GAS LEAKAGE MONITORING AND ALERTING SYSTEM FOR INDUSTRIES

PROJECT NAME	GAS LEAKAGE MONITORING & ALERTING SYSTEM FOR INDUSTRIES
TEAM ID	PNT2022TMID022891
TEAM MEMBERS	1. S. Swetha 2. M. Shalini 3. M. Santhosh 4. K. Yovan
BRANCH	ELECTRONICS AND COMMUNICATION ENGINEERING

1.INTRODUCTION

1.1 Project Overview

Leakage of any kind of gas has been a concern in recent years, whether it is in a residential setting, a business, a cafe, or a canteen. In this paper development of an IoT based gas wastage monitoring, leakage detecting and alerting system is proposed. This paper elaborates design such an intelligent system that will help save gas and smartly prevent accidents. The system needs to be integrated with the cooker. The technology includes ultrasonic sensors that determine if the cooker is being utilized for cooking purposes or not. If it is discovered that the cooker is not in use, the system uses an automatic switching off mechanism to cut off the gas supply. The moment gas leakage will probably be recognized, users will be informed via SMS through GSM, and so that user can solve the issue as soon as possible. The system will monitor flame and fire through flame sensor. When a fire is detected, the

buzzer begins to sound. Aside from that, the system also has a cloud storage capability. The usage of gas for each user each day may be tracked with the aid of this cloud storage solution. At the end of the day, this procedure will assist in detecting per user natural gas usage. The system has been tested and it is able to monitor gas wastage, leakage and send a SMS to the use. The resulting performance indicated its effectiveness toward saving a significant portion of the wasted gas in domestic.

1.2 purpose

The design of a sensor-based automatic gas leakage detector with an alert and control system has been proposed. This is an affordable, less power using, lightweight, portable, safe, user friendly, efficient, multi featured and simple system device for detecting gas. Gas leakage detection will not only provide us with significance in the health department but it will also lead to raise our economy, because when gas leaks it not only contaminates the atmosphere, but also wastage of gases will hurt our economy. The need for ensuring safety in workplaces is expected to be the key driving force for the market over the coming years.

2.LITERATURE SURVEY

2.1 Existing problem

Liquid problem gas is a flammable mixture of hydrocarbon gases used as fuel in heating appliances, cooking equipment, and specifically as a vehicle fuel (it is often referred to as autogas). It is an odorless gas due to ethyl mercaptan is added as an odorant to be easily detected when leakage occurs for safety precaution. LPG is made by refining petroleum or wet natural gas and is almost entirely derived from fossil fuels sources being

manufactured during the refining of crude oil as theory emerged from the natural state. It was classified as a hazardous material because of its explosive potentials when under pressure, due to this hazardous property leading to fire explosion. The gas detection process was made by the chemically infused paper that change its color when it's been exposed to gas before the development of the electronics gas detector. The electronics leakage detector was an active approach to initial fault detection in other to achieve the utmost safety of humanity and properties as a whole they introduced an android base automatic gas detection).different approaches have been used alongside several research in the detection of leakage and were also implemented alongside some incident toward some decades. The existing leakage detection is optical sensor method, cable sensor, negative pressure, vapor sampling, signal processing, mass volume, and pressure point analysis, in which have been implemented using a different framework. Some groups of researchers have classified the technology as two fitting categories, which are software and hardware method but research continues and to technical nature research effort which led them to three group methods.

2.2 References

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- Attia, Hussain A., and Halah Y. Ali. "Electronic Design of Liquefied

  Petroleum Gas Leakage Monitoring, Alarm, and Protection System Based on Discrete Components." International Journal of Applied Engineering Research, vol. 11, no. 19, pp. 9721-9726, 2016.
- Apeh, S. T., K. B. Erameh, and U. Iruansi. "Design and Development of Kitchen Gas Leakage Detection and Automatic Gas

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- Mahalingam, A., R. T. Naayagi, and N. E. Mastorakis. "Design and implementation of an economic gas leakage detector." Recent Researches in Applications of Electrical and Computer Engineering, pp. 20-24, 2012.
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2.3 PROBLEM STATEMENT DEFINITION

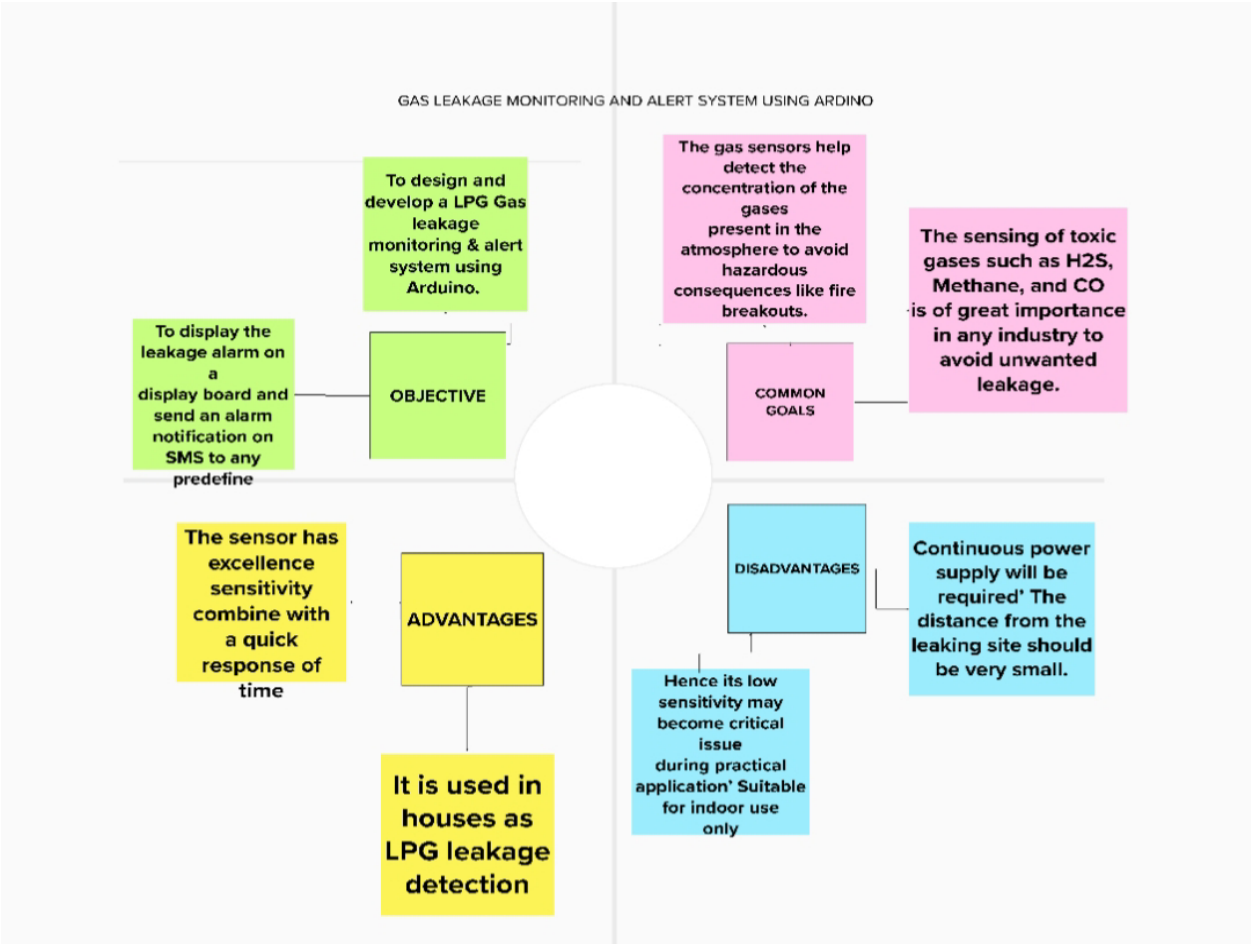
Gas leakage is nothing but the leak of any gaseous molecule from a stove, or a pipeline, or cylinder etc. This can occur either purposefully or even unintendedly. As we are aware that these kinds of leaks are dangerous to our health, and when it becomes explosive it could cause great danger to the people, home, workplace, industry and the environment.

Few of the major incidents that took place due to gas leakage include the Bhopal disaster and the vizag gas leak. The Bhopal disaster is known to be the worst industrial accident ever. Approximately 45 tons of methyl isocyanate was leaked from the insecticide plant. Methyl isocyanate is an organic compound and a chemical that could come from the carbamate pesticides. This colourless, poisonous and flammable liquid is something that human beings have to be away from.

Vizag gas leak was a resultant of the escape of styrene that were unattended for a long period. This colourless oily liquid can spread in fumes. So, a detector must be made in such a way that could detect any kind of gas, fume, leak, smoke etc. However harmful and dangerous it can be, the detector could be attached with certain parameters that could help to prevent the issue.

3.IDEATION & PROPOSED SOLUTION

3.1 Empathy Map Canvas



3.2 IDEATION & BRAINSTORMING

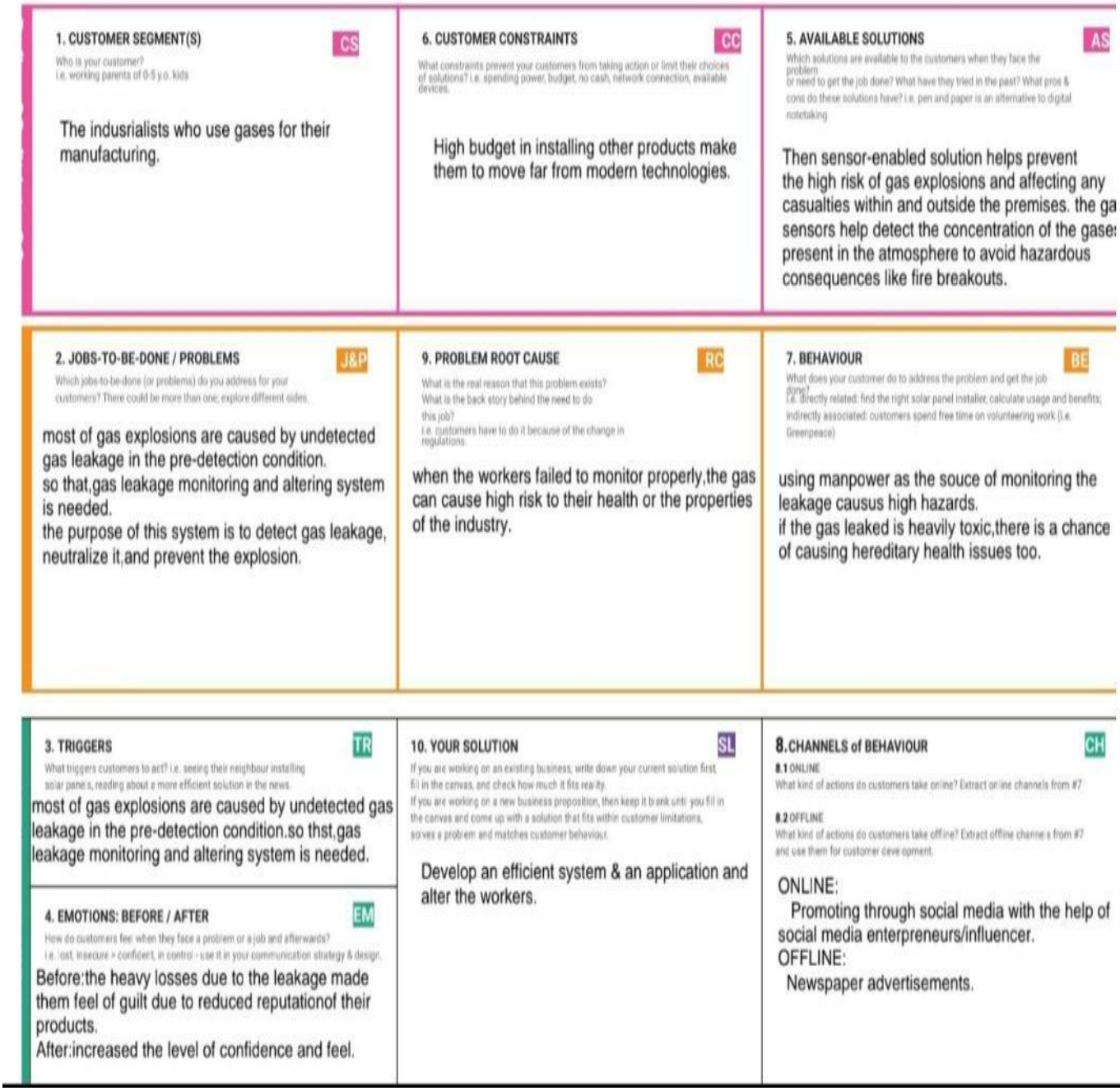
Microcontroller Based LPG Gas Leakage Detector Using GSM Module, in this system where used gas sensor, GSM module, microcontroller, if the gas concentration is increases the gas sensors will sense the leakage of the gas and then send to the microcontroller. Then the GSM module is connected to the microcontroller 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, June-2015)

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 odorless 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.

3.3 Proposed Solution

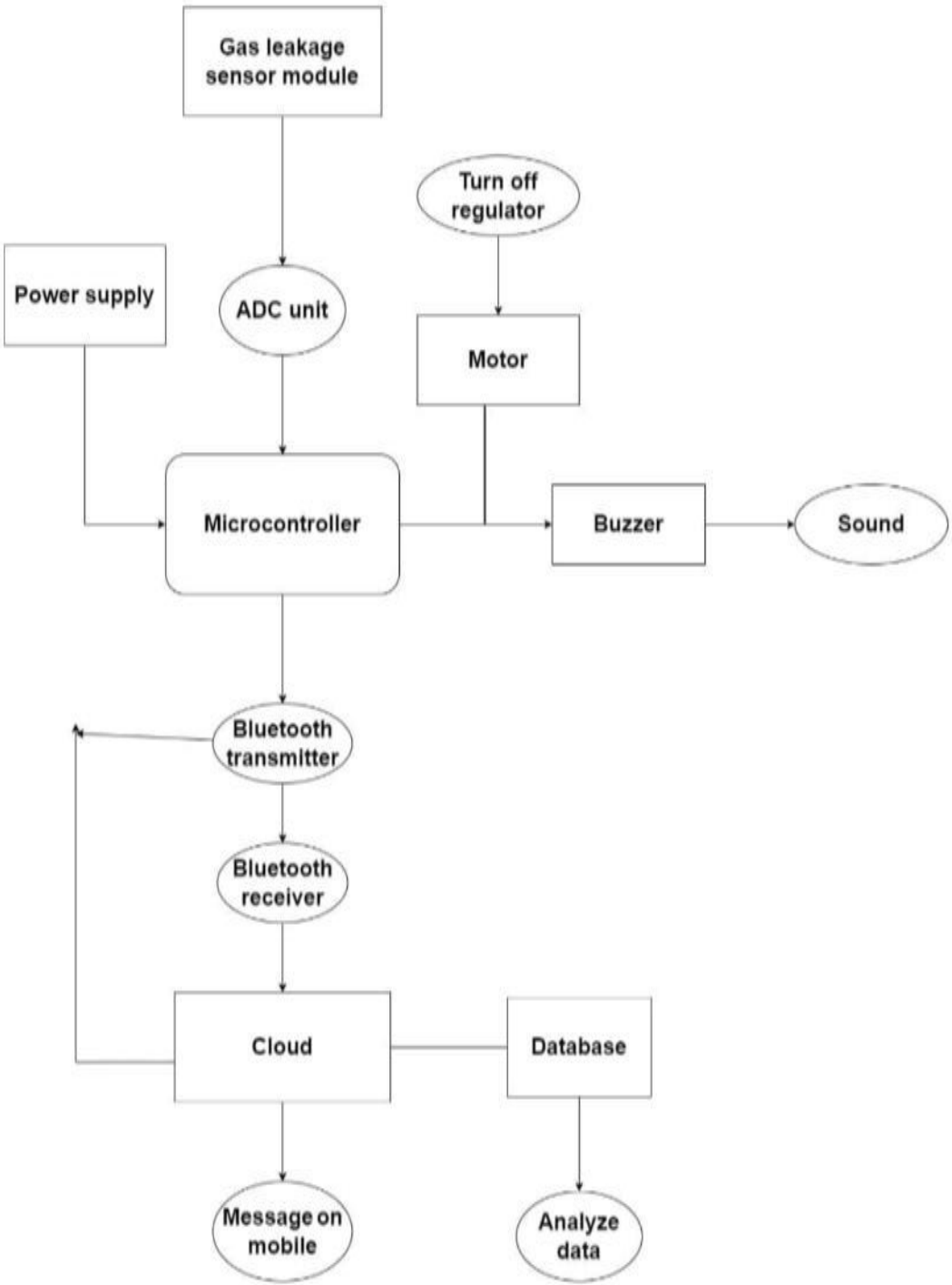
S.No.	Parameter	Description
1.	Problem Statement (Problem to be solved)	Gas leakage leads to various accidents resulting in financial loss as well as human injuries and loss.
2.	Idea / Solution description	The work aims at designing a system that detects gas leakage and alerts these describer through alarm and status display besides turning off the gas supply valve.
3.	Novelty / Uniqueness	It sends messages to mobile number specifically mentioned in the program of the source code for alerting danger to the people
4.	Social Impact / Customer Satisfaction	Using GSM facility every customer can get update of their gas leakage and they can monitor from their own place
5.	Business Model (Revenue Model)	Our project model is more efficient and low cost compared to that in market
6.	Scalability of the Solution	In danger situation we are able to save the life by using this gas leakage detection system.

3.4 Problem solution fit

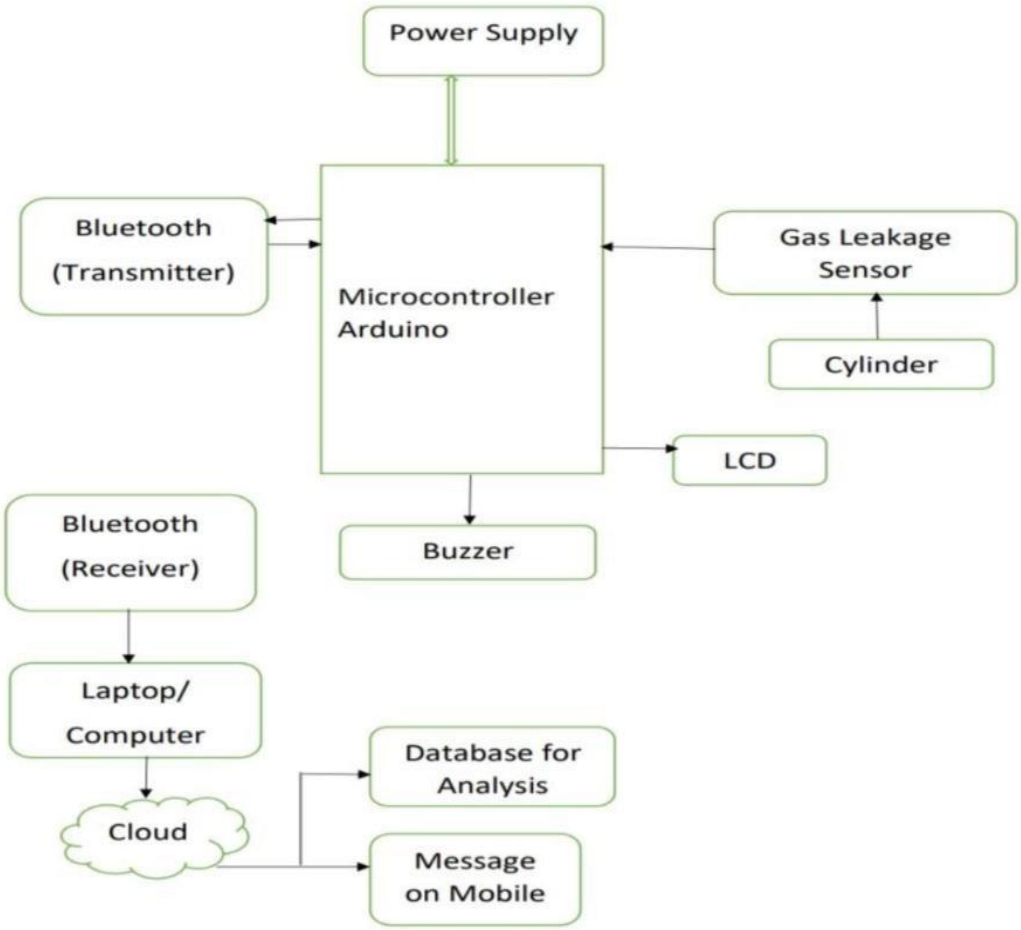


4 PROJECT DESIGN

4.1Data Flow Diagrams



4.2 Solution & Technical Architecture



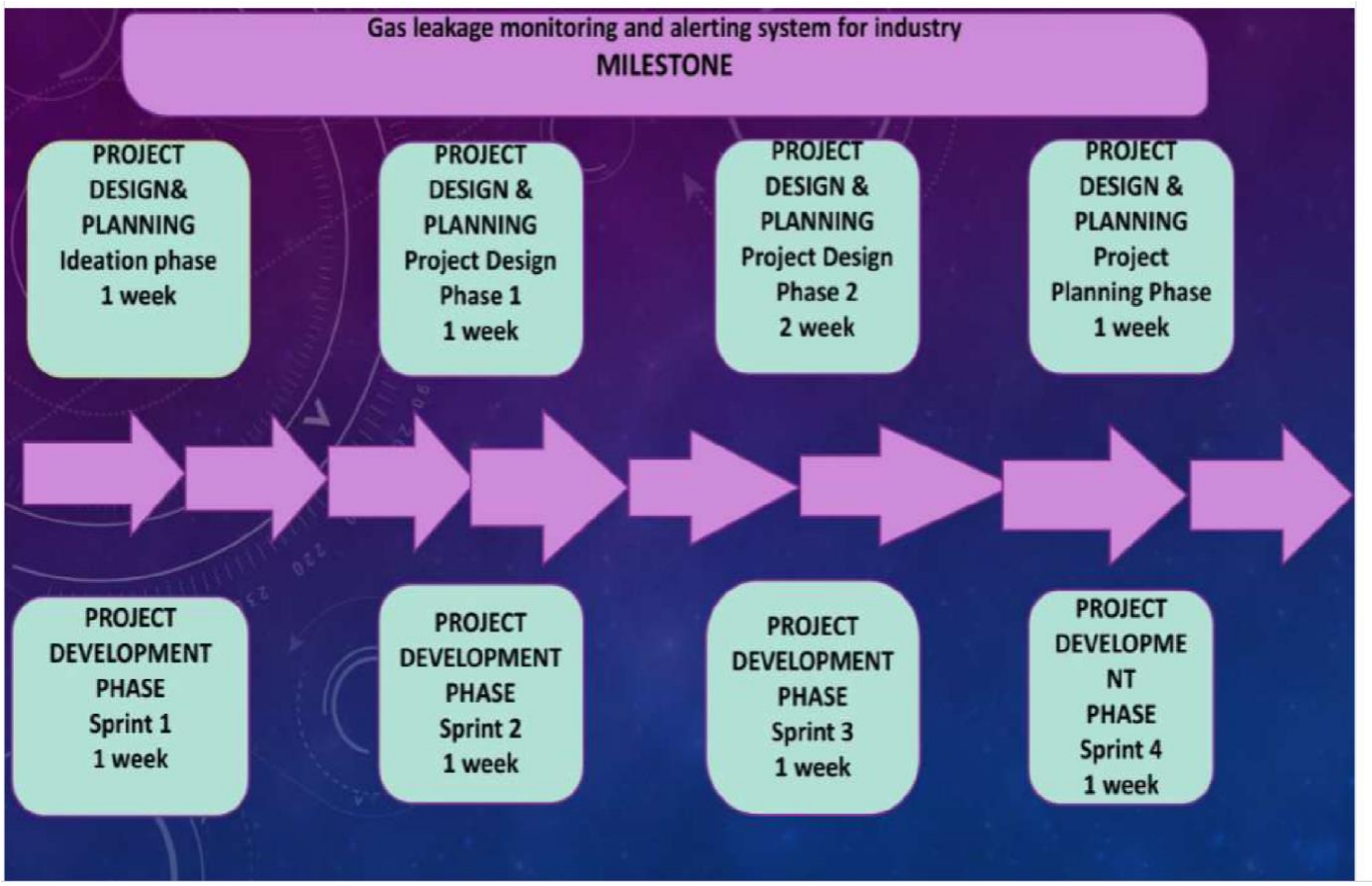
5.PROJECT PLANNING AND SCHEDULING:

5.1 SPRINT PLANNING AND ESTIMATION:

Sprint	Functional Requirement (Epic)	User Story Number	User Story / Task
Sprint-1	Simulation Creation	USN-1	Ibm Watson account creating and node js application creating
Sprint-1	Software	USN-2	Python idle 3.9.6 version download
Sprint-2	Software	USN-3	Develop code for gas leakage monitoring
Sprint-2	Software	USN-4	Application creation in ibm Watson account

Sprint-3	Software	USN-5	Establishing Node-Red connection
Sprint-3	Software	USN-6	Upload program to node js and seeing output in ibm Watson
Sprint-4	Testing	USN-7	Testing and developing web application

5.2 SPRINT DELIVERY SCHEDULE:



6 CODING AND SOLUTIONING:

6.1.FEATURE 1:

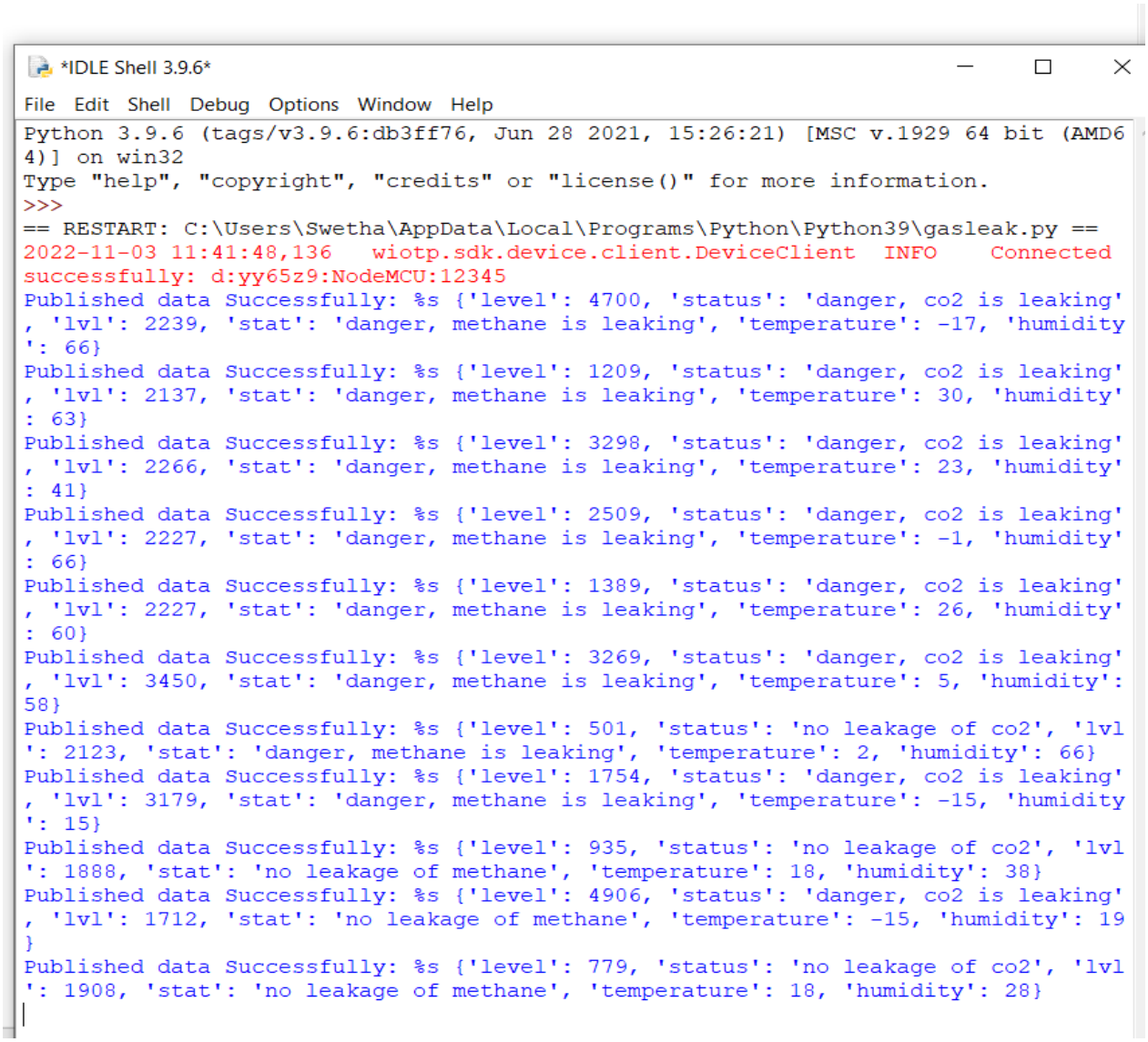
PYTHON PROGRAM:

```
#IBM Watson IOT Platform
#pip install wiotp-sdk
import wiotp.sdk.device
import time
```

```
import random
myConfig = {
    "identity": {
        "orgId": "yy65z9",
        "typeId": "NodeMCU",
        "deviceId":"12345 },
    "auth": {
        "token": "12345678"
    }
}

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:
    co2gas=random.randint(400,5000)
    if co2gas<1000:
        sts="no leakage of co2"
    else:
        sts="danger, co2 is leaking"
    methane=random.randint(1000,4000)
    if methane<2000:
        st="no leakage of methane"
    else:
        st="danger, methane is leaking"
    temp=random.randint(-20,50)
```

```
    humidity=random.randint(0,100)
    myData={'level':co2gas,"status":
sts,"lvl":methane,"stat":st,"temperature":temp,"humidity":humidity}
    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()
```

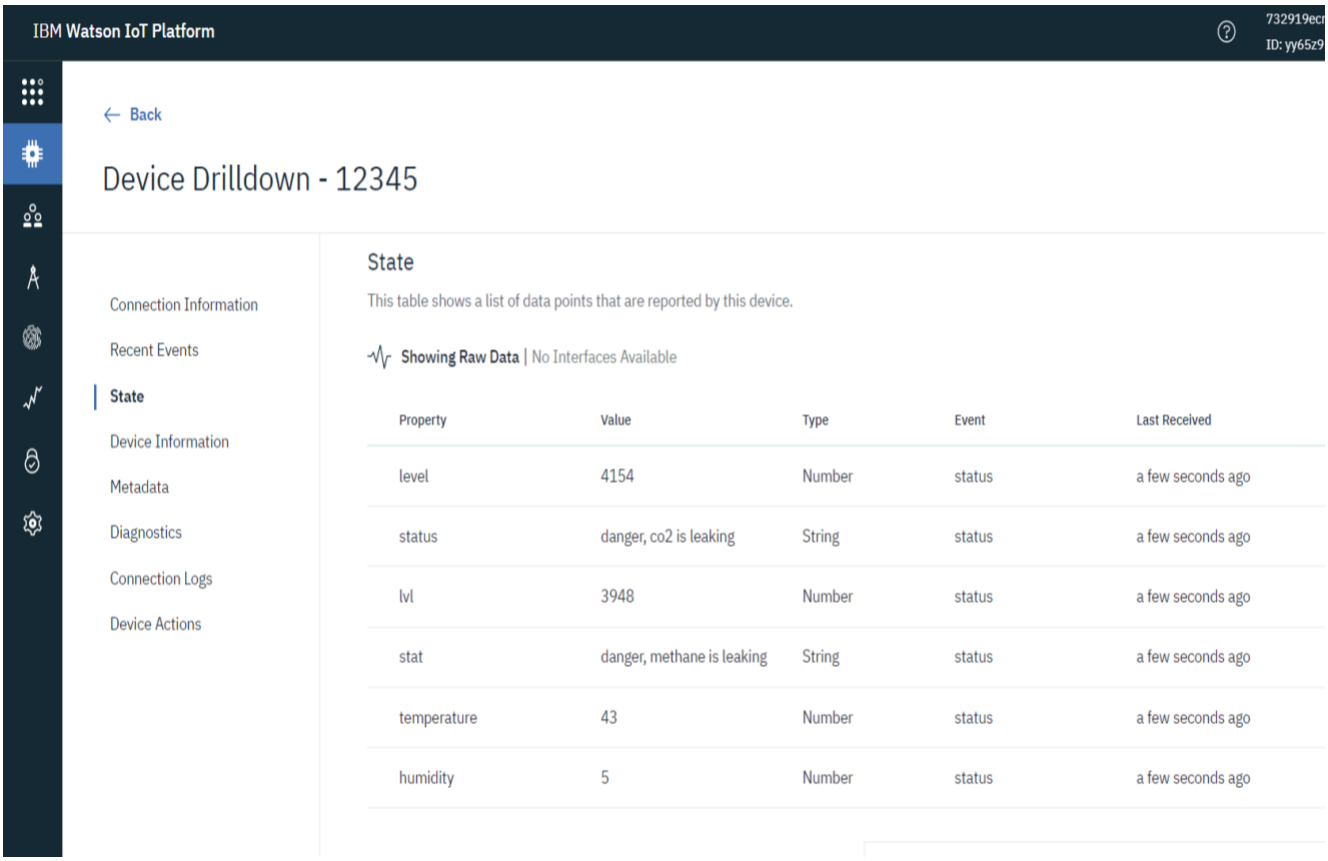
OUTPUT:



Along with gas leakage monitoring and detecting we have also added temperature and humidity monitoring also in this program to know the environmental conditions.

7.RESULTS:

7.1 IOT WATSON OUTPUT:



7.2 NODE RED WEB APPLICATION OUTPUT:

8.ADVANTAGES AND DISADVANTAGES

8.1 Advantage

lt is used in houses as LPG leakage detection

- lt also detects alcohol so it is used as liquor tester’
- The sensor has excellence sensitivity combine with a quick response of time'
- Unidentifiable gas leaks give rise to explosions that are harmful to the employees working in the hazardous environment. There comes a need to install smart systems to

accurately identify combustible, flammable and toxic gases along with detecting oxygen depletion in industry premises for improved safety.

- In the automotive industries like oil and gas, hotels, and places where flammable gases are used in abundance, a gas detection system is a basic requirement for safety. An IoT powered gas detection solution uses gas sensors to identify the presence of toxic gases such as CO2, CO, NOx in the industrial facilities.

- Especially, in the oil and gas industry where many gaseous products like propane, butane, and hydrogen are manufactured at a greater level. Hence, the chances of gas explosions are higher as these gases are easily combustible in the oxygen-rich environment. Apart from these, toxic gases like hydrogen sulfide (H2S) is produced during refining processes that might harm the workers' health. Thus, it becomes a necessity to keep a real-time check on gas production. If these toxic gases are released untreated, their harmful contaminants result in air pollution and acid rains.

8.2 Disadvantage

- Continuous power supply will be required' The distance from the leaking site should be very small.
- Hence its low sensitivity may become critical issue during practical application' Suitable for indoor use only.

9. CONCLUSION

Gas leakage may leads to severe accidents which results in material losses and humaninjuries. Gas leakage occurs mainly due to poor maintenance of equipments and inadequate awareness of the people. Hence LpG leakage detection will be helpful to prevent accidents and to save human lives. This project presented LpG leakage detection and alert system. This system triggers buzzer displays the severity of the leakage to alert people when LPG leakage is detected. This system is very sirnple yet reliable.

10. FUTURE SCOPE

Major cities of India are pushing Smart Home application, gas monitoring system is a part of Smart Home application. Enhancing Industrial Safety using IoT. IoT turns drone into gas detection sensor. Another major future scope could be including a Automatic Shut-off device which will turn off the gas supply whenever it will detect any gas leakage. This system can be implemented in Industries, Hotels and wherever the LPG cylinders are used. This system can be used in industries involving applications such as Furnace, Boilers, Gas welding, Gas cutting, Steel Plants, Metallurgical industries, Food processing Industries, Glass Industries, Plastic industries, Pharmaceuticals, Aerosol manufacturing. As hospitals require to provide maximum possible safety to patients, this system can be used to keep track of all the cylinders used in it. Some of the cylinders used are Oxygen cylinder, Carbon dioxide cylinder, Nitrous oxide cylinder. As many students are naïve the risk of causing accidents is high. Hence, our system can also be used in schools, colleges. Many colleges have well established labs including chemistry lab and pharmaceutical labs where gas burners are used. Plenty of medical equipment requires gas cylinders.