

# **IOT BASED SMART CROP PROTECTION SYSTEM FOR AGRICULTURE**

**NALAIYATHIRAN PROJECT REPORT**

**TEAM ID – PNT2022TMID44196**

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## **1.INTRODUCTION**

### **1.1 PROJECT OVERVIEW:**

An intelligent crop protection system helps the farmers in protecting the crop from the animals and birds which destroy the crop. This system also help farmers to monitor the soil moisture levels in the field and also the temperature and humidity values near the field. The monitors and sprinklers in the field can be controlled using the mobile application.

The device will detect the animals and birds using the clarifai service. If any animal or bird is detected the image will be captured and stored in the IBM cloud object storage. It also generates an alarm and avoid animals from destroying the crops. The image URL will stored in the IBM cloudant DB service. The device will also monitor the soil moisture levels, temperature and humidity values and send them to the IBM IoT Platform. The image will retrieved from object storage and displayed in the web application. A web application is developed to visualize the soil moisture, temperature and humidity values. Users can also control the motors through web applications.

### **1.2 PURPOSE:**

1. Gain knowledge of Watson IoT platform.
2. Connecting IoT devices to the Watson IoT platform & exchanging the sensor data.
3. Gain knowledge on cloudant db.
4. Gain knowledge on using the clarifai service.
5. Gain knowledge of storing images in IBM object storage & retrieving images.
6. Creating a web application through which the user interacts with the device.

## **2.LITERATURE SURVEY**

### **2.1 EXISTING PROBLEM:**

One of the biggest problems farmers face in India is the attack on crops by wild animals in their fields. The damage from these attacks significantly and adversely affects the crop yield. Most of the farmers are using electrical fencing around the fields to keep away wild animals. But due to many accident which caused the death of farmers as well as animals this approach is not so appreciated by the farmers. As an alternative to electrical fencing the farmers keep vigil at night to keep the wild animals away. They use flash lights to ward them off. This is a very strenuous task and the lack of sleep adversely affect the farmers work during the day time. The damage caused by the animals to the crops affects the total yield of the harvest immensely and the farmers have to suffer a loss their income because of this. HuT labs designed a solar powered IoT based intelligent system that can be used to prevent crop damage due to wild animals. The system implements IoT technology along with simple sensors.

### **2.2 REFERENCES:**

1.Krunal Mahajan<sup>1</sup>,Riya parate<sup>2</sup>,Ekta Zade<sup>3</sup>,Shubbam Khante<sup>4</sup>,Shishir bagal<sup>5</sup>,"REVIEW PAPER ON SMART CROP PROTECTION SYSTEM", International Research Journal of engineering and technology,volume:08 issue 02 feb 2021.

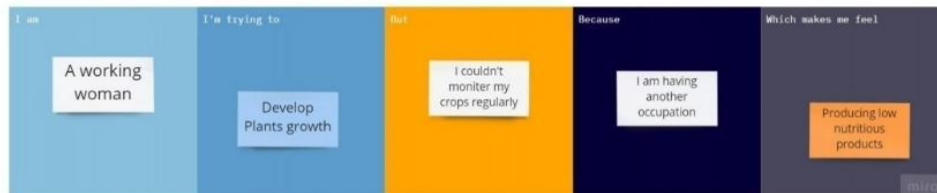
2.Dr. M. Chandhra, MohanReddy, Keerthi Raju , Kamakshikodi, BabithaAnapalli, Mounika Pulla,"SMART CROP PROTECTION SYSTEM FROM LIVING OBJECT AND FIRE USING ARDUINO",Science,technology and developement, volume IX,PG.NO 261-265,Sept 2020

3.<https://www.electronicshub.org/arduino-Flame-sensor-interface/#:-:text=Flame%20sensor%20has%20three%20pins.fire%2C%20A%20Buzzer%20is%20used>

4.Anjana,Sowmiya,Charan kumar, Monisha,Sahana,"Review on IoT in Agricultural crop protection and power Generation",international Research Journal of Engineering and technology(IRJET),Volume06,Issye 11,Nov 2019.

## 2.3 PROBLEM STATEMENT DEFINITION:

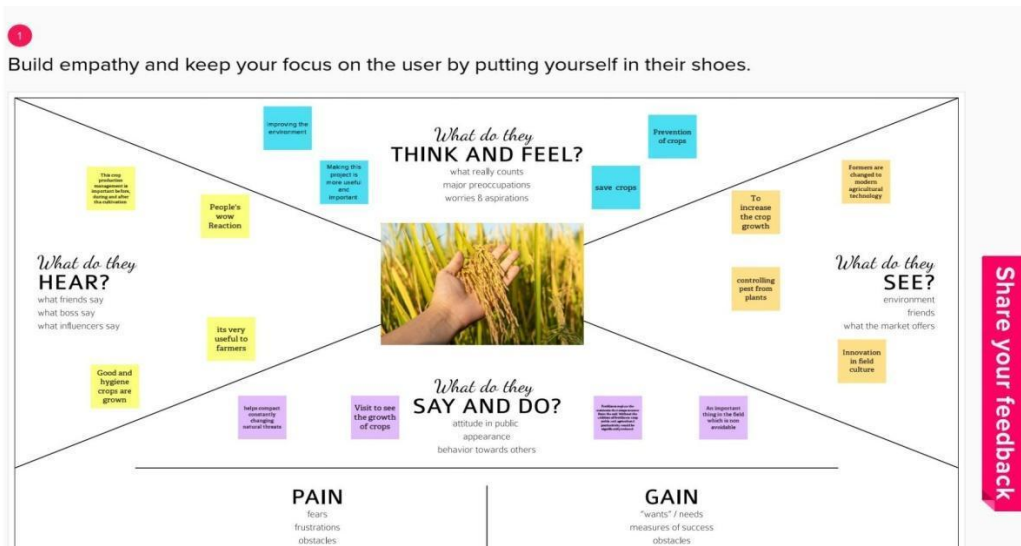
### PROBLEM STATEMENT



A working women is trying to develop plants growth but she couldn't monitor her crops regularly, Because she have another occupation which makes her feel producing low nutritious products.

## 3.1 EMPATHY MAP:

An empathy map allows us to sum up our learning from engagements with people in the field of design research. The map provides four major areas in which to focus our attention on,thus providing an over view of a person's experience.



## 3.2 IDEATION & BRAINSTORMING:

Ideation is often closely related to the practice of brainstorming, a specific technique that is utilized to generate new ideas. A principal difference between ideation and brainstorming is that ideation is commonly more thought of as being an individual pursuit, while brainstorming is almost always a group activity.

The screenshot shows the first two steps of a digital ideation process. Step 1, 'Define your problem statement', asks the user to frame a problem and provides a text box with the example: 'How might we protect our guests from viruses, pests, leaks and climate change?'. Step 2, 'Brainstorm', instructs the user to write down ideas and shows a grid of sticky notes organized into four columns: 'Siddhaharti', 'Poojithara', 'Vishesh', and 'Kishore'. A 'Key rules of brainstorming' section lists: Stay on topic, Exchange wild ideas, Defer judgment, Listen to others, Go for volume, and If possible be visual. A 'Group ideas' section follows, showing sticky notes clustered together on a grid.

**1 Define your problem statement**  
What problem are you trying to solve? Frame your problem as a how might this statement. This will be the focus of your brainstorming.  
5 minutes

**2 Brainstorm**  
Write down any ideas that come to mind that address your problem statement.  
15 minutes

**Key rules of brainstorming**  
Focus on smooth and productive session

- Stay on topic
- Exchange wild ideas
- Defer judgment
- Listen to others
- Go for volume
- If possible be visual

**Group ideas**  
Take turns sharing your ideas while clustering similar or related notes as you go. Once all sticky notes have been grouped, give each cluster a sentence-like label. If a cluster is bigger than six sticky notes, try and see if you can break it up into smaller sub-groups.  
20 minutes

The screenshot shows the 'Prioritize' and 'After you collaborate' sections. The 'Prioritize' section features a 2x2 matrix with axes for 'Importance' (vertical) and 'Feasibility' (horizontal). Sticky notes are placed in the matrix, with labels like 'Use scenarios from end to end', 'Use scenarios from end to end', 'Use scenarios from end to end', and 'Use scenarios from end to end'. The 'After you collaborate' section provides options to 'Share the mural', 'Export the mural', and 'Keep moving forward' with templates for 'Strategy blueprint', 'Customer experience journey', and 'Strengths, weaknesses, opportunities, and threats (SWOT)'. A 'Quick add-ons' section is also visible.

**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

**Importance**  
If each of these tasks could get done without any difficulty or cost, which would have the most positive impact?

**After you collaborate**  
You can export the mural as an image to share with members of your team. You might find it helpful.

**Quick add-ons**

- A Share the mural**  
Share a view link to the mural with all team members in the loop about the outcomes
- B Export the mural**  
Export a copy of the mural as an image, PDF, or CSV

**Keep moving forward**

- Strategy blueprint**  
Define the components of a strategy.  
Open the template →
- Customer experience journey**  
Understand customer needs, obstacles for an experience.  
Open the template →
- Strengths, weaknesses, opportunities, and threats (SWOT)**  
Identify strengths, weaknesses, and threats (SWOT) to develop.  
Open the template →

### 3.3 PROPOSED SOLUTION:

| S.NO | PARAMETER                               | DESCRIPTION  |
|------|---|--|
| 1    | Problem statement(problem to be solved) | Crops are affected by animals and birds  |
| 2    | Idea/solution description               | These animals and birds are detected before a particular distance from the crop by using PIR sensors   |
| 3    | Novelty/uniqueness                      | Through mobile phones we can able to know the status of the sensor.  |
| 4    | Social impact/customer satisfaction     | Customer can know the  |
| 5    | Business model (revenue model)          | Application  |
| 6    | Scalability of the solution             | Mobile phone is portable .The crops are protected by insects, animals, etc through the use of deliberate sensors connected in the form field |

### 3.4 PROBLEM SOLUTION FIT:

The problem solution fit simply means that you have found a problem with your customer and that the solution you have realized for it actually solve the customers problem.

|                         |   |  |   |                           |
|-------------------------|---|--|---|---------------------------|
| Define CS, fit into CC  | <b>1. CUSTOMER SEGMENT(S)</b> <span>CS</span><br>Who is your customer?<br>i.e. working parents of 0-5 y.o. kids<br><br>The farmers  | <b>6. CUSTOMER CONSTRAINTS</b> <span>CC</span><br>What constraints prevent your customers from taking action or limit their choices of solutions? i.e. spending power, budget, no cash, network connection, available devices<br><br>pests, high cost of inputs, shortage of land, weed infestation, shortage of inputs, low yield, poor quality of seed and poor soil fertility were identified as important crop protection constraints.   | <b>5. AVAILABLE SOLUTIONS</b> <span>AS</span><br>Which solutions are available to the customers when they face the problem?<br>Or need to get the job done? What have they tried in the past? What pros & cons do these solutions have? i.e. pen and paper is an alternative to digital notepad<br><br>Due to the affect of crops the financial status leads to down.   | Explore AS, differentiate |
|                         | <b>2. JOBS-TO-BE-DONE / PROBLEMS</b> <span>J&amp;P</span><br>Which jobs-to-be-done (or problems) do you address for your customers? There could be more than one, explore different sides.<br><br>Crop protection helps to keep plants healthy and maintain sustainable yields.   | <b>9. PROBLEM ROOT CAUSE</b> <span>RC</span><br>What is the real reason that this problem exists?<br>What is the back story behind the need to do this job?<br>i.e. customers have to do it because of the change in regulations.<br><br>Not getting awareness on crop protection  | <b>7. BEHAVIOUR</b> <span>BE</span><br>What does your customer do to address the problem and get the job done?<br>i.e. directly related: find the right solar panel installer, calculate usage and benefits, indirectly associated: customers spend how time on volunteering work (i.e. Greenpeace)<br><br>Certain cultural practices can prevent or reduce insect crop damage: these include destruction of crop residues, deep plowing, crop rotation, use of fertilizers, strip-cropping, irrigation and scheduled planting operation. |                           |
| Identify strong TR & EM | <b>3. TRIGGERS</b> <span>TR</span><br>What triggers customers to act? i.e. seeing their neighbour installing solar panels, reading about a more efficient solution in the news.<br><br>Introducing efficient farming methods requires growers' appropriate plant protection strategy and training.  | <b>10. YOUR SOLUTION</b><br>If you are working on an existing business, write down your current solution first, fill in the context, and check how much it fits reality.<br>If you are working on a new business proposition, start keep it blank until you fill in the context and come up with a solution that fits within customer limitations, solves a problem and matches customer behavior.<br><br>These animals and birds are detected before a particular distance from the crops by using PIR sensors. | <b>8. CHANNELS of BEHAVIOUR</b> <span>CH</span><br><b>ONLINE:</b><br>What kind of actions do customers take online? Extract online channels from #7<br><br><b>OFFLINE:</b><br>What kind of actions do customers take offline? Extract offline channels from #7 and use them for customer development.<br><b>ONLINE:</b><br>Customer should directly make connection from the sensors to their mobile<br>Phones so that they can take actions through online<br><b>OFFLINE:</b><br>Use of electrical fencing                               | Map AS & TR into EM       |
|                         | <b>4. EMOTIONS: BEFORE / AFTER</b> <span>EM</span><br>How do customers feel when they face a problem or a job and afterwards?<br>i.e. lost, insecure > confident, in-control - use it in your communication strategy & design<br><b>BEFORE:</b><br>Crops are destroyed by animals and the crop protection become less this makes customer Worry.<br><b>AFTER:</b><br>After using this method runs by sensors crops are being protected and the yield will be high and the customer need not to be worry |  |   |                           |

## 4.REQUIREMENTS ANALYSIS

### 4.1 FUNCTIONAL REQUIREMENTS:

| FR   | FUNCTIONAL REQUIREMENT(EPIC) | SUB REQUIREMENT(STORY/SUB TASK)   |
|------|------------------------------|---|
| FR-1 | User registration            | Install the app<br>Sign up with gmail or phone number creating a profile<br>Understand the guidelines |
| FR-2 | User confirmation            | Email or phone number verification required via OTP   |
| FR-3 | Accessing datasets           | Data's are obtained by cloudant DB  |
| FR-4 | Interface sensor             | Connect the sensor and application<br>When animals enter the field,the alarm is generated             |
| FR-5 | Mobile application           | It is used to control sensors and field sprinklers  |



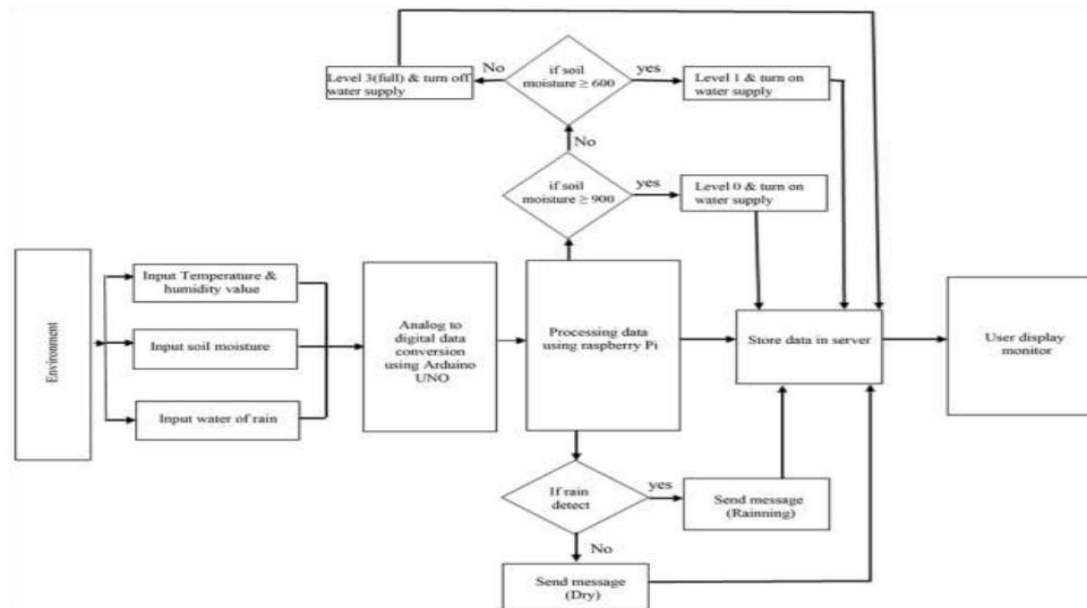
## 4.2 NON FUNCTIONAL REQUIREMENTS:

| FR. NO | NON FUNCTIONAL REQUIREMENT | DESCRIPTION  |
|--------|----------------------------|--|
| NFR-1  | Usability                  | This project's contributes the farm protection through the smart protection system   |
| NFR-2  | Security                   | It was created to protect the crops from animals   |
| NFR-3  | Reliability                | Farmers are able to safeguard their lands by help of this technology they will also benefits from higher crop yields,which will improve our economic situation |
| NFR-4  | Performance                | When animals attempt to enter the field,IOT devices and sensors alert the farmer via message   |
| NFR-5  | Availability               | We can defend the crops against wild animals by creating and implementing resident hardware and software   |
| NFR-6  | Scalability                | This system's integration of computer vision algorithms with IBM cloudant services makes it moreefficient to retrieve photos at scale,enhancing scalability    |

## 5.PROJECT DESIGN

### 5.1 DATA FLOW DIAGRAM:

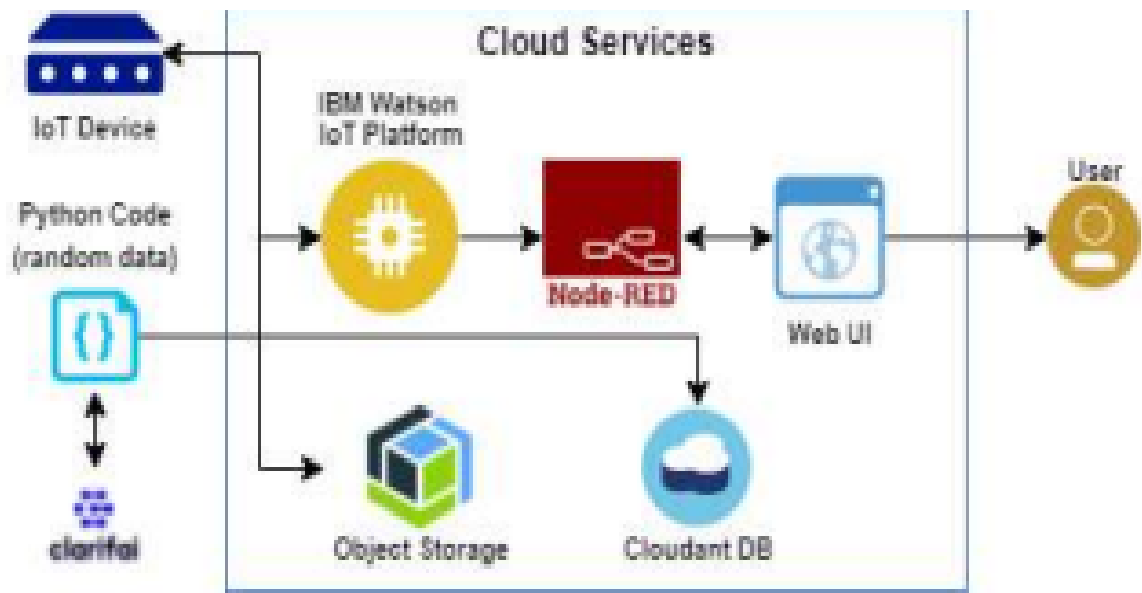
Flow diagram (DFD) is a traditional visual representation of the information flows with in a system. A neat and clear DFD can depict the right amount of the system requirement graphically.it shows how data enters and leaves the system, what changes the information,and where data is stored.



| USER TYPE                  | FUNCTIONAL REQUIREMENT(EPIC)          | USER STORY NUMBER | USER STORY/TASK   | ACCEPTANCE CRITERIA   | PRIORITY | RELEASE  |
|----------------------------|---------------------------------------|-------------------|---|---|----------|----------|
| Customer                   | Registration                          | USN -1            | As a user,I can register for the application by entering my Email,password and conforming my password | I can access my account/dashboard                                   | High     | Sprint-1 |
| Customer                   | Registration                          | USN-2             | As a user , I will receive confirmation message once I have registered for the application            | I can receive conformation message and clock confirm                | High     | Sprint-1 |
| Administrator              | Login page                            | USN-3             | As a user entering user name and password which is already existing                                   | Redirecting to user account   | medium   | Sprint-1 |
| Weather station            | Forecasting the weather               | USN-4             | As a user,we can monitor the weather fundamentals like(humidity, temperature)                         | Notified about weather conditions.                                  | High     | Sprint-1 |
| Controlling the motor pump | Controlling                           | USN-5             | It is used to control motors and field sprinklers   | Switching on and off the motor pump manually via mobile application | High     | Sprint-2 |
| Fencing                    | Detecting the motion in certain range | USN-6             | Fencing system are helpful in providing security against unauthorized access of human and animal      | I can receive notification prevention has been taken                | High     | Sprint-3 |

|                      |                              |       |                            |                            |      |          |
|----------------------|------------------------------|-------|----------------------------|----------------------------|------|----------|
| Warehouse management | Connecting database at crops | USN-7 | Here former need to update | Generate the popup message | High | Sprint-4 |
|----------------------|------------------------------|-------|----------------------------|----------------------------|------|----------|

5.2 SOLUTION AND TECHNICAL ARCHITECTURE:



**TABLE-1:COMPONENTS&TECHNOLOGIES**

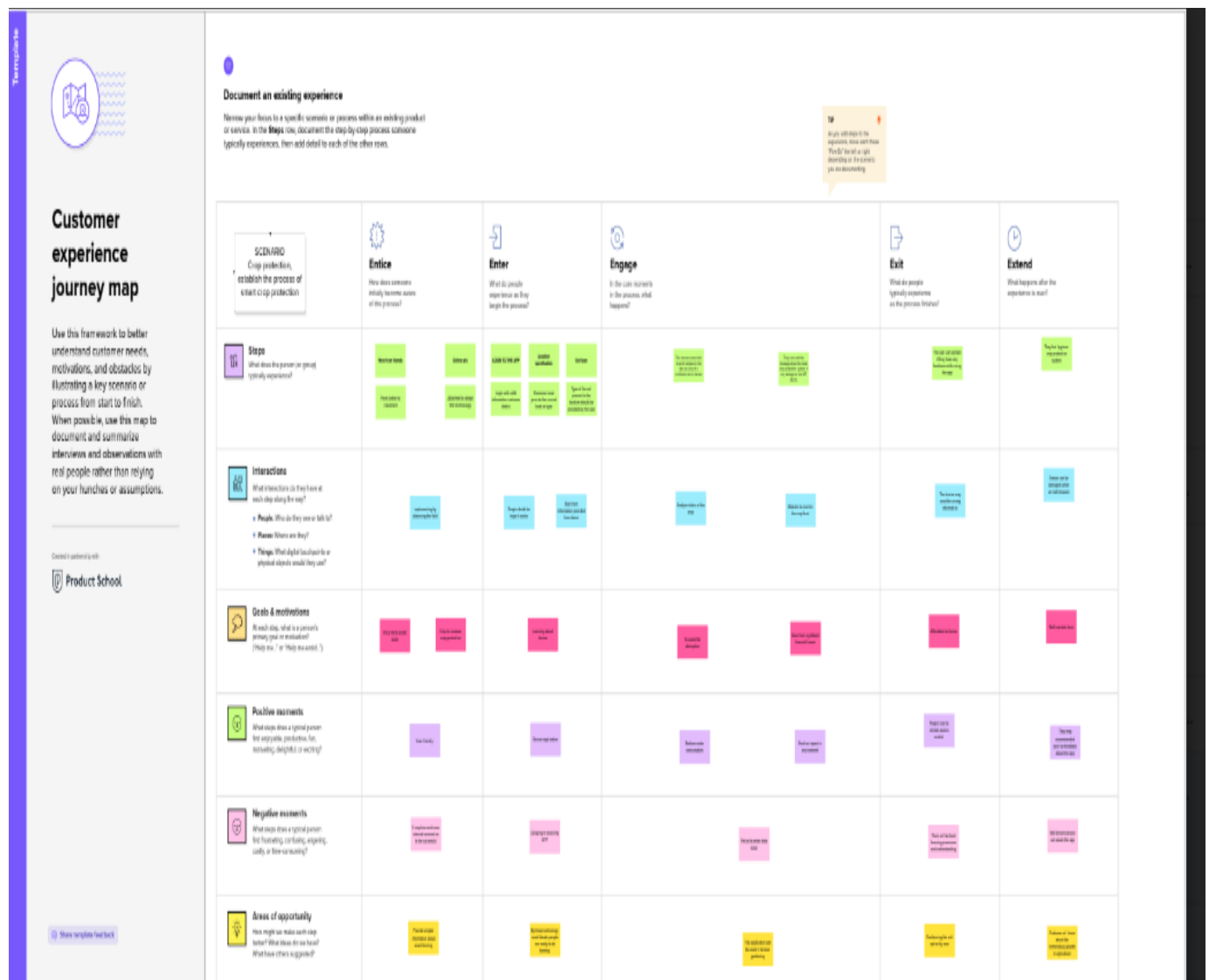
| <b>S.No</b> | <b>Component</b>     | <b>Description</b>  | <b>Technology</b>                                |
|-------------|----------------------|---|--|
| 1.          | User Interface       | How user interacts with application e.g. Web UI, Mobile App, Chatbot etc. | HTML, CSS, JavaScript / Angular Js/ ReactJs etc. |
| 2.          | Application Logic-1  | Logic for a process in the application                                    | Python   |
| 3.          | Application Logic-2  | Logic for a process in the application                                    | IBM Watson/node red                              |
| 4.          | Application Logic-3  | Logic for a process in the application                                    | IBM Watson/node red                              |
| 5.          | Database             | Data Type, Configurations etc.  | MySQL, NoSQL, etc.                               |
| 6.          | Cloud Database       | Database Service on Cloud   | IBM Cloudant.                                    |
| 7.          | Temperature sensor   | Monitor the temperature   | TMP36  |
| 8.          | Humidity sensor      | Monitor the humidity  | DHT11  |
| 9.          | Soil moisture sensor | Measure the amount of water in the soil                                   | Soil maoisture sensor                            |
| 10.         | Weather monitoring   | Monitor the weather   | Temperature sensor                               |

**Table-2: Application Characteristics:**

| <b>S.No</b> | <b>Characteristics</b>   | <b>Description</b>   | <b>Technology</b>  |
|-------------|--------------------------|--|--------------------|
| 1.          | Open-Source Frameworks   | Clarifai,Node- red   | Software           |
| 2.          | Security Implementations | Sensitive and private data must be protected from their protection until the decision-making and storage stages.   | Encryption process |
| 3.          | Scalable Architecture    | Scalability is a major concern for IOT platform it has been shown that different architectural choices of IOT platform affect system capability and that automatic real time decision making is feasible in an environment composed of dozens of thousand. | Software           |
| 4.          | Availability             | Automatic adjustment of farming equipment made possible by linking information like crops/weather and temperature,humidity etc.  | Software           |
| 5.          | Performance              | The ideas of implementing integrated sensors with sensing soil and environmental or ambient parameters in framing will be more efficient for overall monitoring .  | Software           |

## 5.3 USER STORIES:

A user story is an informal, general explanation of a software feature written from the perspective of the end user or customer. The purpose of a user story is to articulate how a piece of work will deliver a particular value back to the customer.



## 6.PROJECT PLANNING & SCHEDULING

### 6.1 SPRINT PLANNING & ESTIMATION:

| SPRINT   | FUNCTIONAL REQUIREMENT (EPIC) | USER STORY NUMBER | USER STORY/TASK  | STORY POINTS | PRIORITY | TEAM MEMBERS                               |
|----------|-------------------------------|-------------------|--|--------------|----------|--|
| Sprint-1 | CLARIFAI                      | USN-1             | Sensors and WiFi module with python code To create application in clarifai and run the python code | 2            | High     | Aishwarya, Dhinesh, Subhaharini, Tejashree |
| Sprint-2 | SOFTWARE                      | USN-2             | IBM Watson IOT platform, workflows for IOT scenarios using node-red                                | 2            | High     | Aishwarya, Subhaharini, Dhinesh, Tejashree |
| Sprint-3 | SOFTWARE                      | USN-3             | Connecting iot device with object storage  | 2            | High     | Aishwarya, subhaharini, dhinesh, tejashree |
| Sprint-4 | WEB UI                        | USN-4             | To make the user to interact with software   | 2            | High     | Aishwarya, subhaharini, dhinesh, tejashree |



## PROJECT TRACKER,VELOCITY&BURNDOWN CHART:

| SPRINT   | TOTAL STORY POINTS | DURATION | SPRINT START DATE | SPRINT END DATE (PLANNED) | STORY POINT COMPLETED (AS PLANNED END DATE) | SPRINT RELEASE DATE (ACTUAL) |
|----------|--------------------|----------|-------------------|---------------------------|---|------------------------------|
| Sprint-1 | 20                 | 6Days    | 24 Oct 2022       | 29 Oct 2022               | 20  | 29 Oct 2022                  |
| Sprint-2 | 20                 | 6Days    | 31Oct 2022        | 05 Nov 2022               | 20  | 05 Nov 2022                  |
| Sprint-3 | 20                 | 6Days    | 07Nov 2022        | 12 Nov 2022               | 20  | 12 Nov 2022                  |
| Sprint-4 | 20                 | 6Days    | 14Nov 2022        | 19 Nov 2022               | 20  | 14 Nov 2022                  |
|          |                    |          |                   |                           |   |                              |

### VELOCITY:

Image we have a 10-days 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 days)

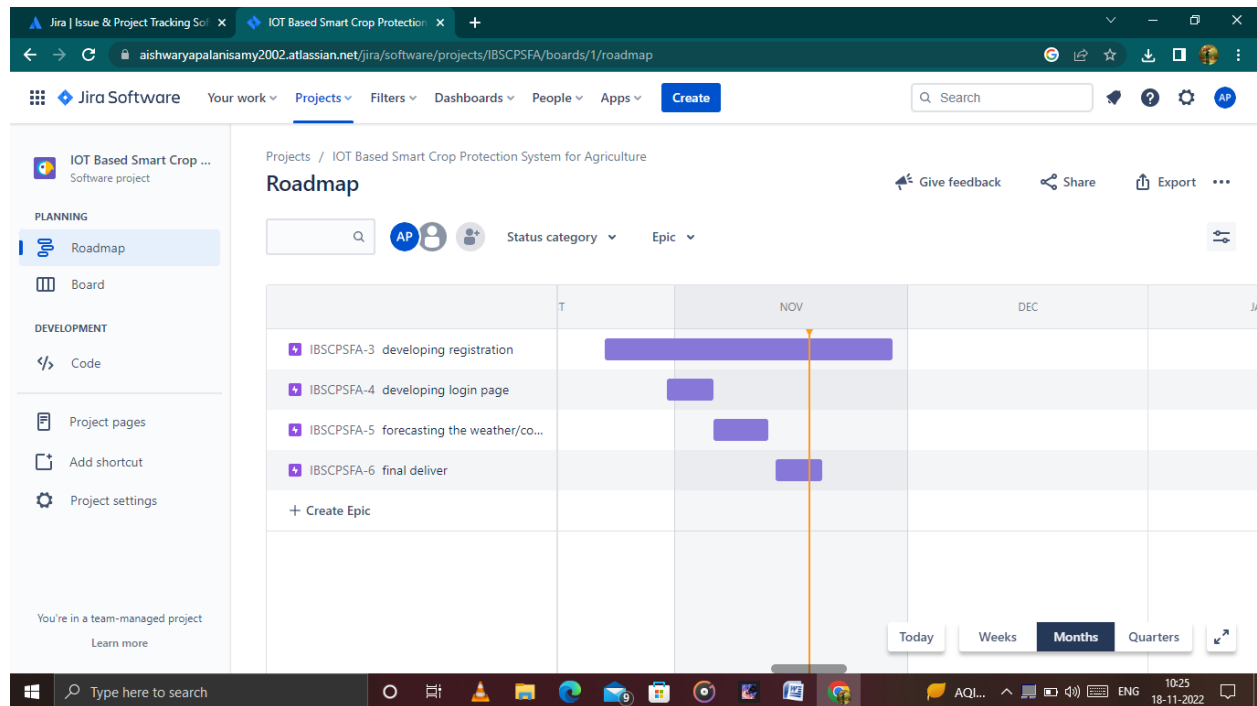
$$\frac{AV = \text{Sprint duration}}{\text{velocity}} = \frac{20}{10} = 2$$

### BURNDOWN CHART:

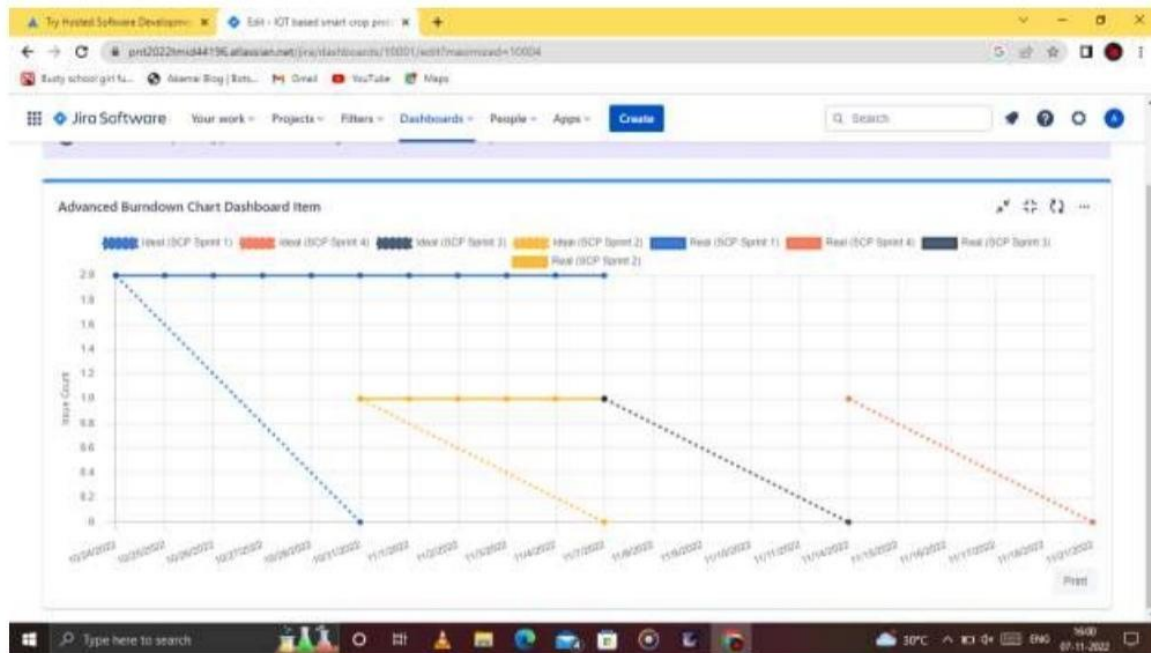
A born down chart is a graphical representation if work left to do versus time. It is often used in agile software development methodologies such as scrum. However, burn down charts can be applied to any project containing measurable progress over time.

## 6.3 REPORT FROM JIRA:

### ROAD MAP:



### BURNDOWN CHART:



## 7.CODING & SCHEDULING

### 7.1 FEATURE 1:

```
#IBM Watson IOT Platform
#pip install wiotp-sdk
import wiotp.sdk.device
import time
import random
myConfig = {
    "identity": {
        "orgId": "XXXXXX",
        "typeId": "YYYYYYYYYY",
        "deviceId": "ZZZZZZ"
    },
    "auth": {
        "token": "XXYYZZ"
    }
}

def myCommandCallback(cmd):
    print("Message received from IBM IoT Platform: %s" %
    cmd.data['command'])
    m=cmd.data['command']
```

```

client = wiotp.sdk.device.DeviceClient(config=myConfig,
logHandlers=None)
client.connect()

while True:
    temp=random.randint(0,100)
    hum=random.randint(0,100)
    soil=random.randint(0,100)
    myData={'Temperature':temp,
            'Humidity':hum,
            'SoilMoisture':soil}
    client.publishEvent(eventId="status", msgFormat="json",
data=myData, qos=0, onPublish=None)
    print("Published data Successfully: %s", myData)
    if(soil<25):
        print("Motor is ON")
    else:
        print("Motor is OFF")
    client.commandCallback = myCommandCallback
    time.sleep(2)
client.disconnect()

```

## **FEATURE 2:-**

```

if(soil<25):
    print("Motor is ON")
else:
    print("Motor is OFF")
if(soil<25):
    print("Light is ON")
else:
    print("Light is OFF")

```

## **8.TESTING**

### **8.1 TEST CASES:**

IBM-P x

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## 8.2 USER ACCEPTANCE TESTING:

### 1. Purpose of Document

The purpose of this document is to briefly explain the test coverage and open issues of the [Product Name] 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.

### Defect analysis table:

| 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          | 5          | 2          | 1          | 8        |
| Totals         | 24         | 14         | 13         | 26         | 77       |

### 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        | 7           | 0          | 0    | 7    |
| 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 | 4           | 0          | 0    | 4    |
| Version Control     | 2           | 0          | 0    | 2    |

## 9. RESULT

### 9.1 PERFORMANCE METRICS:

performance template for IoT - Microsoft Excel

| NFT - Risk Assessment    |                                     |                           |   |                            |                   |  |                   |
|--------------------------|-------------------------------------|---------------------------|---|----------------------------|-------------------|--|-------------------|
| S.No                     | Scenario Name                       | Scope/feature             | Functional Changes                      | Hardware Changes           | Software Changes  | Impact of Downtime   | Risk Score        |
| 1                        | Detection accuracy - Response       | New                       | New                                     | Low                        | Moderate          | Moderate   | Orange            |
| 2                        | Soil Moisture below threshold limit | New                       | Moderate                                | No                         | NO                | Low  | Green             |
| 3                        | Clarifai is a device used to detect | New                       | Moderate                                | Low                        | No                | Moderate   | Orange            |
| NFT - Detailed Test Plan |                                     |                           |   |                            |                   |  |                   |
| S.No                     | Project Overview                    | NFT Test approach         | Assumptions/Dependencies/Risks          | Approvals/SignOff          |                   |  |                   |
| 1                        | Detection Accuracy and response     | Using python and Node Red | Dependency-Cloud client / Risk-Moderate |                            |                   |  |                   |
| 2                        | Soil Moisture below threshold limit | Using python and Node Red | Dependency-Cloud client / Risk-Low      |                            |                   |  |                   |
| 3                        | User Mobile Application             | Using MIT App Inventor    | Dependency-Cloud client / Risk-Low      |                            |                   |  |                   |
| End Of Test Report       |                                     |                           |   |                            |                   |  |                   |
| S.No                     | Project Overview                    | FT Test approach          | NFR - Met                               | Test Outcome               | GO/NO-GO decision | Identified Defects (Detected/Closed/Open)  | Approvals/SignOff |
| 1                        | Detection accuracy - Response       | Using Python and NodeRed  | No                                      | Expectations partially met | No-Go             | Observed intermittent performance issue sometimes. Bug is open                         |                   |
| 2                        | Soil Moisture below threshold limit | Using Python and NodeRed  | Yes                                     | Expectations met           | Go                | Observed response for the leakage detection in the UI and its accuracy is as expected. |                   |
| 3                        | Clarifai is a device used to detect | Using Python              | No                                      | Expectation partially met  | No-Go             | Observed intermittent performance issue sometimes. Bug is open                         |                   |

## 10.ADVANTAGES & DISADVANTAGES

### ADVANTAGES:

- 1.Optimized crop treatment such as accurate planting, watering ,pesticide application and harvesting directly affects production rates.
- 2.Weather predictions and soil moisture sensors allow for water use only when and where needed.
- 3.To increase the crop gain.
- 4.It helps to conserve the environment.
5. Sensor help to warn the farmers.

## **DISADVANTAGES:**

- 1.High cost
- 2.Lack of infrastructure

## **11.CONCLUSION:**

From this literature survey we have seen lots of technology that helps to farmer for to protect his farm specially IoT based system who can monitor the farm online. In above research papers they are not looking cost of system and so that did not get affordable to every farmer, Hence we want to implement a costless smart crop protection.

## **12.FUTURE SCOPE:**

In the future, there will be a large scope for this system. The IR sensors and ultrasonic sensors are used to collect the information and transmitted through GSM. This project is further enhanced by wireless sensor network. The type of sensors like finding the moisture content of the soil, growth of the crop and nutrition content in the soil. This sensor gather information which is useful to the farmers and able to conscious of the farm land from any place in the world.

## **13.APENDIX**

### **13.1 SOURCE CODE:**

```
#IBM Watson IOT Platform
#pip install wiotp-sdk
import wiotp.sdk.device
import time
import random
myConfig = {
    "identity": {
        "orgId": "76fcms",
        "typeId": "adsdevice",
        "deviceId":"1109"
    },
    "auth": {
        "token": "16092001"
    }
}

def myCommandCallback(cmd):
```



```

        print("Message received from IBM IoT Platform: %s" %
cmd.data['command'])
        m=cmd.data['command']

client = wiotp.sdk.device.DeviceClient(config=myConfig,
logHandlers=None)
client.connect()

while True:
    temp=random.randint(0,100)
    hum=random.randint(0,100)
    soil=random.randint(0,100)
    myData={'Temperature':temp,
            'Humidity':hum,
            'SoilMoisture':soil}
    client.publishEvent(eventId="status", msgFormat="json",
data=myData, qos=0, onPublish=None)
    print("Published data Successfully: %s", myData)
    if(soil<25):
        print("Motor is ON")
    else:
        print("Motor is OFF")
    client.commandCallback = myCommandCallback
    time.sleep(2)
client.disconnect()

```

### 13.2 GITHUB&PROJECT DEMO LINK:

[IBM-EPBL/IBM-Project-44196-1660723212](https://github.com/IBM-EPBL/IBM-Project-44196-1660723212)

[https://drive.google.com/file/d/1syHqhhr4jdxKVYMY\\_gOAiRR5PejRbj3u/view?usp=sharing](https://drive.google.com/file/d/1syHqhhr4jdxKVYMY_gOAiRR5PejRbj3u/view?usp=sharing)