PROJECT REPORT

# PROJECT TITLE : INDUSTRY-SPECIFICINTELLIGENT FIRE MANAGEMENT

SYSTEM TEAM ID PNT2022TMID22484

## INTRODUCTION

* 1. Project overview The three main risks for the process industry are ﬁre, explosion, andhazardous leakage, with ﬁre being the most frequent one. The needforautomatic intelligent ﬁre alarm systems

in residential and commercial buildingshas increased due to an increase in ﬁre incidences and propertyloss. Anintelligent ﬁre alarm system is made expressly to offer beneﬁts includingpinpointing the location of the ﬁre, ﬁnding any wiring issues, andensuringsimpler maintenance. To detect any changes in the environment, this systemhastemperature, ﬂame, and gas sensors. The exhaust fans are turned onbasedonthe temperature readings and whether any gases are present. The sprinklerswillbe turned on automatically if any ﬂame is found. The authorities andtheFirestation are notiﬁed of emergency notiﬁcations.

Additionally, thesecontemporary intelligent ﬁre alarm systems are capable of recognising false alarm

Purpose The main goal of a ﬁre alarm system is to give people advance noticeofaﬁre so they can escape and take swift action to minimise the effects of theﬁreas soon as possible.

# LITERATURE SURVEY

* 1. Existing problem Traditionally, ﬁre monitoring systems have only used a singlesensor, such as smoke or ﬂame. These single

sensor systems cannot distinguishbetween real and fake ﬁre presence. Relying on a single sensor all dayandrunning the risk of false alarms results in energy ineﬃciency and environmentalharm. We require a system that is capable of accurately detecting ﬁre as well asan intelligent solution. To improve the functionality of existing singlesensorsystems, the smart ﬁre management system includes a temperature sensor, aﬂame sensor, and a gas sensor. This system also requires a good networkwithseparate smart devices connected to various panels.

# References

* + 1. N N Mahzan, N I M Enzai, N M Zin and K S S K MNoh, ”DesignofanArduino-based home ﬁre alarm system with gSMmodule”, 1st Internationalconference on green and

Sustainable computing (ICoGeS), 2017. [2] ZHANG Ying-Cong, YU Jing, “Study on the Fire IOTDevelopmentStrategy”, Shenyang Fire Research Institute --Radiant Energy-SensingFireDetectors for Automatic Fire Alarm Signaling, US: ANSI/FMRC, pp. FM3260- 2004. [3] Public Security, Shenyang 110034, China Shenyang Institute of Engineering,Shenyang 110136, China, 2019. Liu Yunhong Qi Meini,"The Designof BuildingFire Monitoring System Based on ZigBee-WiFi Networks", Eighth InternationalConference on Measuring Technology and Mechatronics Automation,

IEEE,2016, pp-733-735 [4] R.A. Sowah, A.R. Ofoli, S.N. Krakani, S.Y.

Fiawoo, hardware DesignandWeb-Based Communication Modules of a Real-Time multisensor Fire Detection

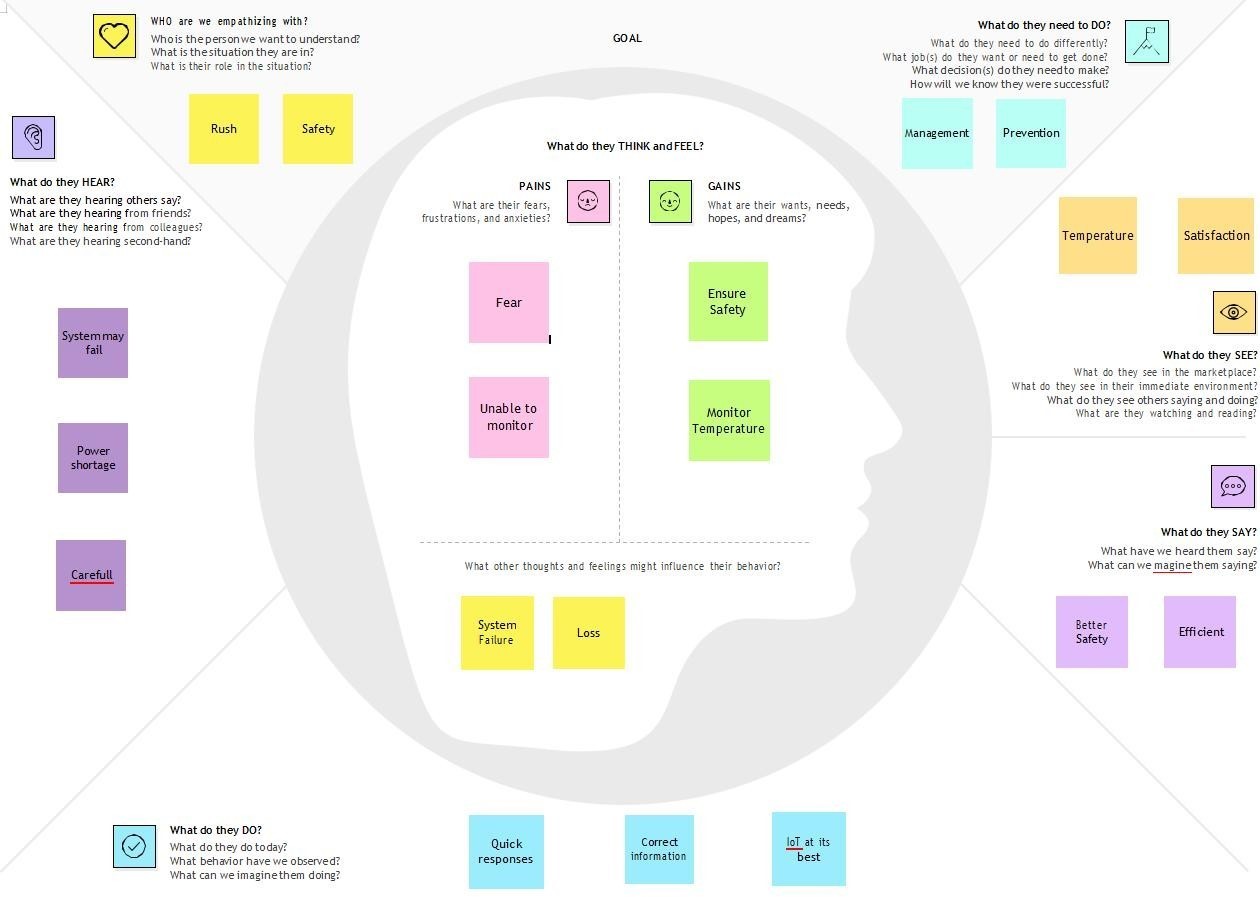
## Problem Statement

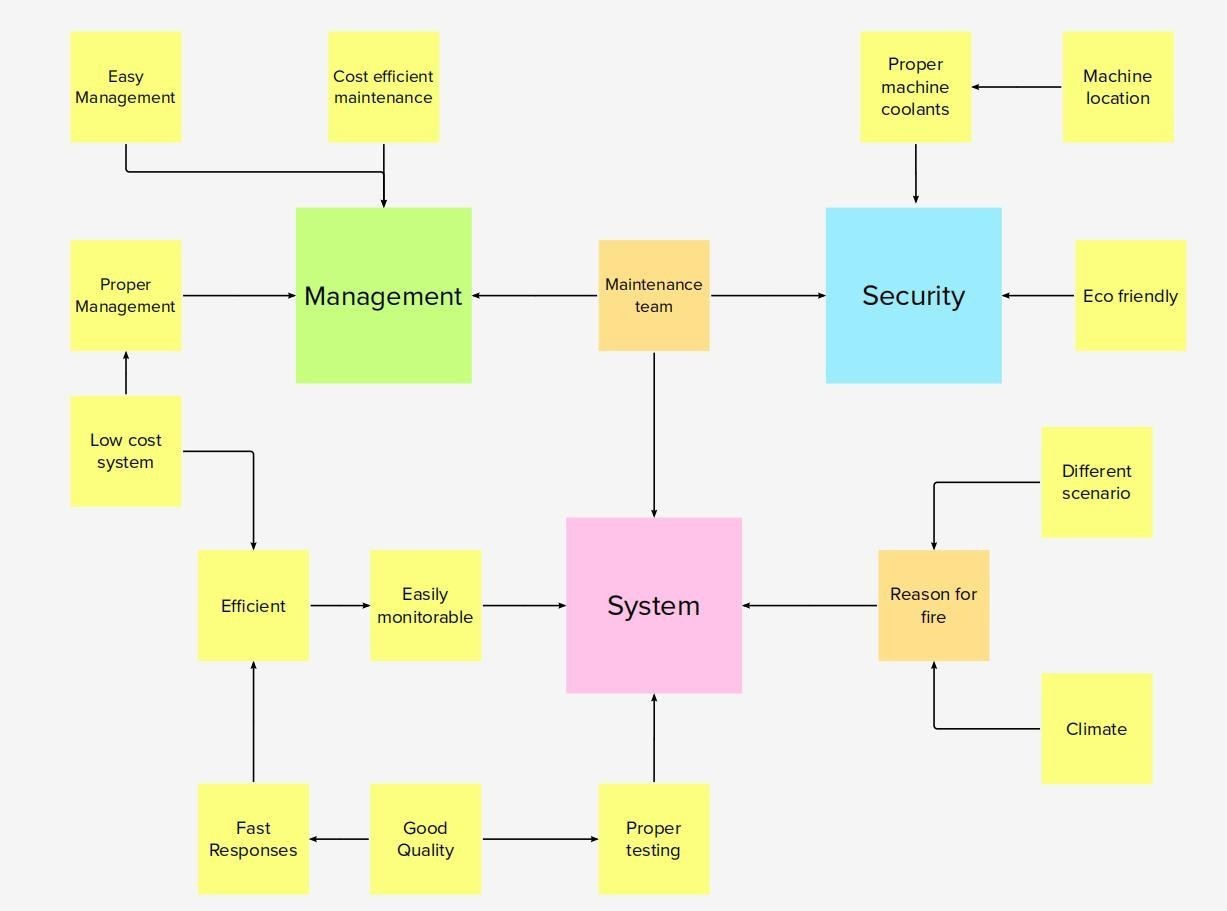
Deﬁnition Industry-Speciﬁc Systemsformanaging ﬁresintelligently are intendedtopreventindustrialﬁres caused by gasleaks and ﬂame.

## IDEATION & PROPOSED SOLUTION

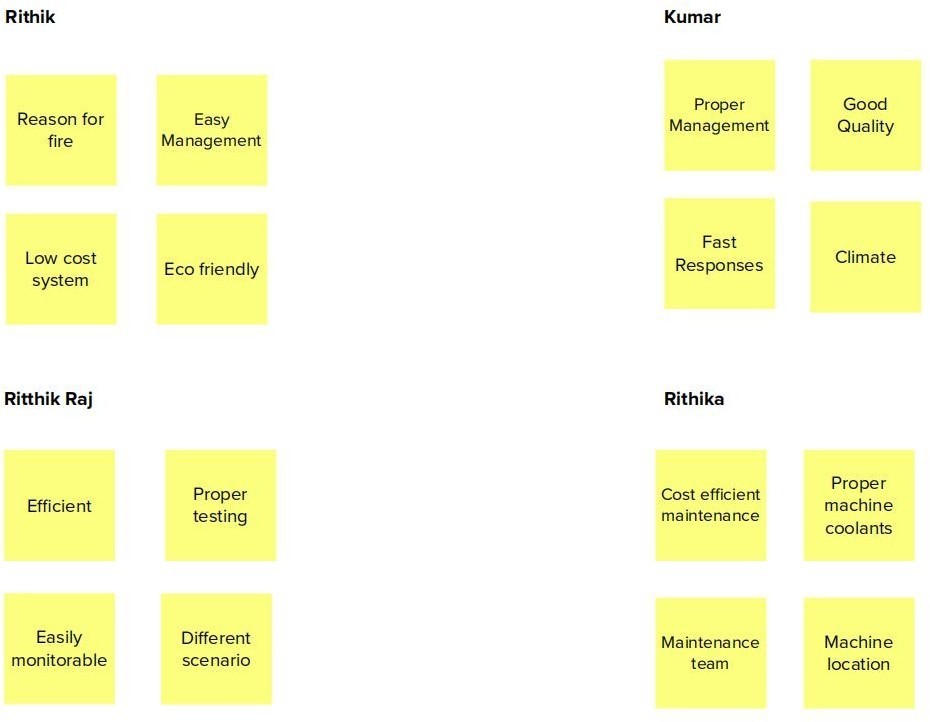
EMPATHY MAP AND

## BRAINSTORMING

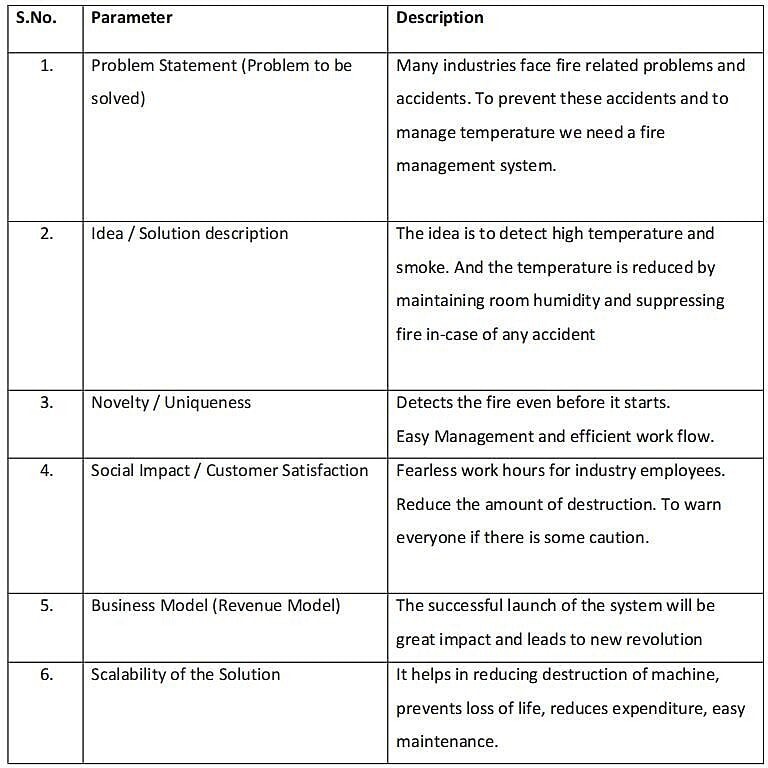




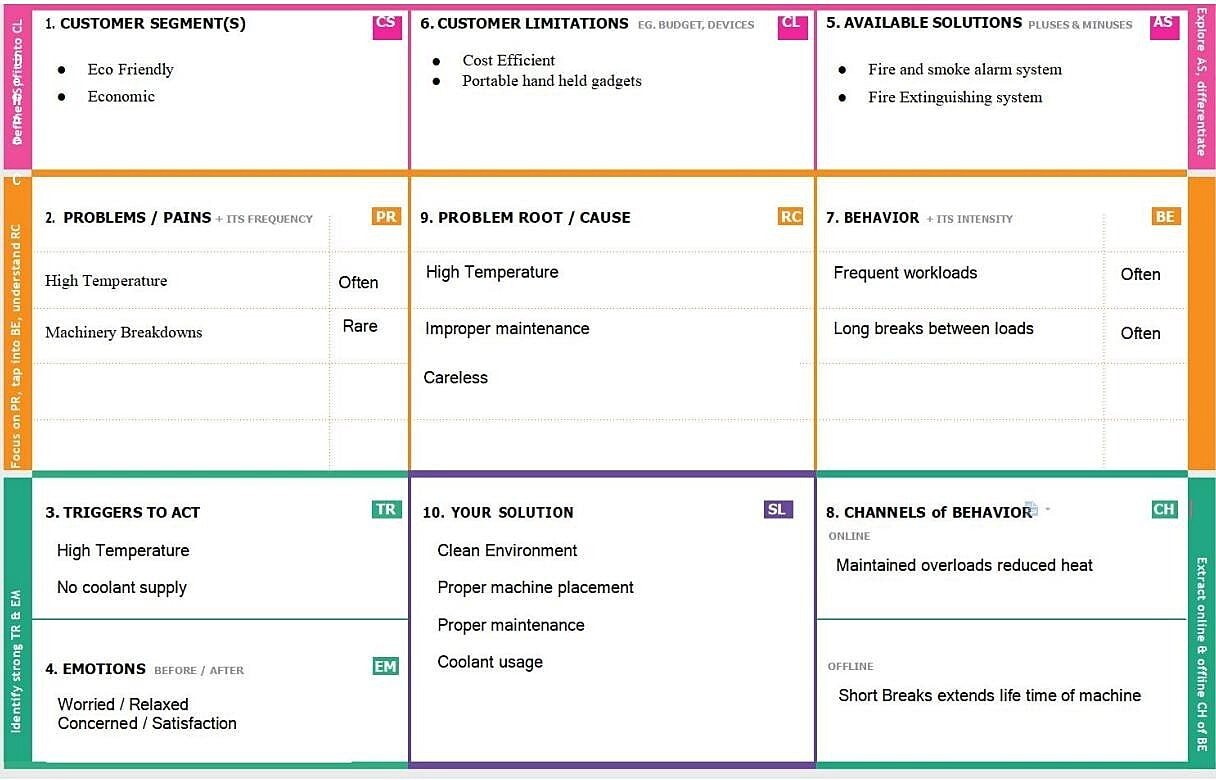




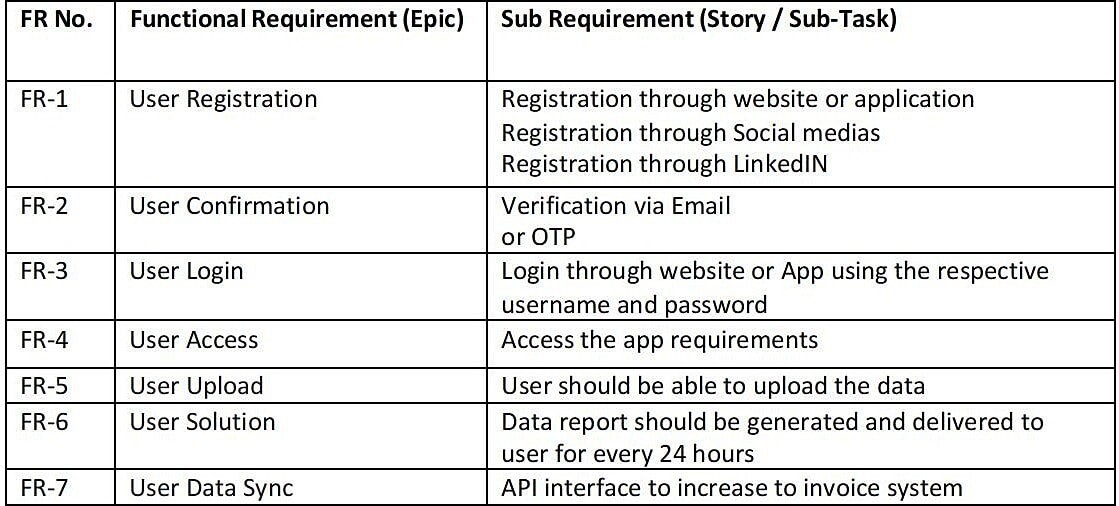
PROPOSED SOLUTION



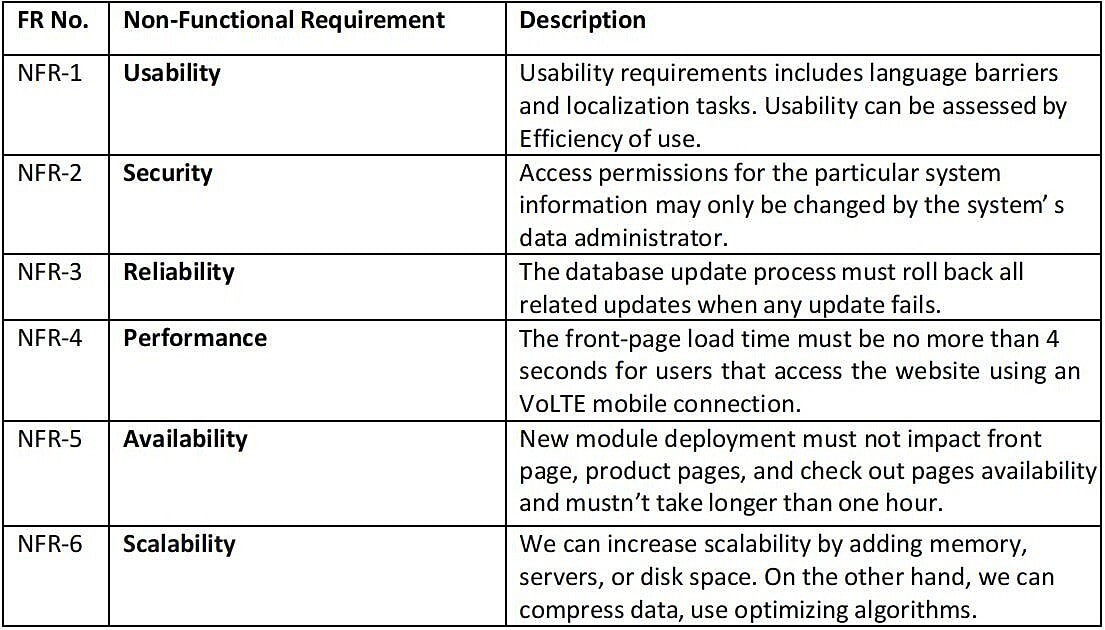
PROPOSED SOLUTION FIT



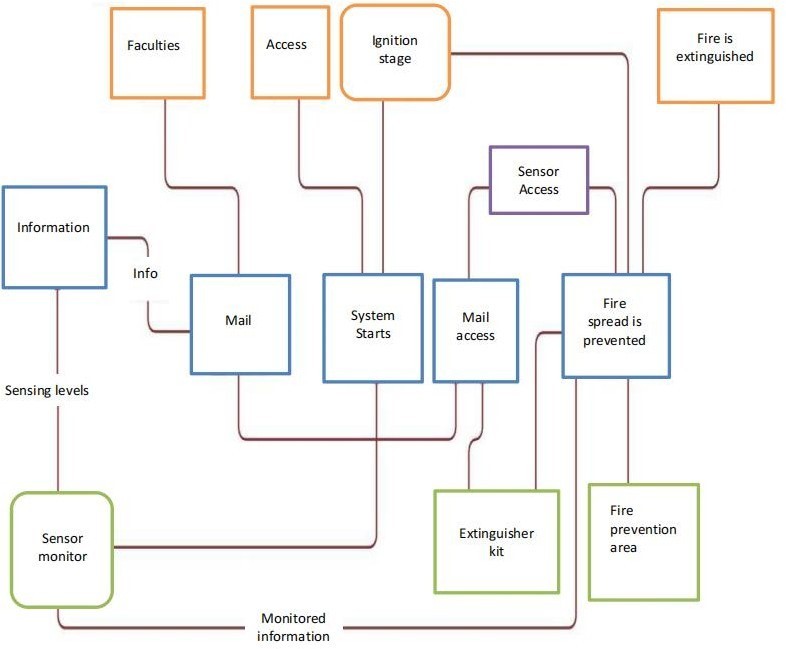
# FUNCTIONAL REQUIREMENT



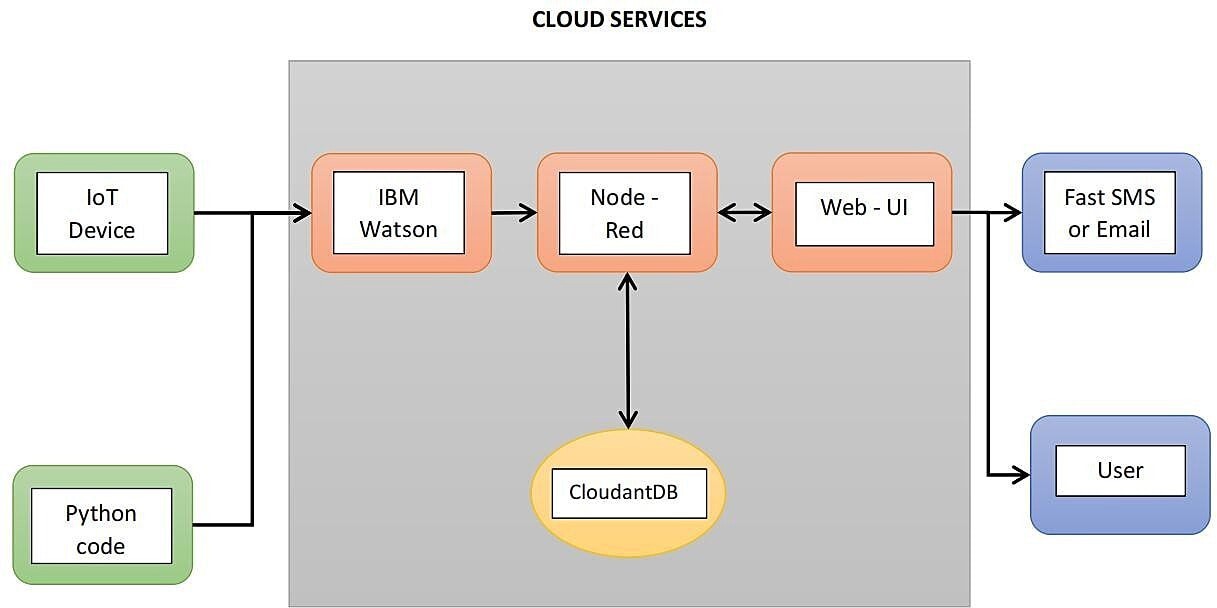
## NON FUNCTIONAL REQUIREMENT



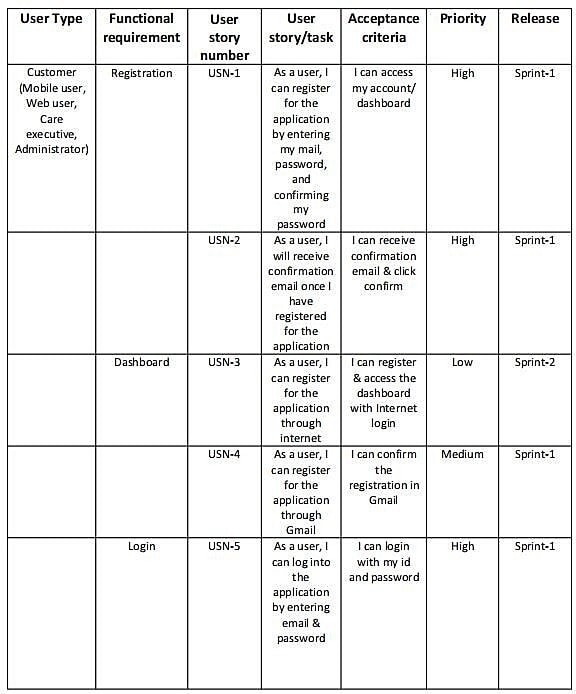
DATA FLOW DIAGRAM



# SOLUTION ARCHITECTURE

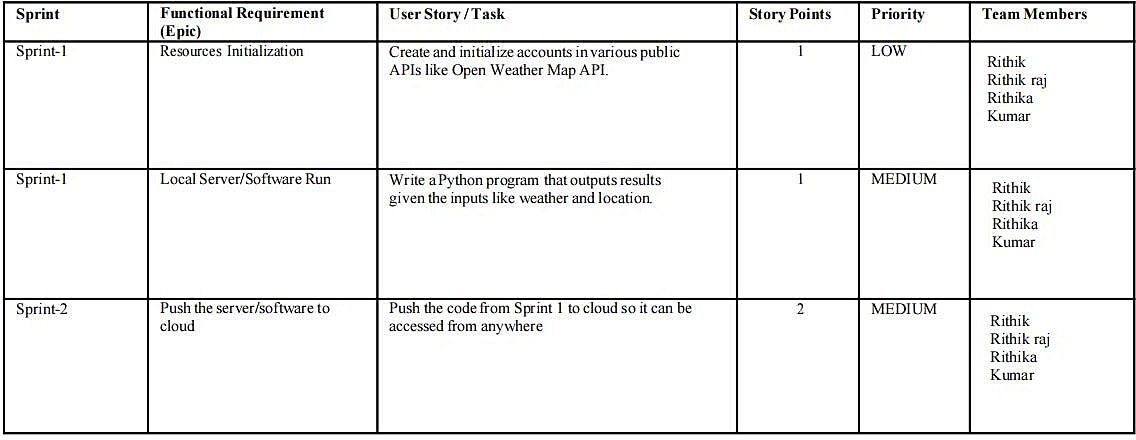


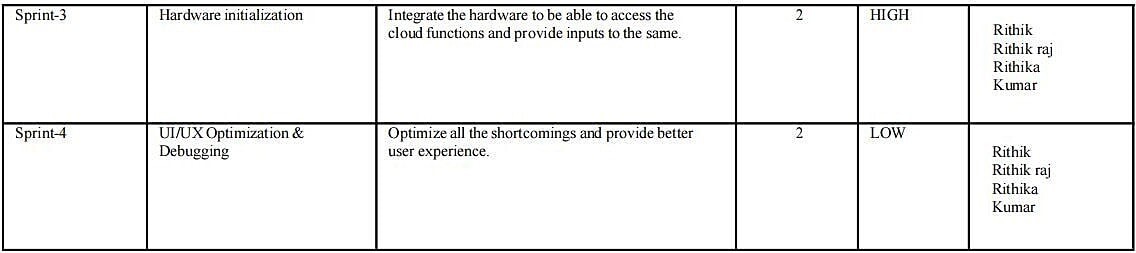
USER STORIES



# PROJECT PLANING AND SCHEDULING

1 sprint planing and estimation



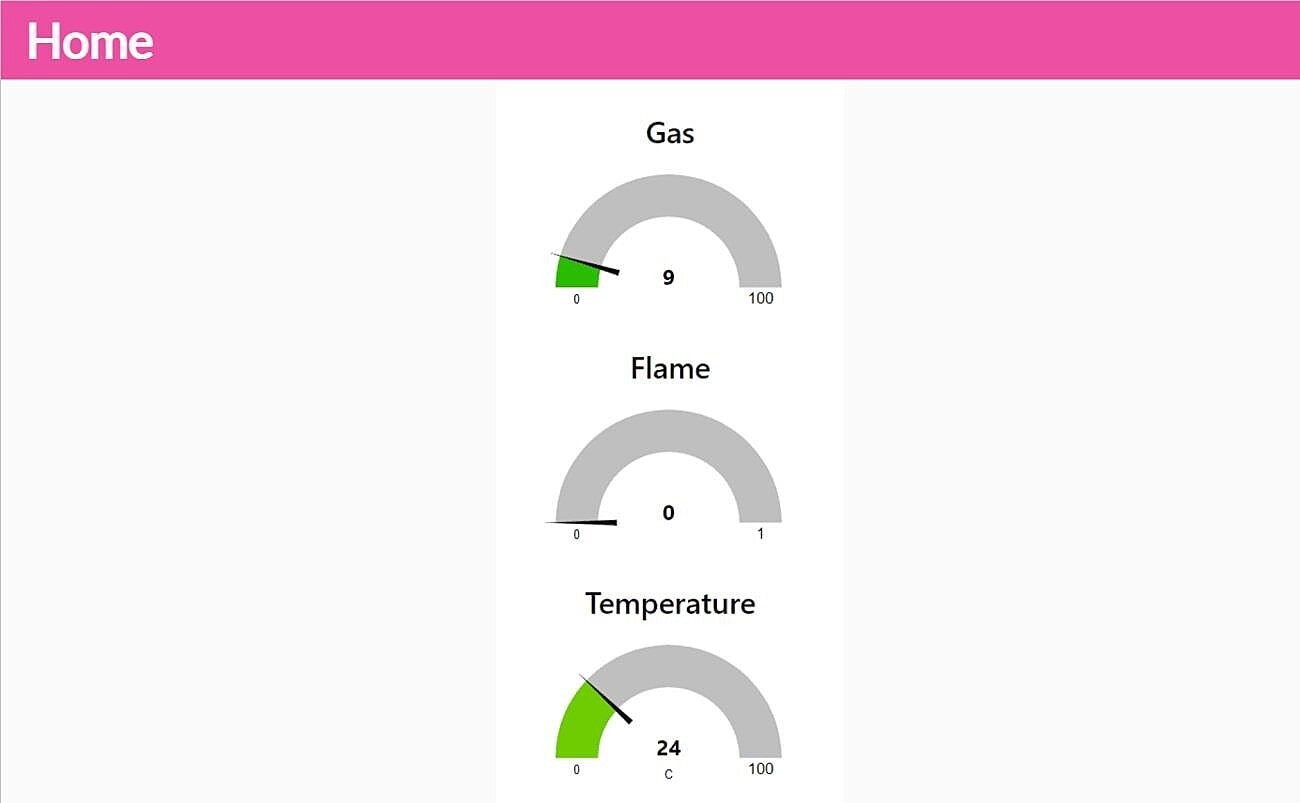


1. CODING & SOLUTION

a. Features

* 1. IoT device
  2. IBM Watson Platform
  3. Node red
  4. Cloudant DB
  5. Web UI
  6. MIT App Inventor
  7. Python code
  8. Wokwi

## TESTING AND RESULT



### ADVANTAGES

* Reduced installation cost.
* They monitor 24/7.
* Improved security in homes, industries and Oﬃces.
* It pin points location of the ﬁre.

### DISADVANTAGES

* Heat detectors are not considered as life savingdevices because they aresensitive only to heat.
* High battery or current consumption will need for these detectors.
* Control pannel may need to be replacedif it becomes damaged.

## CONCLUSION

This gas leakage device has several industrial uses in addition to home security. In the past, industrial and residential fires and gas leaks have caused extensive damage and losses. If the right steps are not taken promptly, gas leaks and fire outbreaks can expand rapidly and cause considerably greater loss of life and property. So, in this case, we suggested a system that alerts us to gas and fire breakouts and identifies them so that the appropriate steps may be done to manage them.

## FUTURE SCOPE

Thefunction of smoke detectors and alarms is evolving from simple smoke detection to combination detectors and multicriteria detectors. The identification of more combustion byproducts, such as carbon monoxide, carbondioxide, sulphur dioxide,and nitrogen dioxide,in addition to heat and particulate matter, will be possible in the

future with multicriteria detection. Within the next ten years, video image detection (VID), which enables the isolation and detection of the picture of smoke or flame from within a room or place using analytics, will become more widely used. The VID system would also be capableof detecting the presence of a person inside the area and, through interaction with the notification appliances, would be able to give an evacuation route.

## APPENDIX SOURCE CODE

#include

<WiFi.h> #include

<Wire.h> #include

<SPI.h>

#include "ThingSpeak

.h"#include

<WiFiClient. h>

unsigned long myChannelNumber = 2; const char \* myWriteAPIKey = "25V40ZAPI6KIZFGY";int LED\_PIN = 32;

const int mq2 = 4;int value

= 0;

int flame\_sensor\_ pin = 10; lame\_pin = HIGH;

char ssid[] = "NALAIYA";

char pass[]= "NALAIYATHIRAN";

WiFiClient client;

#define PIN\_LM35 39

#define ADC\_VREF\_mV3300.0 #define ADC\_RESOLUTION 4096.0

#define RELAY\_PIN 17

#define RELAY\_PIN1 27

void setup(){ **Serial**.begin(115200); pinMode(RELAY\_PIN, OUTPUT);

pinMode(RELAY\_PIN1, OUTPUT);

**Serial**.print("Con necting to "); **Serial**.println(ssid

); WiFi.begin(ssid, pass);

int wifi\_ctr = 0;

while (WiFi.status() != WL\_CONNECTED){

delay(1000); **Serial**.print(".");

}

**Serial**.println("WiFi connected"); ThingSpeak.begin(cli ent); pinMode(LED\_PIN, OUTPUT);

pinMode(mq2, INPUT); pinMode ( flame\_sensor\_pin , INPUT

);pinMode(BUZZER\_PIN, OUTPUT);

}

void temperature(){

int adcVal = analogRead(PIN\_LM35);

float milliVolt = adcVal \* (ADC\_VREF\_mV / ADC\_RESOLUTION);float tempC = milliVolt / 10;

**Serial**.print("Tem perature: "); **Serial**.print(temp C);

**Serial**.print("°C"

);

if(tempC > 60){ **Serial**.println("Alert"); digitalWrite(BUZZER\_P IN, HIGH);

}

else{

digitalWrite(BUZZER\_PIN, LOW);

}

int x = ThingSpeak.writeField(myChannelNumber,1, tempC, myWriteAPIKey);

}

void GasSensors(){

int gassensorAnalogmq2 = analogRead(mq2);**Serial**.print("m q2 Gas Sensor: "); **Serial**.print(gassensorAnalogmq2

); **Serial**.print("\t");

**Serial**.print("\t");

**Serial**.print("\t");

if (gassensorAnalogmq2

>

1500){**Serial**.println("m q2Gas"); **Serial**.println("Alert"); digitalWrite(RELAY\_PI N1, HIGH);

}

else{ **Serial**.println("No mq2Gas");

digitalWrite(RELAY\_PI N1, LOW);delay(100);

}

int a = ThingSpeak.writeField(myChannelNumber,4, gassensorAnalogmq2, myWriteAPIKey);

}

void flamesensor(){ flame\_pin = digitalRead(

flame\_sensor\_pin );if (flame\_pin

== LOW ){

**Serial**.println (" ALERT: FLAME IS DETECTED" );digitalWrite (BUZZER\_PIN,HIGH ) ;

}

else{

**Serial**.println ( " NO FLAME

DETECTED " );digitalWrite (BUZZER\_PIN , LOW );

}

int value = digitalRead(flame\_sensor\_pin

);if (value ==LOW) { **Serial**.print("FLAME"); digitalWrite(RELAY\_PIN, HIGH);

} else {

**Serial**.print("NO FLAME");

digitalWrite(RELAY\_ PIN, LOW);

}

}

void loop(){ temperature() gas sensor() ﬂame sensor()

}