IBM
PROJECT
IOT BASED SMART CROP PROTECTION SYSTEM FOR AGRICULTURE

Batch: B11-5A1E
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CONTENTS

1. INTRODUCTION:

1.1 Project Overview:

In this project very useful on HORTICULTURE in monitor and alert the user for crop growth without any dismay. In the web application, admins can view the sensor parameters integrate the buttons in the UI to control the motors by the need of crop protection.

1.2 Purpose:

To protect the farm from the theft in the horticulture and Min purpose of thisproject is to alert the farmer as well as fear the animals with getting harm to animals.

2. LITERATURE SURVEY:

2.1 Existing Problem:

The number of sensors and that position is unpredictable and improper toassess data analytics driving automation and response activites.

2.2 References:

A. Tzounis, N. Katsoulas, T. Bartzanas, and C. Kittas, "Internet of things in agriculture, recent advances and future challenges," Biosystems Engineering, vol. 164, pp. 31–48, 2017.

2.3 Problem statement definition:

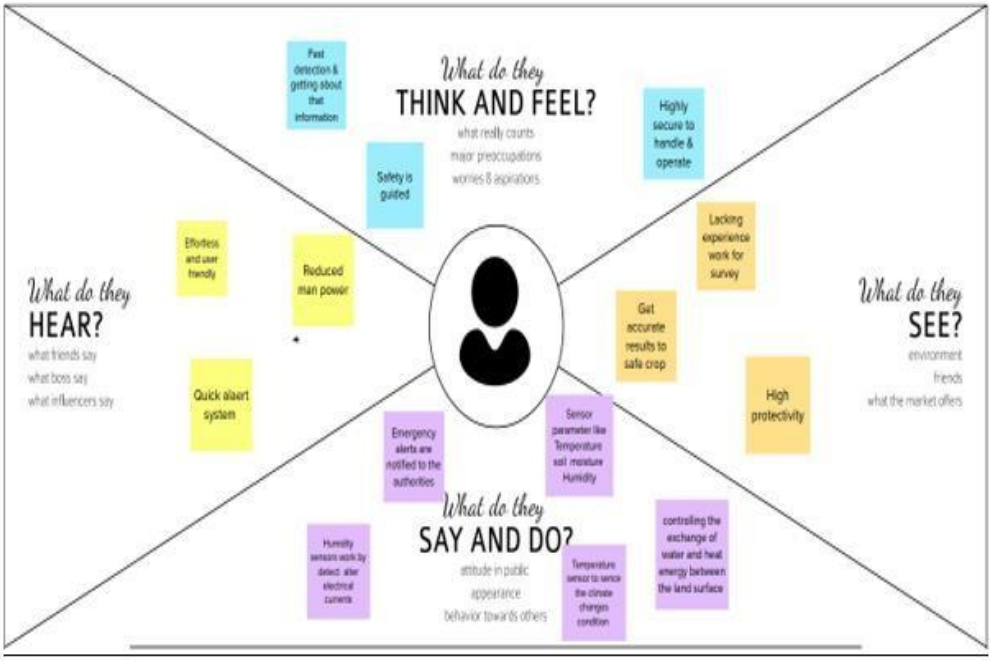
*** Since sensors is unpredictable secured in handling**

*** Also the cost price of the products and the complications in installing the systems are high.**

*** Climates changes to increased the maintenance of channel**

3. IDEATION & PROPOSED SOLUTION:

3.1 Empathy Map Canvas:



3.2 Ideation & Brainstorming:

Step:1

SIDHARTHINI KS

The smart protection system defines that this project help to Farmer for the protection of a farm.

The IOT device is used to indicate the farmer by a message while someone enter into the farm and we are used SD card module that helps to store a specified sound to fear the animals.

)This whole project is work on 12V dc supply from battery. We used solar panel to charge the battery

This project contents Arduino UNO,node mcu,LCD display,Flame sensor,PIR sensor,SD card module,solar panel,(solar charge converter)(boost converter)

ABARNA A

Sensors to detect if there is any disease

Realtime crop monitoring

Effective accuration and adaptive

Imroved livestock farming

KAYATHRI V

Ultrasonic sensors are used to detect the animal movement

Alarm to scare the small predator like birds so on ....

Send intimation message to user where there is any movement of animals activities

Reduce the environmental footprints

MADHUMITHA A

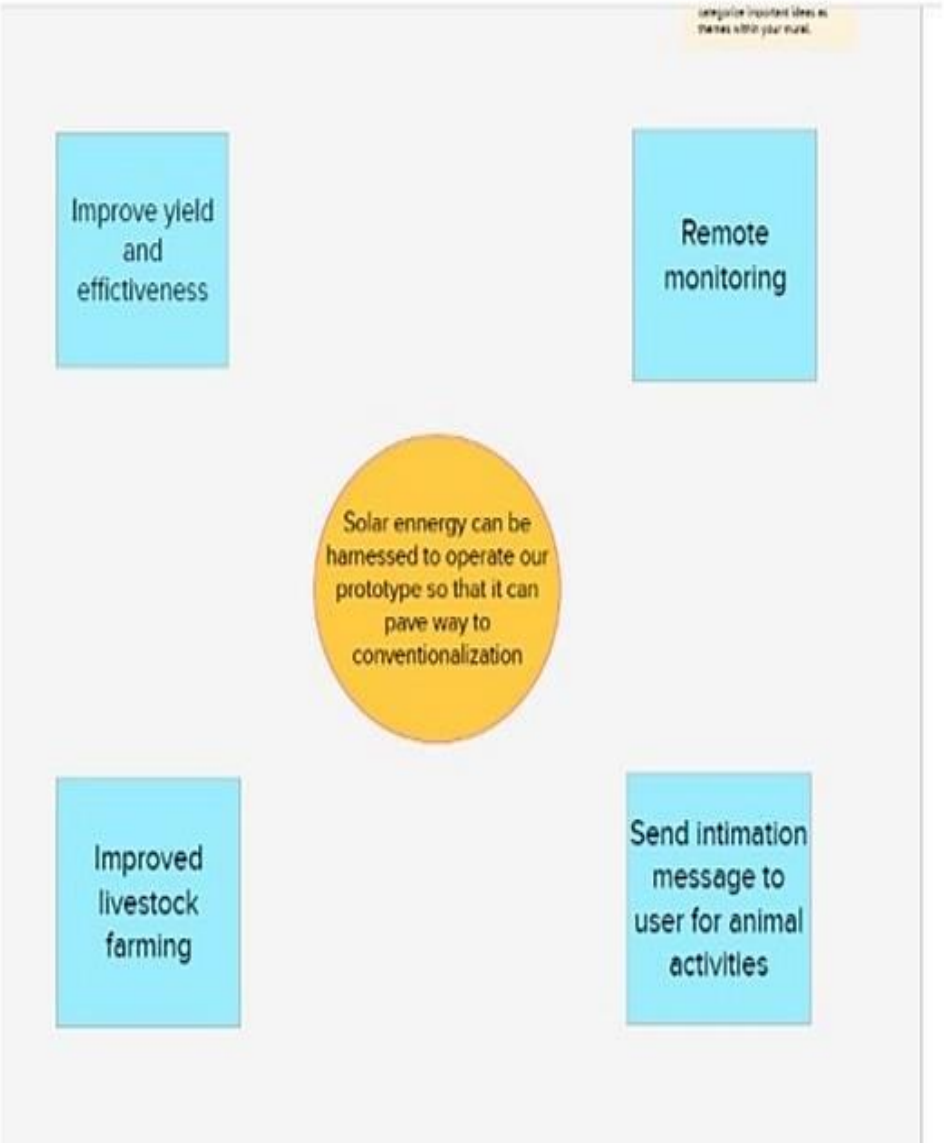
Necessary communication interface

Highly flexible and more accuration

Sensors to detect the any movement of the animals

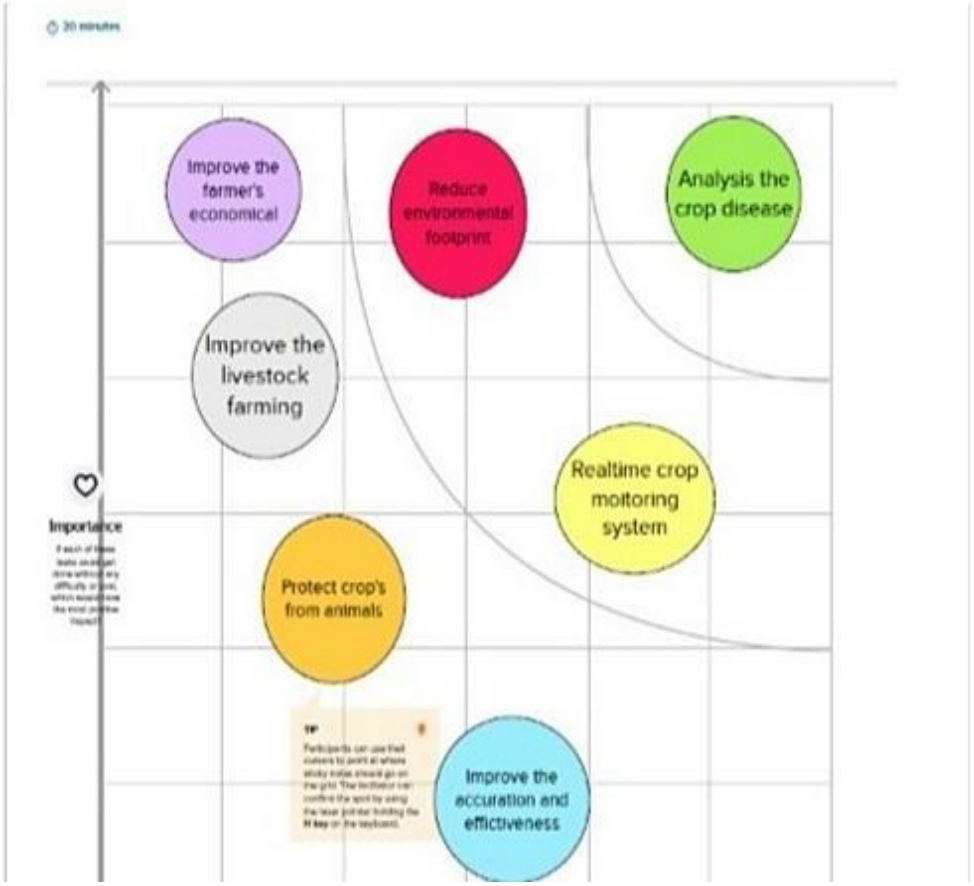
Local data acquisation

GROUP IDEAS:


Improve yield and effictiveness
Remote monitoring
Solar ennergy can be harnessed to operate our prototype so that it can pave way to conventionalization
Improved livestock farming
Send intimation message to user for animal activities

Step:3

IDEA PRIORITIZATION:

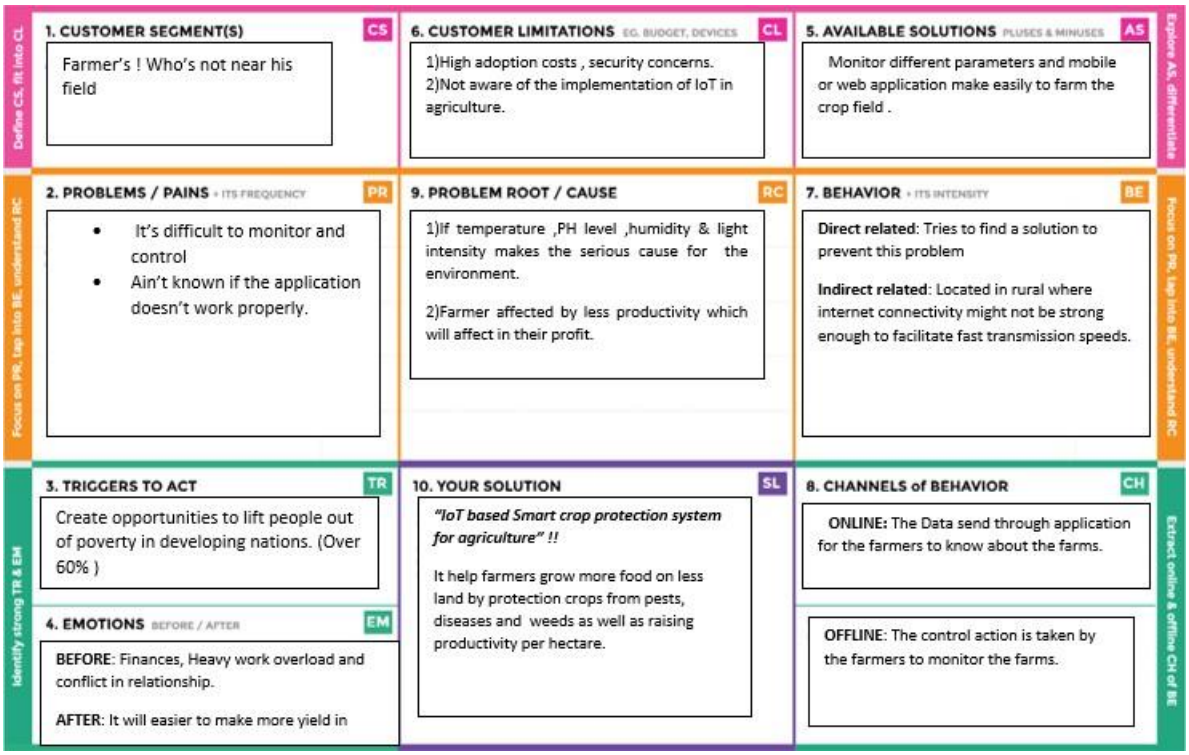


3.3 Proposed Solution:

S.NO	Parameter	Description
1)	ProblemStatement(Problem to be solved)	Develop an efficient system &an application that can monitor and alert the users(farmers)
2)	Idea/Solution description	➤ This product helps the field in monitoringthe animals other disturbance. ➤ In several areas, the temperature sensorswill be integrated to monitor the temperature & humidity. ➤ If in any area feel dry or wetless is detected by admins, will be notified alongwith the location in the web application.
3)	Novelty/Uniqueness	➤ Fastest alerts to the farmers ➤ The increasing demand for quality food ➤ User friendly
4)	Social Impact/Customer Satisfaction	➤ As the product usage can be understood by everyone, it is easy for them to use it properly for their safest organization. ➤ The product is advertised all over the platforms. Since it is economical, even helps small scale farming land from disasters.

5)	**Business Model(Revenue Model).**	➢ **As the product usage can be understoodby everyone, it is easy for them to use it properly for their safest organization.** ➢ **The product is advertised all over the platforms. Since it is economical, even helps small scale farming land from disasters..**
6)	**Scalability of the Solution**	➢ **Even when the interruption is more, the product sense the accurate location and alerts the farmers effectively**

3.4 Problem solution fit



4. REQUIREMENT ANALYSIS

4.1Functional Requirement:

FR No	Function Requirement(Epic)	Sub Requirement (Story / Sub-Task)

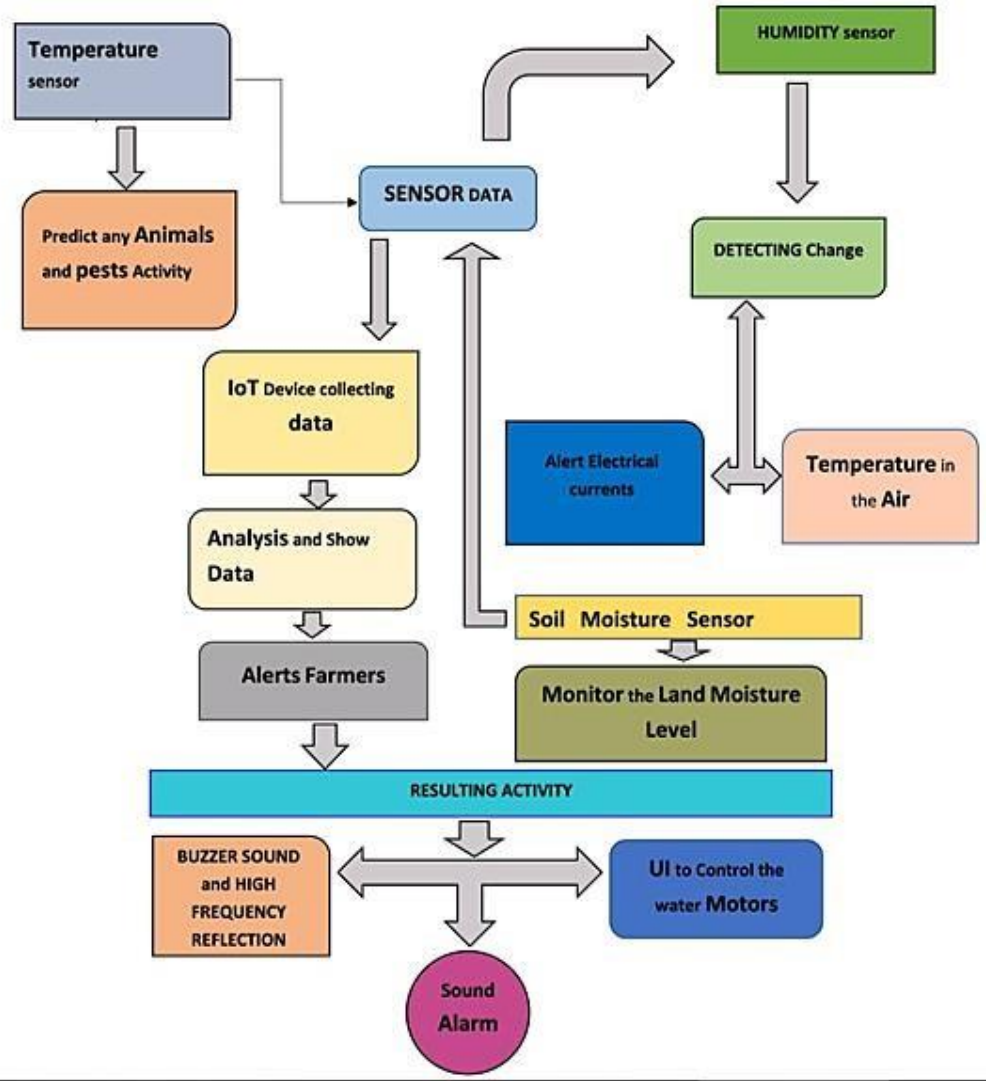
FR-2	**User Visibility**	**Sense animals nearing the crop field and sounds alarm to woo them away as well as sends SMS to farmer using cloud service**
FR-2	**User Reception**	**Sense animals nearing the crop field and sounds alarm to woo them away as well as sends SMS to farmer using cloud service**
FR-3	**User Understanding**	**Based on the sensor data value to get the information about present of farming land**
FR-4	**User Action**	**The user needs take action like destruction of crop residues, deep plowing, crop rotation, fertilizers, strip cropping, scheduled planting operations**

Non-functional Requirements:

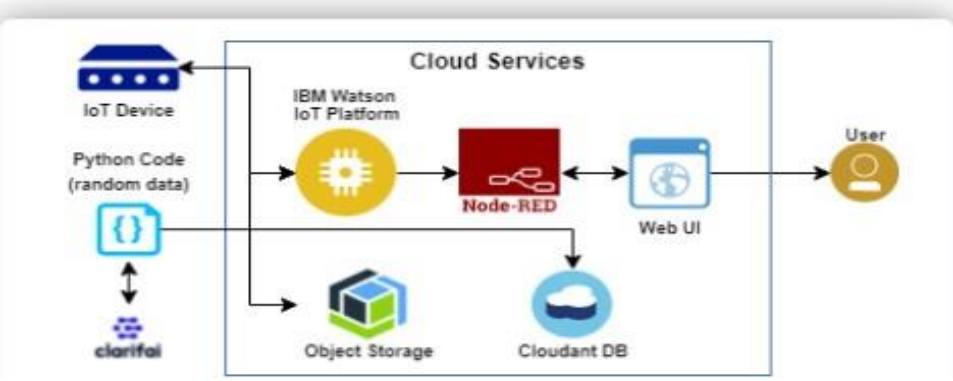
FR No	Non-Functional Requirement	Description
NFR-1	**Usability**	**Mobile support. Users must be able to interact in the same roles & tasks on computers & mobile devices where practical, given mobile capabilities.**
NFR-2 **NFR-3**	**Security** **Reliability**	**Data requires secure access to must register and communicate securely on devices and authorized users of the system who exchange information must be able to do.** **It has a capacity to recognize the disturbance near the field and doesn't give a false caution signal.**
NFR-4	**Performance**	**Must provide acceptable response times to users regardless of the volume of data that is stored and the analytics that occurs in background. Bidirectional, near real-time communications must be**

		supported. This requirement is related to the requirement to support industrial and device protocols at the edge.
NFR-5	**Availability**	**IoT solutions and domains demand highly available systems for 24x7 operations. Isn't a *critical production* application, which means that operations or production don't go down if the IoT solution is down.**
NFR-6	**Scability**	**System must handle expanding load and data retention needs that are based on the upscaling of the solution scope, such as extra manufacturing facilities and extra buildings.**

5.1 Data Flow Diagrams:



5.2 Solution & Technical Architecture:



User-Stories:

User Type	Functional requirement (Epic)	User Story Number	User Story/Task	Acceptance criteria	Priority	Release
Customer(Mobile user)	Registration	USN-1	User can enter into the web application	I can access my account /dashboard	High	Sprint 1
		USN-2	User can register their credentials like email id and password	I can receive confirmation email & click confirm	High	Sprint 1
	Login	USN-3	User can log into the application by entering email & password	I can login to my account	High	Sprint 1
	Dashboard	USN-4	User can view the temperature	I can view the data given by the device	High	Sprint 2
		USN-5	User can view the level of sensor	I can view the data	High	Sprint 2

			monitoring value	given by the device		
Customer(Web user)	Usage	USN-1	User can view the web page and get the information.	I can view the data given by the device	High	Sprint 3
Customer	Usage	USN-1	User can view the web page and get the information	I can view the data given by the device	High	Sprint 3
Customer	Working	USN-1	User act according to the alert given by the device	I can get the data work according to it	High	Sprint 3
		USN-2	User turns ON the water motors/Buzzer/Sound Alarm when occur the disturbance on field.	I can get the data work according to it	High	Sprint 4
Customer care Executive	Action	USN-1	User solve the problem when some faces any usage issues	I can get the data work according to it	High	Sprint 4
Administration	Administration	USN-1	User store every	I can store the gained information	High	Sprint 4

6. PROJECT PLANNING AND SCHEDULING

6.1 Sprint Planning & Estimation:

Sprint	Functional Requirement (Epic)	User Story Number	User Story / Task	Story Points	Priority	Team Members
Sprint-1		US-1	Create the IBM Cloud services which are being used in this project.	6	High	Sidharthini KS Abarna A Kayathri V Madhumitha A
Sprint-1		US-2	Configure the IBM Cloud services which are being used in completing this project.	4	Medium	Sidharthini KS Abarna A Kayathri V Madhumitha A
Sprint-2		US-3	IBM Watson IoT platform acts as the mediator to connect the web application to IoT devices, so create the IBM Watson IoT platform.	5	Medium	Sidharthini KS Abarna A Kayathri V Madhumitha A
Sprint-2		US-4	In order to connect the IoT device to the IBM cloud, create a device in the IBM Watson IoT platform and get the device credentials.	5	High	Sidharthini KS Abarna A Kayathri V Madhumitha A
Sprint-3		US-1	Configure the connection security and create API keys that are used in the Node-RED service for accessing the IBM IoT Platform.	10	High	Sidharthini KS Abarna A Kayathri V Madhumitha A
Sprint-3		US-2	Create a Node-RED service.	10	High	Sidharthini KS Abarna A Kayathri V Madhumitha A
Sprint-3		US-1	Develop a python script to publish random sensor data such as temperature, moisture, soil and humidity to the IBM IoT platform	7	High	Sidharthini KS Abarna A Kayathri V Madhumitha A
Sprint-3		US-2	After developing python code, commands are received just print the statements which represent the control of the devices.	5	Medium	Sidharthini KS Abarna A Kayathri V Madhumitha A
Sprint-4		US-3	Publish Data to The IBM Cloud	8	High	Sidharthini KS Abarna A Kayathri V Madhumitha A
Sprint-4		US-1	Create web UI in node red	10	High	Sidharthini KS Abarna A Kayathri V Madhumitha A

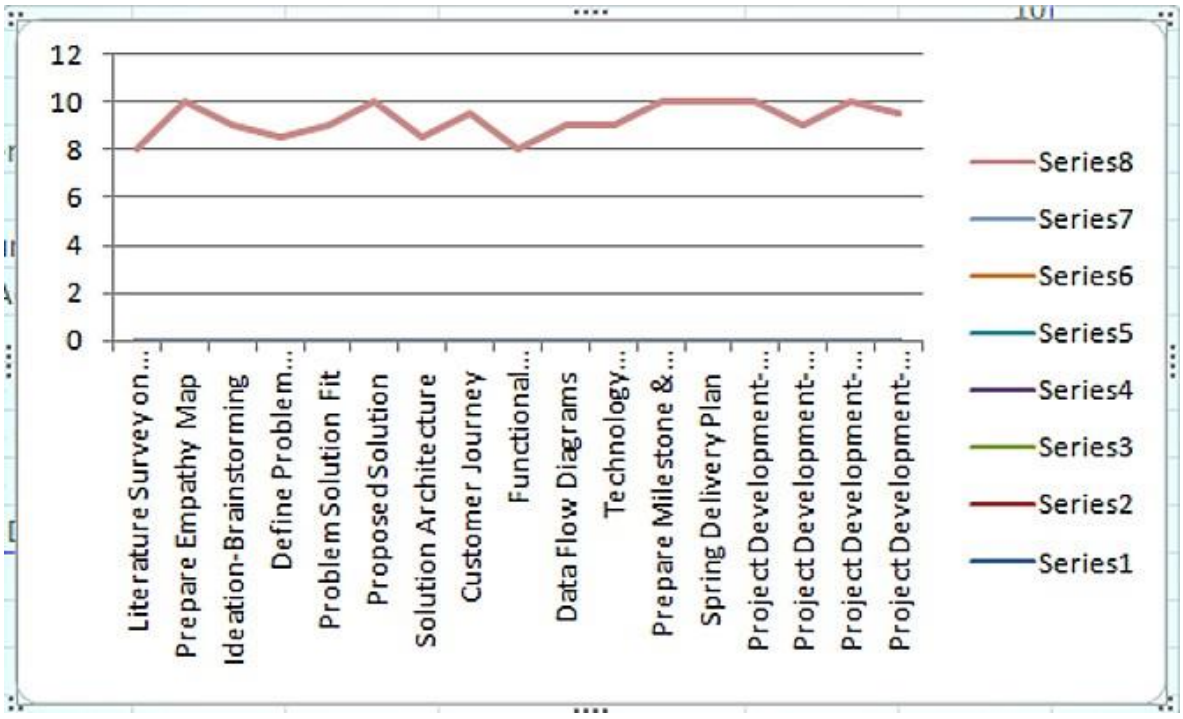
Sprint-4		**US-2**	**Configure the Node-RED flow to receive data from the IBM IoT platform and also use Cloudant DB nodes to store the received sensor data in the cloudant DB**	**10**	**High**	**Sidharthini KS Abarna A Kayathri V Madhumitha A**

Project Tracker, Velocity & Burndown Chart:

Sprint	Total Story Points	Duration	Sprint Start Date	Sprint End Date (Planned)	Story Points Completed (as on Planned End Date)	Sprint Release Date (Actual)
Sprint-1	20	6 Days	24 Oct 2022	29 Oct 2022	20	29 Oct 2022
Sprint-1	20	6 Days	31 Oct 2022	05 Nov 2022	20	05 Nov 2022
Sprint-1	20	6 Days	07 Nav2022	12 Nov 2022	20	12 Nov 2022
Sprint-1	20	6 Days	14 Nav 2022	19 Nov 2022	20	19 Nov 2022

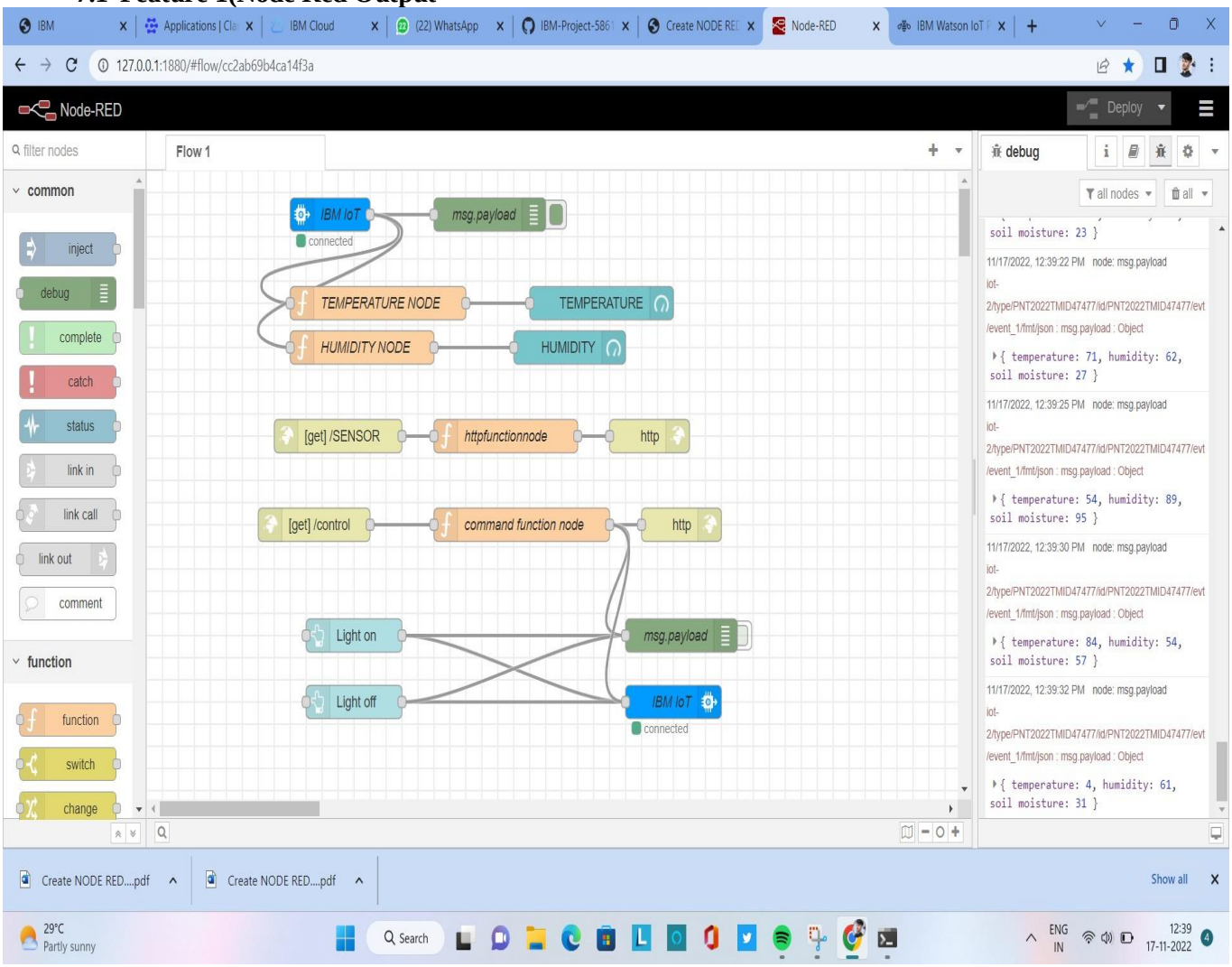
6.3 Reports From JIRA:

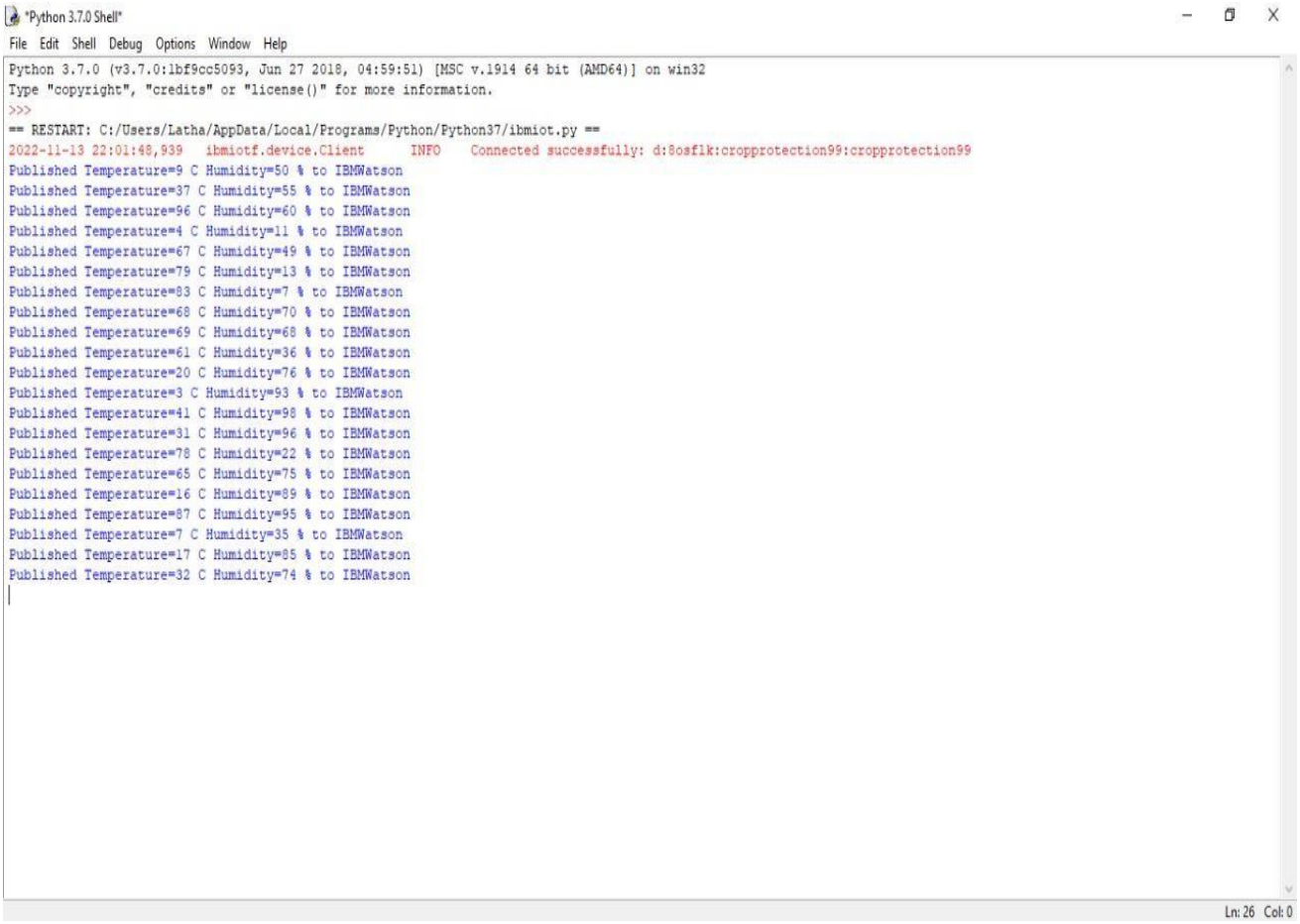
Jira report



7. CODING AND SOLUTIONING:

7.1 Feature 1(Node Red Output





8. TESTING:

- 8.1 Test cases
- 8.2 User Acceptance Testing

9. RESULTS:

- 9.1 Performance Metrics

10. ADVANTAGES AND DISADVANTAGESAdvantages:

- ☆ Farmers can monitor the health of farm animals closely, even if they physically distant
- ☆ Also possible to monitor the pregnancy of these animals and identify which of them aresick.
- ☆ Real-time updates.
- ☆ Ensure worker's health.
- ☆ Get immediate alerts.
- ☆ Reduce waste, improve productivity and enable management of a greater number of resources through remote sensing.
- ☆ Data analytics for improved decisions

Disadvantages:

- ☆ **Chances where the data might get wrong at time.**
- ☆ **Farms are located in remote areas and are far from access to the internet.**
- ☆ **A farmer needs to have access to crop data reliably at any time from any location, so connection issues would cause an advanced monitoring system to be useless.**

11. CONCLUSION:

Agriculture irrigation control stays unique of the determined significant interests in agriculture .The simulation result describes the aqua utilization according to the field parameters in the cultivation field. Guideline of horticultural water system stays restrictive to the set up significant interests of farming.. In the field of IoT, we proposed an integrative way to deal with brilliant horticulture at modern level, zeroed in on low-power crusades and arisingcauses. This field of this effort remains towards withdraw to monitor the system for crop security conflicting to subconscious occurrences and meteorological conditions.

12. FUTURE SCOPE:

- ◊ **IoT enabled device are likely to be all-pervasive, from industry to households.**
- ◊ **The future scope of IoT is bring and varied , and it is only a matter of time beforethe above applications of the technology are realized.**

13. APPENDIX:

Source Code:

Python code

GitHub and Project Demo Link:

GitHub link

Project Demo Link