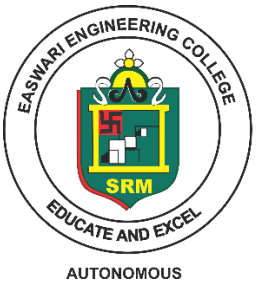

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ENGINEERING COLLEGE
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RAMAPURAM CHENNAI

INDUSTRY-SPECIFIC INTELLIGENT FIRE MANAGEMENT SYSTEM

Team ID	PNT2022TMID54463
Project Name	Industry-Specific Intelligent Fire Management System

Submitted by

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PROJECT REPORT

CONTENTS

1. INTRODUCTION

Project Overview

- The smart fire management system includes a Gas sensor, Flame sensor and temperature sensors to detect any changes in the environment.
- Based on the temperature readings and if any Gases are present the exhaust fans are powered ON.
- If any flame is detected the sprinklers will be switched on automatically.Emergency alerts are notified to the authorities and Fire station.

Purpose

- he purpose of the system is :To prevent life losses , assets damage and uncontrollable spread of fire.
- To ensure the safety of workers and alert the manager and fire department.
- To not to recklessly endanger the life of the fire workers. This can be done by taking the control measures automatically.

2.LITERATURE SURVEY

Existing problem

The existing problems of the system are:

- Cost of ownership : The fire management system should be cost effective. In average, the fire management is expected to last 10 years. The biggest problem is when the system cannot be maintained any longer due to component non-availability or due to being unsupported by the manufacturer.

- Structural changes : The structure of the hospital changes over time. The fire management system should be easily able to upgrade and adaptable to the changing structure.
- Evacuation and fire strategy : The alert and the control measures are taken immediately, so that the building can be completely evaculated.
- System performance changes within specific environments : The industry will have unique or specified condition at some time. The major problem caused is the false fire alarm.

References

[1] Gazi weldesyase, Bahta G/meskel, Mekonen Abreha, Solomon Baynes, "GSM Based Fire and Smoke Detection and Prevention System", on 08/10/2010, Adigrat, Tigray, Ethiopia.

[2] May Zaw Tun, Htay Myint, "Arduino based Fire Detection and Alarm System Using Smoke Sensor", Volume 6, Issue 4, on April – 2020, Myanmar.

[3] Nitin Galugade, Mahesh Jakka, Devika Nair, Madhur Gawas, "Fire Monitoring and Controlling System based on Iot", 2020, Mumbai, India.

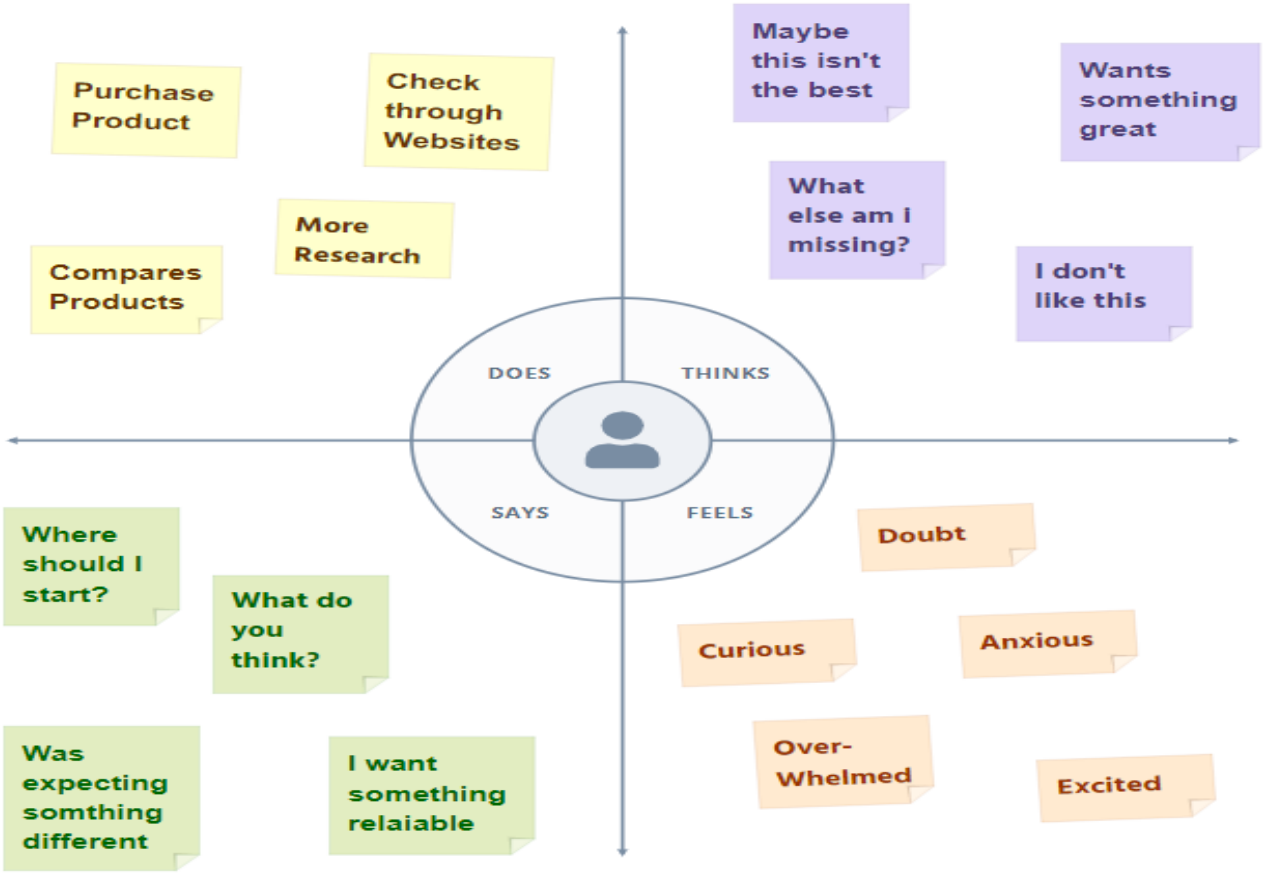
Problem Statement Definition

Background: Fire is the rapid oxidation of a material in the exothermic chemical process of combustion, releasing heat, light and various reaction products. Although it's a natural process, it can lead to great destruction. On average, everyday 35 people killed due to Fire-related accidents in the five years between 2016 and 2020, according to a report by Accidental Deaths and Suicides in India (ADSI), maintained by the National Crime Records Bureau. Fire is one of the major concerns when analyzing the potential risks on the building. Industrial Fires and Explosions cost companies and governments billions of Rupees every year apart from the loss of life, which can't be described in monetary terms. These Fires not only results only in huge loss of Lives and Property but also disrupt production in the Industry. The Nilflisk says that the five major causes of industrial fires and explosions are Combustible dust, hot works, Flammable liquids and gasses, equipment and machinery and Electrical hazards.

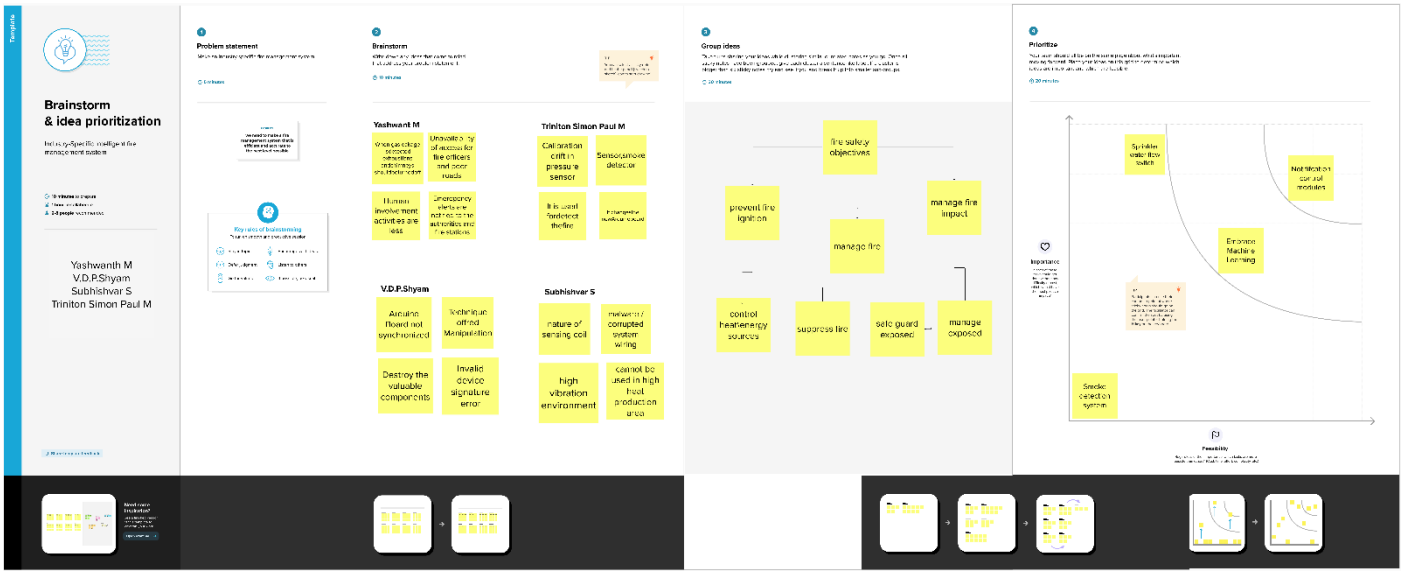
Objective: The objective of this Industry-Specific Intelligent Fire Management System is to detect any changes in environment like detecting hazardous gas, flame detection and temperature that can lead to fire and exploitation incident. Based on the temperature readings and if any Gasses are present the exhaust fans should be powered ON automatically to replace contaminated and stale air with fresh, healthy air. If any flame is detected the sprinklers will be switched on automatically. Emergency alerts are notified to the authorities and Fire station. So that the authorities and Fire Fighters can control the situation.

3. IDEATION & PROPOSED SOLUTION

Empathy Map Canvas



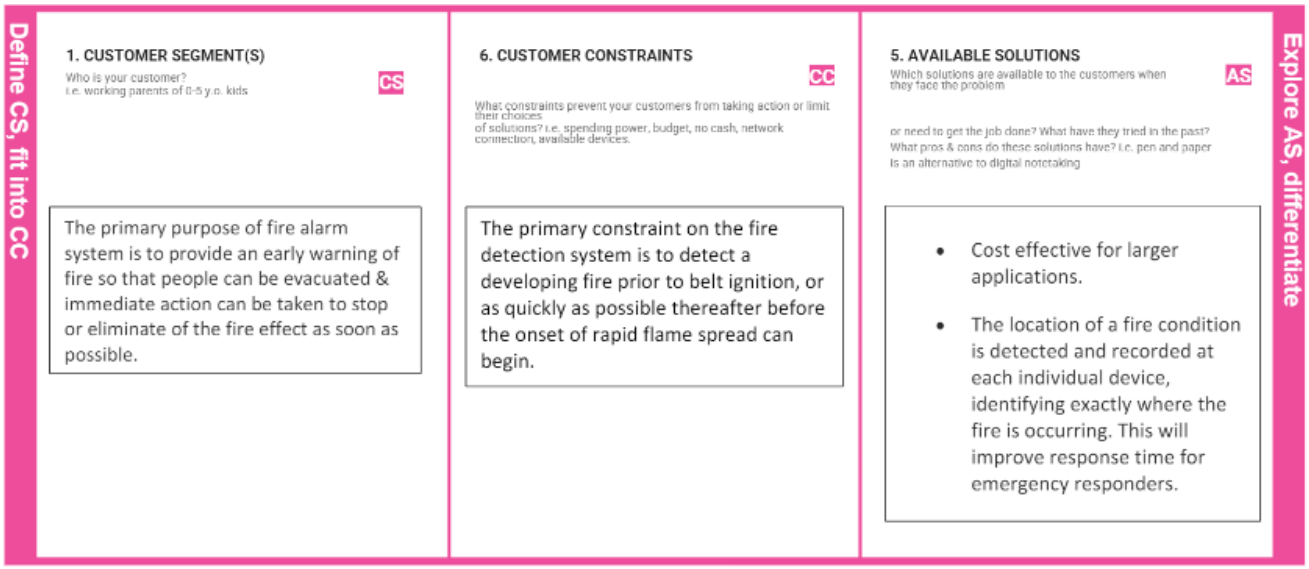
Ideation & Brainstorming



Proposed Solution

S.No.	Parameter	Description
1.	Problem Statement (Problem to be solved)	Fire alarm systems are only effective if they can generate reliable and fast fire alerts with exact location of fire. There is a direct correlation between the amount of damage caused by fire and interventions time in various fire alarm systems.Hence the most important factor in a fire alarm system is the reaction or response time of fire alarm system
2.	Idea / Solution description	Point-based solution-System consists of enclosed detectors with a fan system, which draws air samples to check the potential threat.Laser-based solution-Laser technology solutions detect smoke by drawing air into a laser chamber to identify a possible threat. It's the fastest-growing detector type, because these systems are designed to detect fire and smoke activity in large and open spaces, where smoke dilution and stratification can occur.
3.	Novelty / Uniqueness	• Voice Alert Systems • Limit Risks with Remote Monitoring • Multi-Sensor Detection • Embrace Machine Learning
4.	Social Impact / Customer Satisfaction	Our mission is to provide an exceptional customer experience that will earn continued business. •Quality •Integrity •Accountability •Reliability
5.	Business Model (Revenue Model)	IOT Based Fire Alerting System uses two Sensors, namely, Temperature and Smoke sensors. Arduino has an inbuilt ADC converter, which converts the analog signals received at the sensor end to digital. The Arduino is programmed to turn on the buzzer when the temperature & the smoke reach a threshold value. •At the same time, Arduino sends the data to the Wi-Fi module ESP8266, it will then the following data to the IOT website.
6.	Scalability of the Solution	To develop an automatic early warning system integrating multiple sensors to remotely monitor areas. •The signals and measurements collected from these sensors will be transmitted to a monitoring centre.

Problem Solution fit



4. REQUIREMENT ANALYSIS:

FUNCTIONAL REQUIREMENT

Following are the functional requirements for the proposed solution.

FR No.	Functional Requirement (Epic)	Sub Requirement (Story / Sub-Task)
FR-1	Smoke Alarm (Photoelectric Smoke Detectors, and Ionization Smoke Detectors)	These devices are one of the best early-warning devices of a fire. They are designed to sense low levels of smoke and sound an alarm.
FR-2	Fire Alarm System (Conventional Analogue Fire alarm system, Addressable Analogue Fire alarm system, Wireless Fire alarm system)	The main bone of this system is the Circuit board. The single circuit board contains power supply, control, and initiating and notification circuitry.
FR-3	Wireless Fire Alarm System	This system consist of a central control panel to which smoke alarms and heat detectors are connected, along with bells or horns that are activated when the system triggers an alarm.
FR-4	RF wireless technology	It is a short distance, low-complexity, low-power, low data rate, low-cost two-way wireless communication technologies, mainly suitable for the field of automatic control and remote control can be embedded into various devices.
FR-5	System Display	The design of the CPU shall provide for a configuration with the 64-character display, it shall provide all the controls and indicators used by the system operator, the system shall support the display of battery charging current and voltage on the LCD display.

NON FUNCTIONAL REQUIREMENTS

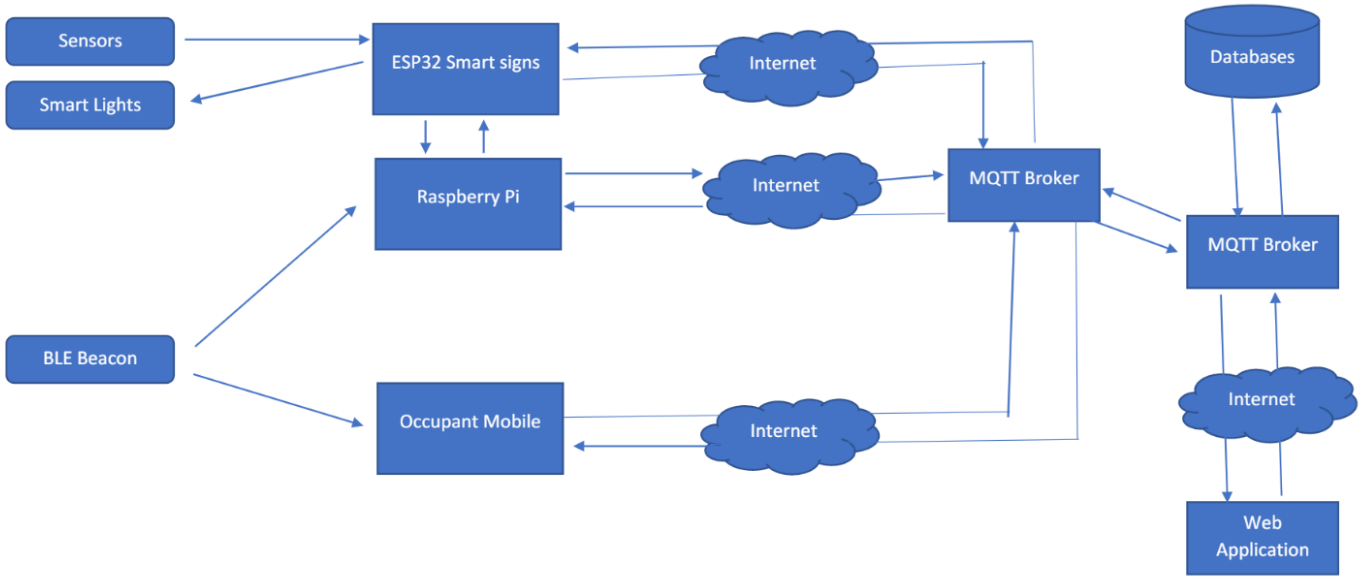
The following are the non-functional requirements.

FR No.	Non-Functional Requirement	Description
NFR-1	**Usability**	This system can be used at the commercial level and results are reproducible.
NFR-2	**Security**	Addressable systems provide a greater level of fire safety because they allow fire-fighters to respond more quickly and effectively by pointing the exact location of a fire in a building.
NFR-3	**Reliability**	If one end becomes damaged or severed, signals can still reach the control panel through the other end of the loop.
NFR-4	**Performance**	The proposed system more efficient, robust and reliable; and reduces false alarms; the proposed

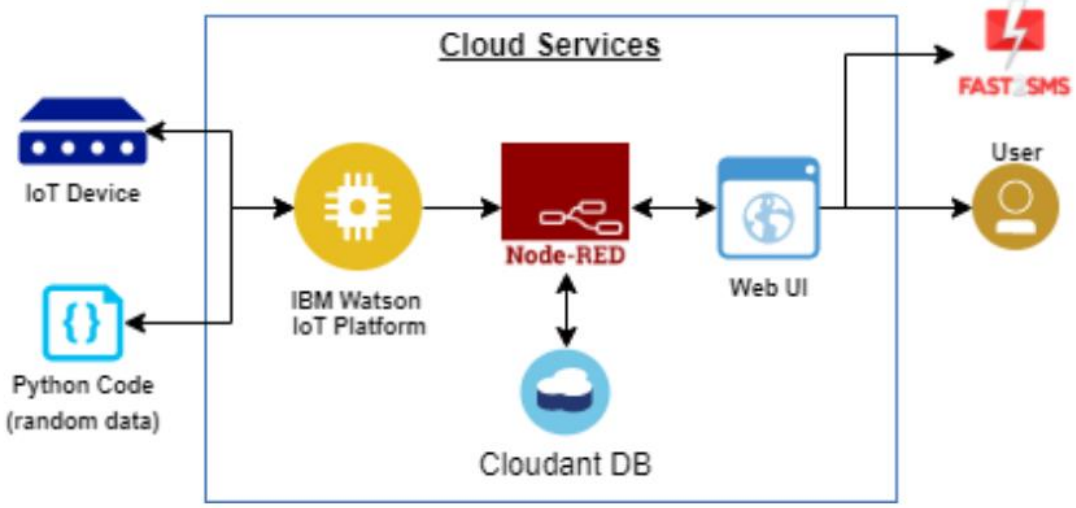
		system used easily available, lightweight and cost-effective sensors and is more reliable than conventional fire detection systems.
NFR-5	**Availability**	It can be made available at any place where river water is used and can be accessed 24x7.
NFR-6	**Scalability**	Because they require less wire, an addressable alarm control panel can accommodate far more devices than a conventional system.

5. PROJECT DESIGN:

DATA FLOW DIAGRAM



SOLUTION AND TECHNICAL ARCHITECTURE



USER STORIES

USER TYPE	FUNCTIONAL REQUIREMENT	USER STORY NUMBER	USER STORY/TASK	Acceptance criteria	Priority	Release
Developer	System building	USN-1	Collecting data from the sensor	I can collect data from sensor	High	Sprint-1
		USN-2	Implementing Arduino uno from data	I can Implementing the arduino	High	Sprint-2
		USN-3	Message alert to fire officials	I can receive the message	High	Sprint-1
		USN-4	Fire officials identify the problem and resolve it by using mobile application	I can try to solve the problem	High	Sprint-2
CUSTOMER (WEB USER)	Monitor	USN-1	The automatic nature of fire alarm monitoring means valuable time isn't lost between the start of the	I can monitor the industry	Medium	Sprint-1
			emergency and first responders arriving on the scene			
	Detection	USN-2	Detect the temperature, Smoke, flame, containment and extinguisher	I can detect the fire accident in the industry	High	Sprint-2

1. PROJECT PLANNING AND SCHEDULING:

SPRINT PLANNING AND ESTIMATION

S.No	Activity Title	Activity Description	Duration
1	Understanding The Project Requirement	Create a repository and assign team members utilising GitHub. Give them the task, all individuals teach students how to use, open and class the GitHub, career at IBM education.	1 Week
2	Starting of Project	Encourage students to enrol in IBM portal classes conceive of create a rough depiction based on project detailing and group of details about IBM and IOT task and team leader delegate a task every participant of the undertaking.	1 Week
3	Attend Class	Team members and the team captain must observe and discover from classes offered from IBM and NALAYATHIRAN and must advance entry to MIT permit for their project.	4 Week
4	Budget and scope of project	Analyse the projects budget and IOT use and speak of using a team for budget forecast to foresee the favourableness of the client to buy.	1 Week

SPRINT DELIVERY SCHEDULE

Sprint	Functional Requirement (Epic)	User Story Number	User Story / Task	Story Points	Priority	Team Members
Sprint-1	Simulation software	USN-1	Using WOKWI, connect temperature, flame, gas sensors to ARDUINO with python script	2	High	Shyam VDP, Subhishvar S, Triniton Simon Paul M, Yashwanth M
Sprint-2	Cloud software	USN-2	Create device in the IBM Watson IoT platform, and link it to Node-Red	2	High	Shyam VDP, Subhishvar S, Triniton Simon Paul M, Yashwanth M
Sprint-3	MIT app invertor	USN-3	Develop a mobile application using MIT App invertor	2	High	Shyam VDP, Subhishvar S, Triniton Simon Paul M, Yashwanth M
Sprint-4	linking	USN-4	Link WOKWI, IBM Cloud and the developed App Application	2	High	Shyam VDP, Subhishvar S, Triniton Simon Paul M, Yashwanth M
Sprint-4	Dashboard	USN-5	Design the modules and Test the Mobile Application	2	High	Shyam VDP, Subhishvar S, Triniton Simon Paul M, Yashwanth M

Project Tracker, Velocity & Burndown Chart: (4 Marks)

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

Project Tracker, Velocity & Burndown Chart: (4 Marks)

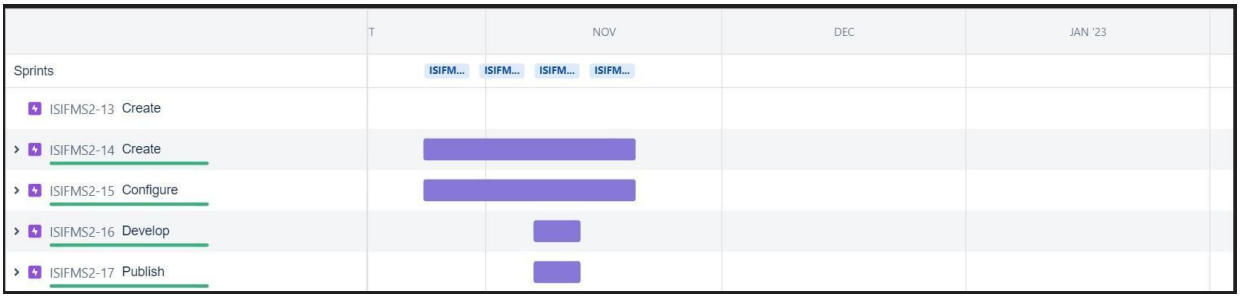
Velocity:

Imagine we have a 10-day sprint duration, and the velocity of the team is 20 (points per sprint).

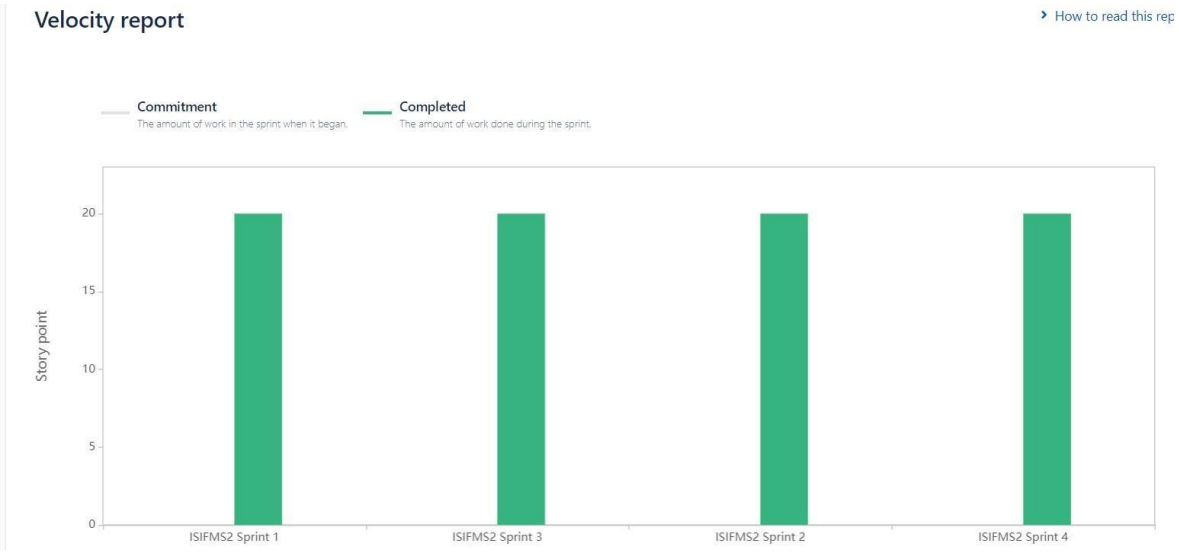
Let's calculate the team's average velocity (AV) per iteration unit (story points per day)

$$AV = \frac{sprint\ duration}{velocity} = \frac{20}{10} = 2$$

Reports from JIRA



https://pnt2022tmid47460.atlassian.net/jira/software/projects/ISIFMS2/boards/2/roadmap



CODING & SOLUTIONING

Feature 1

Fire alarm system is designed to alert us to an emergency so that we can take actions to protect ourselves, staffs and general public.

This project concentrates on the measures to prevent fire accidents caused due to flammable gas, smoke andrise in temperature. This system makes use of the best sensor available that detects any transpose in the environment. Basedon the sensor readings, if any disparity is encountered, appropriate actions will be taken in order to prevent any misfortune. This model incorporates MQ2 gas sensor for detecting propane and methane gases, IR Flame sensor module to detect flame and LM35 Temperature sensor for the temperature measurement of the environment. These readings are monitored continuously by IBM Watson IoT Platform and stored in Cloudant DB. In case any undesirable variation occurs, the authorities and fire stationwill be alerted via Fast2SMS web service.

Python script for generating the random sensor values - Temperature, Flame Level and Gas Level to the IBM Watson IoT Platform.

```
import time
import sys
import ibmiotf.application
import ibmiotf.device
import random

#Provide your IBM Watson Device Credentials

organization = "4aqwut"
deviceType = "12345678dt"
deviceId = "12345678did"
authMethod = "token"
authToken = "*PrtsGAO?B@_tTPEKT"

# Initialize GPIO

def myCommandCallback(cmd):
    print("Command received: %s" % cmd.data['command'])
    status=cmd.data['command']
    if status=="sprinkleron":
        print ("Sprinkler is on")
    elif status == "sprinkleroff":
        print ("Sprinkler is off")
    elif status == "exhaustfanon":
        print ("Exhaust Fan ON")
    elif status == "exhaustfanoff":
        print ("Exhaust Fan OFF")

    #print(cmd)

try:
        deviceOptions = {"org": organization, "type": deviceType, "id": deviceId, "auth-method":
authMethod, "auth-token": authToken}
        deviceCli = ibmiotf.device.Client(deviceOptions)

#.....

except Exception as e:
        print("Caught exception connecting device: %s" % str(e))
```

```
            sys.exit()

# Connect and send a datapoint "hello" with value "world" into the cloud as an event of type
"greeting" 10 times
deviceCli.connect()


while True:
    #Get Sensor Data from DHT11


    temp=random.randint(0,100)
    flame_level=random.randint(0,100)
    gas_level = random.randint(0,100)


    data = { 'Temperature' : temp, 'Flame_Level' : flame_level, 'Gas_Level' : gas_level }

    #print data

    def myOnPublishCallback():
      print ("Published Temperature = %s C" % temp, "Flame_Level = %s %%" % flame_level,
"Gas_Level = %s %%" %gas_level ,"to IBM Watson")

    success = deviceCli.publishEvent("IoTSensor", "json", data, qos=0,
on_publish=myOnPublishCallback)
    if not success:
      print("Not connected to IoTF")
    time.sleep(1)

    deviceCli.commandCallback = myCommandCallback


# Disconnect the device and application from the cloud

deviceCli.disconnect()
```

FEATURE 2

This project not only uses special and advanced devices for its working, but also teaches strong leadership quality. Following are the examples.

- Understanding the project requirement- The Aim is team members are assigned with tasks for each to be executed as a responsible team lead. Also create repository in the Git hub-repo, Assign membersand teach how to use and open the Git hub and IBM career education portals.

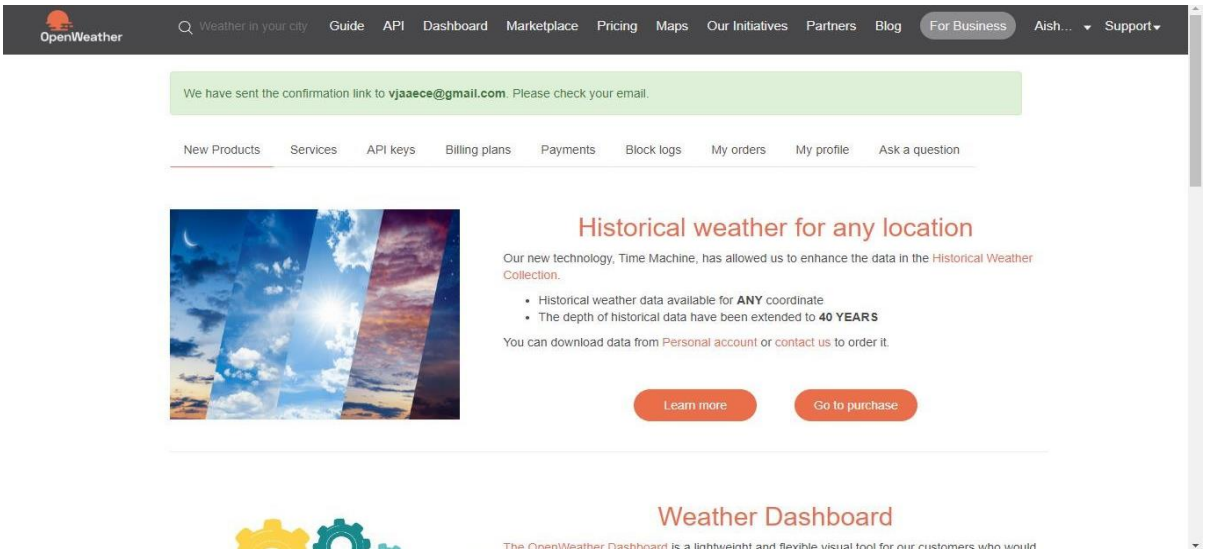
- Starting phaseof project- Team lead to team members based on regularly attending training sessions for installing and use of prerequisite withoutskipping. Also necessarily attending the training sessions based on python code, development of android app in mobile app invtr.com and working along Node Red is ensured by the team lead and acknowledged by team members simultaneously.

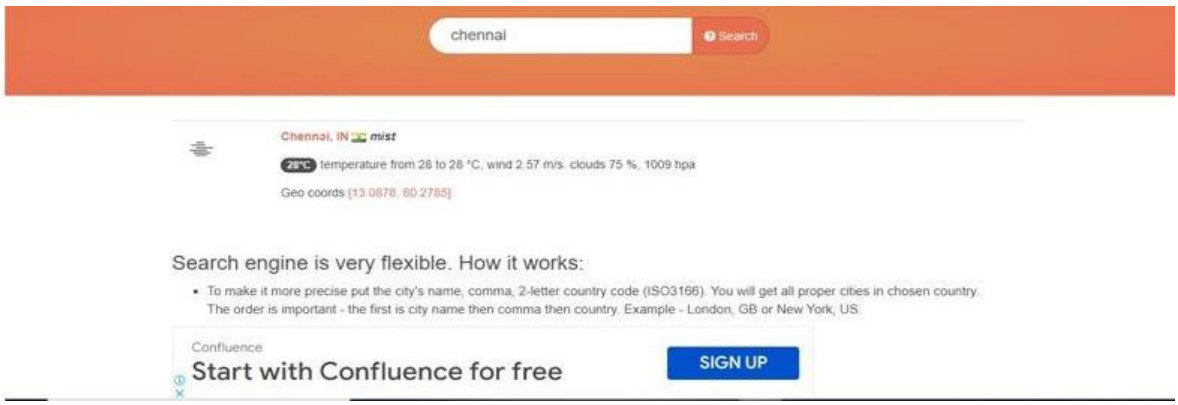
- Attend class- Team members and team lead must watch and learn from classes provided by IBM and NALAYATHIRAN and must gain access ofMIT license for their project. IBM cloud service cloud Watson and node red service.

- Budget and scope of project- Budgetary planning process taken up on whole as a team to detect the user compatible price to the buy the product based on budgetary on IOT andcomponent level.

Create a code snippet using python to

1. Extract weather data from OpenWeatherMap using APIs
2. Send the extracted data to the cloud
3. Receive data from the cloud and view it in the python compiler





Output :

```
Published Temperature = 3 C Flame_Level = 88 % Gas_Level = 30 % to IBM Watson
Published Temperature = 22 C Flame_Level = 51 % Gas_Level = 16 % to IBM Watson
Published Temperature = 80 C Flame_Level = 32 % Gas_Level = 88 % to IBM Watson
Published Temperature = 98 C Flame_Level = 81 % Gas_Level = 34 % to IBM Watson
Command received: sprinkleroff
Sprinkler is off
Command received: exhaustfanoff
Exhaust Fan OFF
Command received: sprinkleron
Sprinkler is on
Published Temperature = 93 C Flame_Level = 77 % Gas_Level = 43 % to IBM Watson
Command received: exhaustfanon
Exhaust Fan ON
Published Temperature = 18 C Flame_Level = 37 % Gas_Level = 88 % to IBM Watson
Published Temperature = 61 C Flame_Level = 53 % Gas_Level = 65 % to IBM Watson
Published Temperature = 95 C Flame_Level = 76 % Gas_Level = 90 % to IBM Watson
Published Temperature = 56 C Flame_Level = 14 % Gas_Level = 27 % to IBM Watson
Published Temperature = 34 C Flame_Level = 33 % Gas_Level = 51 % to IBM Watson
Published Temperature = 9 C Flame_Level = 56 % Gas_Level = 80 % to IBM Watson
Published Temperature = 42 C Flame_Level = 51 % Gas_Level = 18 % to IBM Watson
```

7. TESTING

Test Cases

Test case ID	Feature Type	Component	Test Scenario	Pre-Requisite	Steps To Execute	Test Data	Expected Result	Actual Result	Status	Comments	TC for Automation(Y/N)
TC_001	Functional	IBM cloud	Create the IBM Cloud services which are being used in this project.	IBM Cloud Login ID & Password	1.Go to IBM Cloud signup page 2.Enter e-mail id and other credentials 3.Enter a password	https://cloud.ibm.com/login	Should be able to create the IBM Cloud account.	Working as expected	Pass	Results verified	No
TC_002	Functional	IBM Cloud	Configure the IBM Cloud services which are being used in completing this project.	IBM Cloud Login ID & Password	1.Go to Cloud login 2.Enter user ID & Password 3.Verify login by the popup display	https://cloud.ibm.com/login	Should able login to IBM Cloud and navigated to IBM Cloud dashboard page	Working as expected	Pass	Results verified	No
TC_003	Functional	IBM Watson IoT Platform	IBM Watson IoT platform acts as the mediator to connect the web application to IoT devices, so create the IBM Watson IoT platform.	IBM Watson IoT Platform Login ID & Password	1.Login to IBM Cloud 2.Click Catalog 3.Search IoT and click create 4.Go to resource list and search Internet of Things platform 5.Press Launch and click Sign in IBM Watson Platform	https://vq4nsv.internetofthings.ibmcloud.com/dashboard/	Should be able to navigate to IBM IoT Watson Platform	Working as expected	Pass	Results verified	No
TC_004	Functional	IBM Watson	To create a device in the IBM Watson IoT platform and get the device credentials.	IBM Watson IoT Platform Login ID & Password	1.Login to IBM Watson Platform 2. Click Add Device 3.Enter the details and click Finish. Note down the Device ID, Device Name, Authentication key, Organization name	Device credentials	Should be able to get Device details	Working as expected	Pass	Results verified	No
TC_005	Functional	IBM Cloud(Node Red)	Configure the connection security and create API keys that are used in the Node-RED service for accessing the IBM IoT Platform.	Node Red Installation	1. Search "Node-red" in catalog 2. Wait for some time to completely configure the Node-Red.	https://cloud.ibm.com/developer/appservice/create-app?starterKit=59c9d5bd-4d31-3611-897a-f94eea804dc9f8&defaultLanguage=undefined	Should be able to open Node-Red service	Working as expected	Pass	Results verified	No
TC_006	Functional	Node Red	Create a Node-RED service.	Node Red Installation	1.Select IBM IoT input in Node. In IBM IoT Watson Platform, go to apps and click on generate API keys. 2.Copy & paste generated API key and token in the IBM IoT input. After entering all details, click the done button. 3.Add debug to the IBM IoT and rename as Msg.payload and click on done. Click gauge from the dashboard and fill the details & add functions to the gauge. Check	Values of sensors and button for Alarm & Sprinkler ON/OFF is displayed	Values of sensors and button for Alarm & Sprinkler ON/OFF should be displayed	Working as expected	Pass	Results verified	No

Test case ID	Feature Type	Component	Test Scenario	Pre-Requisite	Steps To Execute	Test Data	Expected Result	Actual Result	Status	Comments	TC for Automation(Y/N)
TC_007	Functional	Python 3.7.0	Develop a python script to publish random sensor data such as temperature, humidity level and Gas level to the IBM IoT platform	Python 3.7.0(64 bit) installatio	1.Download and install Python 3.7.0 2.Develop python code	https://www.python.org/downloads/release/python-370/	Should be develop a python script that can randomly generate and send Temperature, Gas level and Flame level values to the IBM IoT Watson Platform	Working as expected	Pass	Results verified	No
TC_008	Functional	Python 3.7.0	After developing python code, commands are received just print the statements which represent the control of the	Python 3.7.0(64 bit) installatio	1.Download and install Python 3.7.0 2. Open Node-Red or MIT mobile app	Get the output from the cod	Should be able to display the commands like Sprinkler ON, Sprinkler OFF, Exhaust Fan ON, Exhaust Fan OFF	Working as expected	Pass	Results verified	No
TC_009	Functional	IBM Cloudant DB	Store the sensor values - Temperature, Flame Level and Gas Level in the Cloud	IBM Cloud Account	1.Run the python code 2.Verify the displayed output	Output from the python cod	Should be able to store the sensor values generated by the python script in the cloud	Working as expected	Pass	Results verified	No
TC_010	Web UI	Node Red & MIT Inventor	Create Web UI in Node- Red	MIT Inventor Login ID & password	1.Go to Node Red. Select http in & http response. Add functions and select another http in and http response. Connect them to IBM IoT output and function. Print the command statements such as Sprinkler ON/OFF, Alarm ON/OFF and sensor 2.Go to MIT app inventor and create frontend using buttons, horizontal arrangement, text bar, etc. Add blocks and so	Sensors values and command values is displayed in the Debug window and in the mobile application	Sensors values and command values is displayed in the Debug window and the User shoulb be able to view these data in the MIT Mobile APP and be able to press the buttons if any value exceeds the threshold value	Working as expected	Pass	Results verified	No
TC_011	Functional	IBM Cloudant DB	Configure the Node-RED flow to receive data from the IBM IoT platform and also use Cloudant DB nodes to store the received sensor data in the cloudant DB	IBM Cloud Login ID & Password	1.Go to IBM cloud, search Cloudant in Catalog, Add new dashboard, go to Node Red 2.Connect to cloudant and verify the results	Cloudant is connected in the NODE RED	User should be able to connect the Cloudant and Node Red and be able to see the created cloud database with the sensor values	Working as expected	Pass	Results verified	No

User Acceptance Testing

Purpose of Document :

The purpose of this document is to briefly explain the test coverage and open issues of the Industry-specific intelligent fire management system project at the time of the release to User Acceptance Testing (UAT).

Defect Analysis :

Section	Total Cases	Not Tested	Fail	Pass
Print the Sensor values	7	0	0	7
Client Mobile Application	51	0	0	51
Security	2	0	0	2

This report shows the number of resolved or closed bugs at each severity level, and how they were resolved

Resolution	Severity 1	Severity 2	Severity 3	Severity 4	Subtotal
By Design	10	4	2	3	20
Duplicate	1	0	3	0	4

External	2	3	0	1	6
Fixed	11	2	4	20	37
Not Reproduced	0	0	1	0	1
Skipped	0	0	1	1	2
Won't Fix	0	0	0	1	8
Totals	24	14	13	26	70

Test Case Analysis

This report shows the number of test cases that have passed, failed, and untested

Outsource Shipping	3	0	0	3
Exception Reporting	9	0	0	9
Final Report Output	4	0	0	4
Version Control	2	0	0	2

8. RESULTS

Performance Metrics

NFT - Risk Assessment

S.No	Project Name	Scope/feature	Functional Changes	Hardware Changes	Software Changes	Impact of Downtime	Load/Voluem Changes	Risk Score	Justification
1	Receiving sensor va	Existing	Moderate	No Changes	Moderate	No	>5 to 10%	ORANGE	As we have seen the changes
2	Sprinkler ON/OFF	Existing	Low	No Changes	Low	No	>5 to 10%	GREEN	As we have seen the changes
3	Exhaust Fan ON/OF	Existing	Low	No Changes	Low	No	>5 to 10%	GREEN	As we have seen the changes
4	Fast SMS	New	Low	No Changes	No Changes	No	>5 to 10%	GREEN	As we have seen the changes
5	Cloudant DataBase	New	No Changes	No Changes	No Changes	No	>5 to 10%	GREEN	As we have seen the changes

NFT - Detailed Test Plan

S.No	Project Overview	NFT Test approach	sumptions/Dependencies/Ri	Approvals/SignOff
1	Python 3.7.0	Developing Python Scr	Depends on the code	https://www.python.org/psf/sponsors/#heroku
2	IBM Watson IoT Platform	Creating and configur	Depends on the Device Cred	https://4aqwut.internetofthings.ibmcloud.com/dashboard/
3	Node-Red	Creating Web-UI	Depends on the sensor valu	https://nodered.org/
4	MIT App Devoloper	Developing Mobile ap	Depends on the Sensor valu	https://appinventor.mit.edu/about/termsofservice
5	Cloudant DB	Storing Sensor values	Depends on the Sensor valu	https://2587b83c-debe-4618-8ea6-c3bdd6111fb4-bluemix.cloudant.com/dashboard.html

End Of Test Report

S.No	Project Overview	NFT Test approach	NFR - Met	Test Outcome	GO/NO-GO decision	Recommendations	Identified Defects (Detected/Closed/Open)	Approvals/SignOff
1	ame sensor and tel	This is done by deve	Met	Pass	GO	Code working properly	Closed	https://www.python.org/psf/sponsors/#heroku
2	Based on the temp	This is done by creat	Met	Pass	GO	Sprinkler is turning on and o	Closed	http://159.122.183.108:32627/red/#flow/51cd2ad32ac08578
3	If any flame is dete	This is done by creat	Met	Pass	GO	Exhaust fan is turning on an	Closed	http://159.122.183.108:32627/red/#flow/51cd2ad32ac08578
4	Emergency alerts are notified to the auth		Met	Pass	GO	Emergency alerts are send vi	Closed	https://www.fast2sms.com/dashboard/sms/bulk

9. ADVANTAGES AND DISADVANTAGES:

ADVANTAGES

- Cost effective for larger applications.
- The location of a fire condition is detected and recorded at each individual device, identifying exactly where the fire is occurring. This will improve response time for emergency responders.
- Lower ongoing service cost, because when a device goes into trouble (i.e. needs cleaning, repair or replacement), the panel will tell you the exact location of the device needing service.
- Online capabilities: New intelligent panels have the capability to provide detailed online notification of alarm/trouble/supervisory events.
- As far as fire alarm installers go, a wireless system is ideal because they are much easier to install. A wireless system essentially involves mounting the devices to the appropriate locations around a building or room, setting up the actual system and syncing it to WiFi. Compare this to a wired system, which requires fire alarm installers to connect the system to power supplies and ensure cables are connected properly.
- Another great advantage of a wireless fire alarm system is it operates off of a battery. This frees up a wall outlet and you can feel safe knowing the system will still work in the event of a power outage. And adding a second or subsequent wireless device is easy if you add on to your home or office.
- Reduced alarm response time
- Intelligence – devices communicate with the control panel and each other
- Reliable Fire & Security provides regular inspection and maintenance service for all types of fire alarms.
- These devices differ from their conventional counterparts because each device constantly communicates with the control panel. Within seconds, alarms, supervisory and trouble conditions are alerted to the control panel and a precise location of the event is displayed. Conventional alarm systems only "communicate" when there is an event.

DISADVANTAGES

- Cost, not as competitively priced for smaller applications.

- Typically with an intelligent panel, your peripheral devices tend to be more expensive than conventional devices.
- This panel is computer like and at times there maybe issues caused by the firmware (panel software). However, this is not common and the advantages of intelligent panel far outweigh any of these firmware issues.
- Maintaining the integrity of fire alarm systems in any building while integrating them with the building's automation systems (BAS) requires more than just communication standards. The technology of building automationand control systems has advanced at a much faster pace over the past many years. Today's technology provides building owners and designers with a rich assortment of options and flexibility with intelligent distributed controllers that process complex set of building information at lightning speed to efficiently characterize state-of-the-art building automation and control systems.
- These advances have taken place across a variety of building services including the control s systems for heating, ventilating, and air conditioning (HVAC), lighting, access and fire alarm. However, in spite of these advances in BAS, due to non-availability of any standard interfacing protocol, fire alarm systems have been finding it difficult to get integrated with BAS. To overcome this difficulty, in 1987, BACnet communication protocol was developed by the American Society of Heating Refrigerating, and Air-Conditioning Engineers (ASHRAE).

10. CONCLUSION:

The Industry specific intelligent fire management system can reduce the casualties of the disaster in industries to prevent the employees, industrial machines and infrastructure by providing appropriate evacuation guidance. The system can also aid disaster fighting with the help of water sprinklers because it allows for a quick assessment of the disaster with decentralized control that can intelligently guide evacuees based on the detection of humans.

The intelligent fire management system makes full use of the fire information, realizes the information sharing of all parties, and improves the rescue ability of trapped persons and rescuers when the fire occurs. However, information collection, centralized processing and how to connect the information with the model to ensure the effectiveness of information and other factors, have a great impact on the overall practicality and reliability of the system, and is also the guarantee of maximizing the success of self-rescue and rescue. Therefore, strengthening the management of fire information will greatly improve the power of fire rescue, and it is of great significance to improve fire safety.

11. FUTURE SCOPE:

The future scope of this project is to add additional features like triggering the extinguisher automatically, predict the escape route if the fire outbreaks and to implement this system in real time using hardware.

12. APPENDIX:

Source code, GitHub link:

https://github.com/IBM-EPBL/IBM-Project-41912-1660646014

Project demo link:

https://drive.google.com/file/d/1lamGp_Jjy_XgW-juH0NZ_gzFvZ_3pqMU/view