Project report

Date	November 18 2022
Team ID	PNT2022TMID49530
Project	IOT Based Smart Crop Protection of System For Agriculture
Maximum Mark	2 Mark

1 Introduction:

*Project Overview:

The system consists of several sensors, Automatic motors to maintain crops from all factors that affect the plants growth: using raspberry pi all sensors is controlled.

*Purpose:

The main aim is to develop automation in agriculture field by monitoring continuously the field by PIR
Sensors, moisture level meter, pestiside spray, sound system, water spray etc.All factors that affecting plants growth are analyzed and eliminated

2 Literature survey :

In our project we are analyzing the temperature, humidity, soil moisture and it can be seen in web U1 and Node red. We can get clear idea by analyzing our project which done by them.

3 Ideation and proposed solution :

*Empathy map canvas:

It is used to tell about the project of what do they see, think, hear, and fell. Pain and gain in a project.

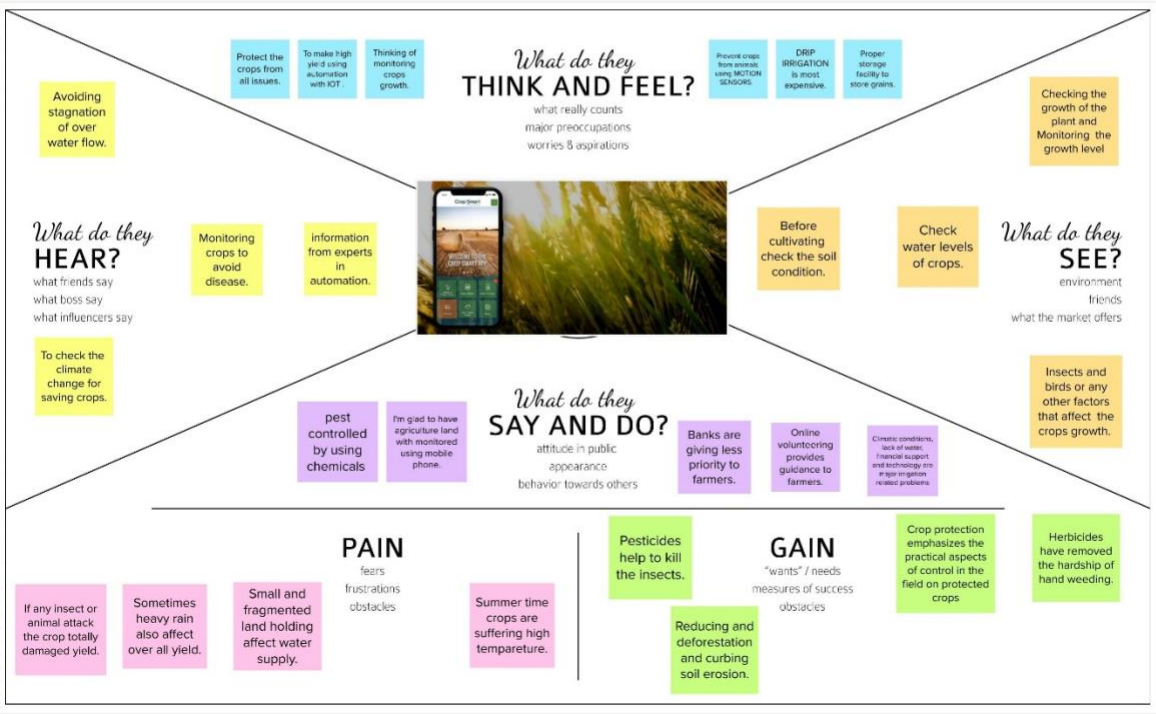
Edit this template
Right-click to unlock

Empathy Map Canvas

Gain insight and understanding on solving customer problems.

1

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



*Ideation & Brainstorming:

Each and every member that is 4 members in a team shared about our idea about this project from this idea we have chosen one idea for the next level of this project.

Brainstorm

Write down any ideas that come to mind that address your problem statement.

10 minutes

Mohamedyasmin S

- Cooling system is used when air humidity is low.
- Automatic motors have to be used for water distribution.
- Pesticides are sprayed to prevent crop damage.
- Grasshopper controlled by spraying pesticide
- Using rat traps prevents damage to crops.
- Natural fertilizers are used for the growth of crops.

Nagajothi A

- Fertilizer in correct proportion is used for healthy yield
- Soil and water pH level is tested frequently
- Trampilng crops.
- Sound system is used for crop protection from animals and birds.
- Moisture meter should be included for watering plants
- Cooling systems to avoid over heating

PONCHITRA S...

- Animals are made away by water spray
- Temperature level is indicated for any abnormalities.
- Unwanted water stagnation avoided by water pumps and motors.
- Automatic irrigation for plant growth to implemented
- pH sensor is used for morning plant growth
- heating system is used when air humidity is low.

Priyadharshini P

- Drip irrigation is to be followed for over heating
- If birds entry detected , sound system is turn on.
- Pepper flakes are used for avoiding rats in field
- Soil conditions are checked before planting.
- Corntoy is used to protect crops from birds.
- animal are detected by the sensor then the sound system is ON

3

Group ideas

Take turns sharing your ideas while clustering similar or related notes as you go. In the last 10 minutes, give each cluster a sentence-like label. If a cluster is bigger than six sticky notes, try and see if you and break it up into smaller sub-groups.

20 minutes

Category 1

Fertilizer in correct proportion is used for healthy yield

Natural fertilizers are used for the growth of crops.

Category 2

Cooling system is used when air humidity is low.

Cooling systems to avoid over heating

Category 3

Automatic irrigation for plant growth to implemented

Drip irrigation is to be followed for over heating

Category 4

Animals are made away by water spray

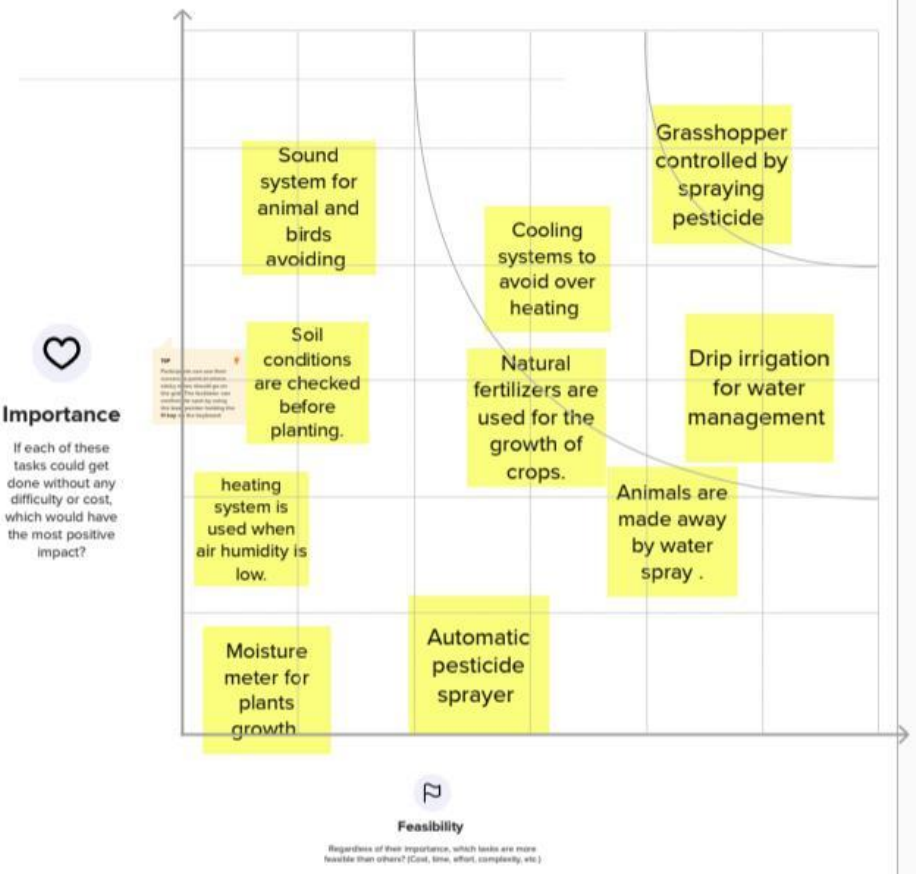
animal are detected by the sensor then the sound system is ON

4

Prioritize

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

20 minutes



*Proposed solution:

We have given the solution for the project impact in more ways. Also we have said about the marketing of this solution.

Project Design Phase-I
Proposed Solution Template

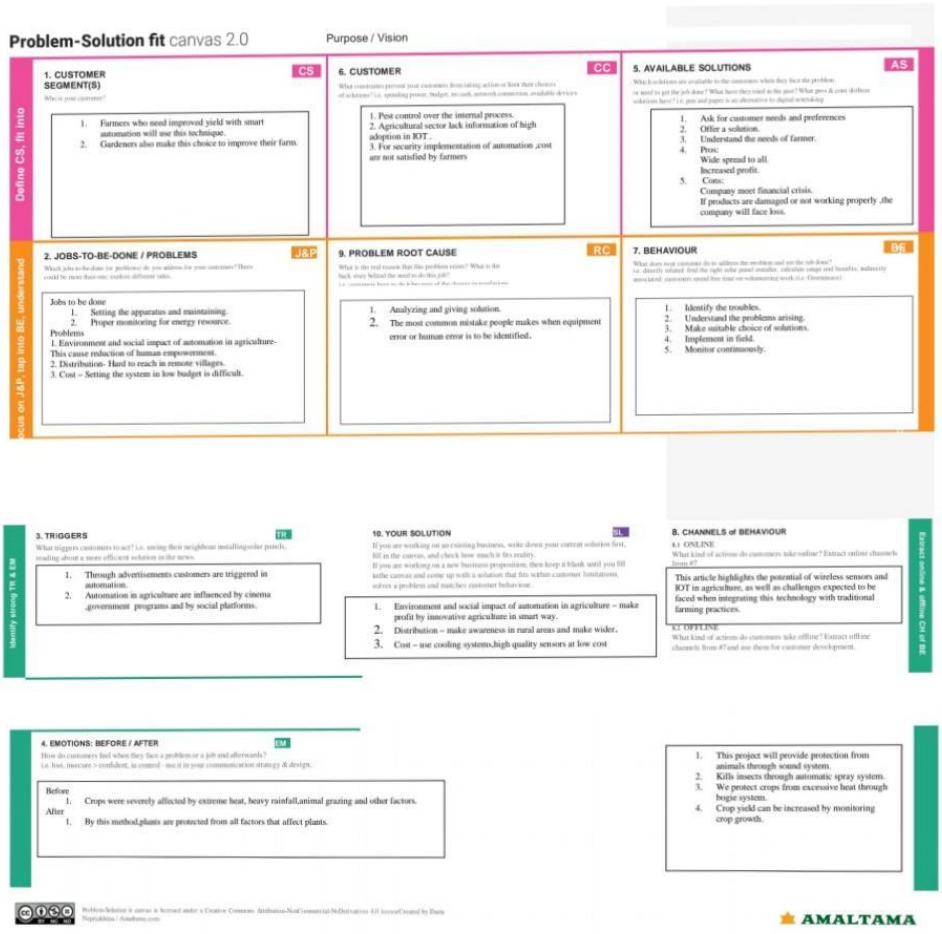
Date	19 September 2022
Team ID	PNT2022TMID49530
Project Name	Project – IOT Based Smart Crop Protection System
Maximum Marks	2 Marks

Proposed Solution Template:

Project team shall fill the following information in proposed solution template.

S.No.	Parameter	Description
1.	Problem Statement (Problem to be solved)	Protecting crops from insects , animals and other factors using pest sprayer , sound system and automatic drip irrigation.
2.	Idea / Solution description	Using moisture meter ,automatic sprayer of pesticide ,automatic DC motor and sensors are placed for protect crops.
3.	Novelty / Uniqueness	Water stagnation and scarcity is maintained every movement in field and growth of plants are monitored with mobile phone.
4.	Social Impact / Customer Satisfaction	Improved and high yield crops are obtained . Farmers work is reduced with automation.
5.	Business Model (Revenue Model)	This makes agriculture easier and profit is attained more by using this technique.
6.	Scalability of the Solution	This solution will gives high performance for proper maintenance.

Problem – Solution Fit Template:



4.Requirement analysis:

*Functional and non functional requirement:

Project Design Phase-II
Solution Requirements (Functional & Non-functional)

Date	15 October 2022
Team ID	PNT2022TMID49530
Project Name	Project – IOT based smart crop protection system.
Maximum Marks	4 Marks

Functional Requirements:

Following are the functional requirements of the proposed solution.

FR No.	Functional Requirement (Epic)	Sub Requirement (Story / Sub-Task)
FR-1	Mobile application	mobile application is used to monitor and control the affecting factor and farming processes according to agricultural needs by using mobile application.
FR-2	Sensors	Sensors is used to monitor and control the crop from insects or animals or other environmental conditions. Then send the data to the processor.
FR-3	Automatic spray system	Automatic sprayer is used to protect paddy fields from insects, herbicides and herbivores.
FR-4	Smart irrigation	Using an irrigation system helps to soil maintenance moisture and protect the soil from drying out.
FR-5	Processor	IOT application and raspberry pi can deliver the processing power and functionality one need as the result raspberry pi are most often the best , most economic hardware choice for smart crop protection of system for agriculture. Over all they often simple, secure, functionality for little cost.
FR-6	cloud	Data storing for the information about the crops.

Non-functional Requirements:

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

FR No.	Non-Functional Requirement	Description
NFR-1	**Usability**	The Farmer at any time to protect the crop in efficient way without using manpower.
NFR-2	**Security**	The IOT device is used to indicate the farmer by a message while someone enter into the field and we are used SD card

		module that helps to store a specified sound to fear the animals. This project is smart crop protection system for protect the crop from animals as well as unknown persons.
NFR-3	**Reliability**	The primary goal of the smart crop monitoring system is to increase efficiency for farmer and provide better predictability and management.
NFR-4	**Performance**	This project work is to yield monitoring arrangement for farm safety against animal attacks and climate change conditions.
NFR-5	**Availability**	this system will provide a complete technical solution using the internet of things to the farmers to prevent their crop from wild animals and provide information to the farmer to maximize their production.
NFR-6	**Scalability**	This solution will gives high performance for proper maintenance.

It is used to tell the function needed for this project and

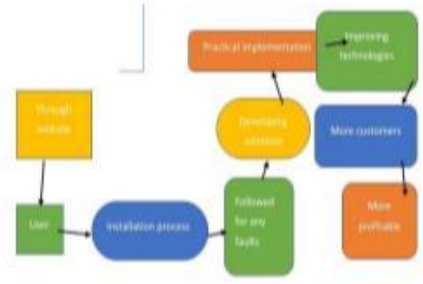
its use.

5 Project design:

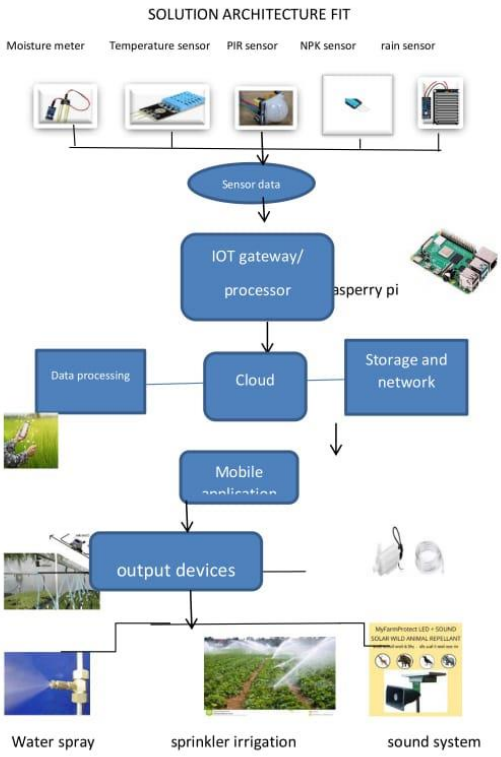
- Data flow diagrams
- Ideas are given by the user for improved quality of for improved quality of crops with automation.

Data Flow Diagram & User Stories

Date	15 October 2022
Team ID	PNT2022TMID49530
Project Name	IOT Based Smart crop Protection system.
Maximum Marks	4 Marks



Solution & Technical Architecture



Technology Architecture

Project Design Phase-II
Technology Stack (Architecture & Stack)

Date	15 October 2022
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Project Name	Project – IOT based smart Crop protection system.
Maximum Marks	4 Marks

Technical Architecture:

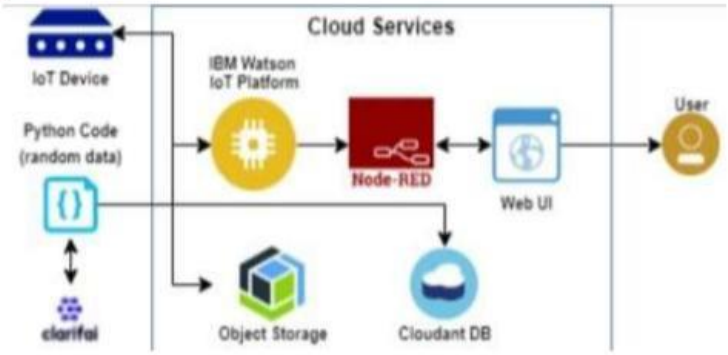


Table-1 : Components & Technologies:

S.No	Component	Description	Technology
1.	User Interface	How user interacts with application e.g. Web UI, Mobile App, Chatbot etc.	HTML, CSS, JavaScript / Angular Js / React Js etc.
2.	Application Logic-1	Logic for a process in the application	Java / Python
3.	Application Logic-2	Logic for a process in the application	IBM Watson STT service
4.	Application Logic-3	Logic for a process in the application	IBM Watson Assistant
5.	Database	Data Type, Configurations etc.	MySQL, NoSQL, etc.
6.	Cloud Database	Database Service on Cloud	IBM DB2, IBM Cloudant etc.
7.	File Storage	File storage requirements	IBM Block Storage or Other Storage Service or Local Filesystem
8.	External API-1	Purpose of External API used in the application	IBM Weather API, etc.
9.	External API-2	Purpose of External API used in the application	Aadhar API, etc.
10.	Machine Learning Model	Purpose of Machine Learning Model	Object Recognition Model, etc.
11.	Infrastructure (Server / Cloud)	Application Deployment on Local System / Cloud Local Server Configuration: Cloud Server Configuration :	Local, Cloud Foundry, Kubernetes, etc.

Table-2: Application Characteristics:

S.No	Characteristics	Description	Technology
1.	Open-Source Frameworks	List the open-source frameworks used	Technology of Opensource framework
2.	Security Implementations	List all the security / access controls implemented, use of firewalls etc.	e.g. SHA-256, Encryptions, IAM Controls, OWASP etc.

S.No	Characteristics	Description	Technology
3.	Scalable Architecture	Justify the scalability of architecture (3 – tier, Micro-services)	Technology used
4.	Availability	Justify the availability of application (e.g. use of load balancers, distributed servers etc.)	Technology used
5.	Performance	Design consideration for the performance of the application (number of requests per sec, use of Cache, use of CDN's) etc.	Technology used

User stories:

To provide good yield crops by maintaining plants from all factors.

User Stories

Use the below template to list all the user stories for the product.

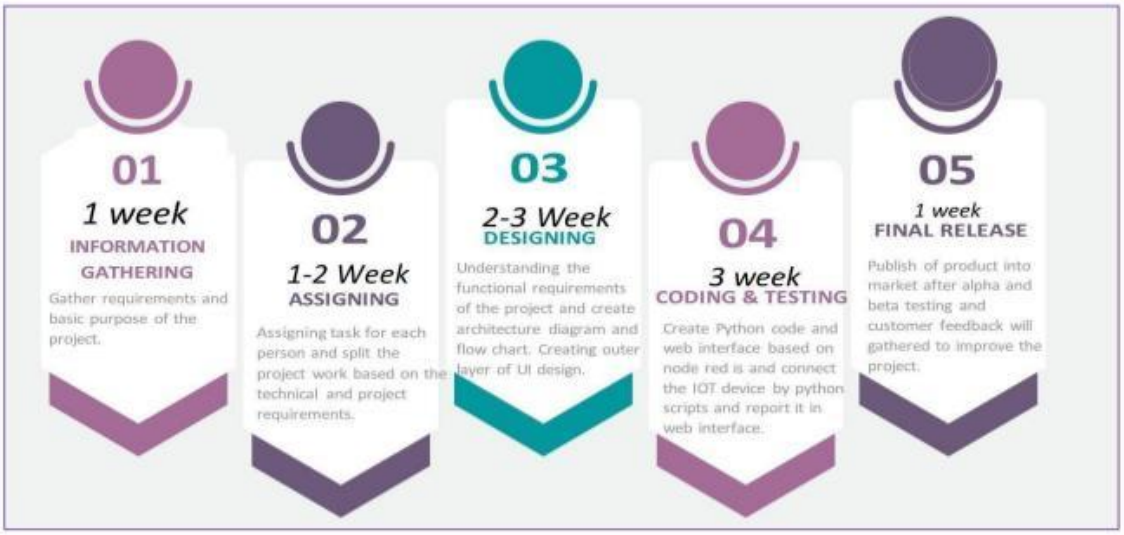
User Type	Functional Requirement (Epic)	User Story Number	User Story / Task	Acceptance criteria	Priority	Release
Customer (Mobile user)	Registration	USN-1	As a user, I can register for the application by entering my email, password, and confirming my password.	I can access my account / dashboard	High	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
		USN-3	As a user, I can register for the application through Facebook	I can register & access the dashboard with Facebook Login	Low	Sprint-2
		USN-4	As a user, I can register for the application through Gmail	I can register through gmail	Medium	Sprint-1
	Login	USN-5	As a user, I can log into the application by entering email & password	I can successfully login into app	High	Sprint-1
	Dashboard	USN-6	As a user, I can access the dashboard	I can refer dashboard for my clarification	Medium	Sprint-1
Customer (Web user)	Smart Phone	USN-7	As a user , I can Receive the Notification through application	I reach the notification on mobile	Medium	Sprint-1
Customer Care Executive	Feedback, comment section	USN-8	As a user ,I can receive a crop review as both positive and negative	I can choose the platform to receive my crop information	Low	Sprint-2
Administrator	Supervising	USN-9	As a user I can apply the crop production application	I can ensure that privileges and permission in account	High	Sprint-1

6. Project planning and scheduling:

PROJECT PLANNING PHASE

Date	12 November 2022
Team ID	PNT2022TMID49530
Project Name	IoT Based Smart Crop Protection System for Agriculture
Maximum Marks	4 Marks

PROJECT MILESTONE



Sprint planning and estimation.

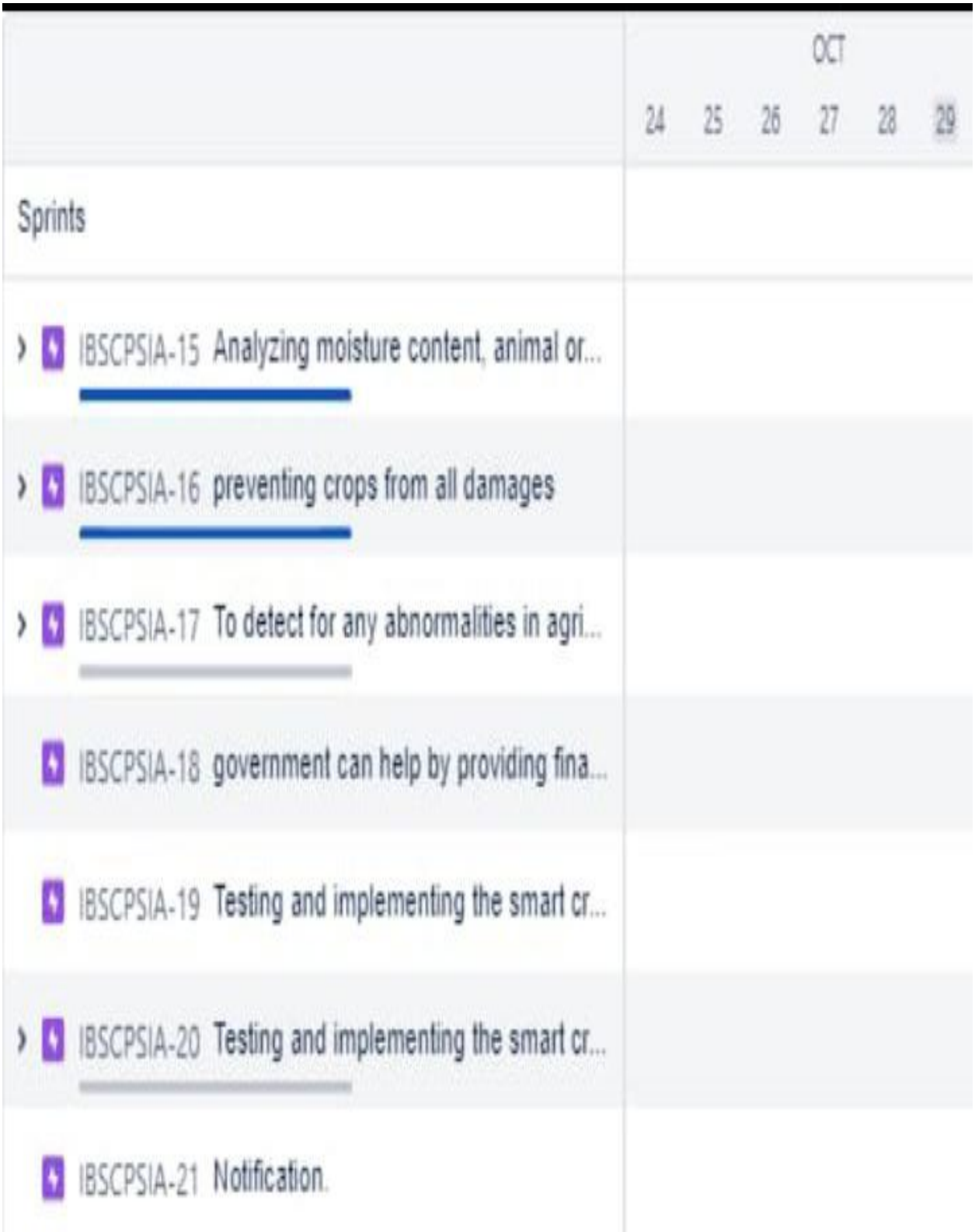
- For analyzing step by step process.

Sprint delivery time.

ACTIVITY LIST

S. No	Activity Title	Activity Description	Duration
1.	Understanding the Project Requirement	Assign the team members & create the repository in GitHub. Assign the task to each members and teach how to use and open access the GitHub and IBM Career Education.	1 Week
2.	Starting of Project	Advice student to attend classes of IBM portals create and develop an rough diagram based on the project description and gather information of IOT and IBM project.	1 week
3.	Attend classes	Team members & team lead must watch and learn from classes provided by IBM and Nalaiya Thiran and must gain access of MIT License for their project.	4 Week
4.	Budget and scope of the project	Budget & analyse the use of IOT in the project and discuss with the team for budget prediction to predict the favourability of the customer to buy the product for efficient use of the product among the environment.	1 week

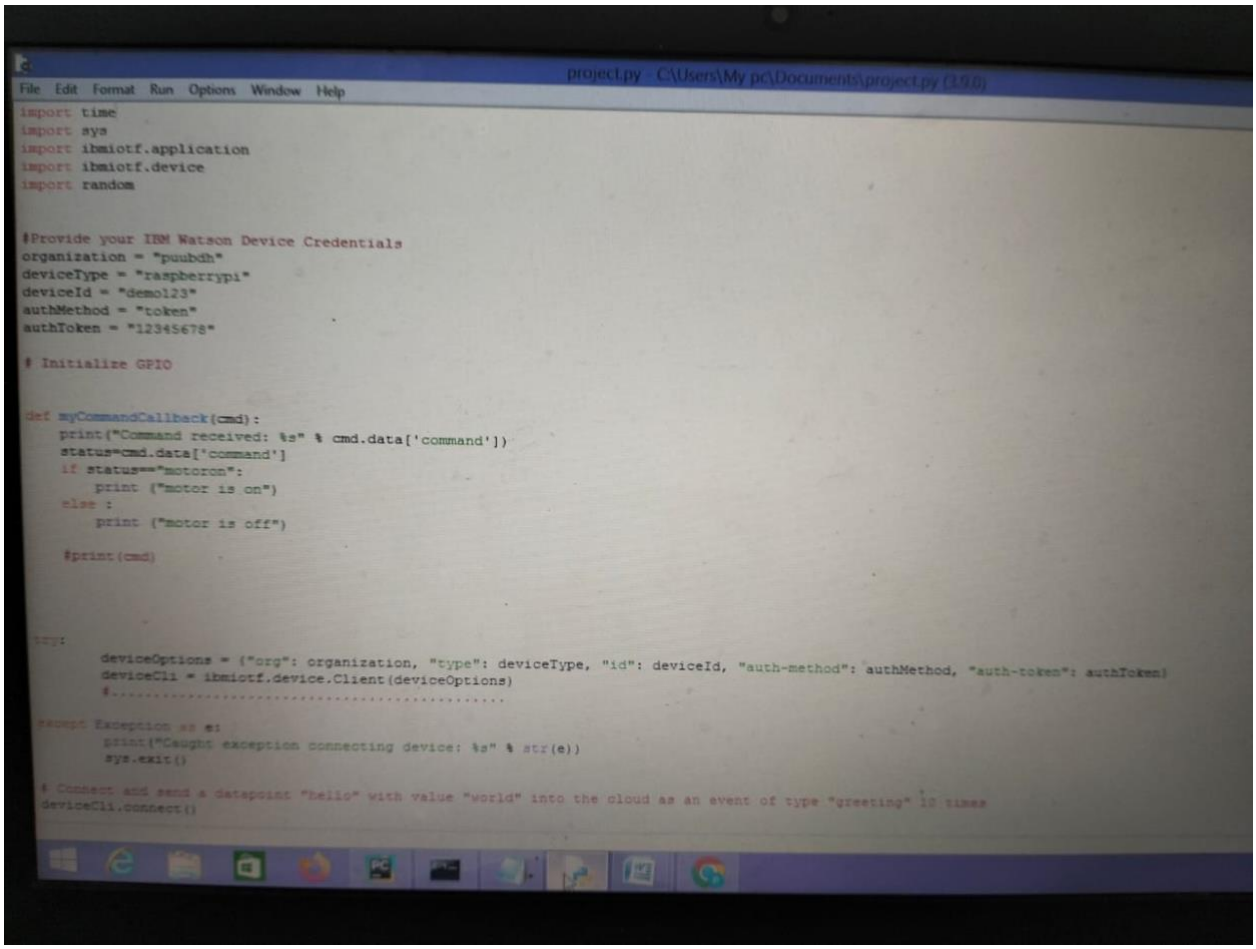
Report from JIRA



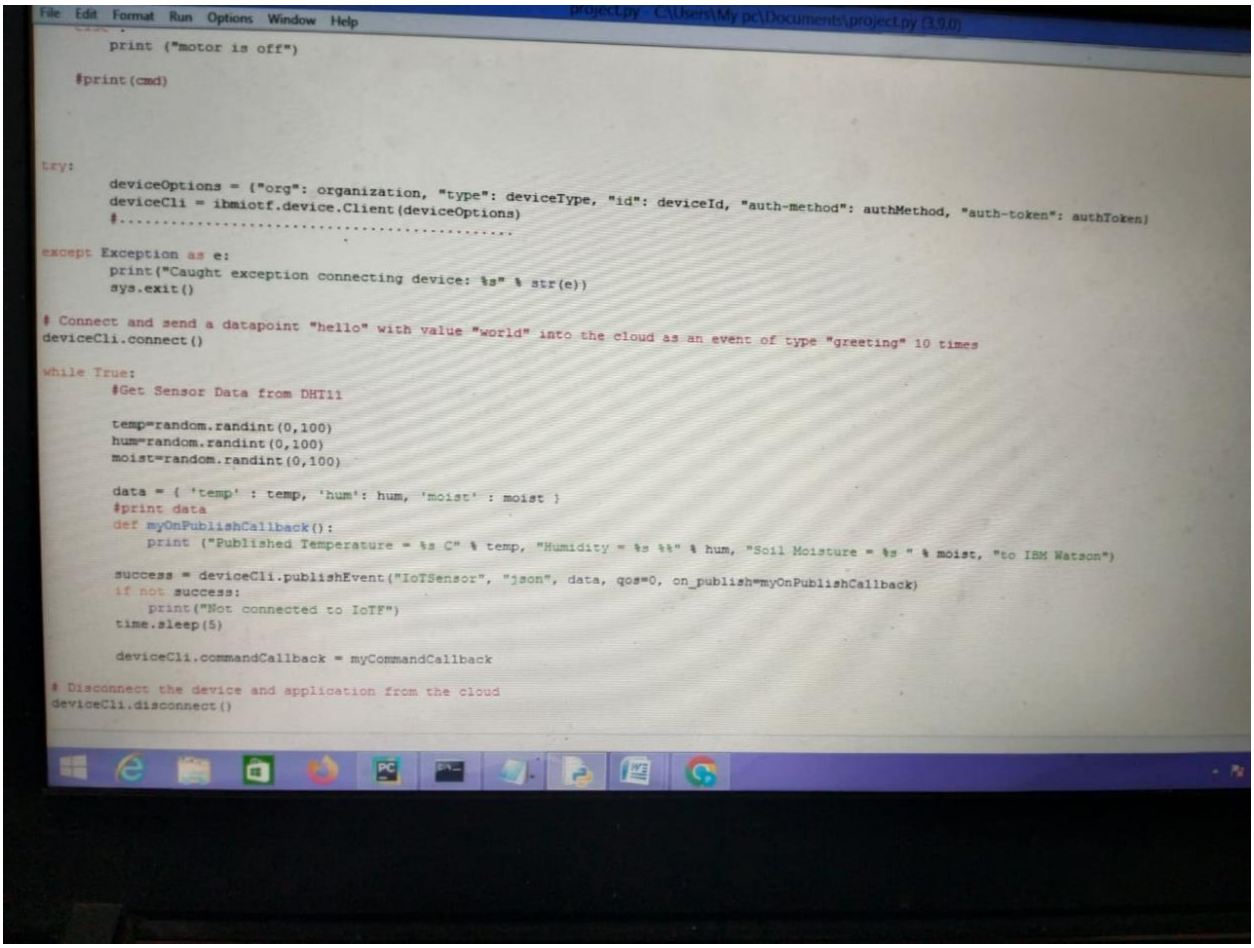
7. Coding and solution:

*Coding explanation:

- This coding is based on identifying ph level,humidity,soil moisture level.
- This output will be shown in IBM Watson and in Node-Red



Solution



Through the web U1 we can see the quality of land for agriculture.

8. Testing

Test cases

	Date	18-Nov-22
	Team ID	PNT2022TMID49530
	Project Name	project- IOTbased smart crop protection for agriculture
	Maximum Marks	4 marks

Test case ID	Feature Type	Component	Test Scenario	Pre-Requisite	Steps To Execute	Test Data	Expected Result	Actual Result	Status
LoginPage_TC_OO1	Functional	Home Page	Agriculture land test case	Know about the particular land	By using advertisement	https://shopenzer.com/	Detect the all factors that affect the plant growth	Working as expected	Pass
LoginPage_TC_OO2	UI	Home Page	Ph test case	to know ph level	provide more information about ph level	https://shopenzer.com/	Detect the ph level of water	Working as expected	Fail
LoginPage_TC_OO3	Functional	Home page	Humidity test case	collects the humidity information	To maintain irrigation by knowing humidity	Username: chalam@gmail.com password: Testing123	detect the humidity content		
LoginPage_TC_OO4	Functional	Login page	Moisture meter test case	to know about moisture level in soil	To know soil moisture content makes plant grow better	Username: chalam@gmail password: Testing123	To detect the soil moisture content		
LoginPage_TC_OO4	Functional	Login page	PIR sensor test case	to know about animal detection	prevents from animal grazing	Username: chalam@gmail.com password: Testing123678686786876876	Better protection from animals		

User acceptance testing

Acceptance Testing
UAT Execution & Report Submission

Date	18 November 2022
Team ID	PNT2022TMIDI49530
Project Name	Project – IOT Based Smart crop protection for agriculture
Maximum Marks	4 Marks

1. Purpose of Document

The purpose of this document is to briefly explain the test coverage and open issues of the project name and notification] project at the time of the release to User Acceptance Testing (UAT).

2. Defect Analysis

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	9	7	3	3	22
Duplicate	1	0	5	0	6
External	6	3	0	1	10
Fixed	9	2	8	19	38
Not Reproduced	6	0	3	0	9
Skipped	0	3	2	1	6
Won't Fix	0	5	2	1	8
Totals	31	20	23	25	99

3. Test Case Analysis

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

Section	Total Cases	Not Tested	Fail	Pass
Print Engine	8	0	0	8
Client Application	51	0	0	51
Security	2	0	0	2
Outsource Shipping	3	0	0	3
Exception Reporting	9	0	0	9
Final Report Output	5	0	0	5
Version Control	2	0	0	2

9.Result

Performance matrix

			NFT - Risk Assessment						
S.No	Project Name	Scope/feature	unctional Change	Hardware Changes	Software Changes	Impact of Downtime	Load/Voluem Changes	Risk Score	Justification
1	IOT based smart crop protection system	New	Low	No Changes	Moderate	low	>5 to 10%	ORANGE	we have improve production of high yield using IOT

10. Advantage and disadvantage

Advantage

1. To get accurate value of ph in water

2. Soil moisture level is continuously monitored.

3. Humidity measurement is done used for irrigating levels

4. Provide high yield

5. improved quality of crops by monitoring continuously.

Disadvantage

1. The cost of equipment is high.

2. It is difficult to maintain all sensors in the agriculture field

3. The analysis of measurements continuously makes system heat.

11. Conclusion

`1.by this technique the plants provide improved yield

2. It makes agriculture smart by automation.

3. Plants are continuously prevented from all factors that decrease crop quality.

12. Future scope

1. It is necessary to maintain agricultural fields to get quality in foods

2. It is important to prevent crops which are the source of all beings.

13. Appendix

- **Source code**

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



#Provide your IBM Watson Device Credentials
organization = "puubdh"
deviceType = "raspberrypi"
deviceId = "demo123"
authMethod = "token"
authToken = "12345678"

# Initialize GPIO



def myCommandCallback(cmd):
    print("Command received: %s" % cmd.data['command'])
    status=cmd.data['command']
    if status=="motoron":
        print ("motor is on")
    else :
        print ("motor is 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)
    hum=random.randint(0,100)
    moist=random.randint(0,100)


    data = { 'temp' : temp, 'hum': hum, 'moist' : moist }
    #print data
    def myOnPublishCallback():
       print ("Published Temperature = %s C" % temp, "Humidity = %s %%" % hum, "Soil Moisture = %s " % moist, "to IBM Watson")
```

```
        success = deviceCli.publishEvent("IoTSensor", "json", data, qos=0,
on_publish=myOnPublishCallback)
        if not success:
            print("Not connected to IoTF")
        time.sleep(5)


        deviceCli.commandCallback = myCommandCallback


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

- **Github link**

  https://github.com/IBM-EPBL/IBM-Project-20778-1659762525

- **Project demo link**

  https://drive.google.com/file/d/194F-7Obf9yT55MjL52Kf7l7U3tJ-ygdc/view?usp=drivesdk