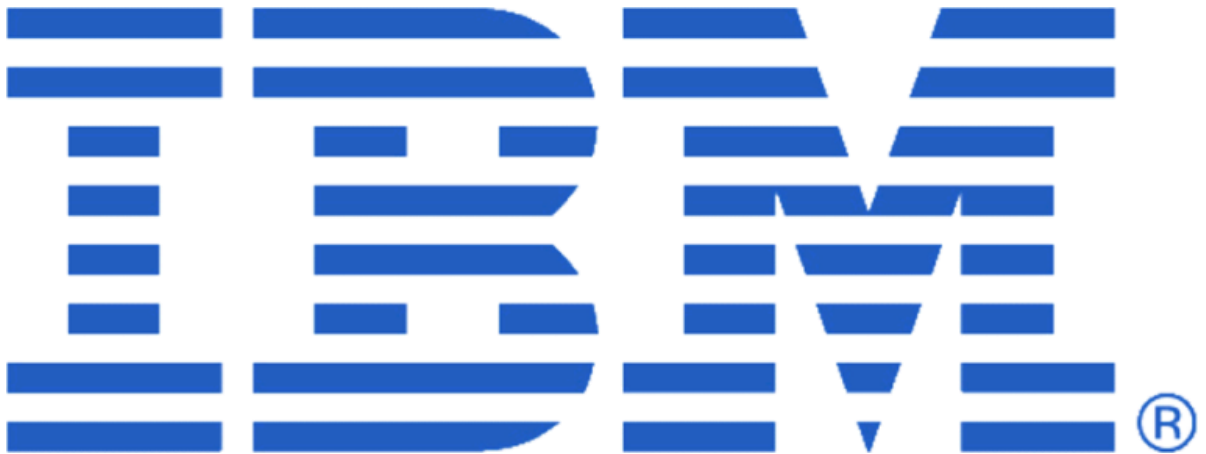


IBM-Project-20023-1656711147

Industry-specific Intelligent Fire Management System



TEAM ID: PNT2022TMID16845

TEAM SIZE: 4

Team Leader: SuriyaPrakash

Team Member 1: Sukanth

Team Member 2: Tamilmani

Team Member 3: Vivek



Industry Mentor's Name: Santoshi

Faculty Mentor's Name: K.Radha

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INTRODUCTION

Project Overview

Nowadays Internet of things can be anything in the world that actually gathering or collecting everything in our world to basically connect all things to the internet. All connected things are then being used to make a group of information or sending information or it can be for both processes in this system. Safety is significant and it is vital that acceptable wellbeing framework be executed in the spots of all fields. This system is used in buildings and home dwellings for the fire detection and prevention purpose. It should be implemented in all the establishments where the risk of fire accident is very high. The sensor nodes are placed in important areas of building, which we create a network and the monitored data is transmitted to control unit through wireless sensor network and if the temperature or pressure reach above the threshold value and building damage is detected automatically, alerts the surroundings and take necessary precautions to prevent the disaster. This safety system that can be used in any constructing and constructed environments. The sensor node detects the maximum level that it can withhold, in the meantime it calculates where the damage is occurring and remaining time that the building can offer further resistance to damage.

Project Purpose

The objective of “Industry specific-intelligent fire management system” is to avoid the unintended fire accidents in industries and also take appropriate measures to avoid any mishap. The smart fire management system includes a Gas sensor, Flame sensor and temperature sensors to detect any changes in the environment. If any flame is detected the sprinklers will be switched on automatically. The model incorporates MQ2 gas sensor for detecting propane and methane gases, flame is detected by IR flame sensor module and LM35 Temperature Sensor for the measurement of the environment. These readings are monitored continuously by IBM Watson IOT Platform and stored in Cloudant DB. Based on the temperature readings and if any Gases are present, the exhaust fans are powered ON. In case any variation occurs, the authorities and fire station will be alerted

via Fast2SMS web service. Emergency alerts are notified to the authorities and Fire station.

LITERATURE SURVEY

Existing Problem

Smart buildings are among the most innovative solutions for engineers to ensure social and environmental responsibility and provide safe and secure environments for occupants. Emerging technologies when aligned together to complement each other, can deliver the promise of enhanced fire safety, enabling the promise of smart buildings and cities that are safer.

References

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2. Ondrej Krejcar, "Using of mobile device localization for several types of applications in intelligent crisis management", 5th IEEE GCC Conference & Exhibition, IEEE, 2009
3. Karwan Muheden, Ebubekir Erdem, Sercan Vançin, "Design and implementation of the mobile fire alarm system using wireless sensor networks", 17th International Symposium on Computational Intelligence and Informatics (CINTI), IEEE, 2016
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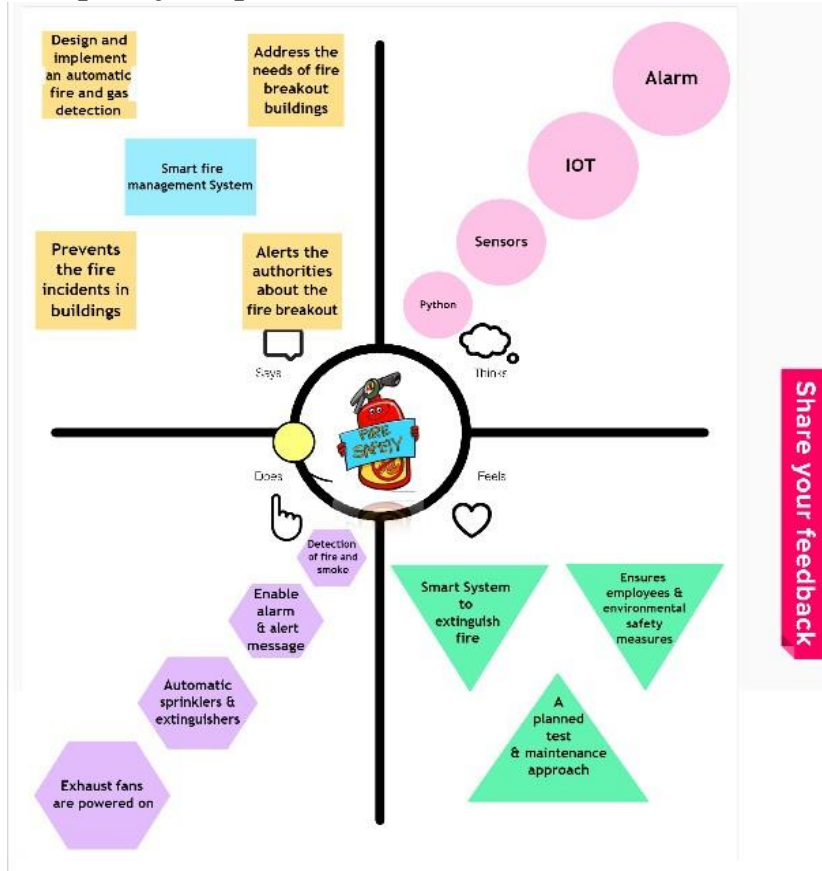
5. Al Mamari, A. R. M. H., Al Mamari, H., Kazmi, S. I. A., Pandey, J., & AlHinai, S. (2019). *IoT based Smart Parking and Traffic Management System for Middle East College.*

Problem statement Definition

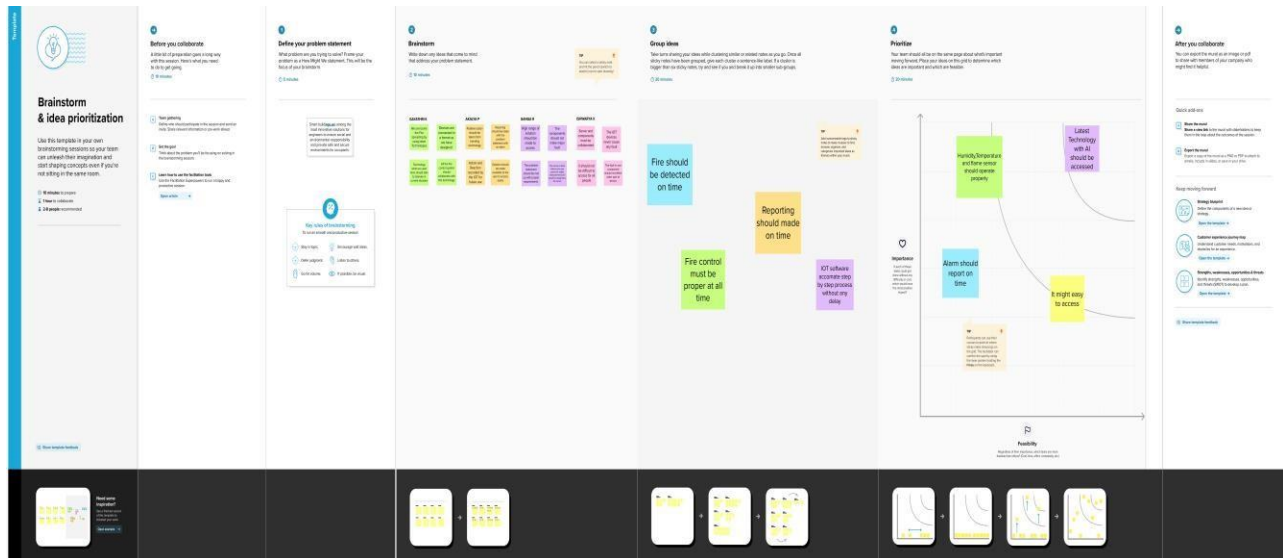
Problem Statement (PS)	I am (Customer)	I'm trying to	But	Because	Which makes me feel
Identify the chemical Explosion and fire in industry	A customer	Ensure the fire safety in my industry	I want to handle it easily	The fire explosion should be automatically detected without ant human monitoring	That my industry and my workers are safe
I can avoid the fire explosion in my industry and keep all my products safe from the fire spread	An industrialist	Work in chemical industry	It is not safe due to harmful effect	Fire and gas Leak safety Measure	To reduce the explosion
Fire detection Using Arduino uno and flame,gas, temperature sensors	A worker	To find the fire detection place/location	Some difficult in find location	The temperature Will increase Sometimes	While using GPS to find the locations

IDEATION & PROPOSED SOLUTION

Empathy Map



Ideation & Brainstorm



Proposed Solution

S.no	Parameter	Description
1	Problem Statement (Problem to be solved)	We are ready to solve the unintended fire explosion in the industry level.
2	Idea / Solution description	Idea for this problem titled Industry Specific Intelligent Fire Management System. The solution is to detect the fire before it becomes huge explosion in the industry as well as in public places.
3	Novelty / Uniqueness	By using Latest Technology Artificial Intelligence to answer and solve the fire explosion without Human presence.
4	Social Impact / Customer Satisfaction	The AI detects and senses the fire using many sensors that we use and it helps the customers to access with the immediate notification and the timely access.
5	Business Model (Revenue Model)	This model is used to calculate the probability of the ignition level and check how long it spread across a landscape.
6	Scalability of the Solution	The System is completely modular make it expandable and business efficiency in customized fire detection , with affordable price.

Problem Solution Fit

1. CUSTOMER SEGMENT(S) CS Persons owing to Large buildings , malls, industries, factories and Hospitals.	6. CUSTOMER LIMITATIONS CL The integrated fire management system, well monitoring system, reasonable cost and accuracy of result.	5. AVAILABLE SOLUTIONS AS Fire Detection and Alarm system. Smoke removal and ventilation system, gas extinguishing system.	Explore AS, differentiate
2. PROBLEMS / PAINS PR <ul style="list-style-type: none"> We are solving the problem of fire spread by automatically detecting the fire at the ignition stage and stop the fire spread easily using Artificial Intelligence and IOT based ideations. 	9. PROBLEM ROOT / CAUSE RC <ul style="list-style-type: none"> The root cause of the problems are Due to electrical hazards Equipment fault Human error & flammable , compostable materials. 	7. BEHAVIOR BE <ul style="list-style-type: none"> At once the message is send to the customers mobile from the sensors-controlled Intelligence the customer himself can give the access to stop the fire spread on the whole. 	Focus on PR, tap into BE, understand RC
3. TRIGGERS TO ACT TR We can ask our customer to get an experience about our product. We can insist they must need of our product.	10. YOUR SOLUTION SL We just enable access the message from the IOT devices combined with sensors to stop the fire spread at the ignition stage itself. It is much easier, safe to handle.	8. CHANNELS of BEHAVIOR CH ONLINE Notifications send can be accessed. OFFLINE The accidental area solved by sensors with the help of intelligence can stop the fire spread at the initial stage itself..	Extract online & offline CH of BE
4. EMOTIONS BEFORE / AFTER EM Before: Customer is not finding a proper rid for the fire spread problem. After: Now with the help of our product the customer can easily enhance the problem.			

REQUIREMENT ANALYSIS

Solution Requirements (Functional & Non-functional)

Functional Requirements:

Following are the functional requirements of the proposed solution.

FR No.	Functional Requirement (Epic)	Sub Requirement (Story / Sub-Task)
FR-1	User Registration	Registration is done through Gmail which is available in the playstore .

FR-2	User Confirmation	Confirmation via Email as a invitation Confirmation via OTP through user's mobile number.
FR-3	User Login	It is necessary to Login through website or App using the respective username and password given by the user.
FR-4	User Access	User might allow all the requirements for better experience.
FR-5	User Guide	Guides the basic steps of using the application.
FR-6	User Upload	User should be able to send the data
FR-7	User Solution	Data report should be generated and delivered to user for per every 24 hours
FR-8	User Data Sync	API interface to increase to invoice system

Non-functional Requirements:

Following are the non-funconal requirements of the proposed solution.

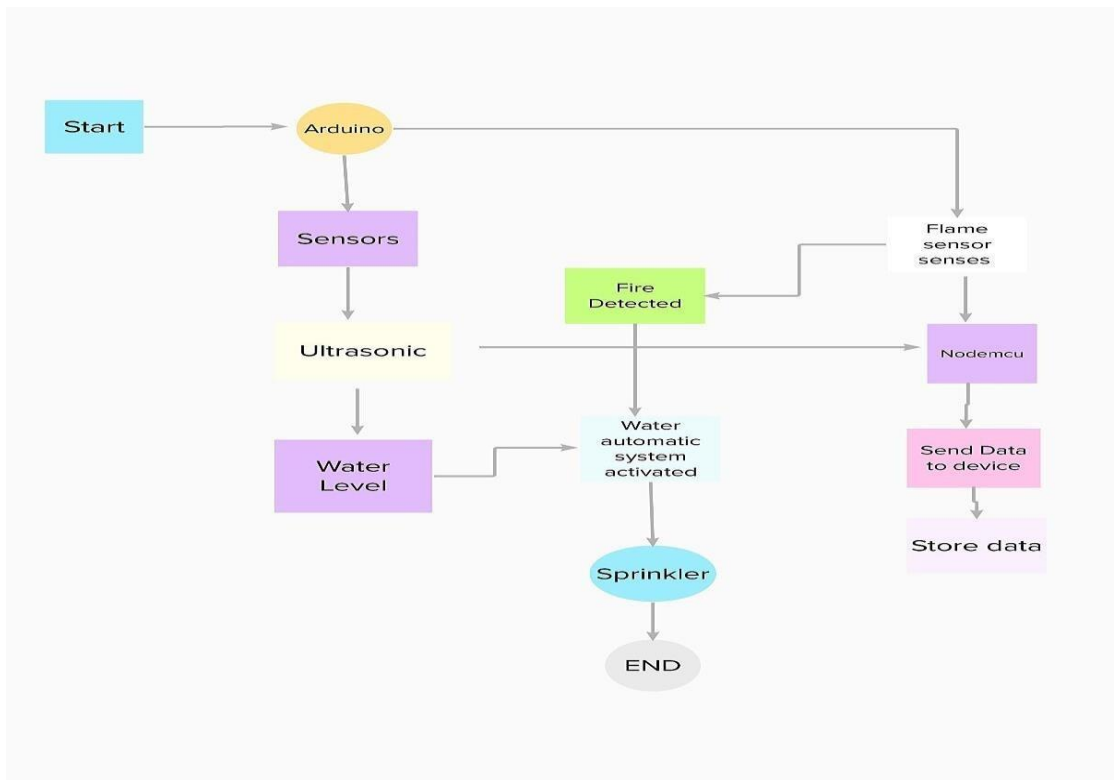
FR No.	Non-Functional Requirement	Description
NFR-1	Usability	Usability requirements includes barriers in language and localization

		tasks. Easy for everyone to access.
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 an 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.

PROJECT DESIGN

Data Flow Diagram



USER STORIES

User Type	Functional requirement	User story number	User story/task	Acceptance criteria	Priority	Release
Customer (Mobile user, web user; care executive, Administrator)	Registration	USN-1	As a user, I can register for the application by entering my mail, password, and confirming my password	I can access my account/dashboard	High	Sprint-1
		USN-2	As a user, I will receive confirmation email once I have registered for the application	I can receive confirmation email & click confirm	High	Sprint-1

	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 Gmail	I can confirm the registration in Gmail	Medium	Sprint-1
	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

PROJECT PLANNING & SCHEDULING

Sprint Planning & Scheduling

Sprint	Functional Requirement (Epic)	User Story Number	User Story / Task	Story Points	Priority	Team Members
Sprint-1	Login	USN-1	As a customer , I might ensure login credential through gmail ease manner for the purpose of sending alert message to the owner.	2	High	Gayathri
Sprint-1	Registration	USN-2	As a user , I have to registered my details and tools details in a simple and easy manner in case of fire incident, this registered system sends notification to the industrialist.	2	High	Akalya
Sprint-2	Dashboard	USN-3	As a user, In case of Fire in the industry I need the sprinkler to spray water on the	2	Low	Ganga

			existingfire automatically.			
Sprint-1	Dashboard	USN-4	As a user , I need to safeguard my properties as well as and it will be better to send alertmessage to the fire department.	2	Medium	Ishwarya
Sprint-1	Dashboard	USN-5	As a user , Its good to havea IOT basedsystem to extinguish the fire without humanpresenc e.	2	High	Gayathri

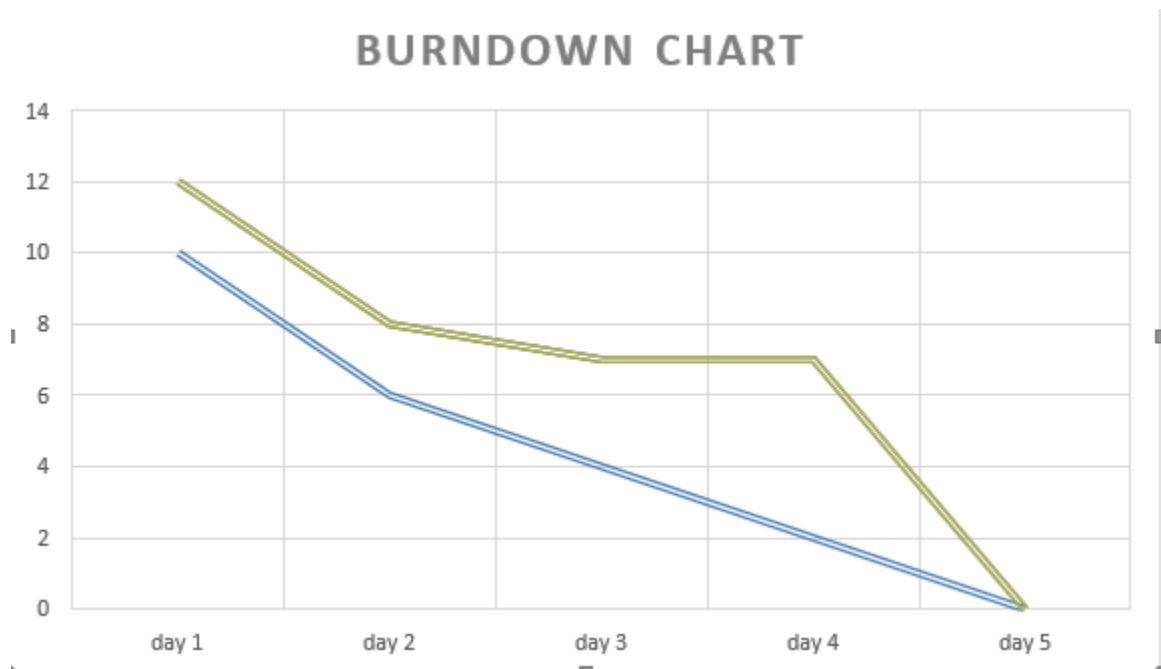
Sprint Delivery Schedule

Sprint	Total Story Points	Durati on	Sprint Start Date	Sprint End Date (Planned)	Story Points Completed (as on Planned EndDate)	Sprint Release Date (Actual)
Sprint-1	20	6 Days	24Oct 2022	29 Oct2022	20	29 Oct2022
Sprint-2	20	6 Days	31Oct 2022	05 Nov 2022	20	05 Nov 2022
Sprint-3	20	6 Days	07Nov	12 Nov 2022	20	12 Nov 2022

			2022			
Sprint-4	20	6 Days	14Nov 2022	19 Nov 2022	20	19 Nov 2022

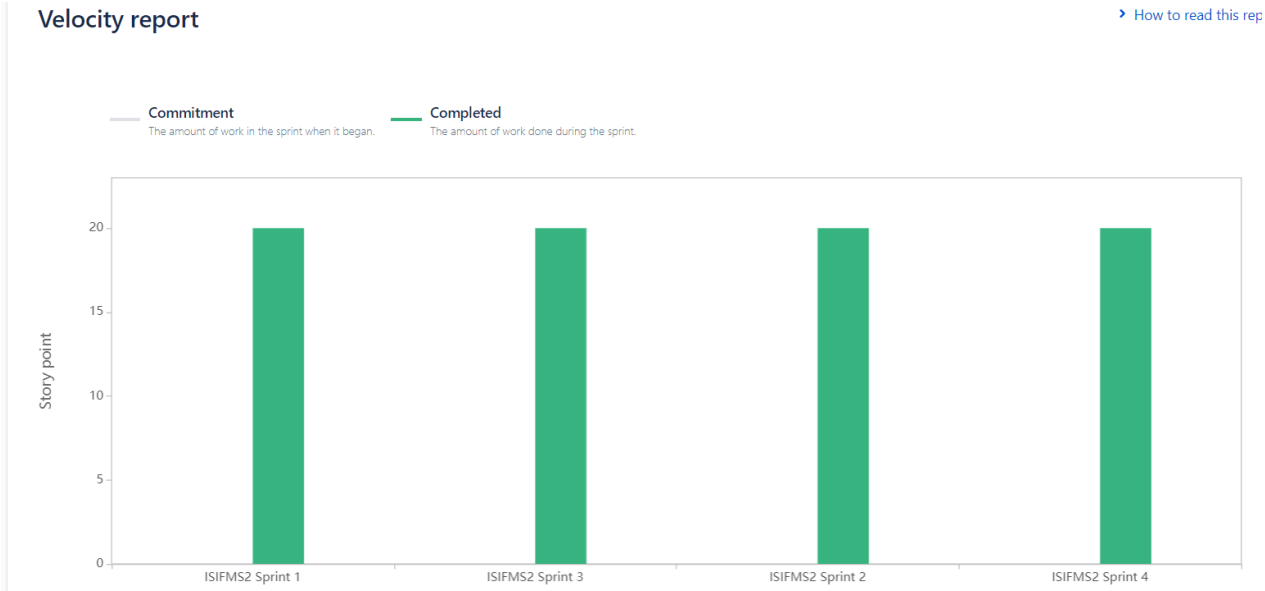
Velocity:

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)



Reports from JIRA

	T	NOV				DEC	JAN '23	
Sprints		ISIFM...	ISIFM...	ISIFM...	ISIFM...			
ISIFMS2-13 Create								
> ISIFMS2-14 Create								
> ISIFMS2-15 Configure								
> ISIFMS2-16 Develop								
> ISIFMS2-17 Publish								



CODING & SOLUTIONING

Feature 1

source code.py - C:\Users\HP\Desktop\source code.py (3.7.0)

File Edit Format Run Options Window Help

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

#Provide your IBM Watson Device Credentials
organization = "s8ovlq"
deviceType = "abcd"
deviceId = "12345"
authMethod = "token"
authToken = "12345678"

# 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)

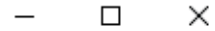
    data = { 'Temperature' : temp, 'Flame_Level' : flame_level, 'Gas_Level' : gas_level }
    #print data
    def myOnPublishCallback():
        print ("Published Temperature = %s C" % temp, "Flame_Level = %s" % flame_level, "Gas_Level = %s" % gas_level , "to IBM Watson")

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

    deviceCli.commandCallback = myCommandCallback

# Disconnect the device and application from the cloud
deviceCli.disconnect()
```

Feature 2



Published Temperature = 87 C	Flame_Level = 46 %	Gas_Level = 7 %	to IBM Watson
Published Temperature = 22 C	Flame_Level = 49 %	Gas_Level = 23 %	to IBM Watson
Published Temperature = 77 C	Flame_Level = 9 %	Gas_Level = 95 %	to IBM Watson
Published Temperature = 28 C	Flame_Level = 99 %	Gas_Level = 99 %	to IBM Watson
Published Temperature = 10 C	Flame_Level = 82 %	Gas_Level = 19 %	to IBM Watson
Published Temperature = 48 C	Flame_Level = 46 %	Gas_Level = 54 %	to IBM Watson
Published Temperature = 43 C	Flame_Level = 72 %	Gas_Level = 90 %	to IBM Watson
Published Temperature = 68 C	Flame_Level = 48 %	Gas_Level = 37 %	to IBM Watson
Published Temperature = 34 C	Flame_Level = 93 %	Gas_Level = 96 %	to IBM Watson
Published Temperature = 94 C	Flame_Level = 18 %	Gas_Level = 27 %	to IBM Watson
Published Temperature = 48 C	Flame_Level = 2 %	Gas_Level = 16 %	to IBM Watson
Published Temperature = 35 C	Flame_Level = 90 %	Gas_Level = 17 %	to IBM Watson
Published Temperature = 37 C	Flame_Level = 99 %	Gas_Level = 39 %	to IBM Watson
Published Temperature = 50 C	Flame_Level = 67 %	Gas_Level = 11 %	to IBM Watson

Test Cases

A	B	C	E		F		G	H	I	J	K	L	M	N
			Date	Team ID	Project Name	Maximum Marks								
1			18-Nov-22	PNT2022MID46732	Project - Industry specific Intelis	4 marks								
Test case ID	Feature Type	Component	Test Scenario	Pre-Requsite	Steps To Execute	Test Data	Expected Result	Actual Result	Status	Comments	TC for Automation(Y/N)	BUG ID	Executed By	
TC_001	Functional	IBM cloud	Create the IBM Cloud services which are being used in this project	IBM Cloud login ID & password	Go to IBM cloud signup page. Enter e-mail id and other credential. Enter password	https://cloud.com/login	Login/Signup popup should display	Working as expected	Pass	results verified	No		Ganga,Gayathri	
TC_002	Functional	IBM cloud	Configure the IBM cloud services which are being used in completing this project	IBM Cloud login ID & password	Go to Cloud login. Enter user id & password. verify the login by the popup display	https://cloud.com/login	Application should show below UI elements: a. email test box b. password test box c. Login button with orange colour d. New customer? Create account link e. I forgot password? Recovery password link	Working as expected	Pass	results verified	No		Ishwarya,Gayathri,Akula	
TC_003	Functional	IBM Watson IOT Platform	IBM Watson IOT platform acts as mediator to connect the web application to IOT devices, so create the IBM Watson	IBM Watson IOT Platform login id & password	Go to IBM cloud - click catalog, search IOT and click create link to resource list and search IOT platform	https://cd4my.internetofthings.ibmcloud.com/#catalog	User should navigate to user account homepage	Working as expected	Pass	results verified	No		Ishwarya,Ganga	
TC_004	Functional	IBM Watson IOT Platform	To create a device in the IBM Watson IOT platform and get the device credential	IBM Watson IOT Platform login id & password	login to IBM Watson platform click Add Device. Enter the details and click finish. Note down the Device ID, device name, authentication key, organisation name	Device credentials	Application should show "Incorrect email or password" validation message.	Working as expected	Pass	results verified	No		Akula,Gayathri,Ganga	
TC_005	Functional	IBM cloud	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	search node-red in catalog wait for some time to completely configure the node-red	https://cloud.ibm.com/catalog?source=results&search=ibm%20node-red&pg=4313-3611-8972-8256&ibm%20node-red%20node-red	Application should show "Incorrect email or password" validation message.	Working as expected	Pass	results verified	No		Ishwarya,Gayathri,Akula	
TC_006	Functional	Node Red	create a Node-Red service	Node-RED installation	select IBM IOT input in node in IBM IOT Watson platform go to apps and click on generate api keys copy and paste generated api key and token in IBM IOT input after entering all details click the done button	values of sensors and button for alarm & sprinkler ON/OFF is displayed	Application should show "Incorrect email or password" validation message.	Working as expected	Pass	results verified	No		Akula,Gayathri,Ganga	

				Date	19-Nov-22								
				Team ID	PNT2022TMD-48732								
				Project Name	Project_Industry-specific intelligence								
				Maximum Marks	4 marks								
Test case ID	Feature Type	Component	Test Scenario	Pre-Requlite	Steps To Execute	Test Data	Expected Result	Actual Result	Status	Comments	TC for Automation(Y/N)	BUG ID	Executed By
TC_004	Functional	IBM Watson IoT Platform	To create a device in the IBM Watson IoT platform and get the device credential	IBM Watson IoT Platform login id & password	login to IBM Watson platform click Add Device Enter the details and click finish. Note down the Device ID, device name, authentication key, organisation name	Device credentials	Application should show 'Incorrect email or password' validation message.	Working as expected	Pass	results verified	No		Akalya.Gayathri.Ganga
TC_005	Functional	IBM cloud	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	search node-red in catalog wait for some time to completely configure the node-red	https://cloud.ibm.com/development/appservice/create-app?target=58a9d0bc-6811-3d11-897c-09ea080c8f6a&url=https://api.mundofirst.com	Application should show 'Incorrect email or password' validation message.	Working as expected	Pass	results verified	No		Ishwarya.Gayathri.Akalya
TC_006	Functional	Node Red	create a Node-Red service	Node-RED installation	select IBM IoT input in node in IBM IoT Watson platform go to apps and click on generate api keys copy and paste generated api key and token in IBM IoT input after entering all details click the done button	values of sensors and button for alarm & sprinkler ON/OFF is displayed	Application should show 'Incorrect email or password' validation message.	Working as expected	Pass	results verified	No		Akalya.Gayathri.Ganga
TC_007	Functional	python 3.7.0	Develop a python script to publish	python 3.7.0 (64 bit) installation	and install python 3.7.0, develop	python.org/downloads/windows/python-370/	Working as expected	Pass	Pass	results verified	No		Gayathri
TC_008	Functional	python 3.7.0	After developing python code, copy	python 3.7.0 (64 bit) installation	python 3.7.0, develop python code, copy	the output from the cloud	Working as expected	Pass	Pass	results verified	No		Ishwarya.Ganga
TC_009	Functional	python 3.7.0	Store the sensor values: Temperature	IBM cloud Account	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 function. Print the command statements such as sprinkler ON/OFF, Alarm ON/OFF and sensor	sensor values and command values is displayed in the debug window and in the application	Working as expected	Pass	Pass	results verified	No		Ishwarya.Gayathri
TC_010	Web UI	Node RED & MIT Inventor	Create Web UI in Node-Red	MIT Inventor Login ID & password	Go to node-red select http in & http response. connect them to IBM IoT output function. Print the command statements such as sprinkler ON/OFF, Alarm ON/OFF and sensor	sensor values and command values is displayed in the debug window and in the application	Working as expected	Pass	Pass	results verified	No		Akalya.Gayathri.Ganga
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	Go to IBM cloud, search cloudant in catalog. Add new dashboard. go to Node-red, 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 and database with the sensor values	Working as expected	Pass	results verified	No		Ishwarya.Ganga

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 ReportOutput	4	0	0	4

RESULTS

Performance Metrics

NFT - Risk Assessment									
S.No	Project Name	Scope/feature	Functional Changes	Hardware Changes	Software Changes	Impact of Downtime	Load/Volumen Changes	Risk Score	Justification
1	Receiving sensor v	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/OFF	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	Impuntions/Dependencies/R	Approvals/SignOff
1	Python 3.7.0	Developing Python Scr	Depends on the code	https://www.python.org/pst/sponsors/#heroku
2	IBM Watson IoT Platform	Creating and configur	Depends on the Device Cred	https://4aavut.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-4618-8ea5-c3bd66111fb4-bluemix.cloudant.com/dashboard.html

End Of Test Report						
S.No	Project Overview	NFT Test approach	NFR - Met	Test Outcome	GO/NO-GO decision	Identified Defects (Detected/Closed/Open)
1	ame sensor and tes	This is done by devel Met	Pass	GO	Code working properly	Closed https://www.pythop.org/pst/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/S1cd2ad32ac08578
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/S1cd2ad32ac08578
4	Emergency alerts are notified to the aut	Met	Pass	GO	Emergency alerts are send vi	Closed https://www.fast2sms.com/dashboard/sms/bulk

ADVANTAGES & DISADVANTAGES

The Advantages of this Industry-Specific Intelligent Fire Management system are as follows

1. The user need not require expertise knowledge to control this system. This system is simple. The user can easily view the sensor values and take control actions.
2. The control actions are taken automatically.
3. If it is implemented in hardware, then the cost of implementation will be affordable.
4. As we are sensing the sensor values continuously, any slight change in the environment is detected
5. This system is in User-Friendly format.

The Disadvantage of this Industry-Specific Intelligent Fire Management system are as follows

6. This system will not be able to detect the origin of fire.
7. This system will not provide the escape route if there is fire outbreak.
8. If the industry has specific changes in the environment, then this system will give false alarm.

CONCLUSION

An understanding and having Fire Management system in the industry is of utmost importance. This project is a fire management system that can be used in the industry based on IOT. This system creates a simulation device credentials in IBM WATSON IOT PLATFORM. In node-red, necessary nodes are installed and used. These nodes are installed and used. These nodes are deployed and the data is collected. In the event of fire, this system can issue sprinkler on, exhaust fan on. This remote user

monitoring system can monitor the system status of each node in real time. This system monitors the data continuously so that the any slight change in the environment can be easily detected. This ensures good control accuracy. This Industry- Specific Intelligent Fire Management ensures the protection of property, asset and the processes are cost effective and the automatic measures are in control.

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.

APPENDIX

Solution Architecture Diagram:

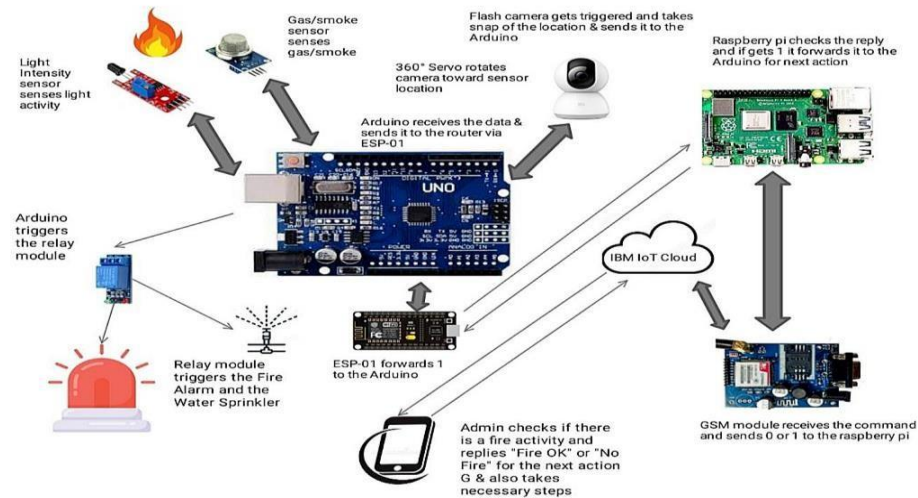


Fig : Technology architecture of our project

Source Code

```
import time

import sys

import ibmiotf.application
import ibmiotf.device

import random


#Provide your IBM Watson Device Credentials

organization = "s8ov1q"

deviceType = "abcd"

deviceId = "12345"

authMethod = "token"

authToken = "12345678"


# 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 IoT")
```

```
time.sleep(1)
```

```
deviceCli.commandCallback = myCommandCallback
```

```
# Disconnect the device and application from the cloud
```

```
deviceCli.disconnect()
```

GitHub & Project Demo Link

GitHub

IBM-Project-20023-1656711147

Project Demo Link

[https://drive.google.com/file/d/1eN4TKw0TaMvbCQKM76a31IZ5b72hNQTL/view?usp=share link](https://drive.google.com/file/d/1eN4TKw0TaMvbCQKM76a31IZ5b72hNQTL/view?usp=share_link)