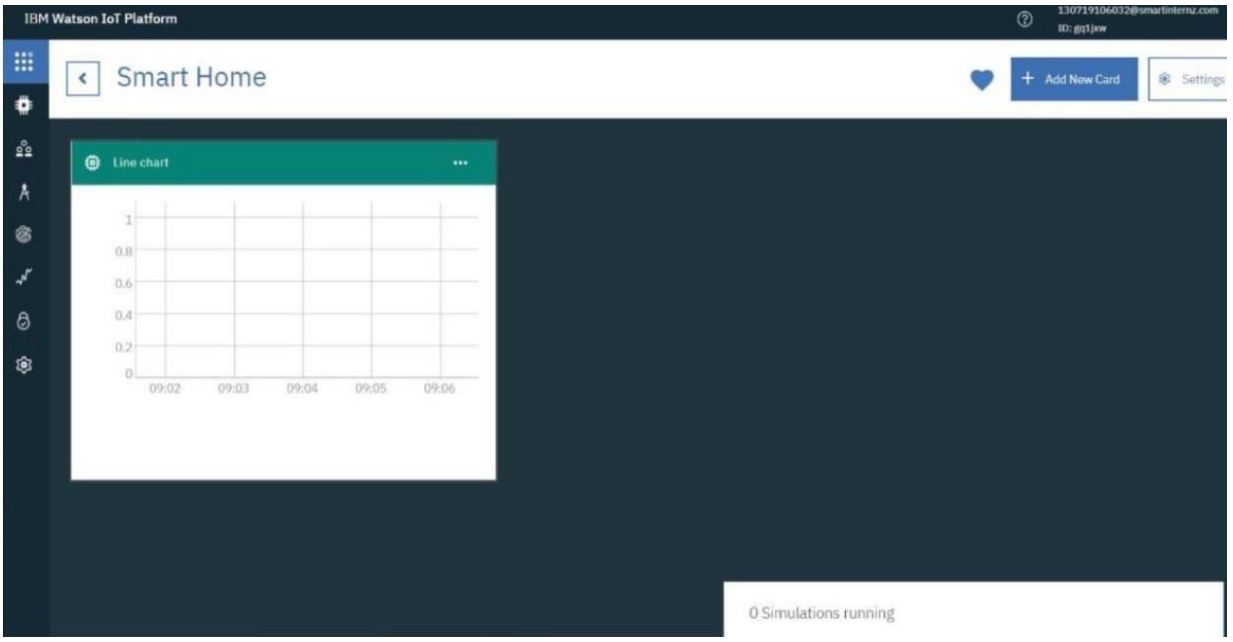

Resource list /
Internet of Things Platform-xl
Active
Add tags
Details
Actions...
Manage
Plan
Connections
Let's get started with IBM Watson IoT Platform
Securely connect, control, and manage devices. Quickly build IoT applications that analyze data from the physical world.
Launch
Docs
Ready for the next level?
IBM Watson IoT Platform Journey
Lite
The Lite service plan provides a lightweight development environment to get you started
Non-Production
The Non-Production service plan is a full-featured, fully-integrated offering that enables
Production
The Production service is a fully managed SaaS offering that enables you to manage and analyze


Collect data from
Equipment
and make value from it
Learn More
Cookie Preferences

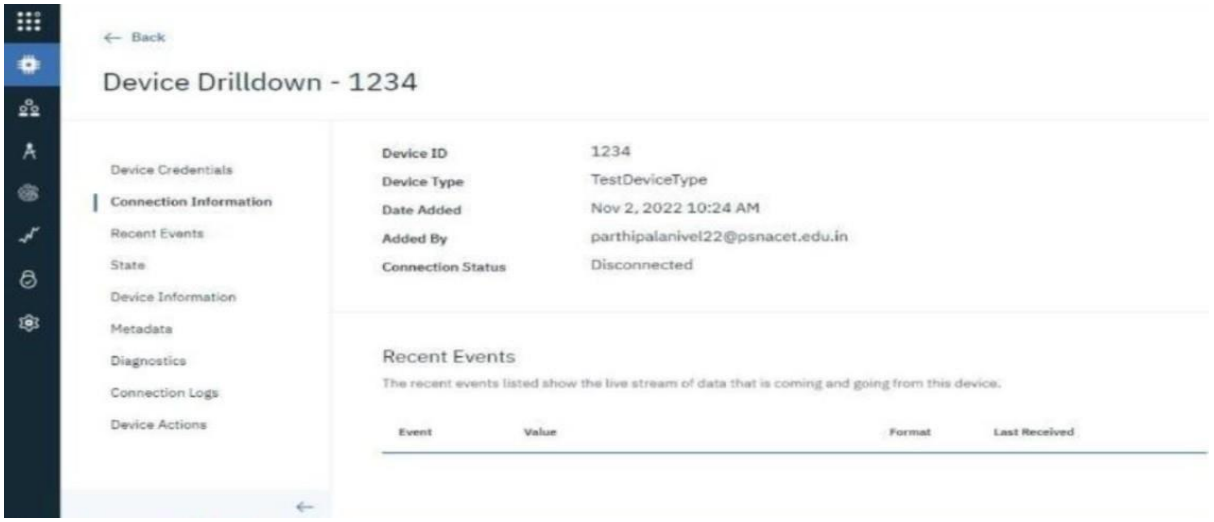

IBM Watson IoT Platform
Your boards
Public boards
Create New Board
Your boards
Sort By
Recently changed
SMART HOME
No cards
Owned by you
USAGE OVERVIEW
3 Cards
Owned by you
RISK AND SECURITY OVERVIEW
4 Cards
Owned by you
Boards shared with you
0 Simulations running


Browse
Action
Device Types
Interfaces
Add Device
Identity
Device Information
Security
Summary
Verify that the following information is correct then select Finish
Device Type
TestDeviceType
Device ID
1234
View Metadata
Security Token
To be generated
Back
Finish


Browse
Action
Device Types
Interfaces
Add Device
Delete
1 item selected
Cancel
Device ID
Status
Device Type
Class ID
Date Added
1234
Disconnected
TestDeviceType
Device
Nov 2, 2022 10:24 AM
Identity
Device Information
Recent Events
State
Logs
The recent events listed show the live stream of data that is coming and going from this device.
Event
Value
Format
Last Received
event_1
{"temperature":37,"Humidity":52}
json
a few seconds ago
event_1
{"temperature":65,"Humidity":36}
json
a few seconds ago
event_1
{"temperature":57,"Humidity":8}
json
a few seconds ago
event_1
{"temperature":17,"Humidity":65}
json
a few seconds ago
1 Simulation running


IBM Watson IoT Platform
Smart Home
Add New Card
Settings
Line chart
1
0.8
0.6
0.4
0.2
0
09:02
09:03
09:04
09:05
09:06
0 Simulations running

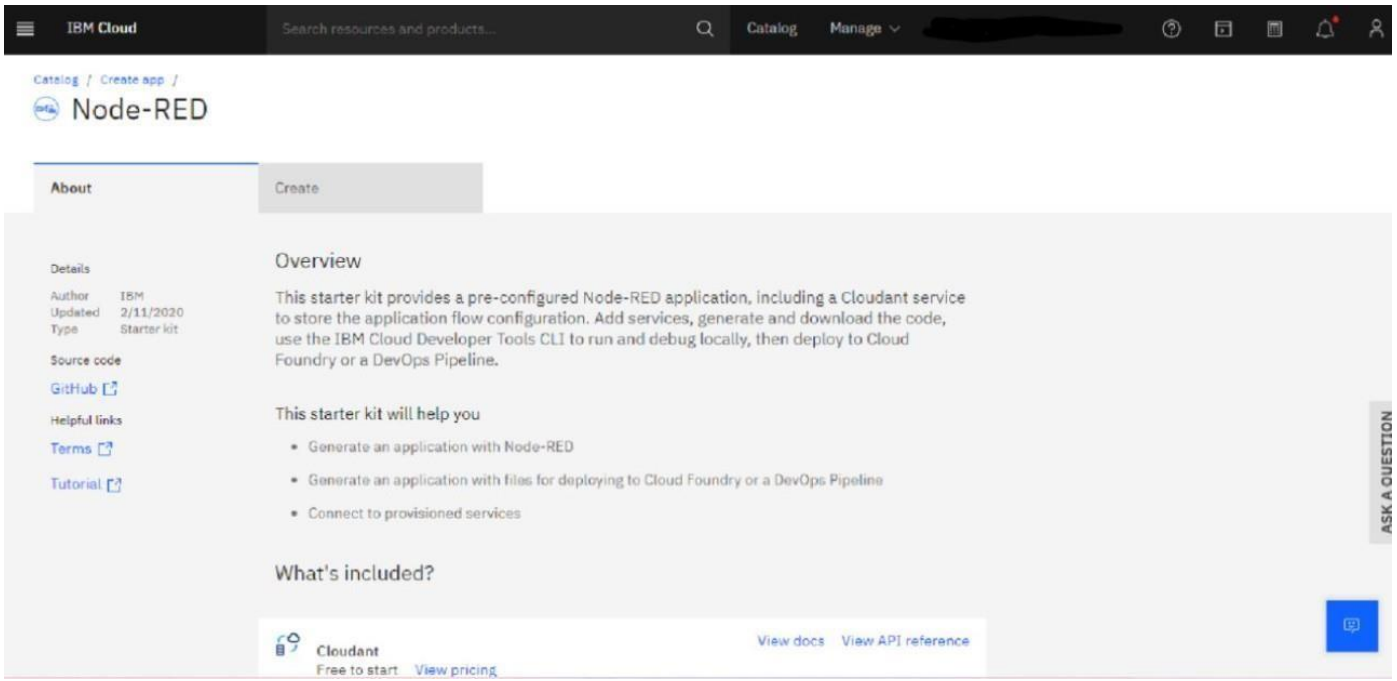

Back
Device Drilldown - 1234
Device Credentials
Connection Information
Recent Events
State
Device Information
Metadata
Diagnostics
Connection Logs
Device Actions
Device Credentials
You registered your device to the organization. Add these credentials to the device to connect it to the platform. After the device is connected, you can navigate to view connection and event details.
Organization ID
ea7xfp
Device Type
TestDeviceType
Device ID
1234
Authentication Method
use-token-auth
Authentication Token
a18I+8uAqrHNKXxbo4
Authentication tokens are non-recoverable. If you misplace this token, you will need to re-register the device to generate a new authentication token.
Find out how to add these credentials to your device


Back
Device Drilldown - 1234
Device Credentials
Connection Information
Recent Events
State
Device Information
Metadata
Diagnostics
Connection Logs
Device Actions
Device ID
1234
Device Type
TestDeviceType
Date Added
Nov 2, 2022 10:24 AM
Added By
parthipalanivel22@psnacet.edu.in
Connection Status
Disconnected
Recent Events
The recent events listed show the live stream of data that is coming and going from this device.
Event
Value
Format
Last Received

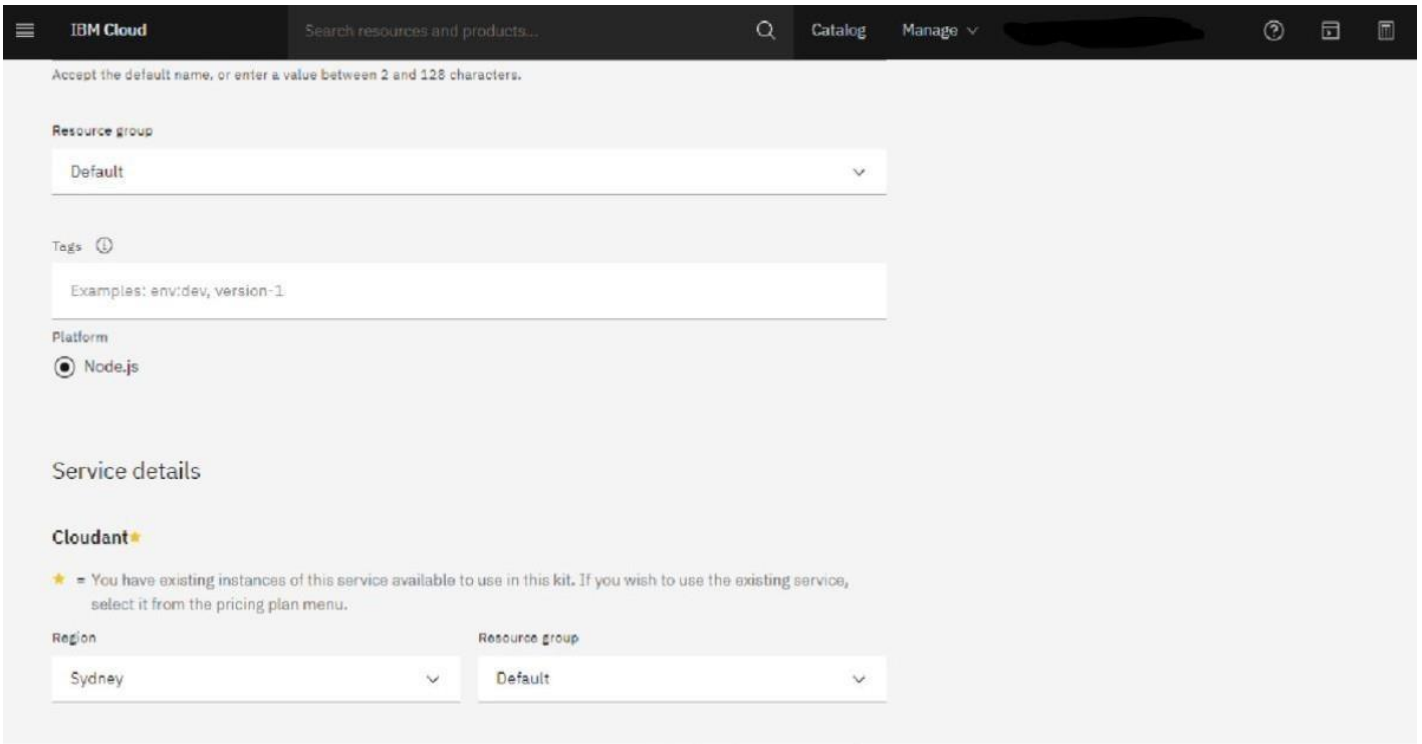
4.2 CREATE NODE-RED SERVICE

Steps to be followed

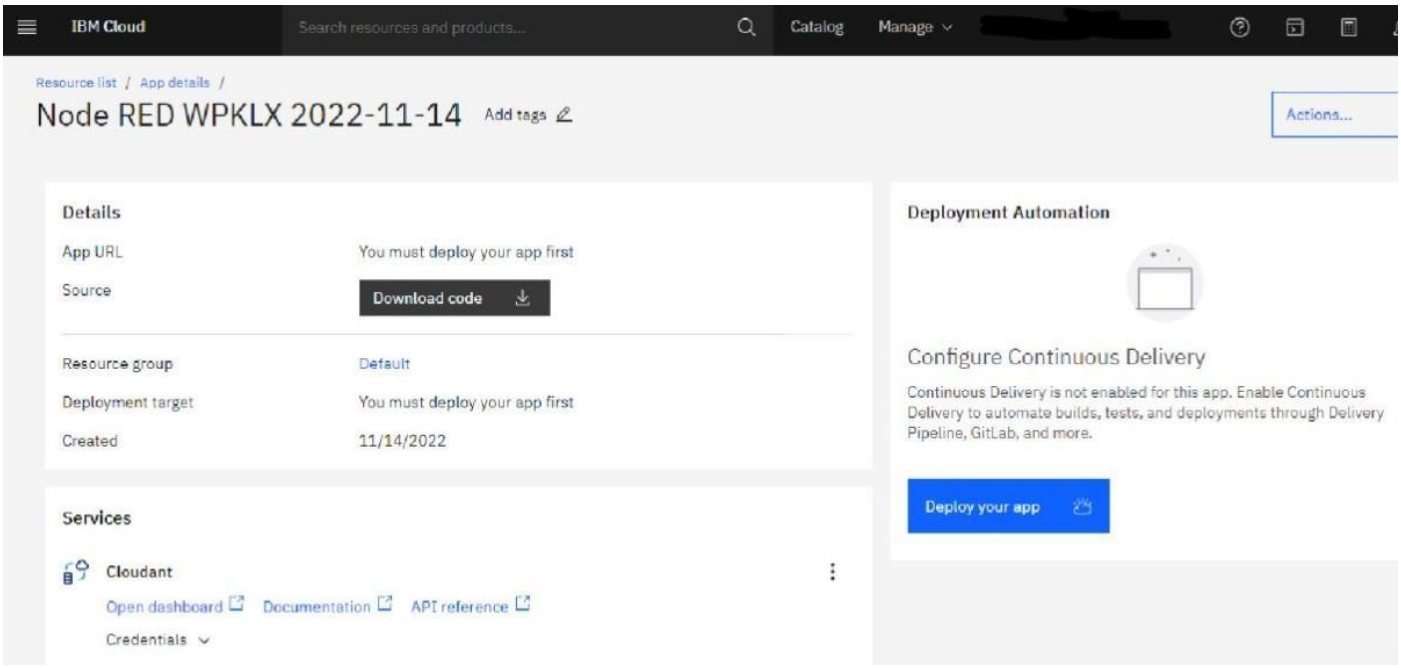
Step 1: Navigated to the App creation page.



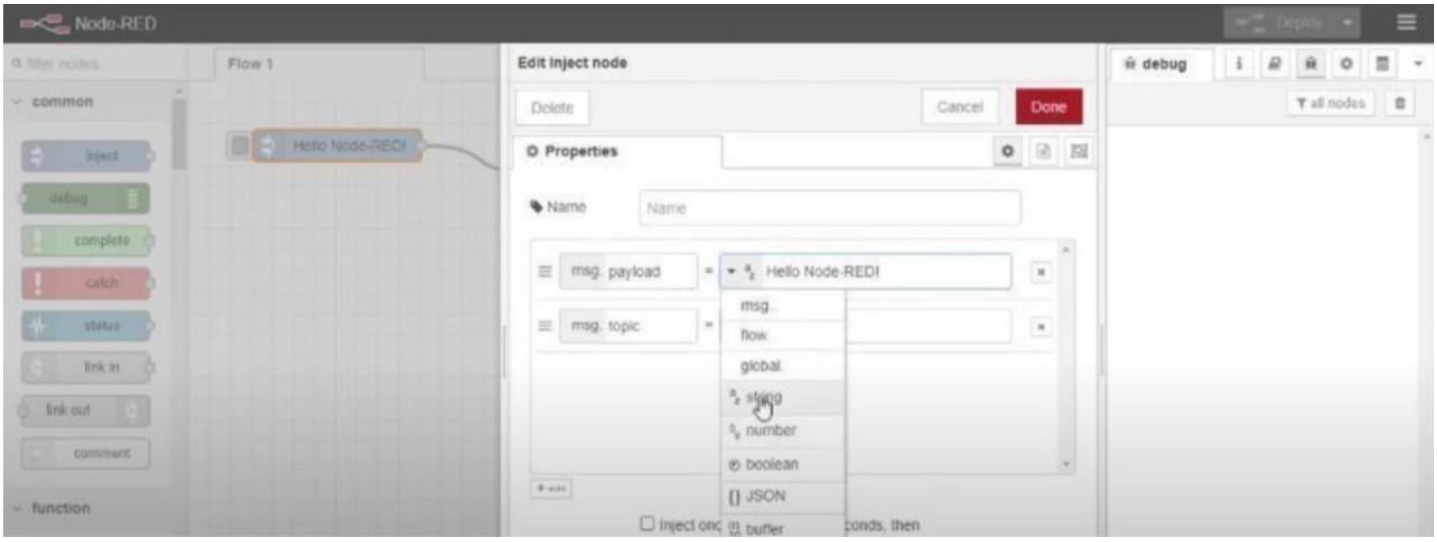
Step 2: Entered project details and clicked on create



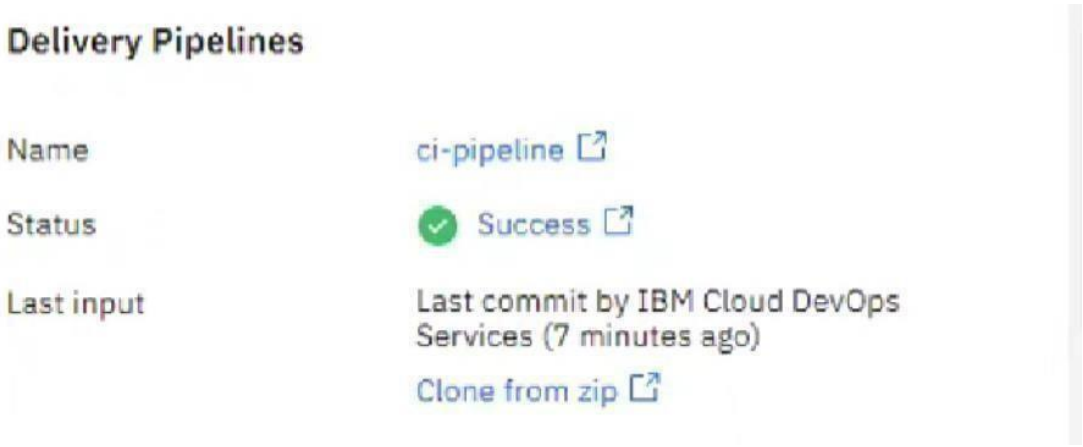
Step 3: Clicking on the “Deploy your App” Button.



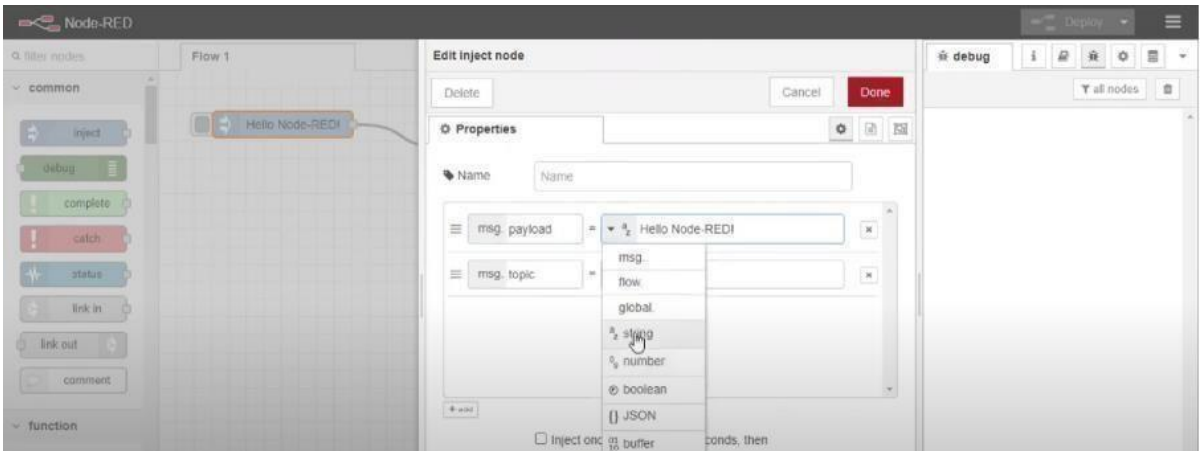
Step 4: Setting up the environment and deploying the app.



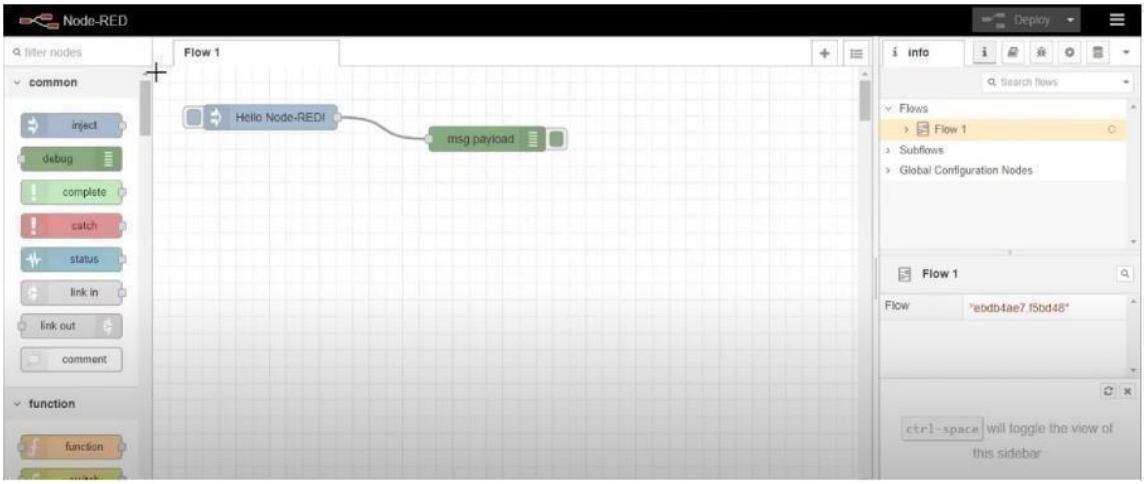
Step 5: Successfully deployed the app.



Step 6: Dragged and dropped components into the editor.



Step 7: Editing some values of the properties.



Step 8: Successfully deployed the app.

5. DEVELOP A PYTHON SCRIPT TO PUBLISH AND SUBSCRIBE TO IBM PLATFORM

5.1 PUBLISH DATA TO THE IBM CLOUD

```
#IBM Watson IOT
Platform #pip install
wiotp-sdk import
wiotp.sdk.device import
time import random
myConfig = {
"identity":
{
    "orgId": "yf0dyy ",
    "typeId":
    "Agassh ",
    "deviceId":"1234
    5"
},
"auth": {
"token": "VJTDPRX@f&4Vuox8ms "
}
 }
def myCommandCallback(cmd):
print("Message received from IBM IoT Platform: %s" %
cmd.data['command']) m=cmd.data['command'] client
                    =
wiotp.sdk.device.DeviceClient(config=myConfig,
logHandlers=None)
client.connect()
```

while

True: gas=random.randint(0,100)

temp=random.randint(0,100) hum=random.randint(0,100)

pre=random.randint(0,100) myData={'Hazardous Gas':gas,

'Temperature':temp, 'Humidity':hum,

'Pressure':pre } client.publishEvent(eventId="status", msgFormat="json", data=myData, qos=0, onPublish=None) print("Published data Successfully: %s", myData) client.commandCallback = myCommandCallback time.sleep(2) client.disconnect()

5.2 DEVELOP THE PYTHON CODE

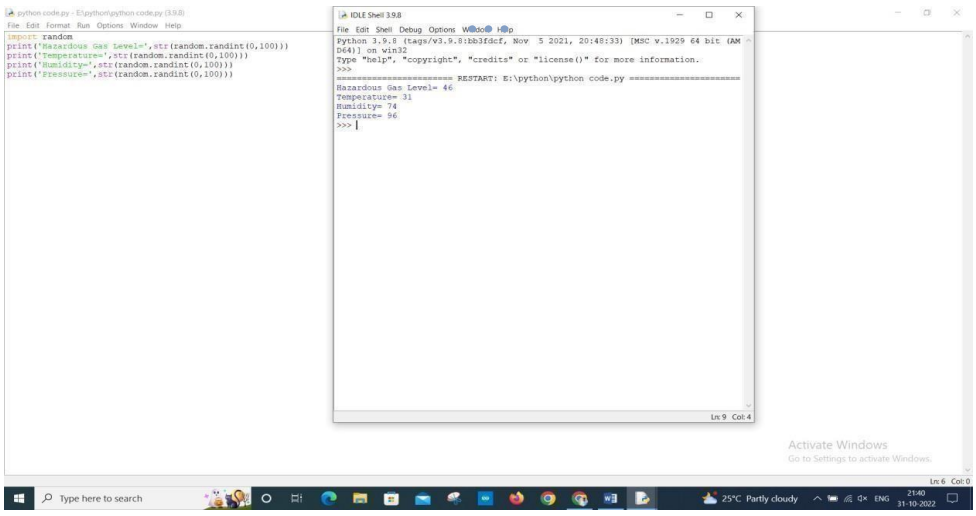
PYTHON CODE import random print('Random number

=',str(random.randint(0,100)))

print('Temperature=',str(random.randint(0,100)))

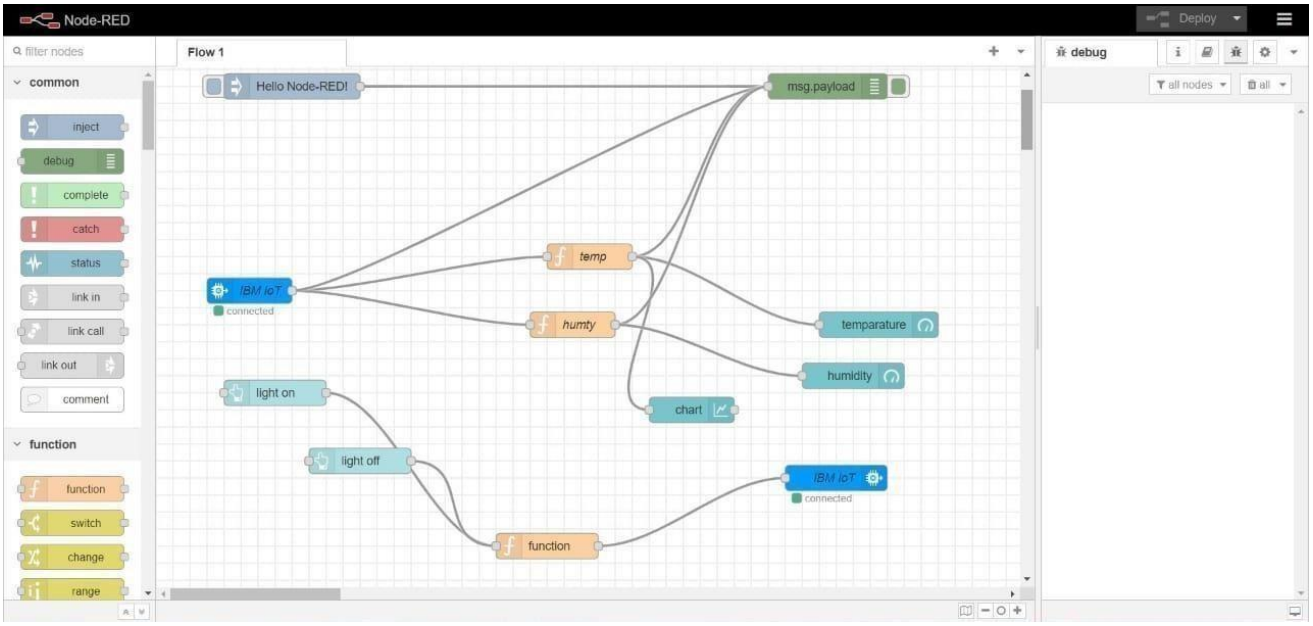
print('Humidity=',str(random.randint(0,100)))

OUTPUT:



6. DEVELOP A WEB APPLICATION USING NODE RED SERVICE

6.1 DEVELOP THE WEB APPLICATION USING NODE-RED



6.2 USE DASHBOARD NODES FOR CREATING UI

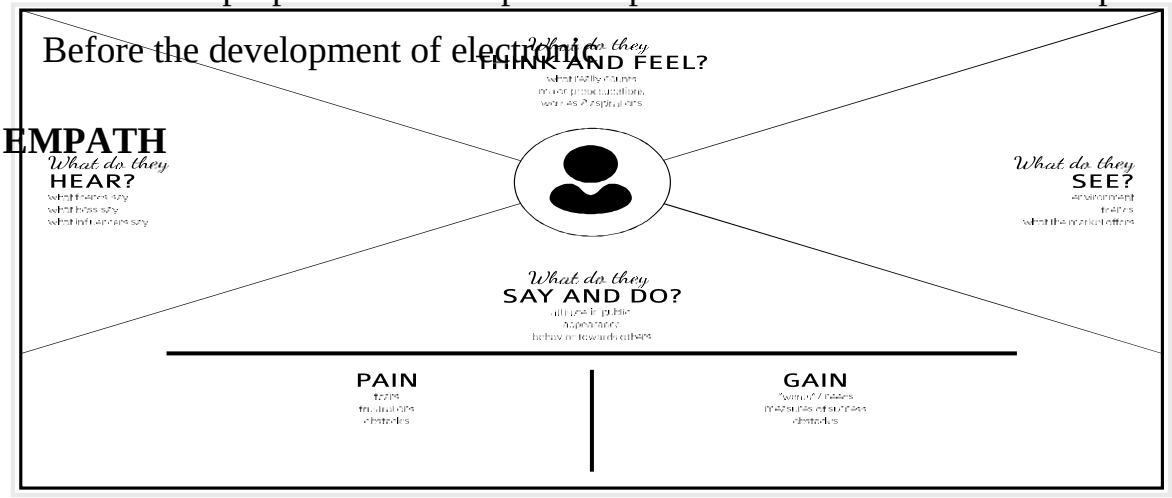
7. IDEATION PHASE

7.1. LITERATURE REVIEW

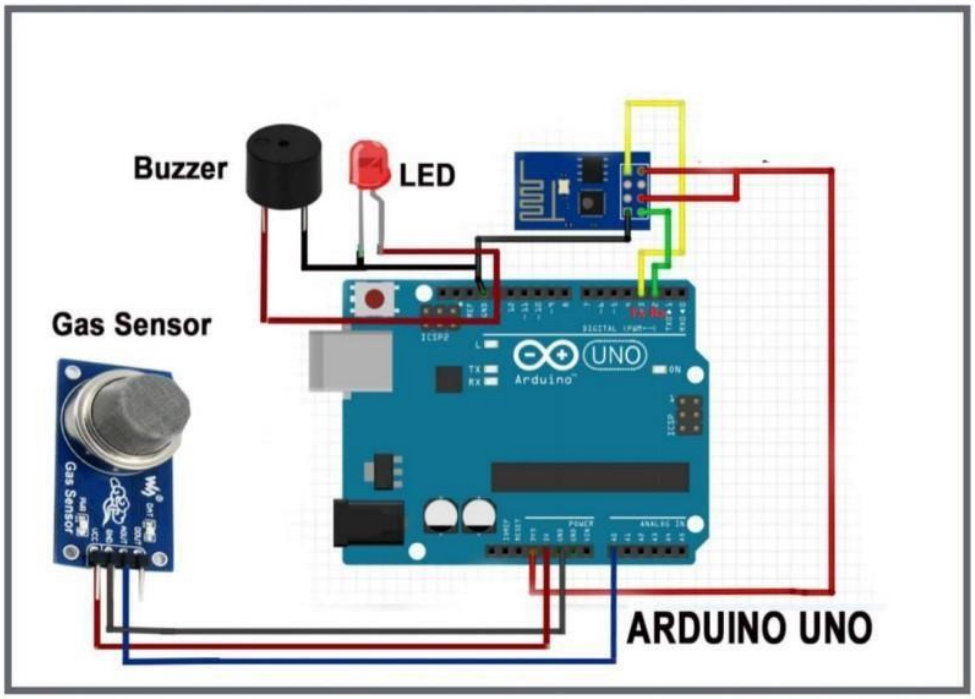
Microcontroller Based LPG Gas Leakage Detector Using GSM Module, in this system where used gas sensor, GSM module, microcontroller, if the gas concentration is increases the gas sensors will sense the leakage of the gas and then send to the microcontroller. Then the GSM module is connected to the microcontroller which will gives the command to stop the main supply. The system is highly reliable, tamper-proof and secure. In the long run the maintenance cost is efficient. It is highly accurate. (A.sood, B.Sonkar, A.Ranjan, Mr. A.Faisal, June2015)

Liquefied Petroleum Gas commonly known as LPG consists of a mixture of Commercial Propane and Commercial Butane having saturated as well as unsaturated hydrocarbons. It is an order less gas due to which Ethyl Herceptin is added as powerful odorant so that leakage can easily be detected. LPG is commonly used in homes for heating and cooking. This energy source is primarily composed of propane and butane which are highly flammable chemical compounds. LPG was first produced in 1910 by Walter Snelling (Didpaye1, 2015) and is classified as a hazardous material because of its flammable properties and explosive potential when stored under pressure. Before the development of electronic

7.2 EMPATH



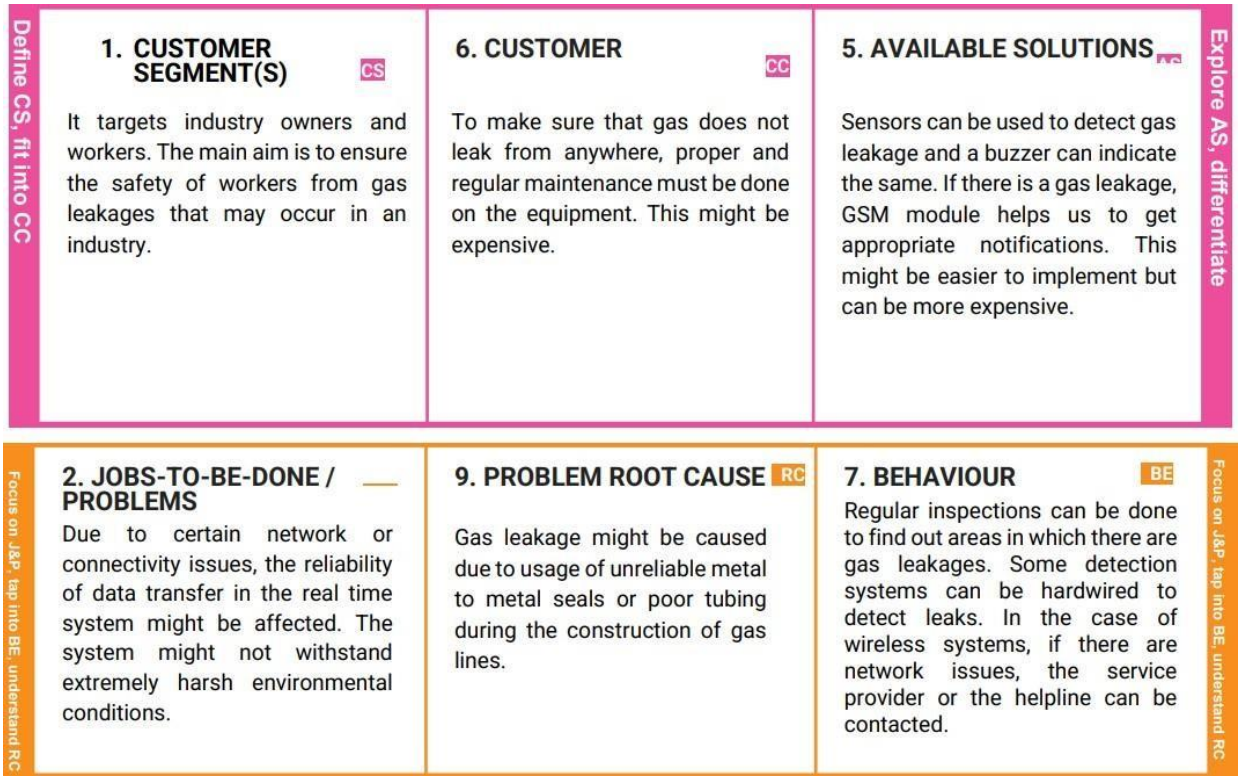
7.3 IDEATION



In this paper we use IOT technology for enhancing the existing safety standards. While makingthis 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 tothem. We have used the IOT technology to make a Gas Leakage Detector for society which having Smart Alerting techniques involving sending text message to the concerned authority andan ability performing data analytics on sensor. This system will be able to detect the gas in environment using the gas sensors. This will prevent form the major harmful problem

8. PROJECT DESIGN PHASE-1

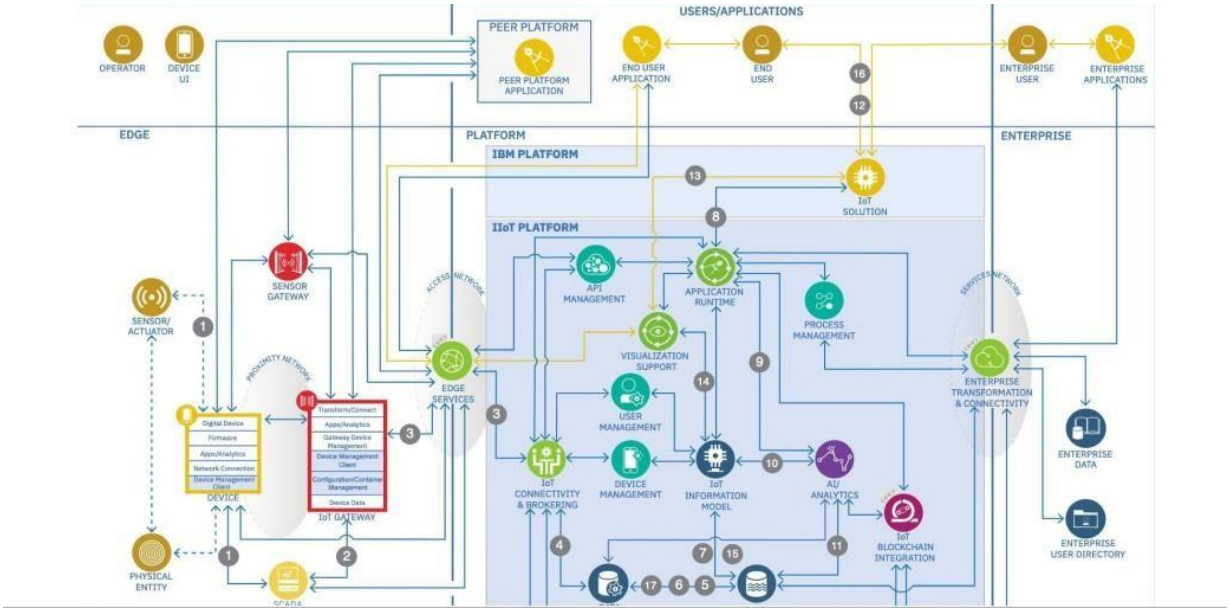
8.1 PROBLEM SOLUTION



8.2 PROPOSED SOLUTION

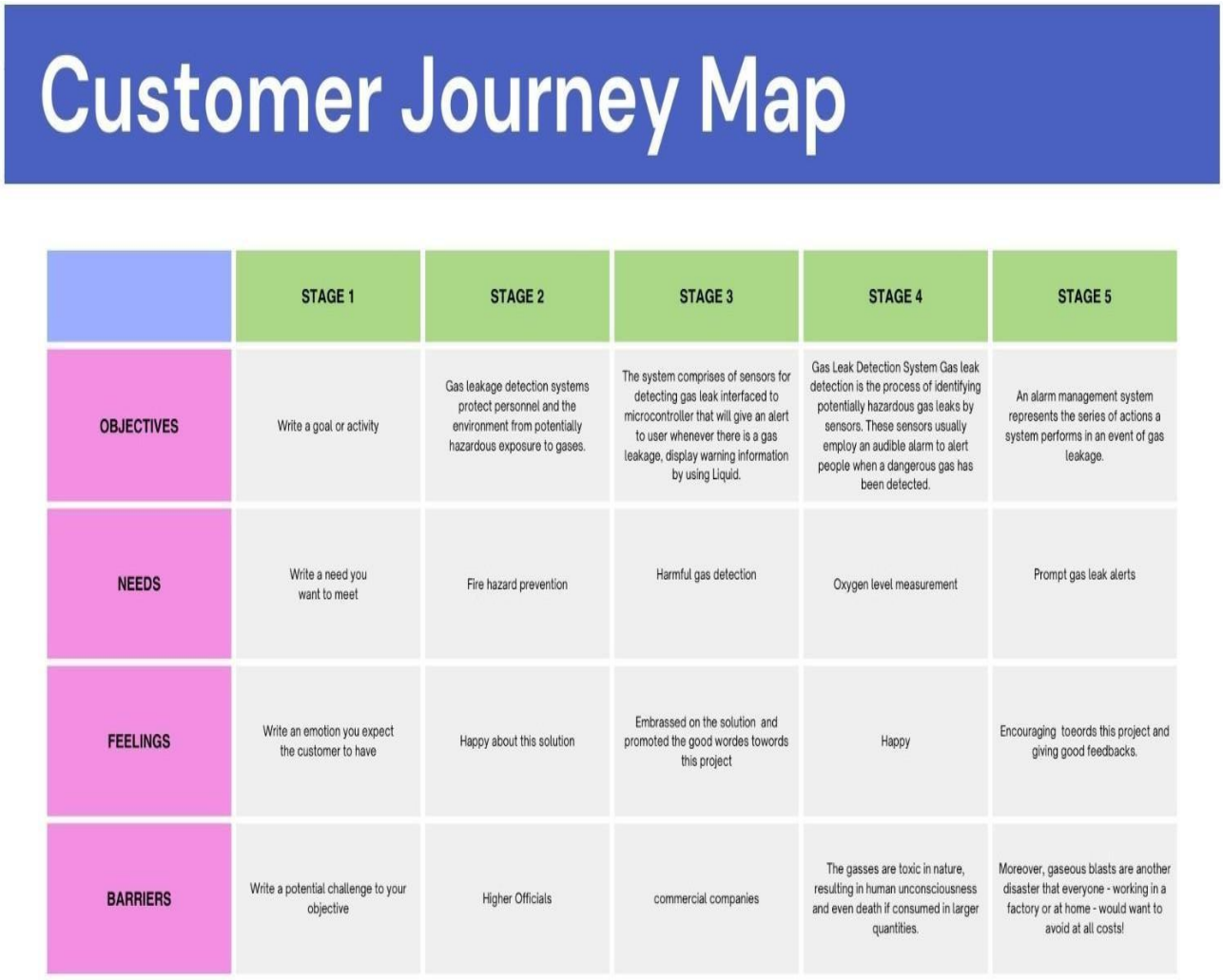
S.NO	Parameter	Description
1	Problem Statement (Problem to be solved)	Gas leakage in industries can be very dangerous as certain gases can be poisonous while others can be explosive. So, system can be designed to monitor, detect and alert the workers in the case of a gas leakage in a timely manner.
2	Idea / Solution description	Gas sensors can be placed at strategic locations in an industry that is prone to accidents due to gas leakage. These sensors can be interfaced with the cloud using a microcontroller. When the level of gas passes a threshold value, the sensor can send an alert via the cloud and also a buzzer can be made to give an alert sound to alert the workers on site. By using GSM module, SMS can also be sent to the required people or helpline. It enables us to monitor gas levels remotely and in real time
3	Novelty / Uniqueness	Here wireless communication system using either Wi-Fi or ZigBee can be used.
4	Social Impact / Customer Satisfaction	Easy to install, lesser cost and reduction in accidents due to gas leakage.
5	Business Model (Revenue Model)	Due to inflammatory or poisonous gases being used in many industries, the rate of accidents and deaths increased. The gas leakage detection model can help prevent accidents so as long as there are workers in industries, this model is a necessity and production will not be stopped.
6	Scalability of the Solution	Even if there is a large volume of gas leakage, the product will sense the accurate value and alert the users. In the case of accident or extreme leakage, the respective authorities or helplines can be notified almost immediately with the fast communication that is provided

8.3 SOLUTION ARCHITECTURE

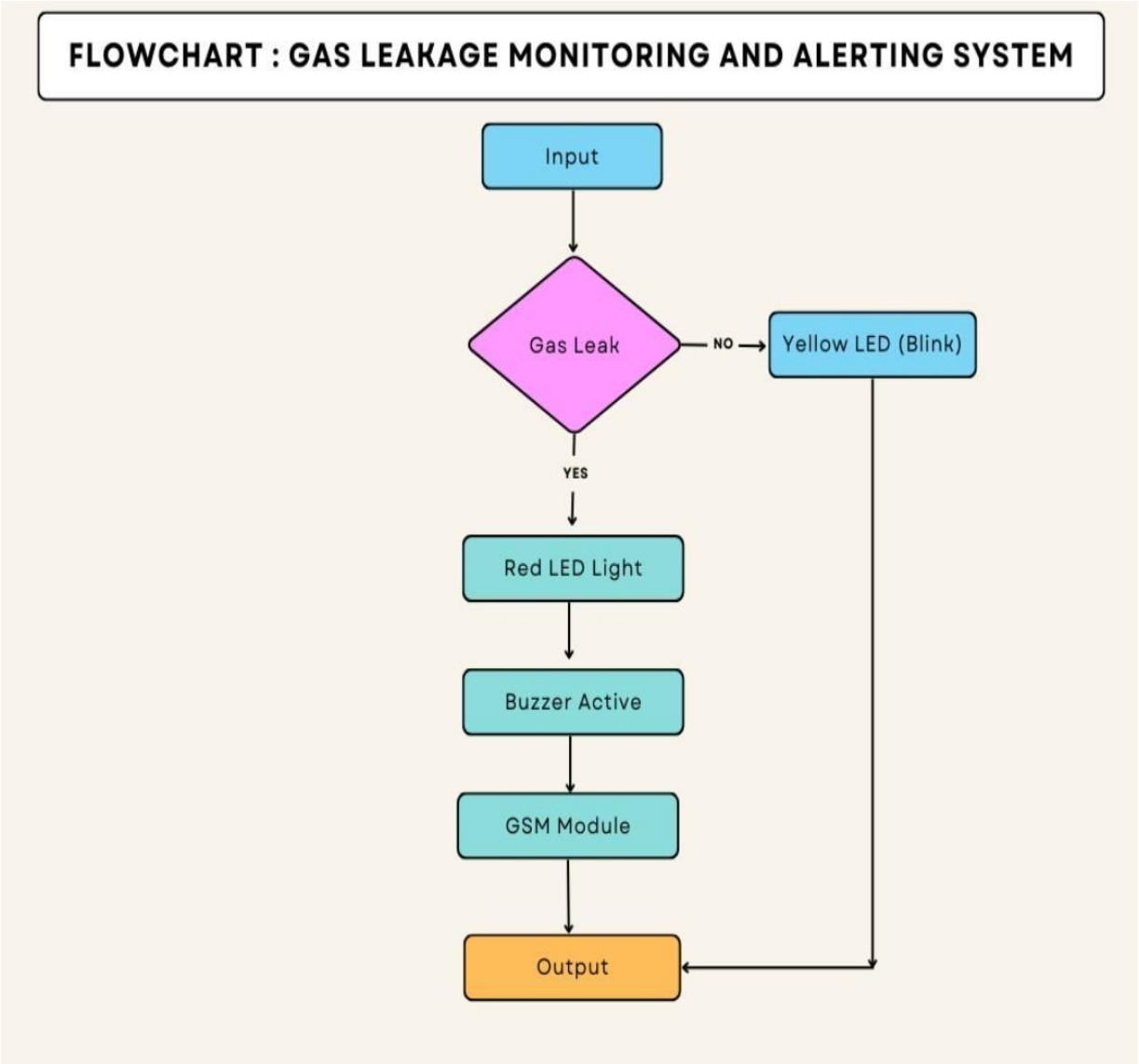


9. PROJECT DESIGN PHASE 2

9.1 CUSTOMER JOURNEY



9.2 DATA FLOW DIAGRAM



9.3 FUNCTIONAL REQUIREMENTS

Business Requirements	User Requirements	Product Requirements
The said system can be deployed in homes, hotels, factory units, LPG cylinder storage areas, and so on. The main advantage of this IoT and Arduino-based application is that it can determine the leakage and send the data over to a site. It can be monitored, and preventive measures can be taken to avoid any disaster.	The gas leakage detection system can be optimized for detecting toxic gasses along with upgrading them with smoke and fire detectors to identify the presence of smoke and fire. Ensuring worker safety is important but making using of the right technology is even more vital.	Detecting gasses is necessary regardless of your business role or individual purpose. Certain technologies at play make such IoT devices what they are, and if you want to indulge in IoT application development, you must know what they are and what purpose they can fulfill

9.4 TECNOLOGY ARCHITECTURE

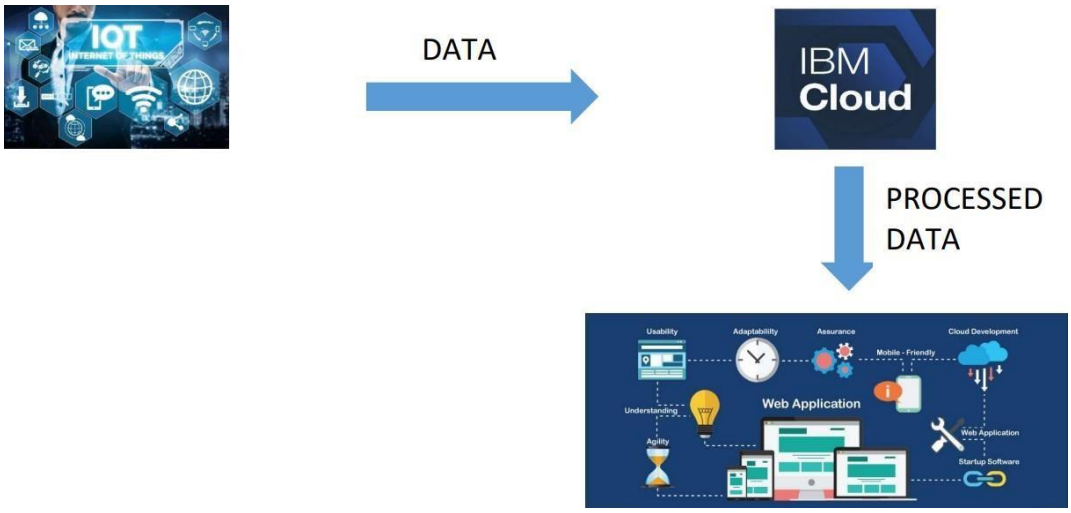


Table-1 : Components & Technologies:

S.NO	Components	Description	Technology
1	User Interface	How user interacts with application e.g. Web UI, Mobile App, Chatbot etc.	HTML, CSS, JavaScript / Angular Js / React Js etc.
2	Application Logic-1	Logic for a process in the application	Java / Python
3	Application Logic-2	Logic for a process in the application	IBM Watson STT service
4	Application Logic-3	Logic for a process in the application	IBM Watson Assistant
5	Cloud Database	Database Service on Cloud	IBM DB2, IBM Cloudant etc.
6	Infrastructure (Server / Cloud)	Application Deployment on Cloud	Local, Cloud Foundry, Kubernetes, etc.

Table-2: Application Characteristics:

S.NO	Charateristics	Description	Technology
1	Scalable Architecture	We can implement in Industries, Hotels, Public places	IOT (Internet of Things)
2	Availability	To Detect leakage 24/7 for interrupted services we have implemented in distributed servers (cloud)	IBM cloud
3	Performance	If we implemented in industries, it needs many gas sensors to detect	

10. PROJECT PLANNING PHASE

10.1 MILESTONE AND ACTIVITY LIST

September 2022

- Project Design and Planning(Ideation Phase)
- Project Design and Planning(Project Design Phase 1)
- Project Design and Planning(Project Design Phase 2)
- Project Design and Planning(Project Planning Phase)

October 2022

- Project Development Phase (Sprint 1)
- Project Development Phase (Sprint 1)
- Project Development Phase (Sprint 1)
- Project Development Phase (Sprint 1)

10.2 SPRINT DELIVERY POINT

1. Identify the Problem

2. Prepare an abstract and Problem Statement

3. List a required Objects needed

4. Create a code and run it

5. Test with a created code and check the designed Prototype

6. Solution for the problem is found

11. PROJECT DEVELOPMENT PHASE

11.1 DELIVERY OF SPRINT 1

```
#include <LiquidCrystal.h> LiquidCrystal
lcd(5,6,8,9,10,11);

Int redled =2;

 Intgreenled=3

Int buzzer =4;

  Int sensor = A0;
Int sensorThresh = 400;

Void setup()
{
pinMode(redled, OUTPUT);
pinMode(greenled,OUTPUT);
pinMode(buzzer,OUTPUT);
pinMode(sensor,INPUT);
Serial.begin(9600); Lcd.begin(16,2);
}

Void loop()
{
   Int analogValue = analogRead(sensor);
   Serial.print(analogValue);
   If(analogValue>sensorThresh)
   {
```

```
    digitalWrite(redled,HIGH);
    digitalWrite(greenled,LOW);
    tone(buzzer,1000,10000);

    lcd.clear();
lcd.setCursor(0,1);
lcd.print("ALERT");
delay(1000); lcd.clear();
lcd.setCursor(0,1);
lcd.print("EVACUATE");
delay(1000);
   }
   Else
   {
    digitalWrite(greenled,HIGH);
    digitalWrite(redled,LOW);
    noTone(buzzer);
    lcd.clear();
    lcd.setCursor(0,0);
    lcd.print("SAFE");
    delay(1000);
     lcd.clear();
    lcd.setCursor(0,1);
    lcd.print("ALL CLEAR");
    delay(1000);
   }
   }
```

11.2 DELIVERY OF SPRINT 2

```
#include <LiquidCrystal.h> LiquidCrystal

lcd(5,6,8,9,10,11);Int redled = 2;

Int greenled = 3;

Int buzzer = 4; Int

sensor = A0;

Int sensorThresh = 400;
delay(1000);

lcd.clear();

lcd.setCursor(0,1);

lcd.print("EVACUE");

delay(1000);

  }

  Else

  {

   digitalWrite(greenled,HIGH);

   digitalWrite(redled,);

    noTone(buzzer);

   lcd.clear();

   lcd.setCursor(0,0);

   lcd.print("SAFE");

   delay(1000);

   lcd.clear();

   lcd.setCursor(0,1);

   lcd.print("ALL

   CLEAR");

   delay(1000);
```

```
  }
}
```

11.3 DELIVERY OF SPRINT 3

```
#include <LiquidCrystal.h>
LiquidCrystal
Void setup()
{
pinMode(redled, OUTPUT);
pinMode(greenled,OUTPUT);
pinMode(buzzer,OUTPUT);
pinMode(sensor,INPUT);
Serial.begin(9600);Lcd.begin(16,2);
}
Void loop()
{
  Int analogValue = analogRead(sensor);
  Serial.print(analogValue);

  If(analogValue>sensorThresh)
  {
   digitalWrite(redled,HIGH);
   digitalWrite(greenled,LOW);
   tone(buzzer,1000,00)
```

```
lcd.setCursor(0,1);
lcd.print(“ALERT”);
delay(1000);
lcd.clear();
lcd.setCursor(0,1);
lcd.print(“EVACUE”);
delay(1000);
  }
  Else
  {
   digitalWrite(greenled,HIGH);
   digitalWrite(redled,);
    noTone(buzzer);
   lcd.clear();
   lcd.setCursor(0,0)
   ;
   lcd.print(“SAFE”)
   ; delay(1000);
   lcd.clear();
   lcd.setCursor(0,1)
   ; lcd.print(“ALL
   CLEAR”);
```

```
    delay(1000);
   }
}
```

11.4 DELIVERY OF SPRINT 4

```
#include <LiquidCrystal.h> LiquidCrystal

lcd(5,6,8,9,10,11);Int redled = 2;

Int greenled = 3;

Int buzzer =

4; Int sensor

= A0;

Int sensorThresh = 400;
delay(1000);

lcd.clear();

lcd.setCursor(0,1);

lcd.print("EVACUE");

delay(1000);

   }

   Else

   {

    digitalWrite(greenled,HIGH);

    digitalWrite(redled,);
```

```
    noTone(buzzer);
    lcd.clear();
    lcd.setCursor(0,0)
    ;
    lcd.print(“SAFE”)
    ; delay(1000);
    lcd.clear();
    lcd.setCursor(0,1)
    ; lcd.print(“ALL
    CLEAR”);
    delay(1000);
   }
}
```