PROJECT REPORT

1. INTRODUCTION

1.1 Project Overview

Internet of Things (IoT) is the networking of ‘things’ by which physical things can communicate with the help of sensors, electronics, software, and connectivity. These systems do not require any human interaction. Internet of Things aim towards making life simpler by automating every small task around us. As much is IoT helping in automating tasks, the benefits of IoT can also be extended for enhancing the existing safety standards.Safety plays a major role in today’s world and it is necessary that good safety systems are to be implemented in places of education and work. This work modifies the existing safety model installed in
industries and this system can also be used in homes and offices. The traditional Gas Leakage Detector Systems though have great precision, fail to acknowledge a few factors in the field of alerting the people about the leakage. Therefore 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 and an ability performing data analytics on sensor readings.

1.2 Purpose

The project entitled “Gas Leakage Detector using Arduino with SMS Alert and Sound Alarm”, will be a great help in terms of preventing any danger caused by gas leakage. The purpose of this project is to detect the presence of LPG leakage as a part of a safety system. Apart from sound alarm, an SMS alert will inform the authorized person and the solenoid valve will be triggered to shut down the gas supply to prevent any harmful effects due to gas leakage. Descriptively, we use a gas sensor to monitor the LPG if the gas leak reaches beyond the normal level. This proposed project will trigger the sound alarm. In addition, the authorized person will be informed about the leakage via SMS alert and the gas supply will be automatically shut down. The people can be saved from a potential explosion caused by gas leakage.

2.LITERATURE SURVEY

2.1 Existing Problem

A neglected public gas leakage problems are the most common problems in industries. Considering their significant impact on the individual, the family, the social life of patients, and their heavy economic burden, the monitoring and alerting system is underappreciated.

2.2 References

1. Liquefied petroleum gas monitoring and leakage detection system using nodemcu ESP8266 and wi-fi technology. Suzi Seroja Binti Sarnin, Divine Senanu Ametefe, Nani Fadzlina Naim, Wan Norsyafizan Wan Mohamad, Norlela Ishak, Norfishah AbWahab, Norsuzila Ya'acob.August 2019,Faculty of Electrical Engineering,Universiti Teknologi MARA, Malaysia.

2.Gas leakage detector & monitoring system.Yekini N.Asafe Adigun J. Oyeranmi loyede A.Olamide Akinade O. Abigael.June 2022, International Journal of engineering & manufacturing.

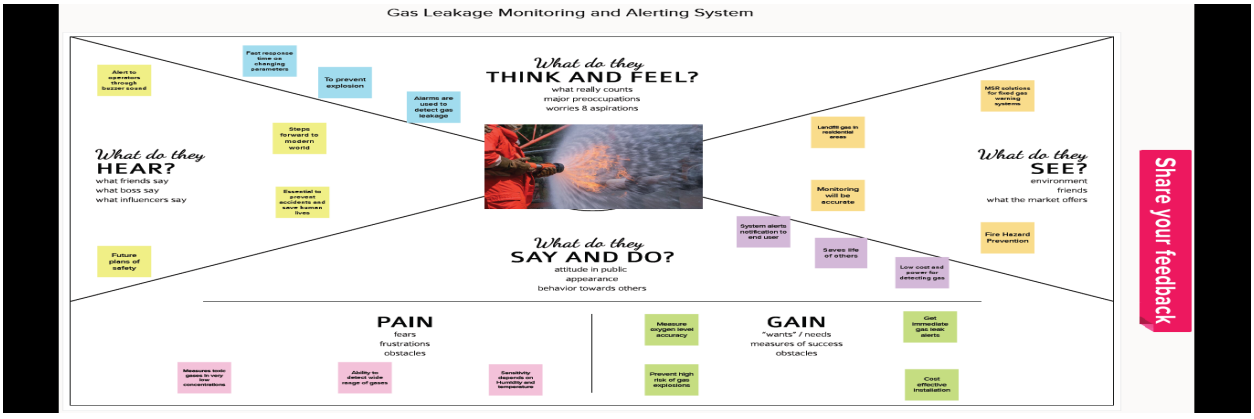
3.LPG gas leakage detection and alert system. E.Jebamalar Leavline1 , D. Asir Antony Gnana Singh2 , B. Abinaya3 H. Deepika4 2017 November, Department of Electronics and Communication Engineering,Department of Computer Science and Engineering,Anna University.

2.3 Problem Statement Definition

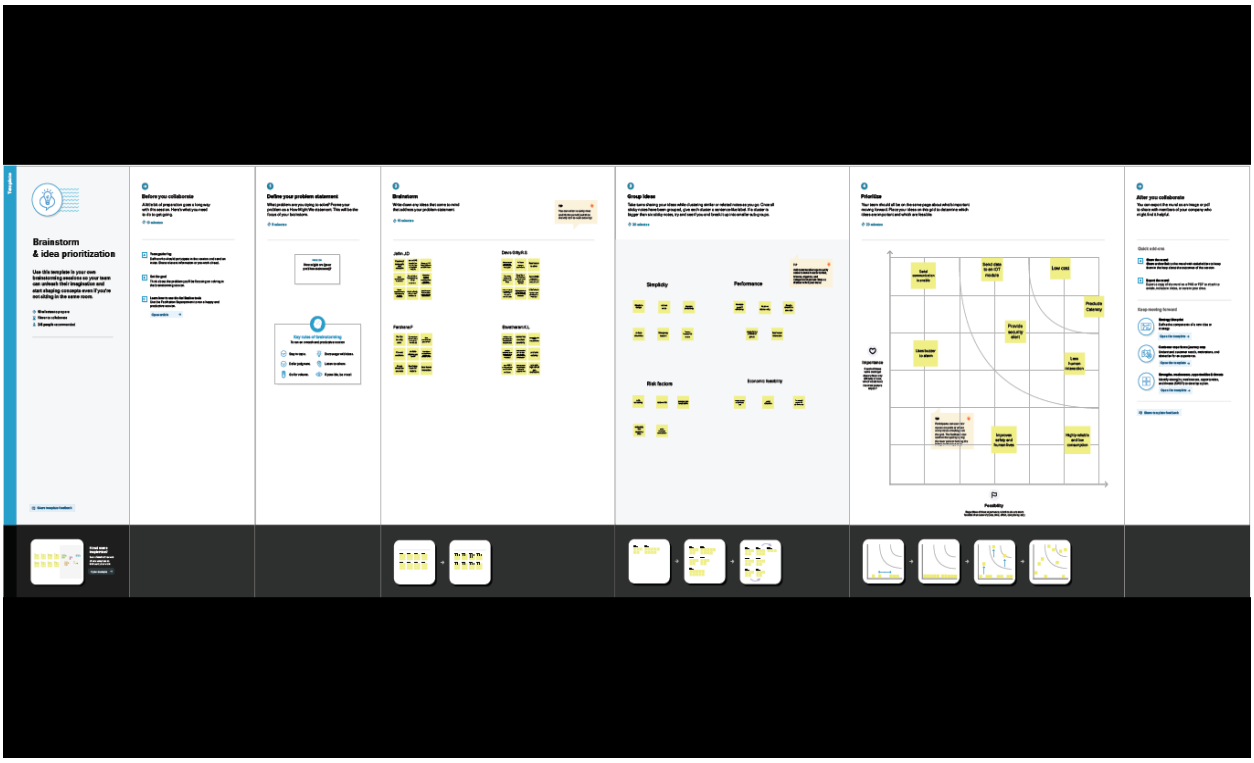
We are trying to monitor and control the gas leakage in industries. But we have no efficient system for monitoring because of high cost and complicated process of installing which makes disappointed.

3.IDEATION AND PROPOSED SOLUTION

3.1 Empathy map canvas



3.2 Ideation & Brainstorming



3.3 Proposed Solution

To develop gas leakage monitoring system in Industries by using IoT to give real-time response to the user and the nearest fire station.Design and build a prototype of an gas leakage detector controlled by Arduino Uno using MQ-2 gas sensor to detect the presence of gas leakage.If the sensor detect the level of gasses is exceeding the normal level it will send an information through the phone apps through Internet of Thing (IOT).

3.4 Problem Solution Fit

Gas can overcome delayed response time to such gas leaks.Hence multiple gas monitors can be placed for early gas leak detection.Mapping of gas leaks in industrial zones can help the safety in time in charge to take timely actions.

4.REQUIREMENT ANALYSIS

4.1 Functional Requirements

The IoT based powered gas leakage detection utilizes an MQ5 sensor as an input. The temperature of the leakage gases was 45 °C.MQ5 sensor is used to detect gas leakage. Buzzer is the output of the system. The sound of the buzzer is beep-beep, which indicates the danger.

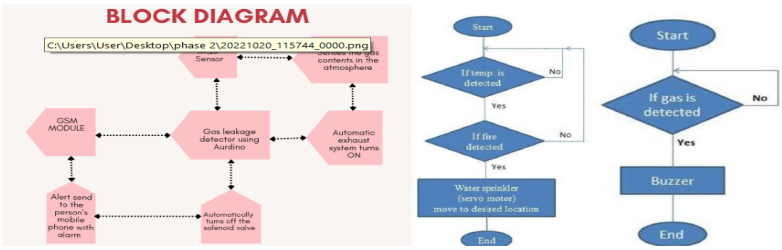
4.2 Non-Functional Requirements

Highly reliable, Highest possible accuracy for temperature, Security and user friendly.

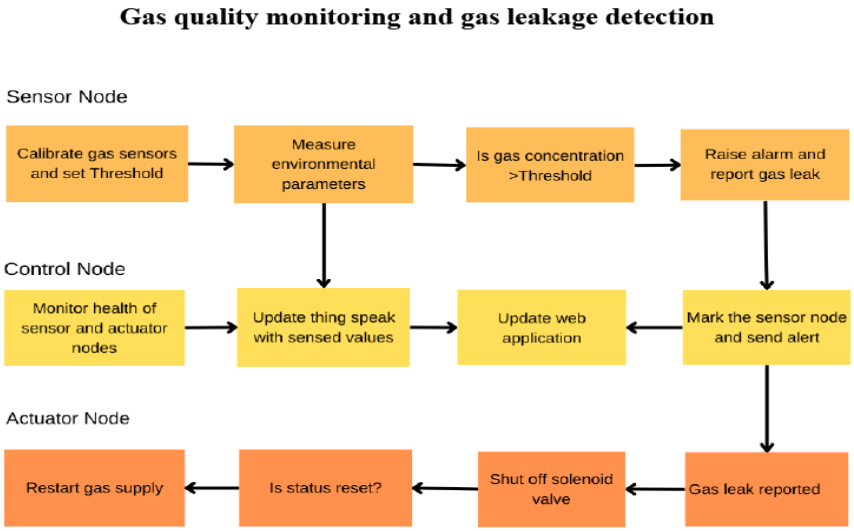
5.PROJECT DESIGN

5.1 Data Flow Diagram

FLOW DIAGRAM:



5.2 Solution & Technical Architecture



5.3 User stories

Sprint	Functional Requirement (Epic)	User Story Number	User Story / Task	Story Points	Priority
Sprint-1	prerequisites	USN-1	I create an IBM cloud services	9	High
Sprint-1		USN-2	I create software code	11	High
Sprint-2	IBM cloud services	USN-3	Create IBM Watson IoT Platform	12	Low
Sprint-2		USN-4	Create Node-Red services	8	Medium
Sprint-3	Python script	USN-5	I can develop a python code	10	High
		USN-6	Publish data to IBM Cloud	10	Medium
Sprint-4	Web Application	USN-7	I can create application to design Node-Red	10	Low
		USN=8	I can install UI Node	10	High

6.PROJECT PLANNING &SCHEDULING

6.1 Sprint Planning &Estimation

Sprint	Functional Requirement (Epic)	User Story Number	User Story / Task	Story Points	Priority	Team Members
Sprint-1	prerequisites	USN-1	I create an IBM cloud services	9	High	Farshana F Bavatharani K.L.
Sprint-1		USN-2	I create software code	11	High	Davis Gifty. R.S Jeflin.J.D
Sprint-2	IBM cloud services	USN-3	Create IBM Watson IoT Platform	12	Low	Davis Gifty. R.S Bavatharani.K.L.
Sprint-2		USN-4	Create Node-Red services	8	Medium	Farshana.F Bavatharani K.L.
Sprint-3	Python script	USN-5	I can develop a python code	10	High	Davis Gifty. R.S Jeflin.J.D
		USN-6	Publish data to IBM Cloud	10	Medium	Davis Gifty. R.S Farshana.F
Sprint-4	Web Application	USN-7	I can create application to design Node-Red	10	Low	Jeflin.J.D Farshana.F
		USN=8	I can install UI Node	10	High	Bavatharaani.K.L Jeflin.J.D

6.2 Sprint Delivery Plan

Sprint	Total Story Points	Duration	Sprint Start Date	Sprint End Date (Planned)	Story Points Completed (as on Planned End Date)	Sprint Release Date (Actual)
Sprint-1	20	6 Days	24 Oct 2022	29 Oct 2022	20	29 Oct 2022
Sprint-2	20	6 Days	31 Oct 2022	05 Nov 2022	20	05 Nov 2022
Sprint-3	20	6 Days	07 Nov 2022	12 Nov 2022	20	12 Nov 2022
Sprint-4	20	6 Days	14 Nov 2022	19 Nov 2022	20	19 Nov 2022

7.CODING & SOLUTION

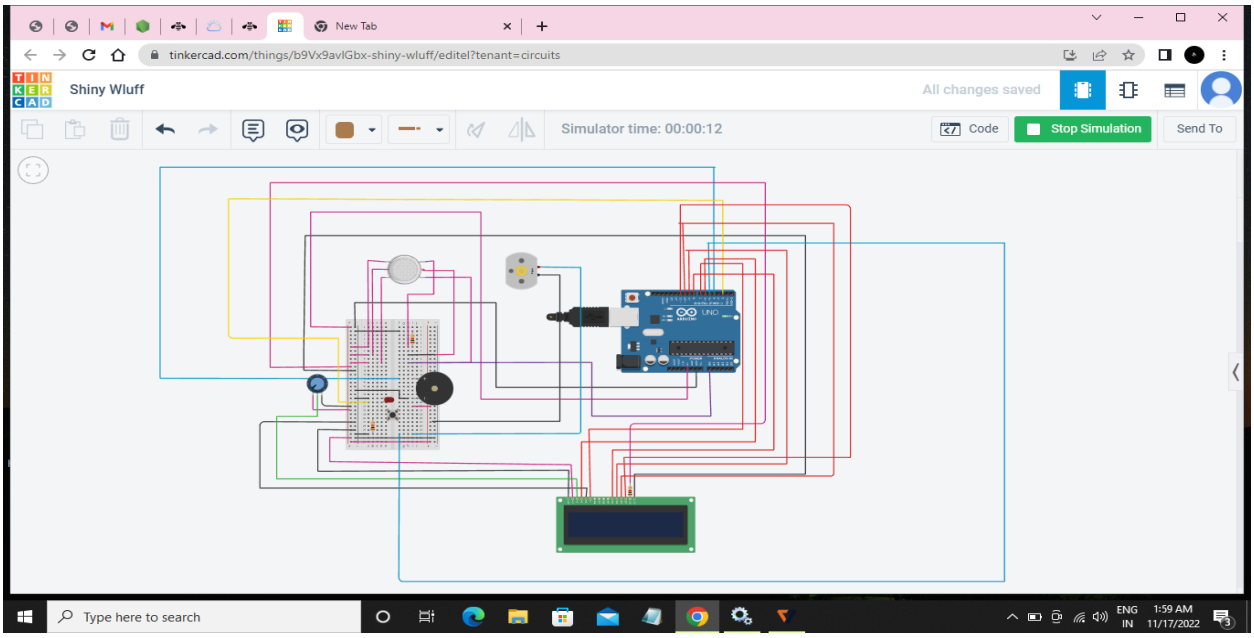
```
#include
<LiquidCrystal.
h>
```

```
LiquidCrystal lcd(6, 7, 8, 9, 10, 11);
float gasPin = A0;
float gasLevel;
int ledPin = 2;
int buttonPin = 3;
int buzzPin = 4;
int buttonState;
int fan = 5;

void setup(){
  pinMode(ledPin, OUTPUT);
  pinMode(buttonPin, INPUT);
  pinMode(gasPin,INPUT);
  pinMode(fan,OUTPUT);
  Serial.begin(9600);
  lcd.begin(16, 2);
  lcd.setCursor(0,0);
  lcd.print(" Welcome");
  lcd.setCursor(0,2);
  lcd.print("PNT2022TMID51246");
  delay(500);
  lcd.clear();
}

void loop(){
  // Read the value from gas sensor and button
  gasLevel = analogRead(gasPin);
  buttonState = digitalRead(buttonPin);

  // call the function for gas detection and button
work
  gasDetected(gasLevel);
  buzzer(gasLevel);
  exhaustFanOn(buttonState);
}

// Gas Leakage Detection & Automatic Alarm and Fan
ON
void gasDetected(float gasLevel){
  if(gasLevel >= 200){
   digitalWrite(buzzPin,HIGH);
    digitalWrite(ledPin,HIGH);
```

```
    digitalWrite(fan,HIGH);
    lcd.setCursor(0,0);
   lcd.print("GAS:");
    lcd.print(gasLevel);
   lcd.setCursor(0,2);
   lcd.print("FAN ON");
   delay(1000);
   lcd.clear();
  }else{
   digitalWrite(ledPin,LOW);
    digitalWrite(buzzPin,LOW);
    digitalWrite(fan,LOW);
    lcd.setCursor(0,0);
   lcd.print("GAS:");
    lcd.print(gasLevel);
   lcd.setCursor(0,2);
   lcd.print("FAN OFF");
   delay(100);
   lcd.clear();
  }
}
//BUZZER
void buzzer(float gasLevel){
if(gasLevel>=200)
  {
  for(int i=0; i<=30; i=i+10)
  {
  tone(4,i);
  delay(400);
  noTone(4);
  delay(400);
  }
  }
}
// Manually Exhaust FAN ON
void exhaustFanOn(int buttonState){
  if(buttonState == HIGH){
    digitalWrite(fan,HIGH);
    lcd.setCursor(0,0);
   lcd.print("Button State:");
    lcd.print(buttonState);
    lcd.setCursor(0,2);
    lcd.print("FAN ON");
```

```
        delay(10000);
        lcd.clear();
      }
    }
```

OUTPUT:



TINKERCAD LINK:

https://www.tinkercad.com/things/b9Vx9avlGbx-shiny-wluff/editel?tenant=circuits

8.RESULT

The final results are based on the blinking of LED and Buzzer when the gas leak is detected.

9.ADVANTAGES & DISADVANTAGES

9.1 Advantages

It is used to protect nature and environment, prevent lot of people from death, modernized technique and it helps to isolate people by providing warning to the public.

9.2 Disadvantages

1.Needs plenty of time and resources.

2.Cost is huge.

3.It requires unlimited internet connection.

10.CONCLUSION

After all the data had been gathered, analyzed and processed, the proponents arrived at the succeeding conclusion.Therefore, GasLeakage Detector Using Arduino with SMS Alert and Sound Alarm will help a lot in terms of preventing any danger caused by gas leakage and useful as part of safety to avoid the gas leak that can cause harmful result. It will also improve the safety of all users.

11.FUTURE SCOPE

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.

12.APPENDIX

GitHub Link: IBM-EPBL/**IBM-Project-40399-1660628909**