PROJECT REPORT FOR INDUSTRY SPECIFIC INTELLIGENT FIRE MANAGEMENT SYSTEM

TEAM ID:PNT2022TMID20931

INTRODUCTION:

In this project we will gain knowledge of Watson IoT Platform, Connecting IoT devices to the Watson IoT platform and exchanging the sensor data, Gain knowledge on Cloudant DB and Creating a Web Application through which the user interacts with the device.

1.1PROJECT 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 Gasses 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.

1.2PURPOSE:

If there is an immediate threat to life, property, or mission, the fire alarm system will sound the alarm, notifying occupants to escape, and letting the authorities know they need to respond.
The fire detection system entails flame detectors along with temperature sensors which reduces the false fire detection rate. The system also notifies the user by emailing the video of fire affected area and gives the updates of room temperature from time to time

2.LITERATURE SURVEY

fire safety systems are usually well designed and properly installed. However the problem appears after this stage, where it is frequent to observe a complete disregarding for the accomplishment of maintenance and test planning. Dieken[3] states that when facing a fire about one third of the safety systems do not work properly just because of the lack of inspection, test or maintenance of such systems. The author also refers that due to improper maintenance around 49% of the fire extinguishing systems installed failed causing property damages around

15.9million dollars per year. Unfortunately, this type of hidden failures is only revealed when a fire occurs and the system is required.

S.No	TITLE	AUTHOR	PUBLISHED	INFERENCE
1	An Intelligent Fire Warning Application Using IoT and an Adaptive Neuro-Fuzzy Inference System	Barera Sarwar, Imran Sarwar Bajwa,Norre n Jamil,Shaban a Ramzan,Nad eem Sarwar	2019	The novel idea proposed in this paper is to use ANFIS for the identification of a true fire incident by using change rate of smoke, the change rate of temperature, and humidity in the presence of fire. The model consists of sensors to collect vital data from sensor nodes where Fuzzy logic converts the raw data in a linguistic variable which is trained in ANFIS to get the probability of fire

				occurrence. The proposed idea also generates alerts with a message sent directly to the user's smartphone.
2	Research on Fire Alarm Computer Monitoring System in Fire Engineering	Xiyang Feng, Chaofei Wang	2021	The fire alarm computer monitoring system in fire protection engineering is a kind of early warning monitoring system based on intelligent equipment, which judges the fire situation by detecting changes in the environment. The principle of the system refers to: using measuring devices to transmit

				the temperature, smoke and other related environmental parameters generated during the fire to microcomputer, and the single-chip microcomputer makes a judgment after analyzing and comparing these data
3	Gas Leakage with Auto Ventilation and Smart Management System Using IoT	Afsana Mim Anika, Nasrin Akter, Md Niamul Hasan,Jannat ul Ferdous Shoma,Abdu s Sattar	2021	The proposed system can detect fire, gas leakage and it also has the ability to take further steps and decrease gas concentration via auto air ventilation and extinguish fire with water. The proposed method will help to improve the safety and reduce the death toll and reduce the damages that occur to the surrounding environment.

4	Iot based Fire and Gas monitoring System	Aayush Doshi	2021	In the proposed device, the temperature detector (DHT 11) the gas detector (MQ2,MQ7 and MQ135) and also humidity sensors are used to determine the environment and the undesirable gas within the manufacturing plant, gauged details can be connected to the web. In addition, our research findings demonstrated substantial energy efficiency and high-precision data analysis relative to conventional protection device strategies. For monitoring the
				fluctuation of parameters like air pollution levels from their normal levels in this case the sensing devices are connected to the embedded computing system.

2.3 PROBLEM STATEMENT DEFINITION

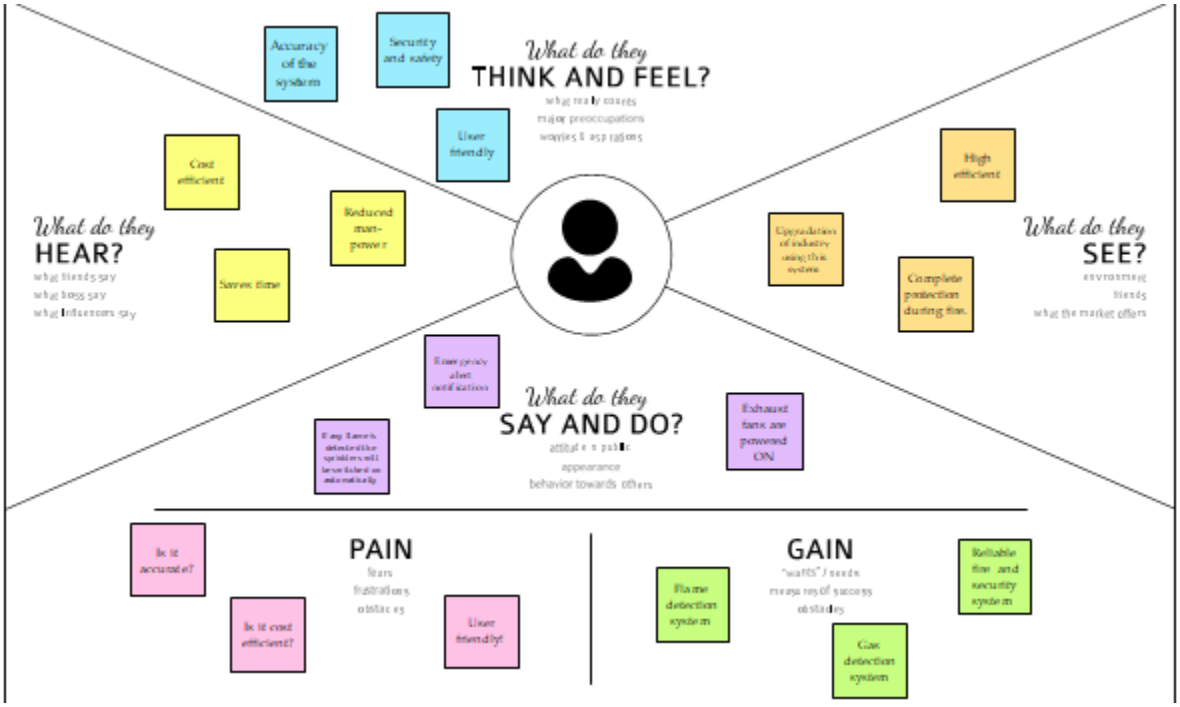
As it can be understood the frequency of tests plays an important role in building fire safety assurance. It is expected that the higher the frequency, the sooner hidden failures are revealed. Thus, the solution relies on establishing maintenance and test planning and to assure its accomplishment. All critical items of the fire safety systems should be analyzed from the probability of failure and failure consequences point of view and must be tested and inspected to ensure system's availability and successful operation (reliability). If assuring the accomplishment of the test and maintenance planning of fire safety systems is somehow a decision of the management structure or building and facilities managers, the establishment of the frequency for those activities is commonly the subject of discussion although some recommendations pointed out by regulators or insurance companies.

3.IDEATION & PROPOSED SOLUTION

3.1 EMPATHY MAP CANVAS

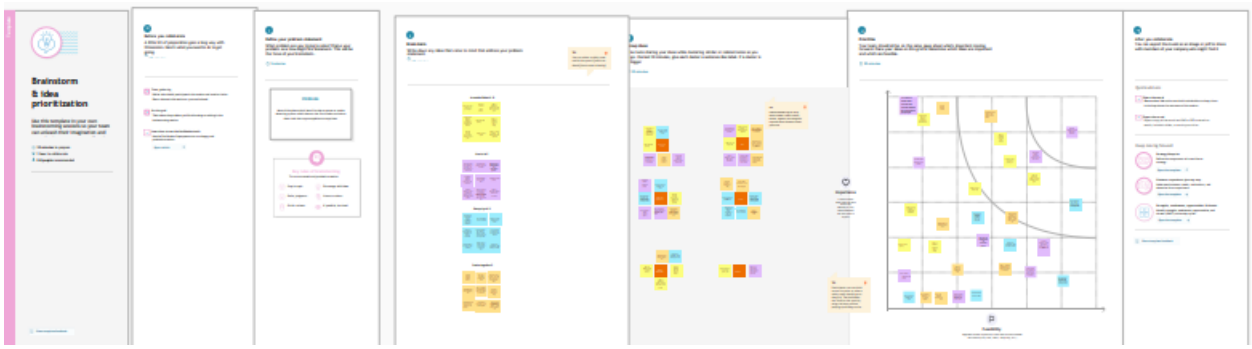
Empathy Map Canvas

Gain insight and understanding on solving customer problems.



Build empathy and keep your focus on the user by putting yourself in their shoes.

3.2 IDEATION AND BRAINSTORMING



3.3 PROPOSED SOLUTION

The task of a fire-fighting system is to early detect and minimise the consequences of a fire, and thus protect people and property. Simple fire-fighting systems consist of a fire and smoke detector, a control panel and fixed fire-fighting systems, e.g. a system of pipes filled with an extinguishing agent and provided with outlet nozzles. Fire-fighting systems may be divided into four main types, depending on the applied extinguishing agent: water, water mist, foam and gas extinguishing systems.

3.4PROBLEM SOLUTION FIT

1. CUSTOMER SEGMENT(S) CS The people who running a industry and unaware of fire accident	**6. CUSTOMER CONSTRAINT** Building fires can be a great threat to the safety of residents, and can lead to economic and social damage. Exploring the views of stakeholders is a great source for understanding the factors that affect fires.	**5. AVAILABLE** Proper controllable with proper management reduces the risk of workers life
2. JOBS TO-BE-DONE / PROBLEMS Environment Pollution Workers will lost their life Damaging the machines and properties	**9. PROBLEM ROOT** RC Rapid fire in industries results in rapid loss in workers life and it is not properly control it may after many workers life.	**7.BEHAVIOR** BE Automatic opening and closing of sprinkler head , when smoke or fire detector. Detection of fire accident
3.TRIGGERS Seeing people who are affected by fire accidents in Industry lost their family and their families have to survive without them	**10. YOUR SOLUTION** Our System is used to control the fire and smoke.	**8. CHANNELS OF BEHAVIOUR** C When the fire incident is detector it sends the information and location to the server and this server contrl the opening and closing of sprinkler head

4 REQUIREMENT ANALYSIS

4.1 FUNCTIONAL REQUIREMENT

Functional Requirements:

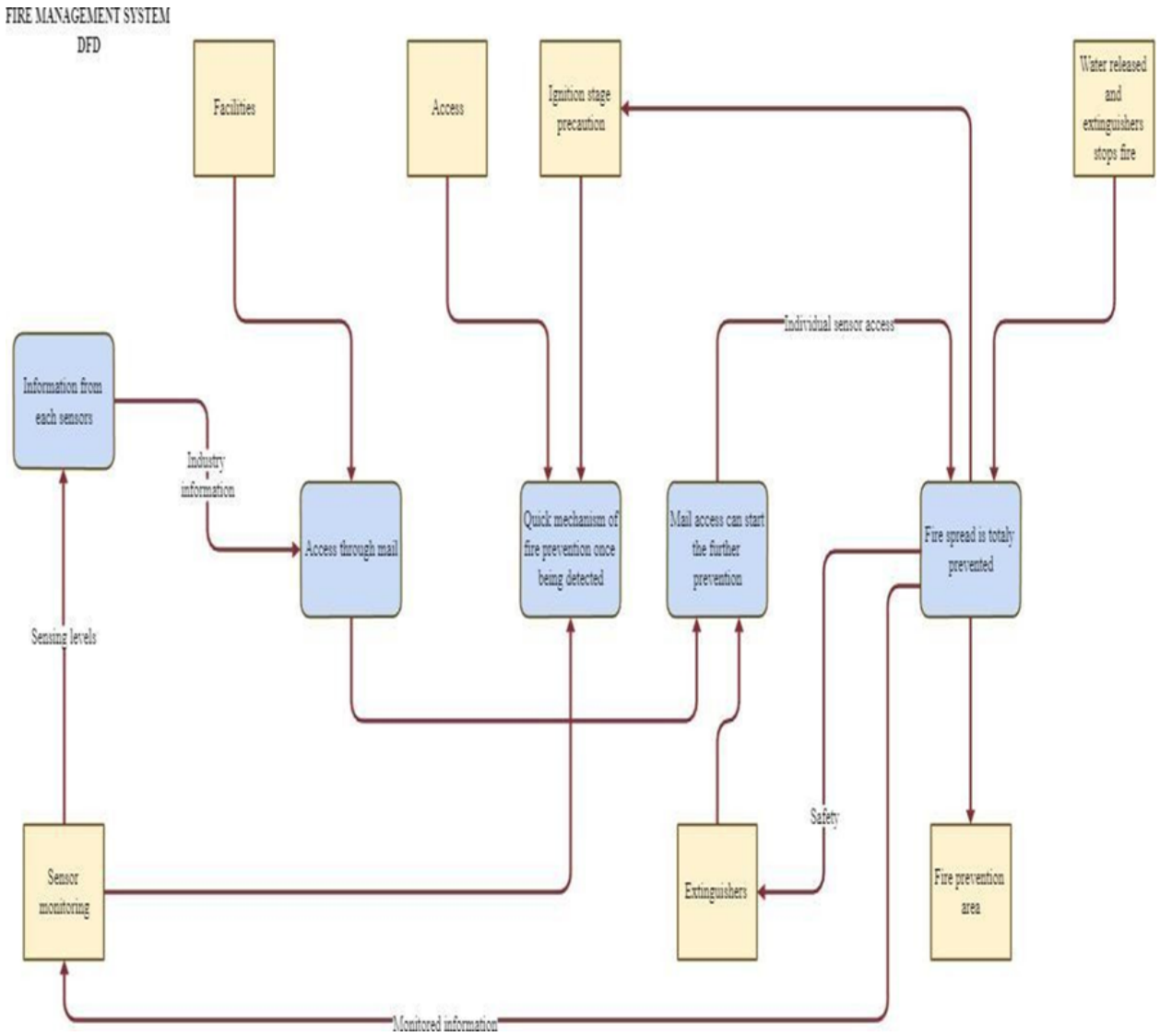
FR No.	Functional Requirement (Epic)	Sub Requirement (Story / Sub-Task)
FR-1	User Registration	Registration through website or application registration through Social media registration through Linked IN.
FR-2	User Confirmation	Verification via Email or OTP.
FR-3	User Login	Login through website or App using the respective username and passwords
FR-4	User Access	Access the app requirements easily
FR-5	User Upload	Users should be able to upload the data anywhere at any time.
FR-6	User Solution	Data reports should be generated and delivered to the user for 1 day.
FR-7	User Data Sync	API interface to increase in voice sync system.

Non-functional Requirements:

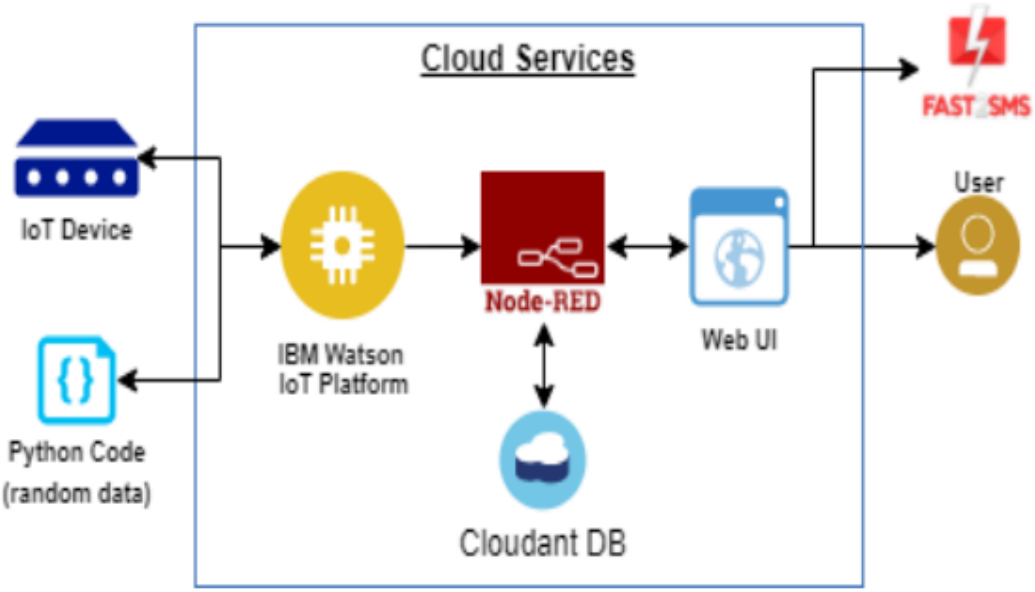
NFR No.	Non-Functional Requirement	Description
NFR-1	**Usability**	A usability requirement includes language barriers and localization tasks. Usability can be assessed by efficiency of use.
NFR-2	**Security**	Access permissions for the particular system information may only be changed by the system's data administrator.
NFR-3	**Reliability**	The database update process must roll back all related updates when any update fails.
NFR-4	**Performance**	The front-page load time must be no more than 2 seconds for users that access the website using a VoLTE mobile connection.
NFR-5	**Availability**	New module deployment must not impact front page, product pages, and check out pages availability and mustn't take longer than one hour.
NFR-6	**Scalability**	We can increase scalability by adding memory, servers, or disk space. On the other hand, we can compress data, use optimizing algorithms.

5 PROJECT DESIGN

5.1 DATA FLOW DIAGRAMS



5.2 SOLUTION & TECHNICAL ARCHITECTURE



5.3USER STORIES

User Stories

User Type	Functional requirement	User story number	User story/task	Acceptance criteria	Priority	Release
Customer (Mobile user, Web user, Care	Registration	USN-1	As a user, I can register for the application	I can access my account/ dashboard	High	Sprint-1

executive, Administrator)			by entering my mail, password, and confirming my password			
		USN-2	As a user, I will receive confirmation email once I have registered	I can receive confirmation email & click confirm	High	Sprint-1

			for the application			
	Dashboard	USN-3	As a user, I can register for the application through internet	I can register & access the dashboard with Internet login	Low	Sprint-2
		USN-4	As a user, I can register for the application through	I can confirm the registration in Gmail	Medium	Sprint-1

			Gmail			
	Login	USN-5	As a user, I can log into the application by entering email & password	I can login with my id and password	High	Sprint-1

6 PROJECT PLANNING & SCHEDULING

6.1 SPRINT PLANNING & ESTIMATION

Use the below template to create product backlog and sprint schedule

Sprint	Functional Requirement (Epic)	User Story Number	User Story / Task	Story Points	Priority	Team Members

Sprint-1	Registration	USN-1	As a user, I can register for the application by entering my email, password, and confirming my password.	2	High	Anuratha Rahavi L R Harini M S Ganapriya N V Sneha Angeline P
Sprint-1		USN-2	As a user, I will receive confirmation email once I have registered for the application	1	High	Anuratha Rahavi L R Harini M S Ganapriya N V Sneha Angeline P
Sprint-2		USN-3	As a user, I can register for the application through Facebook	2	Low	Anuratha Rahavi L R Harini M S Ganapriya N V Sneha Angeline P

Sprint-1		USN-4	As a user, I can register for the application through Gmail	2	Medium	Anuratha Rahavi L R Harini M S Ganapriya N V Sneha Angeline P
Sprint-1	Login	USN-5	As a user, I can log into the application by entering email & password	1	High	Anuratha Rahavi L R Harini M S Ganapriya N V Sneha Angeline P

Sprint	**Functional Requirement (Epic)**	**User Story Number**	**User Story / Task**	**Story Points**	**Priority**	**Team Members**
Sprint 1	Objective	USN-6	As a system, the fire sensor should detect the fire	8	High	Anuratha Rahavi L R Harini M S Ganapriya N V

						Sneha Angeline P
Sprint 1	Features	USN-7	As a system, the fire sensor value should be displayed in a LED screen	2	Low	Anuratha Rahavi L R Harini M S Ganapriya N V Sneha Angeline P
Sprint 1	Features	USN-8	As a system, as soon as the detected fire reaches the threshold level, the red color LED should be turned ON	5	High	Anuratha Rahavi L R Harini M S Ganapriya N V Sneha Angeline P
Sprint 1	Features	USN-9	As a system, as soon as the detected fire reaches the threshold level, the siren should be turned ON	5	High	Anuratha Rahavi L R Harini M S Ganapriya N V Sneha Angeline P

Sprint 2	Focus	USN-10	As a system, it should send the location where the fire is detected	8	High	Anuratha Rahavi L R Harini M S Ganapriya N V Sneha Angeline P
Sprint 2	Focus	USN-11	As a system, it should also send the alerting SMS to the registered phone number	2	Low	Anuratha Rahavi L R Harini M S Ganapriya N V Sneha Angeline P
Sprint 2	Features	USN-12	As a system, the fire alarm should detect automatically when the fire accident is held	5	Medium	Anuratha Rahavi L R Harini M S Ganapriya N V Sneha Angeline P

Sprint 2	Features	USN-13	As a system, it will indicate the fire accident is closed in the LCD screen and send SMS to the registered mobile number	5	Medium	Anuratha Rahavi L R Harini M S Ganapriya N V Sneha Angeline P
Sprint 3	Data transfer	USN-14	As a program, it should retrieve the API key of the IBM cloud to send the details of the system	2	Low	Anuratha Rahavi L R Harini M S Ganapriya N V Sneha Angeline P

Sprint	Functional Requirement (Epic)	User Story Number	User Story / Task	Story Points	Priority	Team Members
Sprint 3	Data Tranfer	USN -15	As a cloud system, it should send the data of the sensor values along with latitudes and	5	Medium	Anuratha Rahavi L R Harini M S Ganapriya N V

			longitudes to the IBM cloud			Sneha Angeline P
Sprint 3	Data transfer	USN-16	As a cloud system, the IBM cloud should send the data to Node-red	2	Medium	Anuratha Rahavi L R Harini M S Ganapriya N V Sneha Angeline P
Sprint 3	Data transfer	USN-17	As a system, it should collect the data from the Node-red and give it to the backend of the MIT app	3	Medium	Anuratha Rahavi L R Harini M S Ganapriya N V Sneha Angeline P
Sprint 3	Data Transfer	USN-18	As an application, it should display the details of the temperature level and other detail to the user through the frontend of the MIT app.	8	High	Anuratha Rahavi L R Harini M S Ganapriya N V Sneha Angeline P

Sprint 4	Registration	USN-19	A a user, I must first register my email and mobile number in the website	2	High	Anuratha Rahavi L R Harini M S Ganapriya N V Sneha Angeline P
Sprint 4	Registration	USN-20	As a user, I must receive confirmation mail and SMS on registration	2	Medium	Anuratha Rahavi L R Harini M S Ganapriya N V Sneha Angeline P
Sprint 4	Login	USN-21	As a user, I can login into the web application through email and pasword	3	High	Anuratha Rahavi L R Harini M S Ganapriya N V Sneha Angeline P
Sprint 4	Dashboard	USN-22	As a user, I can access the dashboard and make use of available resources	2	Medium	Anuratha Rahavi L R Harini M S Ganapriya N V Sneha Angeline P

Sprint 4	Focus	USN-23	As a user, I must receive an SMS once the fire is detected	5	High	Anuratha Rahavi L R Harini M S Ganapriya N V Sneha Angeline P

Sprint	**Functional Requirement (Epic)**	**User Story Number**	**User Story / Task**	**Story Points**	**Priority**	**Team Members**
Sprint 4	Allocation	USN-24	As an admin, I must receive information about the fire accident along with location and share exact location and route to the person	3	High	Anuratha Rahavi L R Harini M S Ganapriya N V Sneha Angeline P

Sprint 4	Allocation	USN-25	As an admin, I must allot particular person to look after the fire accident in a particular location	3	High	Anuratha Rahavi L R Harini M S Ganapriya N V Sneha Angeline P

6.2 SPRINT DELIVERY SCHEDULE

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	9 Nov 2022	15 Nov 2022	20	09 Nov 2022
Sprint -2	20	6 Days	16 Nov 2022	21 Nov 2022		
Sprint -3	20	6 Days	22 Nov 2022			
Sprint -4	20	6 Days	28 Nov 2022	4 Dec 2022		

6.3REPORTS FROM JIRA

7. CODING & SOLUTIONING

7.1 FEATURES

```
WidgetLED led(V1);

void setup() //Setup function - only function that is run in deep sleep mode
{
    Serial.begin(9600); //Start the
    serial output at 9600 baud
    pinMode(GREEN, OUTPUT);
pinMode(smoke)

}
```

The code provided for our project is quite understandable and can be used to detect the smoke generated by any other substance

7.2 FEATURES

void setup() //Setup function - only function that is run in deep

sleep mode

{

Serial.begin(9600);

pinMode(detect)

}

The code has the knowledge how to deal with the detection of the smoke that takes place and when it can share this information.

8.TESTING

8.1 TEST CASE

The testing of the industry specific intelligent fire management system has been provided on the demo link video.

8.2 USER ACCEPTANCE CASE

As per the problem faced by the society the project has been implement in such a way that if smoke or any unusual materials are detected it sends the notification to the owner and nearby fire stations.

9 RESULTS

9.1 PERFORMANCE METRICS

The performance metrics have been shown on the demo link of the project.

10.ADVANTAGES & DISADVANTAGES

ADVANTAGES

- Certainty of avoiding the outbreak and spread of fire.
- Retaining access to protected areas at any time.
- Proactive and permanent fire protection to secure business processes and valuable goods.
- Protecting multiple hazards with just one system.

DISADVANTAGES

- Sometimes the fake detection can be caused by some of animals which causes mistrust of the system
- In addition to sizable upfront installation costs, another major factor to consider is ongoing maintenance and repairs — and those associated costs.
- Safety systems include a fair amount of moving parts that do require periodic adjustment and replacement over time.
- Some of the heads can shift out of alignment and may require manual readjustment to ensure proper coverage of the zones they were designed to water. They may also become damaged during such as repairing or managing of the system, and require complete replacement.

11 CONCLUSION

The system being developed is a web based application.

According to the two-testing taken place in the previous phase of the software lifecycle, the testing showed a good response by the user as well as the test cases generated in the system testing. The objective of the system is to develop a management system on firefighting and fire extinguisher reminder maintenance system where the system flow will be manageable in orderly and accordingly. Clerk can update, add and delete product order by client; also update installation and maintenance date of fire extinguisher. While procurement and sales clerk update information of quotation and invoice and owner can view those particular information and updates clerk work on it.

12 FUTURE SCOPE

- The staffs update the remainder date of particular date of fire extinguisher
- The owner can view monthly report of invoice easily and also quotation report.

The link for the project has been provided here