IBM PROJECT

IOT BASED SMART CROP PROTECTION SYSTEM FOR AGRICULTURE

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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 contorl 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 this project 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 to assess data analytics driving automation and response activies.

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 inceased the maintnace of channel

3. IDEATION & PROPOSED SOLUTION:

3.1 Empathy Map Canvas:
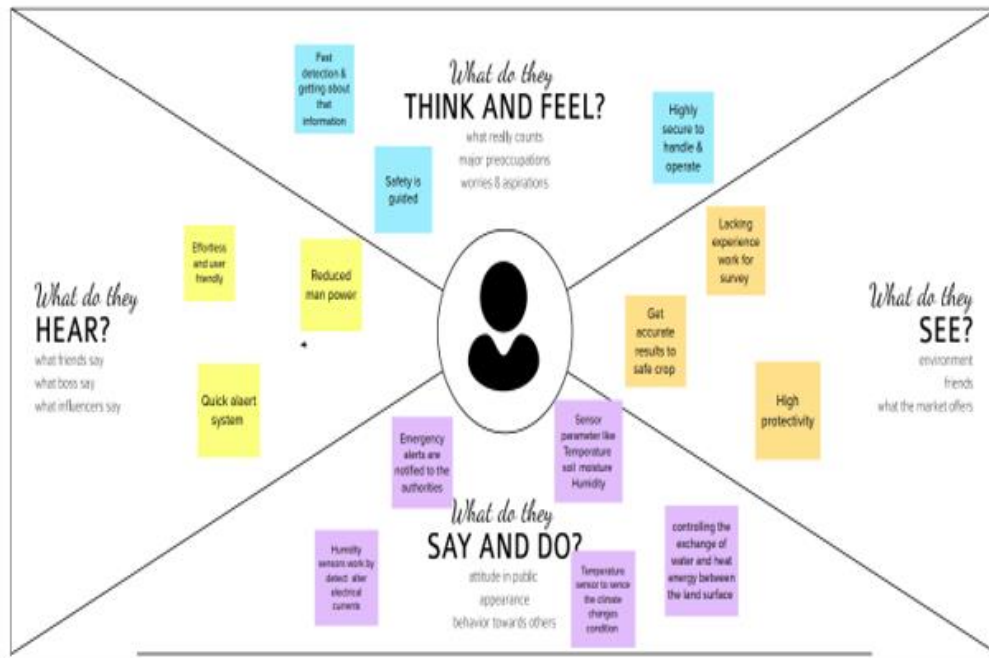
3.2 Ideation & Brainstorming:

Step:1

1

Define your problem statement

What problem are you trying to solve? Frame your problem as a How Might We statement. This will be the focus of your brainstorm.

🕐 5 minutes

PROBLEM
How might we protect crop from being destroyed ?

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).

Sensors to detect if there is any disease

Realtime crop monitoring

Effective accuration and adaptive

Imroved livestock farming

Ultrasonic sensors are used to detect the animal movement

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

Necessary communication interface

Highly flexible and more accuration

Send intimation message to user where there is any movement of animals activities
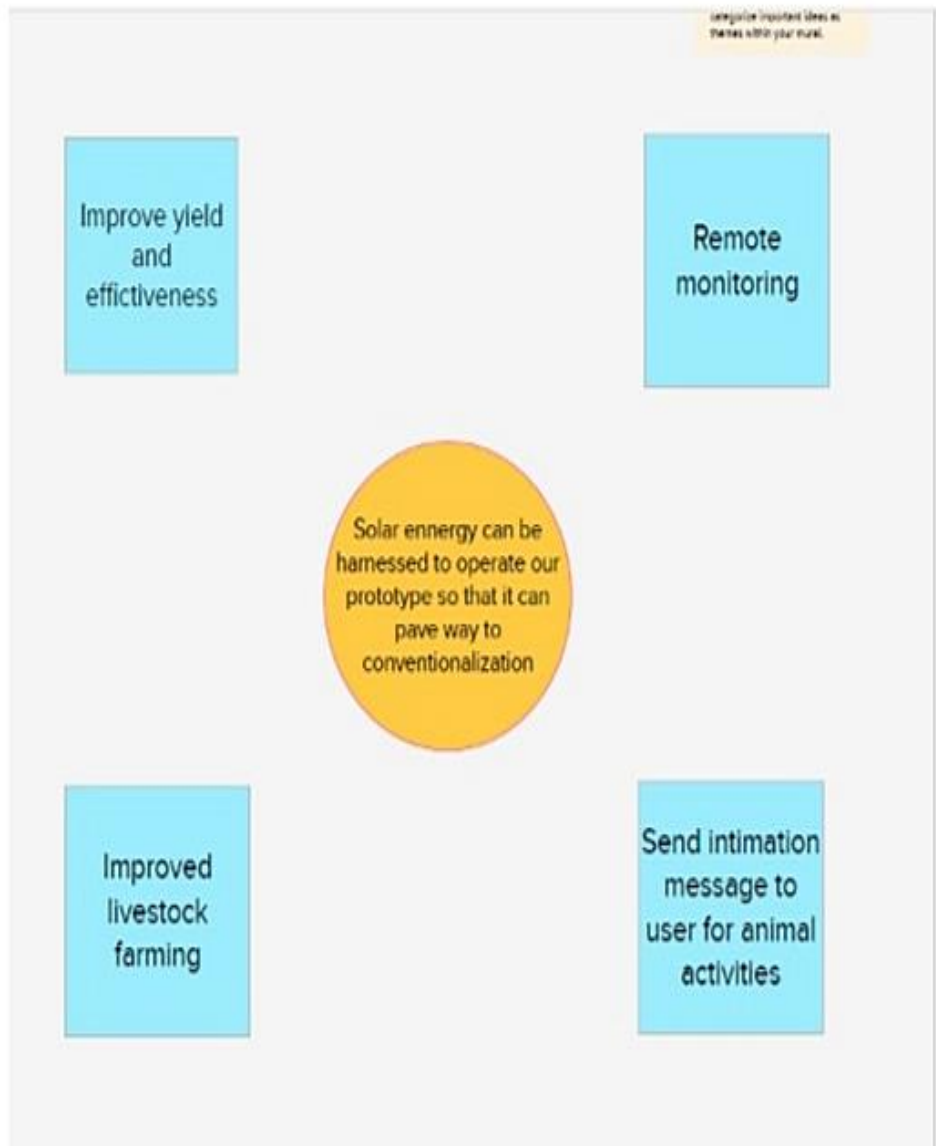
Reduce the environmental footprints

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:
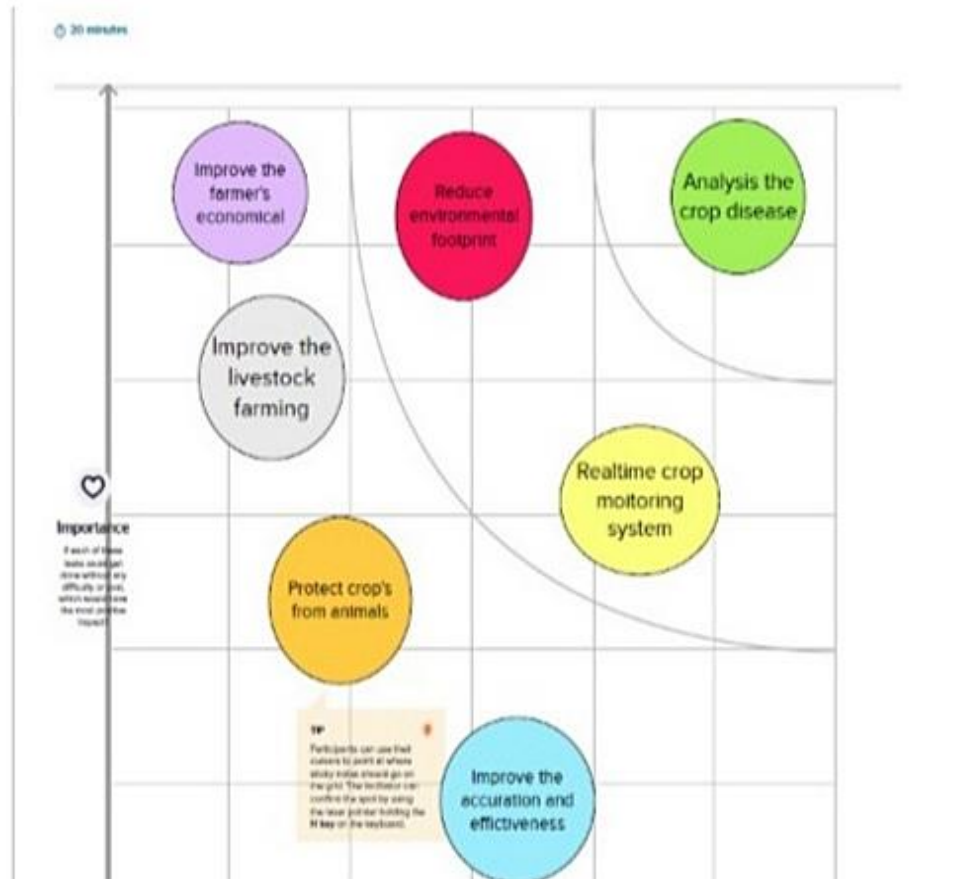
3.3 Proposed Solution:

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 monitoring the animals other disturbance. ➤ In several areas, the temperature sensors will be integrated to monitor the temperature & humidity. ➤ If in any area feel dry or wetless is detected by admins, will be notified along with 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 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..
6)	Scalability of the Solution	➤ Even when the interruption is more, the product sense the accurate location and alerts the farmers effectively

3.4Problem solution fit

Customer-Forces Canvas

1. CUSTOMER SEGMENT(S) `CS`

Farmer's ! Who's not near his field

6. CUSTOMER LIMITATIONS EG. BUDGET, DEVICES `CL`

1)High adoption costs , security concerns.
2)Not aware of the implementation of IoT in agriculture.

5. AVAILABLE SOLUTIONS PLUSES & MINUSES `AS`

Monitor different parameters and mobile or web application make easily to farm the crop field .

(Left margin: Define CS, fit into CL)
(Right margin: Explore AS, differentiate)

2. PROBLEMS / PAINS + ITS FREQUENCY `PR`

- It's difficult to monitor and control
- Ain't known if the application doesn't work properly.

9. PROBLEM ROOT / CAUSE `RC`

1)If temperature ,PH level ,humidity & light intensity makes the serious cause for the environment.

2)Farmer affected by less productivity which will affect in their profit.

7. BEHAVIOR + ITS INTENSITY `BE`

Direct related: Tries to find a solution to prevent this problem

Indirect related: Located in rural where internet connectivity might not be strong enough to facilitate fast transmission speeds.

(Left margin: Focus on PR, tap into BE, understand RC)
(Right margin: Focus on PR, tap into BE, understand RC)

3. TRIGGERS TO ACT `TR`

Create opportunities to lift people out of poverty in developing nations. (Over 60%)

10. YOUR SOLUTION `SL`

"IoT based Smart crop protection system for agriculture" !!

It help farmers grow more food on less land by protection crops from pests, diseases and weeds as well as raising productivity per hectare.

8. CHANNELS of BEHAVIOR `CH`

ONLINE: The Data send through application for the farmers to know about the farms.

OFFLINE: The control action is taken by the farmers to monitor the farms.

4. EMOTIONS BEFORE / AFTER `EM`

BEFORE: Finances, Heavy work overload and conflict in relationship.

AFTER: It will easier to make more yield in

(Left margin: Identify strong TR & EM)
(Right margin: Extract online & offline CH of BE)

4. REQUIREMENT ANALYSIS

4.1 Functional Requirement:

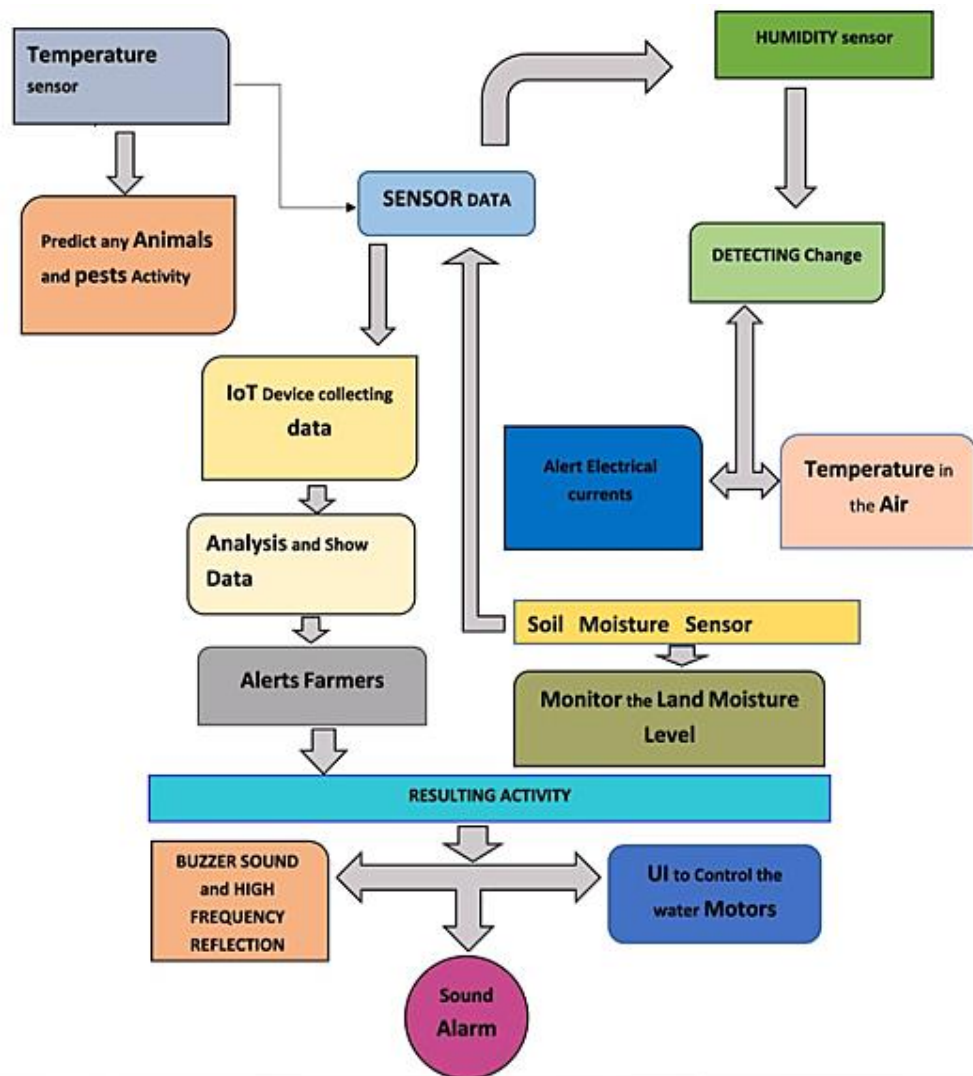| FR No	Function Requirement(Epic)	Sub Requirement (Story / Sub-Task)

FR-2	User Visibility	Sensen 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	Sensen 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:
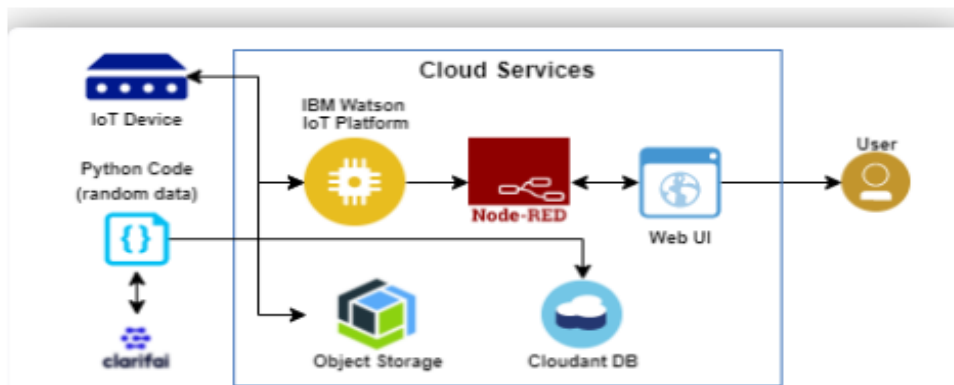
User-Stories:

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**	Ican receive confirmatio nemail & 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 ppage 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 ppage 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	
Sprint-1		US-2	Configure the IBM Cloud services which are being used in completing this project.	4	Medium	
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	
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	
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	
Sprint-3		US-2	Create a Node-RED service.	10	High	
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	
Sprint-3		US-2	After developing python code, commands are received just print the statements which represent the control of the devices.	5	Medium	
Sprint-4		US-3	Publish Data to The IBM Cloud	8	High	
Sprint-4		US-1	Create web UI in node red	10	High	

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	

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
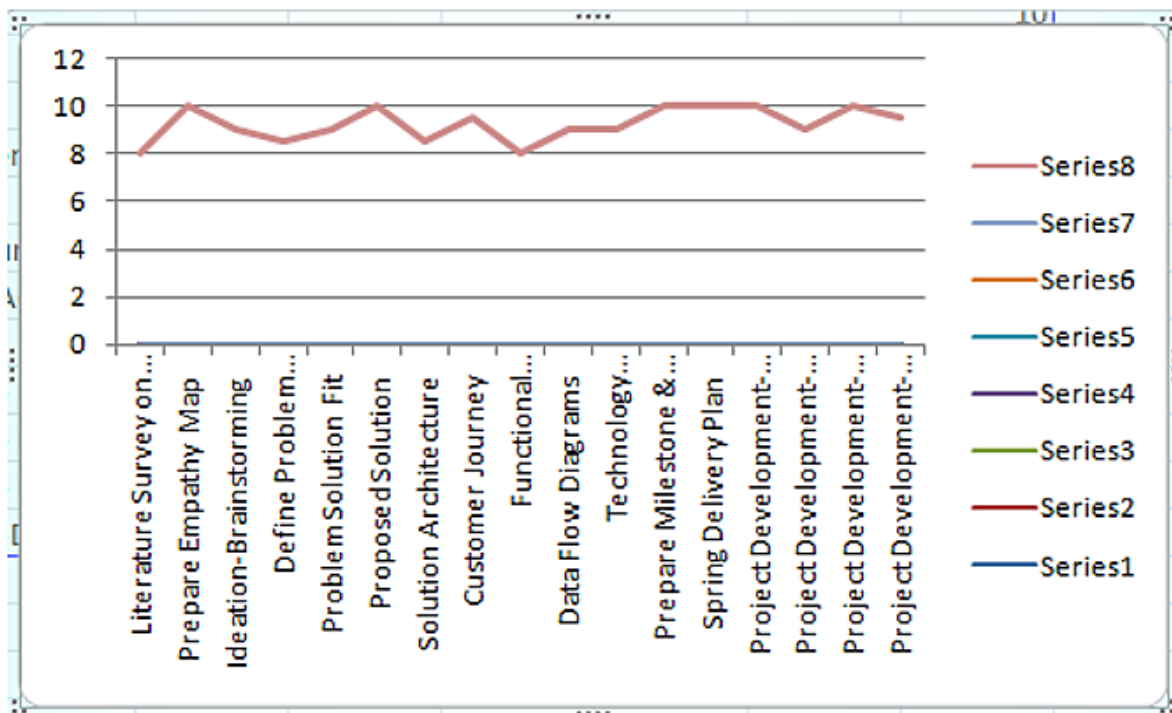
7. CODING AND SOLUTIONING:

7.1 Feature 1(Node Red Output

Advantages:

☆   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 are sick.
☆ Real-time updates.
☆ Ensure worker's health.
☆ Get immediate alerts.
☆ Reduce waste, improve protectivity 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.

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 arising causes. This field of this effort remains towards withdraw to monitor the system for crop security conflicting to subconscious occurrences and meteorological conditions.

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 before the above applications of the technology are realized.