Project Report

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INTRODUCTION

INTRODUCTION

1.1 Project Overview:

Gases are used on over daily basis Gases are used in houses , restaurant,factories,hotel etc If a gas leakage problem is occurred it can cause disasters like fire explosion and death.The number of death due to gas leakages has been increasing in recent years.This paper presents gas leakage detection and alerting system to prevent such fire accidents.

Gas sources are found every where in our daily life (houses, hotels, factories, and restaurant, and are used for many applications. As many aspects of our life depend on the gas sources so that if a gas leakage problem is occurred it will some times cause disasters (suffocations, fires, explosions, and so death). From this point the idea of design a device to control the gas leakage and to avoid these problems is established. The control will be accomplished by detect the gas leakage and then the device will immediately close the gas source by wireless.

1.2 Purpose:

Gas leakage leads to severe accidents resulting in material losses and human injuries. Gas leakage occurs mainly due to poor maintenance of equipments and inadequate awareness of the people. Hence, LPG leakage detection is essential to prevent accidents and to save human lives. We have designed a system which can detect gas leakage productively using a gas sensor and alert other people by using Wi-Fi module to send a message to their mobile phones and by activating LED and buzzer. So accordingly, our project assuredly proofs to be an asset for tribe and industries in halting future gas leakages.

LITERATURE SURVEY

LITERATURE SURVEY

2.1 Existing problem:

In this approach Gas leakage detection and Gas refilling is done using the MQ5 sensor, GSM, Load sensor, Raspberry pi, Aurdino. MQ5 detects the LPG frequently whether the flow of gas is normal or abnormal, if it is abnormal,sends notification to user via GSM. If there is no response, the system automatically turns off. The problem in this is, Gas cannot be refilled without the intermediate (distributor).

”In this approach the data such as humidity, temperature, pressure, gas detection, sound detection is acquired by using sensors. The sensors used are DHT22/AM2302, TMP006, BMP180, MQ6, 20KHz microphone, 40KHz ultrasonic receiver, 40KHz ultrasonic module. ZigBee is a wireless communication technology used to create small personal area network. This idea is to detect leakage with different parameters and test on different type leaks was achieved. This system can be designed by using low power microcontroller board and using more high quality sensors to detect accurate values at the output

This approach gives a system for monitoring the LPG gas leaks in the presence of air. The methods used here are Wireless Sensor Network, Sensor Node, Remote monitoring and controlling, LabVIEW,VISA. In this paper gas leakage is detected and alerts the user via alarm, sending SMS on user mobile phone and turns off the gas regulator valve .

2.2 References:

GokulaKaveeya S, Gomathi S,Kavipriya K, Kalai SelviAand SivakumarS- "Automated Unified System for LPG using Load Sensor". 2017 International Conference on Power and Embedded Drive Control (ICPEDC). 978-1-5090-4679-9/17/$31.00,copyright2017 IEEE459-462. Mr. Sahil Adsul, Mr. Ashok Kumar Sharma and Mr. R.G

Mevekari-"Development of Leakage Detection System". 2016 International Conferenceon Automatic Control and Dynamic Optimization Techniques (ICACDOT) International Institute of Technology (IIIT), Pune. 978-5/16/$31.00, copyright2016IEEE673-677.

L.P Deshmukh, T.H Mujawar, M.S Kasbe, S.S Mule, J.Akthar and N.N Maldar -"A LabVIEW Based Remote Monitoring and Controlling of Wireless Sensor Node for LPG Gas Leakage Detection". 2016 International Symposium on Electronics and Smart Devices (ISESD) November 29-30, 2016. 978-1-5090-3840- 4/16/$31.00, copyright2016 IEEE 115120.

Jinhao Sun, Jinhao Sun Yezi Li Xiaojin Yan -"The design of automatic detection processing device of gas leakage based on the MB95204K". 978-1-4244-81651/11/$26.00,copyright2011IEEE1807 1809.

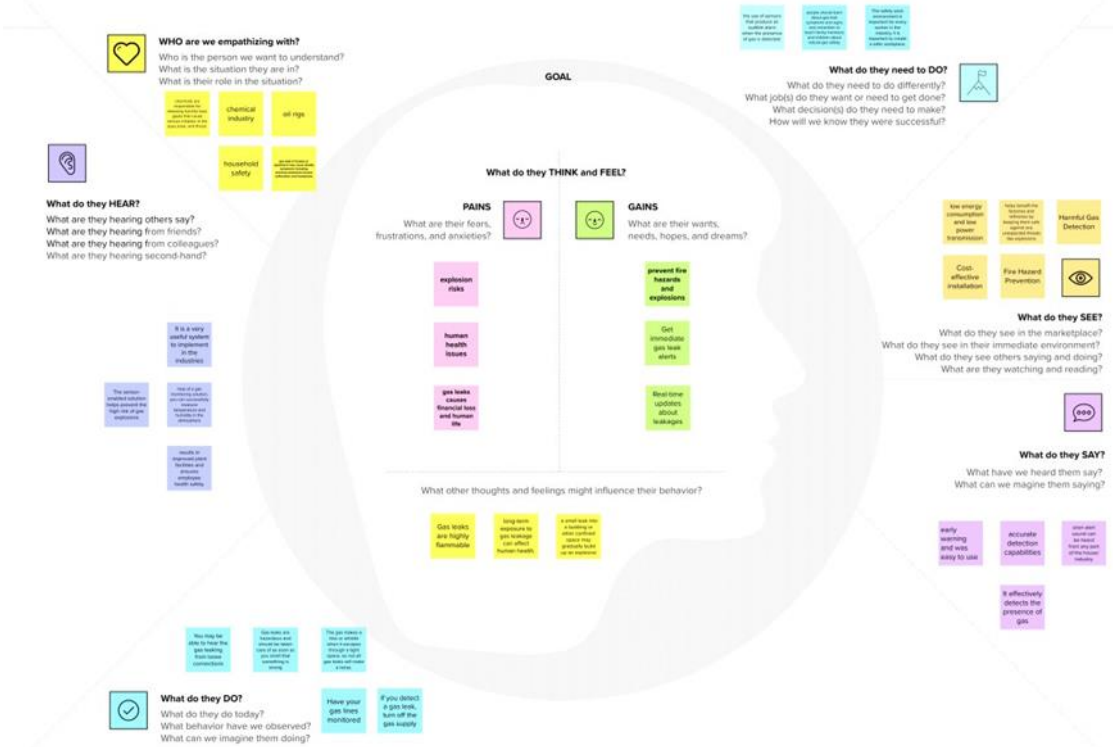
2.3 Problem Statement Definition:

Automated Unified System for LPG using Load Sensor. Development of Leakage Detection System. A LabVIEW Based Remote Monitoring and Controlling of Wireless Sensor Node for LPG Gas Leakage Detection. The design of automatic detection processing device of gas leakage based on the MB95204K. Gas leakage causes loss of energy, personal injury and property damage. To solve these problems paper designed a gas leakage automatic detection and processing device by using Fujitsu MB95204K. Gases such as methane and carbon monoxide will automatically detect and alarm. The chemical transducer MQ5 detects concentration of gas generated signals and then does A/D conversion.

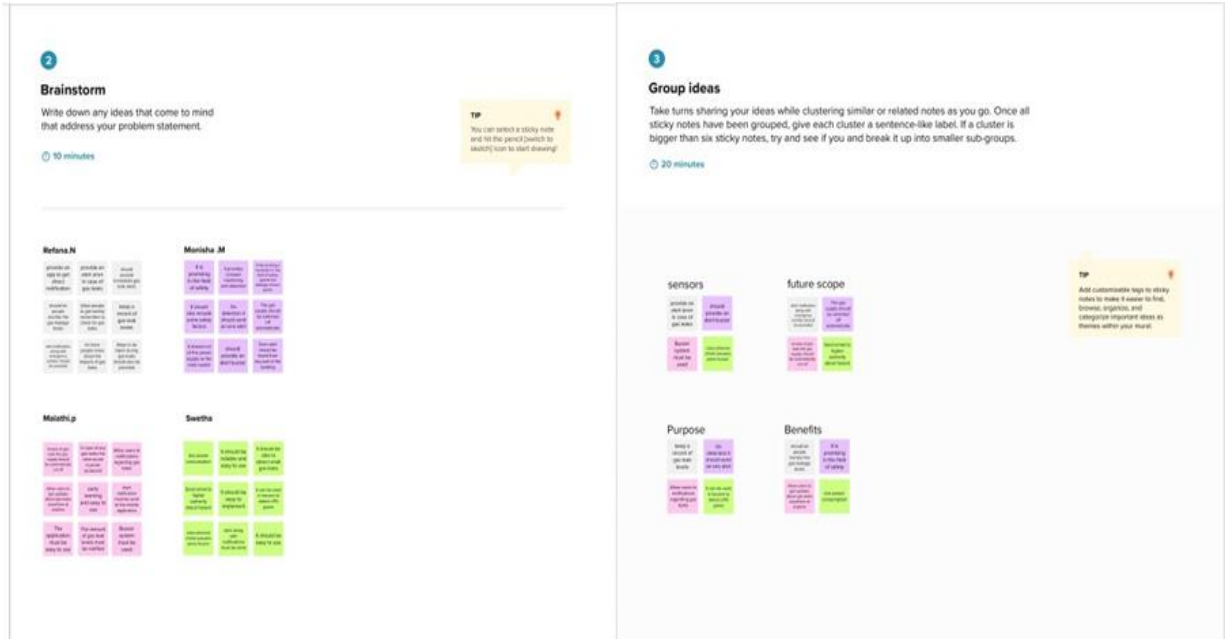
IDEATION & PROPOSED SOLUTION

IDEATION & PROPOSED SOLUTION

2.1 Empathy Map Canvas:



3.2 Ideation & Brainstorming:

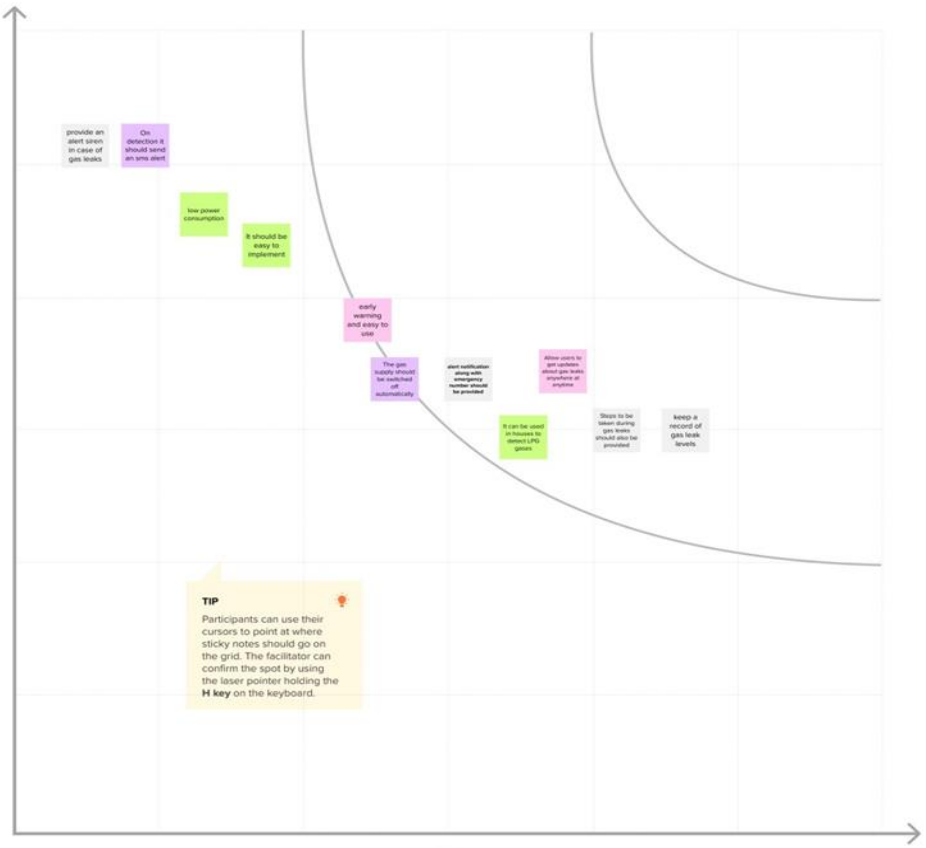


4

Prioritize

Your team should all be on the same page about what's important moving forward. Place your ideas on this grid to determine which ideas are important and which are feasible.

20 minutes



Importance

If each of these tasks could get done without any difficulty or cost, which would have the most positive impact?

TIP

Participants can use their cursors to point at where sticky notes should go on the grid. The facilitator can confirm the spot by using the laser pointer holding the **H key** on the keyboard.

Feasibility

Regardless of their importance, which tasks are more feasible than others? (Cost, time, effort, complexity, etc.)

3.3 Proposed Solution:

S.NO	Parameter	Description
1	Problem Statement (Problem to be solved)	Workers who are engaged with a busy industries packed with gas either harmful or harmless needs a way to monitor their gas pipelines continuously and detect early if there is any leakage of gas in their surroundings so that they can work efficiently on major crises rather than worrying about monitoring or leakage of gas, this will indeed reduce the manpower of that industry and create a peaceful environment.
2	Idea / Solution description	Workers who are engaged with a busy industries packed with gas either harmful or harmless needs a way to monitor their gas pipelines continuously and detect early if there is any leakage of gas in their surroundings so that they can work efficiently on major crises rather than worrying about monitoring or leakage of gas, this will indeed reduce the manpower of that industry and create a peaceful environment
3	Novelty / Uniqueness	Even though there are many existing solutions for this problem they failed to satisfy the needs of customer. Some of the solutions are only detecting some particular gases where some others failed to alert the main department and other solutions are with some delays. Our solution not only notify the industry person but also notify the fire fighters so that can take control over the situation and our solution will alert the workers even there is a small leak of gases.
4	Social Impact /Customer Satisfaction	Our solution will be very helpful for the workers and the society which is associated or located nearby the industries. Our solution will prevent great disasters like Bhopal Gas Tragedy so that so many lives can be saved. Through this project the workers mental pressure will be reduced so that they can concentrate on other works or by relaxing them
5	Business Model (Revenue Model)	The main target of our solution is Industries so we have planned to visit industries and explain them about the benefits of our products. So that they can aware of the importance of this solution and use it.
6	Scalability of the Solution	Our solution can be integrated for further future use because the solution we have provided will be lay on the basic or initial stage of any upgraded version.

3.4 Problem Solution fit:

Problem Statement (PS)	I am (Customer)	I'm trying to	But	Because	Which makes me feel
PS-1	Chemical industry worker	Ensure workers health	It is not easy to detect gas leakge in our industry	Of large number of gas pipeline usage	Stressed
PS-2	Oil rig worker	To prevent hazardous gas leakage	We deal with lot of gases and some gas leaks cannot be found easily	some gases are colourless and odourless	Worried
PS-3	Restaurant owner	Ensure customer and workers safety	we cannot always keep checking for gas leaks	Of our busy work routine	Frustrated
PS-4	Home maker	Keep my family safe	I can not always be present at home	I run a small business	Stressed
PS-5	Fire station worker	To prevent fire explosion due to gas leakage	We can not detect gas leakage	We are busy in extinguishing fire and saving people	Worried

REQUIREMENT ANALYSIS

REQUIREMENT ANALYSIS

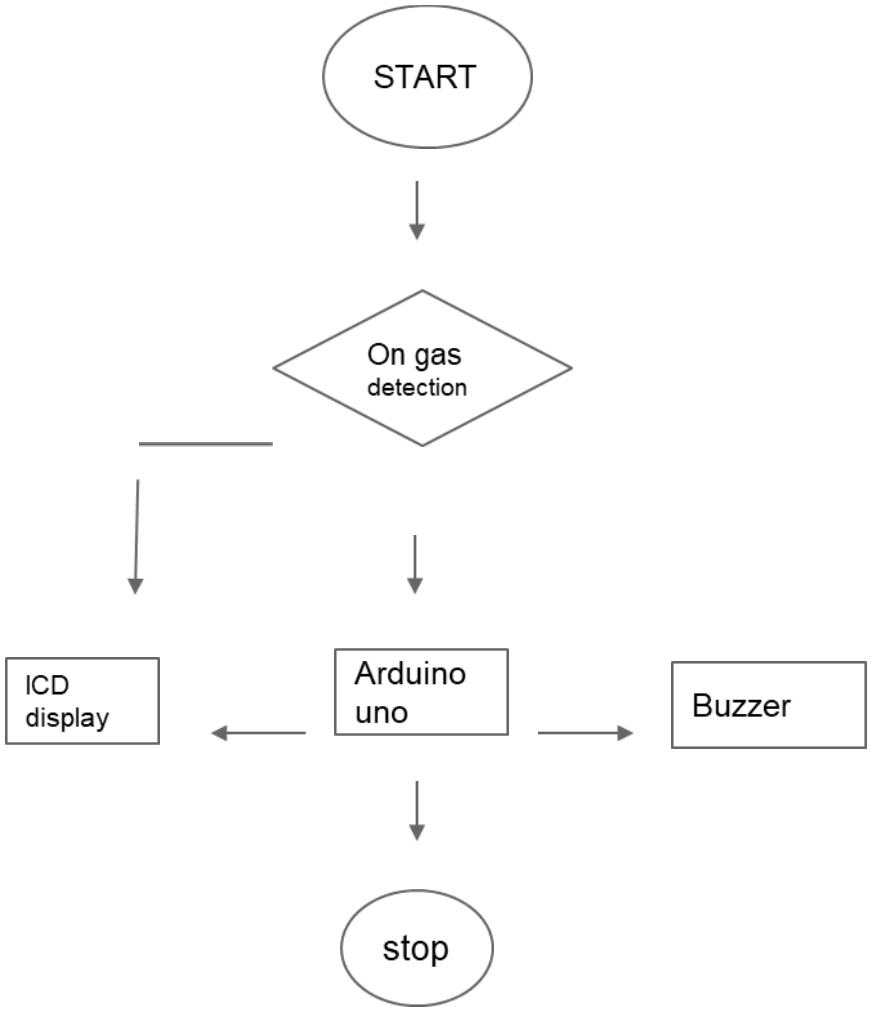
4.1 Functional requirement:

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.**

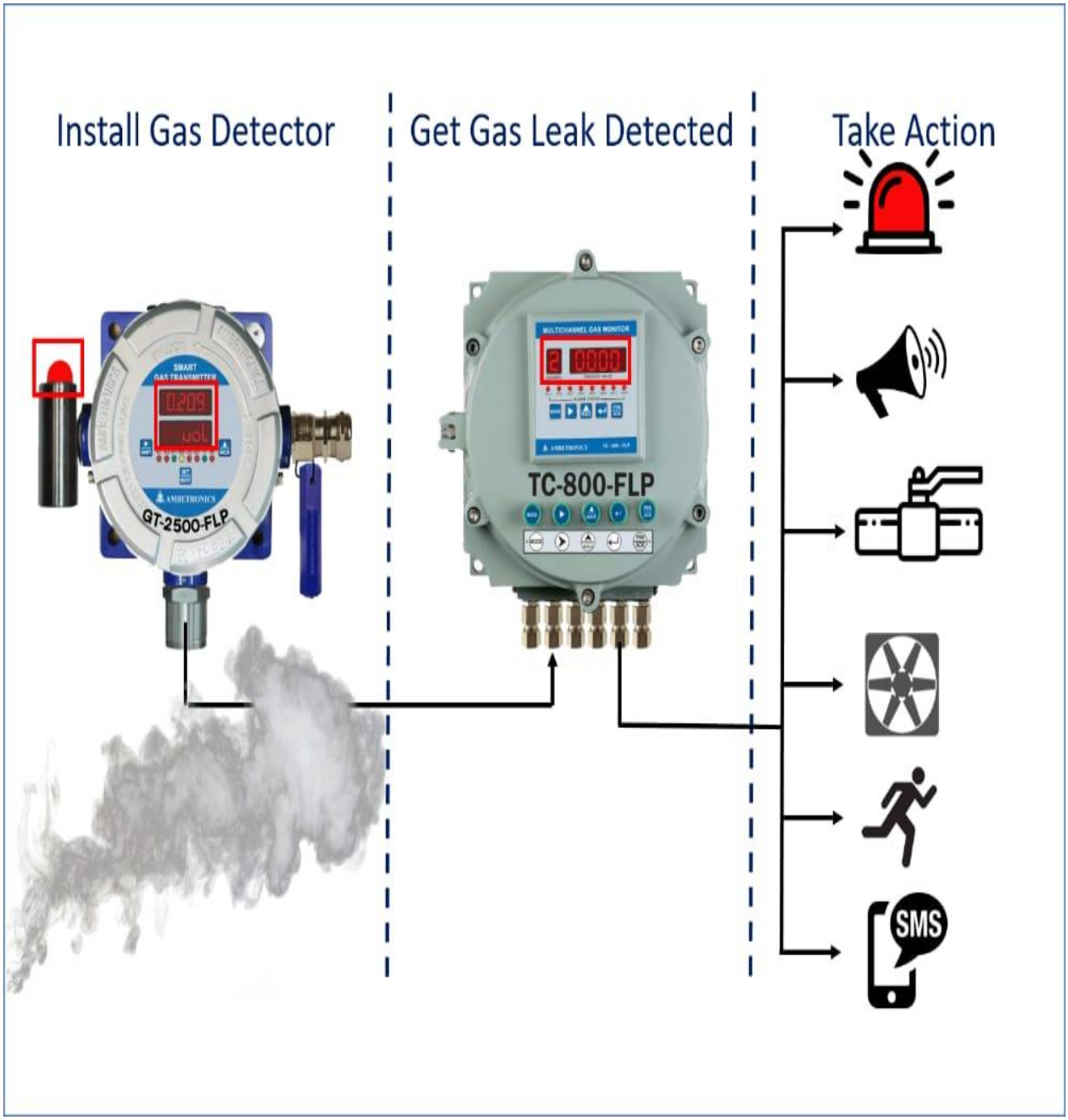
PROJECT DESIGN

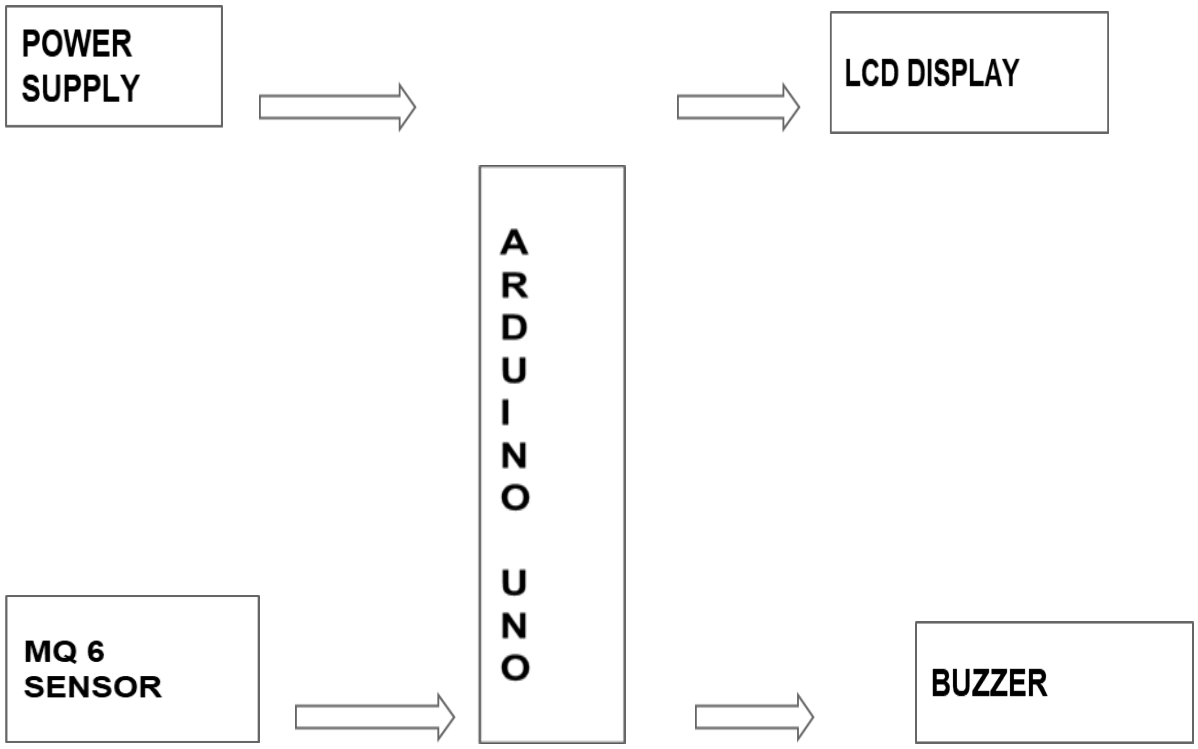
PROJECT DESIGN

5.1 Data Flow Diagrams:



5.2 Solution & Technical Architecture:




POWER SUPPLY
LCD DISPLAY
ARDUINO UNO
MQ 6 SENSOR
BUZZER

5.3 User Stories:

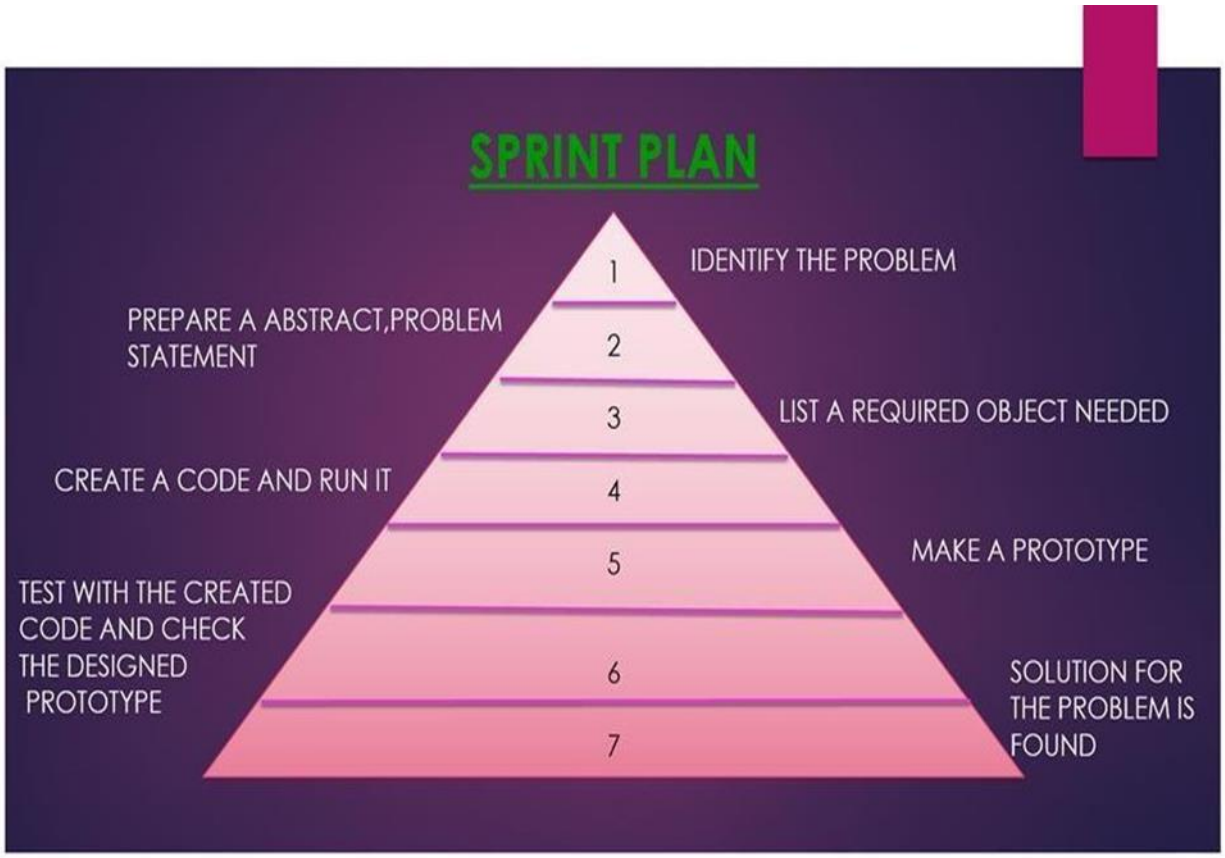
Customer Journey Map

	STAGE 1	STAGE 2	STAGE 3	STAGE 4	STAGE 5
OBJECTIVES	Write a goal or activity	Gas leakage detection systems protect personnel and the environment from potentially hazardous exposure to gases.	The system comprises of sensors for detecting gas leak interfaced to microcontroller that will give an alert to user whenever there is a gas leakage, display warning information by using Liquid.	Gas Leak Detection System Gas leak detection is the process of identifying potentially hazardous gas leaks by sensors. These sensors usually employ an audible alarm to alert people when a dangerous gas has been detected.	An alarm management system represents the series of actions a system performs in an event of gas leakage.
NEEDS	Write a need you want to meet	Fire hazard prevention	Harmful gas detection	Oxygen level measurement	Prompt gas leak alerts
FEELINGS	Write an emotion you expect the customer to have	Happy about this solution	Embrassed on the solution and promoted the good wordes towords this project	Happy	Encouraging toeords this project and giving good feedbacks.
BARRIERS	Write a potential challenge to your objective	Higher Officials	commercial companies	The gasses are toxic in nature, resulting in human unconsciousness and even death if consumed in larger quantities.	Moreover, gaseous blasts are another disaster that everyone - working in a factory or at home - would want to avoid at all costs!

PROJECT PLANNING & SCHEDULING

PROJECT PLANNING & SCHEDULING

6.1 Sprint Planning & Estimation:



CODING & SOLUTIONING

(Explain the features added in the project along with code)

CODING & SOLUTIONING (Explain the features added in the project along with code)

7.1 Feature 1:

- IOT device
- IBM Watson platform
- Node Red
- Cloudant DB
- Web UI
- Geofence
- MIT App
- Python Code

7.2 Feature 2:

- Registration
- Login
- Verification
- Adding Queries

7.3 Database Schema (if Applicable):

Code:

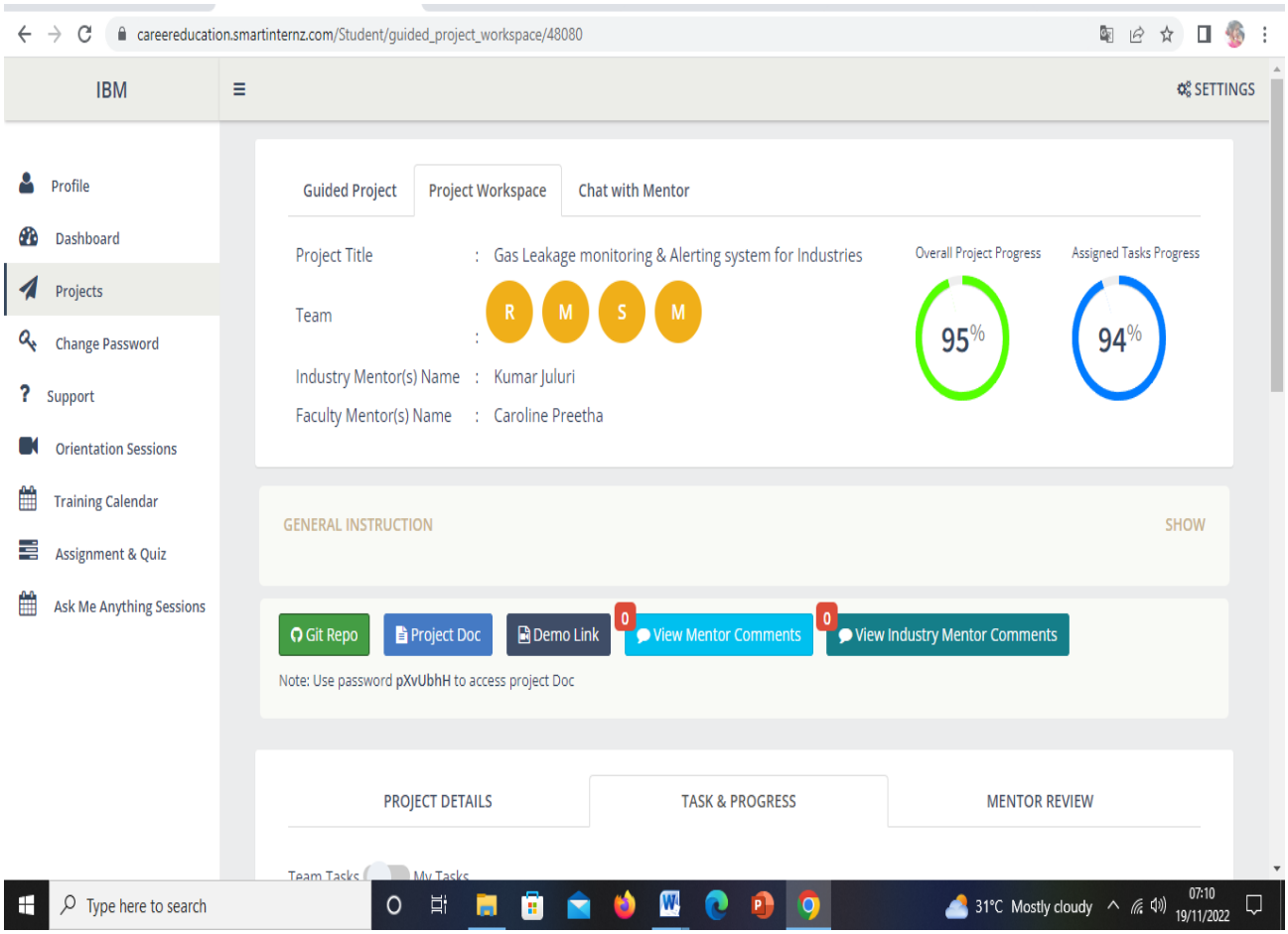
```
#include <LiquidCrystal.h>
LiquidCrystal lcd(5,6,8,9,10,11);

//pin variables
int redled = 3;
int greenled = 2;
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);
```

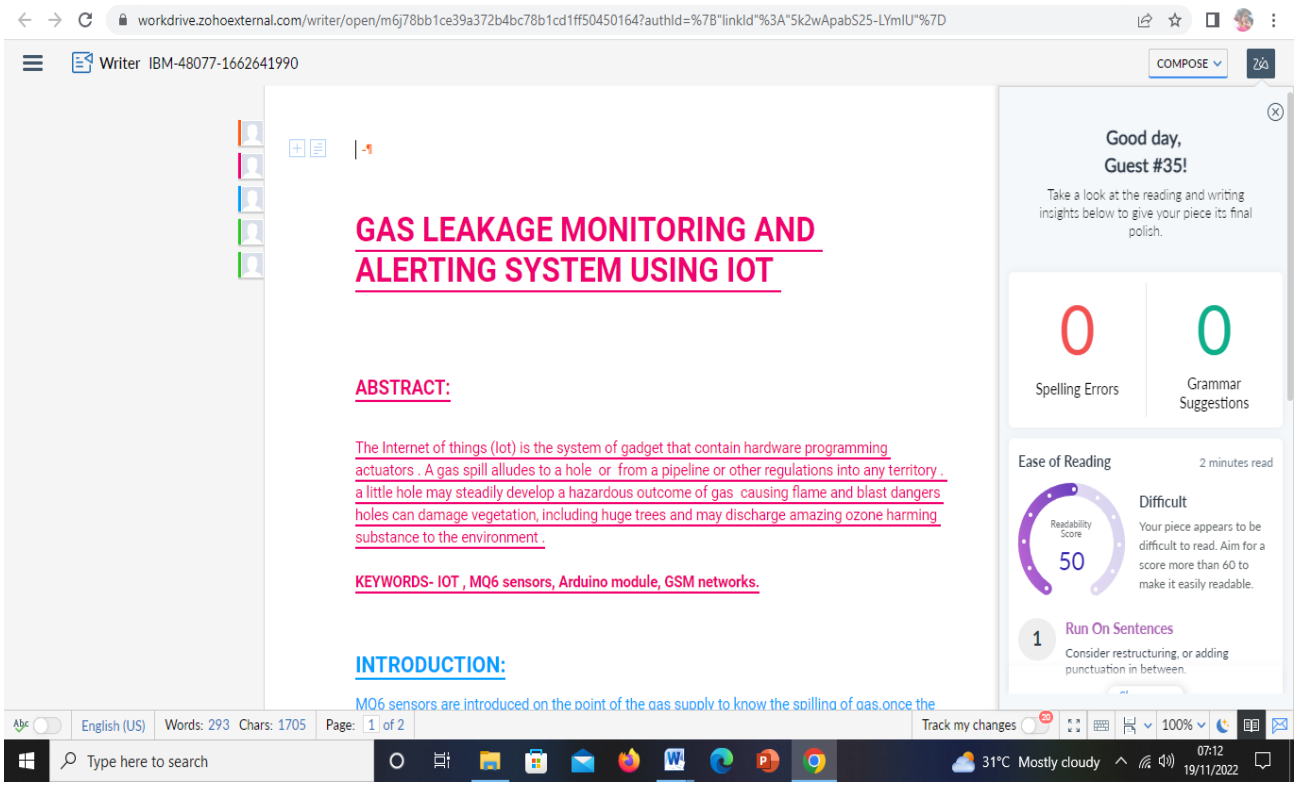
```
Serial.print(analogValue);

//gas concenteration condition
if(analogValue>sensorThresh)
{
  digitalWrite(redled,HIGH);
  digitalWrite(greenled,LOW);
  tone(buzzer,1000,10000);
  lcd.clear();

  //to print on LCD
  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(0,1);
  lcd.print("ALL CLEAR");
```

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

RESULTS

RESULTS


careereducation.smartinternz.com/Student/guided_project_workspace/48080
IBM
SETTINGS
Profile
Dashboard
Projects
Change Password
Support
Orientation Sessions
Training Calendar
Assignment & Quiz
Ask Me Anything Sessions
Guided Project
Project Workspace
Chat with Mentor
Project Title : Gas Leakage monitoring & Alerting system for Industries
Team : R M S M
Industry Mentor(s) Name : Kumar Juluri
Faculty Mentor(s) Name : Caroline Preetha
Overall Project Progress
95%
Assigned Tasks Progress
94%
GENERAL INSTRUCTION
SHOW
Git Repo
Project Doc
Demo Link
0
View Mentor Comments
0
View Industry Mentor Comments
Note: Use password pXvUbhH to access project Doc
PROJECT DETAILS
TASK & PROGRESS
MENTOR REVIEW
Team Tasks
My Tasks
Type here to search
31°C Mostly cloudy
07:10
19/11/2022


workdrive.zohoexternal.com/writer/open/m6j78bb1ce39a372b4bc78b1cd1ff50450164?authId=%7B"linkId"%3A"5k2wApabS25-LYmIU"%7D
Writer IBM-48077-1662641990
COMPOSE
GAS LEAKAGE MONITORING AND ALERTING SYSTEM USING IOT
ABSTRACT:
The Internet of things (Iot) is the system of gadget that contain hardware programming actuators . A gas spill alludes to a hole or from a pipeline or other regulations into any territory . a little hole may steadily develop a hazardous outcome of gas causing flame and blast dangers holes can damage vegetation, including huge trees and may discharge amazing ozone harming substance to the environment .
KEYWORDS- IOT , MQ6 sensors, Arduino module, GSM networks.
INTRODUCTION:
MQ6 sensors are introduced on the point of the gas supply to know the spilling of gas.once the
Good day,
Guest #35!
Take a look at the reading and writing insights below to give your piece its final polish.
0
Spelling Errors
0
Grammar Suggestions
Ease of Reading
2 minutes read
Readability Score
50
Difficult
Your piece appears to be difficult to read. Aim for a score more than 60 to make it easily readable.
1
Run On Sentences
Consider restructuring, or adding punctuation in between.
English (US)
Words: 293 Chars: 1705
Page: 1 of 2
Track my changes
100%
Type here to search
31°C Mostly cloudy
07:12
19/11/2022

ADVANTAGES & DISADVANTAGES

ADVANTAGES & DISADVANTAGES

Advantages:

• Because of the very narrow 0.3 nm line width of the laser emission, there is no interference from other gases.

• Response times are in the order 1 second. This allow for fine resolution/control when making process measurements.

• The intense laser light concentrated at the absorption wavelength enables path lengths up to 1 km to be measured.

• An average measurement is taken over the total path so that a narrow plume of gas has less chance of escaping detection.

• The range of measurement can be up to 4 orders of magnitude, enabling concentrations of 0.1 ppm to 1000 ppm to be measured.

• Because of the internal reference cell, the system is self calibrating.

• There is no 'poisoning' or degradation of the instrument with long term exposure to a gas.

• Can easily be conformed to be 'Intrinsically Safe'.

• Low maintenance and low operating costs.

• Reliable technology**.**

Disadvantages:

• Only one gas can be measured with each instrument.

• When heavy dust, steam or fog blocks the laser beam, the system will not be able to take measurements. This is also the case when a person or vehicle blocks the path.

CONCLUSION

Conclusion

Gas leakage leads to severe accidents resulting in material losses and human injuries. Gas leakage occurs mainly due to poor maintenance of equipments and inadequate awareness of the people. Hence, LPG leakage detection is essential to prevent accidents and to save human lives.

We have designed a system which can detect gas leakage productively using a gas sensor and alert other people by using Wi-Fi module to send a message to their mobile phones and by activating LED and buzzer. So accordingly, our project assuredly proofs to be an asset for tribe and industries in halting future gas leakages.

FUTURE SCOPE

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.
- Some of the cylinders used are Oxygen cylinder, Carbon dioxide cylinder, Nitrous oxide cylinder. As many students are naïve the risk of causingaccidents 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.

APPENDIX

APPENDIX

Source Code :

Code 1:

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

//pin variables
int redled = 3;
int greenled = 2;
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);

  //gas concenteration condition
  if(analogValue>sensorThresh)
  {
    digitalWrite(redled,HIGH);
    digitalWrite(greenled,LOW);
    tone(buzzer,1000,10000);
    lcd.clear();

    //to print on LCD
    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(0,1);
    lcd.print("ALL CLEAR");
    delay(1000);
  }
}
```

Code2:

```
#include "Wire.h"
#include "Adafruit_BMP085.h"
 Adafruit_BMP085 bmp;
 void setup() {
  Serial.begin(9600);
  bmp.begin();
}
 void loop() {
    Serial.print("Temperature = ");
    Serial.print(bmp.readTemperature());
    Serial.println(" *C");
    Serial.print("Pressure = ");
    Serial.print(bmp.readPressure());
    Serial.println(" Pa");
    Serial.println();
    delay(500);
}
```

Code 3:

```
import RPi.GPIO as GPIO
import time

try:
  def lightTraffic(led1, led2, led3, delay ):
    GPIO.output(led1, 1)
    time.sleep(delay)
    GPIO.output(led1, 0)
    GPIO.output(led2, 1)
    time.sleep(delay)
    GPIO.output(led2, 0)
    GPIO.output(led3, 1)
    time.sleep(delay)
    GPIO.output(led3, 0)
  GPIO.setmode(GPIO.BCM)
  button = 19
  GPIO.setup(button, GPIO.IN, pull_up_down=GPIO.PUD_UP)
  ledGreen = 16
  ledYellow = 12
  ledRed = 23
  GPIO.setup(ledGreen, GPIO.OUT)
  GPIO.setup(ledYellow, GPIO.OUT)
  GPIO.setup(ledRed, GPIO.OUT)
  while True:
    input_state = GPIO.input(button)
```

```
  if input_state == False:
    print('Button Pressed')
    lightTraffic(ledGreen, ledYellow, ledRed, 1)
else:
 GPIO.output(ledGreen, 0)
 GPIO.output(ledYellow, 0)
 GPIO.output(ledRed, 0)
 except KeyboardInterrupt:
 print "You've exited the program"
 finally:
 GPIO.cleanup()
```

Code:

```
import time
import adafruit_dht
import board
dht = adafruit_dht.DHT22(board.D2)
while True:
 try:
 temperature = dht.temperature
 humidity = dht.humidity
 # Print what we got to the REPL
 print("Temp: {:.1f} *C \t Humidity: {}%".format(temperature, humidity))
 except RuntimeError as e:
 # Reading doesn't always work! Just print error and we'll try again
 print("Reading from DHT failure: ", e.args)
time.sleep(1)
```

Code:

```
float y,z,temp;
void setup()
{
 pinMode(5, OUTPUT);
 pinMode(6, OUTPUT);
 pinMode(A5, INPUT);
 pinMode(A4, INPUT);
Serial.begin(9600);
}
void loop()
{
 y= analogRead(A5);
 z= analogRead(A4);
 Serial.prfloat y,z,temp;
void setup()
{
 pinMode(5, OUTPUT);
 pinMode(6, OUTPUT);
 pinMode(A5, INPUT);
 pinMode(A4, INPUT);
Serial.begin(9600);
}
void loop()
{
 y= analogRead(A5);
 z= analogRead(A4);
```

```
Serial.println(y);
Serial.println(z);
temp = (double)z / 1024;
temp = temp * 5;
temp = temp - 0.5;
temp = temp * 100;

{
if ((y<550)&&(temp>30))
{
digitalWrite(5, HIGH);
digitalWrite(6, HIGH);
}
else if((y<550)&&(temp<30))
{
digitalWrite(5, HIGH);
digitalWrite(6, LOW);
}
else if((y>550)&&(temp>30))
{
digitalWrite(5, LOW);
digitalWrite(6, HIGH);
}
else if((y>550)&&(temp<30))
{
digitalWrite(5, LOW);
digitalWrite(6, LOW);
```

```
}
}
}
intln(y);
 Serial.println(z);
 temp = (double)z / 1024;
 temp = temp * 5;
 temp = temp - 0.5;
 temp = temp * 100;

 {
 if ((y<550)&&(temp>30))
 {
 digitalWrite(5, HIGH);
 digitalWrite(6, HIGH);
 }
 else if((y<550)&&(temp<30))
 {
 digitalWrite(5, HIGH);
 digitalWrite(6, LOW);
 }
 else if((y>550)&&(temp>30))
 {
 digitalWrite(5, LOW);
 digitalWrite(6, HIGH);
 }
 else if((y>550)&&(temp<30))
```

```
{
digitalWrite(5, LOW);
digitalWrite(6, LOW);
}
}
}
```

GitHub & Project Demo Link :

https://github.com/IBM-EPBL/IBM-Project-48077-1660804246