PROJECT REPORT

1.INTRODUCTION:

Internet of Things(IoT) Smart technology enables new digital agriculture. Today technology has become a necessity to meet current challenges and several sectors are using the latest technologies to automate their tasks. Advanced agriculture, based onInternet Of Things technologies, is envisioned to enable producers and farmers to reduce waste and improve productivity by optimizing the usage of fertilizers to boost the efficiency of plants. It gives better control to the farmers for their livestock, growing crops, cutting costs, and resources.
Smart Farming has enabled farmers to reduce waste and enhance productivity with the help of sensors (light, humidity, temperature, soil moisture, etc.) and automation of irrigation systems. Further with the help of these sensors, farmers can monitor the field conditions from anywhere. Internet of Things based Advanced Farming is highly efficient when compared with the conventional approach. The applications of intelligent Agriculture solutions not only targets conventional, large farming. With operations, but could also be new levers to uplift other growing or common trends in agricultural like organic farming, family farming (complex or small spaces, particular cattle and/or cultures, preservation of specific or high-quality varieties, etc.), and enhance highly transparent Farming.

1.1 PROJECT OVERVIEW:

This project is based on Iot enabed smart farming application which rates to be retained and preferred to be conditional based full automation of the prospects and retained to reduce the work for the farmers who were

considered as the backbone of our society. In order to achive this we use a trending technology named as Iot thus it is applying the concept of Iot and retesion ancient farming irrigation methods and using aurdino UNO and progressing the smart irrigation by making the smart automation this tends to be known as smart irrigation process.

1.2PURPOSE :

The main purpose of reducing the smart farming application using the aurdino UNO is to make an sealed cut down of human interference in the process of irrigation due to this irrigation process becomes simple and easy for farmers.

2.LITERATURE SURVEY

Smart Farmer-IoT Enabled Smart Farming Application

Author Name: A. Bharathsimha Reddy , Mr. E.K. Subramanian.
Year of publishing: February 28,2020
Description: The IoT based agricultural production system has built on the long standing desire of farmers to ensure their land remains productive into the future. It also addresses the community applications for safe food and for environmental production. Agricultural products quality can be improved because farmers observe whole cycle from seeding to selling using this Iot based agricultural production system.

Author Name: Dr. K. Sujatha , Dr. Sheryl Radley
Year of publishing: November 11,2017
Description: IoT based agricultural production system with the help of the sensor for stabilizing between the supply and demand has been managed. A farm can be evaluated with the potential of yield and the target crop and

the profit attained through that crop. By using such models the farmers can grow and not suffer as it is happening in the country. Biological and genetic research helps in the production of genetically modified seeds.

Author Name: Muhamad Shoaib Farooq, Shamyla Riaz, Adnan Abid, Tariq Umer and Yousaf Bin Zikria
Year of publishing: February 12, 2020
Description: The growing demand for food in terms of quality and quantity has increased the need for industrialization and intensification in the agriculture field. Internet of Things (IoT) is a highly promising technology that is offering many innovative solutions to modernize the agricultural sector. Researchers have proposed different IoTbased technologies in the agriculture field that are increasing the production with less workforce effort. Researchers have also worked on different IoT based agricultural products to improve the quality and increase agricultural productivity.

Author Name: H. Y. Geetha, Simantini Roy Chowdhary, Sharanagouda V Patil, Veera Reddy
Year of publishing: July 07,2017
Description: The agricultural IoT coordinated with Web Map Service (WMS) and Sensor Observation Service (SOS) gives an answer for overseeing water necessities or supply for crop irrigation. Farmers will be able to detect many diseases in the seasons crop through mobile phones because of smart wireless sensors used in field and also using small drones to recognize the diseases of plants by using sensors and WSNs in a drone. The role of IoT in cultivation is very helpful to researchers by helping them to identifying or monitoring the fields from remote places.

Author Name: Rohit Maheswari, Mohnish Vidyarthi, Parth Vidyarthi
Year of publishing:2022
Description: Using IoT in farming farmer have not enhanced the yields in multiple but also decreased the cost of farming. With proper usage of IoT

technology, the farmers have gained a tremendous amount of benefit not only financially but also physically by doing smart farming. The water management is much easier , water sprinkling system , where sprinkler automatic sprinkles the water once the sensors found a lack of humidity in the soil.

Author Name: M. U. Farooq
Year of publishing: March 2015
Description: IoT enabled Smart agriculture will monitor Soil nutrition, Light, Humidity etc. and improve the green housing experience by automatic adjustment of temperature to maximize the production. Accurate watering and fertilization will help improving the water quality and saving the fertilizers respectively.

2.1 EXISTING PROBLEMS:

PROBLEM STATEMENT :

To incorporate the process of working and also elevate the smart farming using IOT enabled smart irrigation technique since the traditional irrigation technique which is very complex one.

2.2 REFERENCES:

1. A. Bharathsimha Reddy , Mr. E.K. Subramanian.
Year of publishing: February 28,2020.

2.: Dr. K. Sujatha , Dr. Sheryl Radley
Year of publishing: November 11,2017.

3. Muhamad Shoaib Farooq, Shamyla Riaz, Adnan Abid, Tariq Umer and Yousaf Bin Zikria

Year of publishing: February 12, 2020.

4.Rohit Maheswari, Mohnish Vidyarthi, Parth Vidyarthi
Year of publishing:2022.

5.: M. U. Farooq
Year of publishing: March 2015

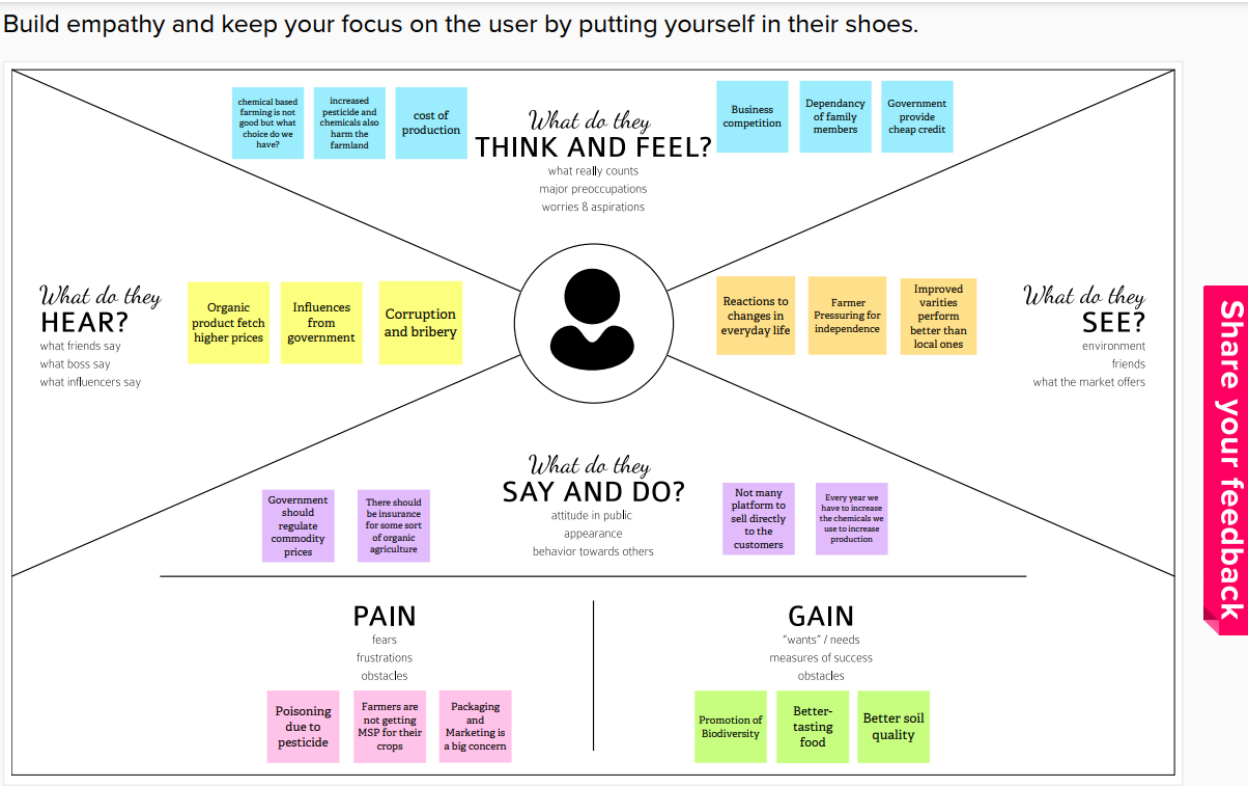
2.3 PROBLEM STATEMENT EXPLANATION:

IOT plays a major role in agricultural field This paper is mainly applied to agricultural field Smart irrigation and farming can help farmers to grow healthy process of watering. The paper is about IOT based smart farming and irrigation system. The ultimate agenda of this paper is to automate the process of watering to plants. This work helps us to know the values of various parameters such as humidity, moisture and temperature of plants and water them accordingly. The system consists of three sensors which sense the values of humidity, moisture and temperature of plants. If any of the values decreases the motor automatically turns on the water for plants. This is done using Arduino board, voltage regulator and relay which controls the motor. WIFI module is used to inform the user about the exact field condition. The various sensors send the values to the Arduino board which has been coded with if else conditions will further pass the commands to the relay which turns on or off the motor according to the conditions given. If the sensor values are decreased, it turns on the motor else it turns off the motor. The ultimate significance of this paper is that most of the manual work is reduced and watering process is automated with the help of devices as a result of which healthy plants can be grown, Water and electricity usage are saved by this paper. Even elderly people can easily do farming. The paper has

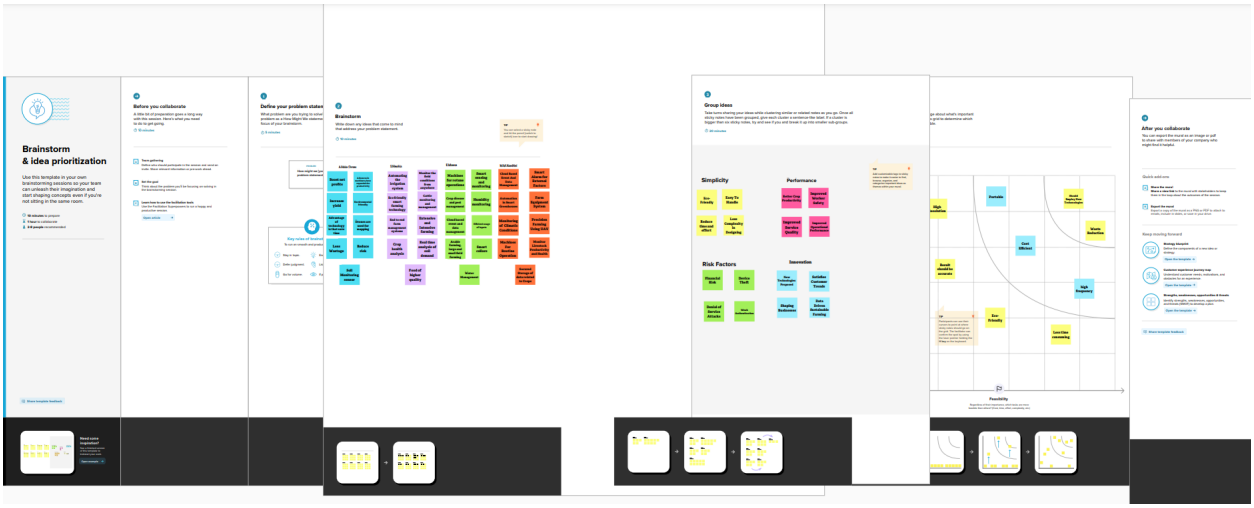
been used to grow a tomato plant and it was successfully grown by automatic process. This methodology with the use of IOT technology had made us achieve a healthy farming. Increase in agriculture also helps us to increase the economical state of the country.

3.IDEATION AND PROPOSED SOLUTION:

3.1 EMPATHY MAP CANVAS:



3.2 IDEATION AND BRAINSTROMING:



3.3 PROPOSED SOLUTION:

Project Design Phase-I
Proposed Solution

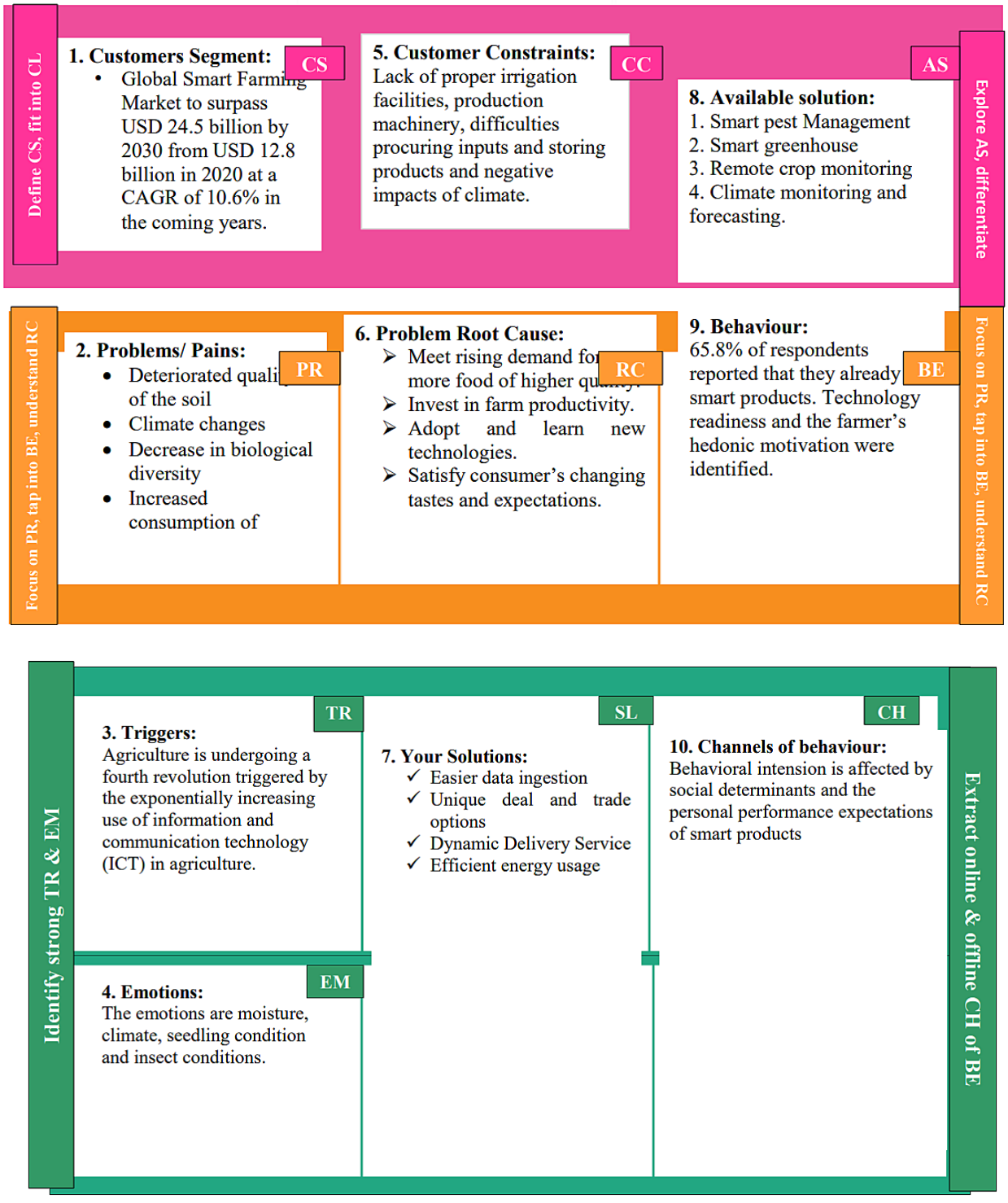
Date	19 September 2022
Team ID	PNT2022TMID34125
Project Name	Smart Farmer -IoT Enabled Smart Farming Application
Maximum Marks	2 Marks

Proposed Solution Template:

S.No.	Parameter	Description
1.	Problem Statement (Problem to be solved)	Farmers are under pressure to produce more food and use less energy and water in the process. A remote monitoring and control system will help farmers deal effectively with these pressures.
2.	Idea / Solution description	It involves using various smart farming technologies, the internet of things (IoT) devices, big data analytics, remote sensing and robotics. It is scientifically proven that using these technologies increase profit, minimizes waste and maintains the environment's quality.
3.	Novelty / Uniqueness	➢ Remote Management with farms located in far-off areas and distant lands, farmers are seeking a better solution to their management issues. ➢ Real-Time Crop Monitoring ➢ Crop Protection ➢ Soil Testing & its Quality ➢ Management with farmers being Remote Real-Time Analysis of Soil Demand ➢ Smart Greenhouses

4.	Social Impact / Customer Satisfaction	The important of direct marketing for highquality farm products has increased during the past few years. This analyzes the impact of customer satisfaction and its driving forces for farmer-to-customer direct marketing. The result emphasize the role of store atmosphere, customer service and product quality as the main factors which influence customer satisfaction.
5.	Business Model (Revenue Model)	Models have been developed for many dimensions of the agricultural enterprise.
		Incorporating pertinent models whilst managing the trade-offs between complexity and usability is a key challenge for enabling a Smart Farm. Smart farming envisages the harnessing of Information and Communication Technologies as an enabler of more efficient, productive, and profitable farming enterprises. Such technologies do not suffice on their own; rather they must be judiciously combined to deliver meaningful information in near real-time.
6.	Scalability of the Solution	Scalability in smart farming refers to the adaptability of a system to increase the capacity. Scalability and scaling approach of a good solution will depend very much on the economic benefit and on the increased welfare of the farm inhabitants.

3.4 PROBLEM SOLUTION FIT



4.REQUIREMENT ANALYSIS:

4.1Functional requirement

Following are the functional requirements of the proposed solution.

FR No.	Functional requirement	Sub requirement
FR-1	IoT devices	Sensors and Wifi module.
FR-2	Software	Web UI, Node-red, IBM Watson, MIT app
FR-3	Aurdino	connectors

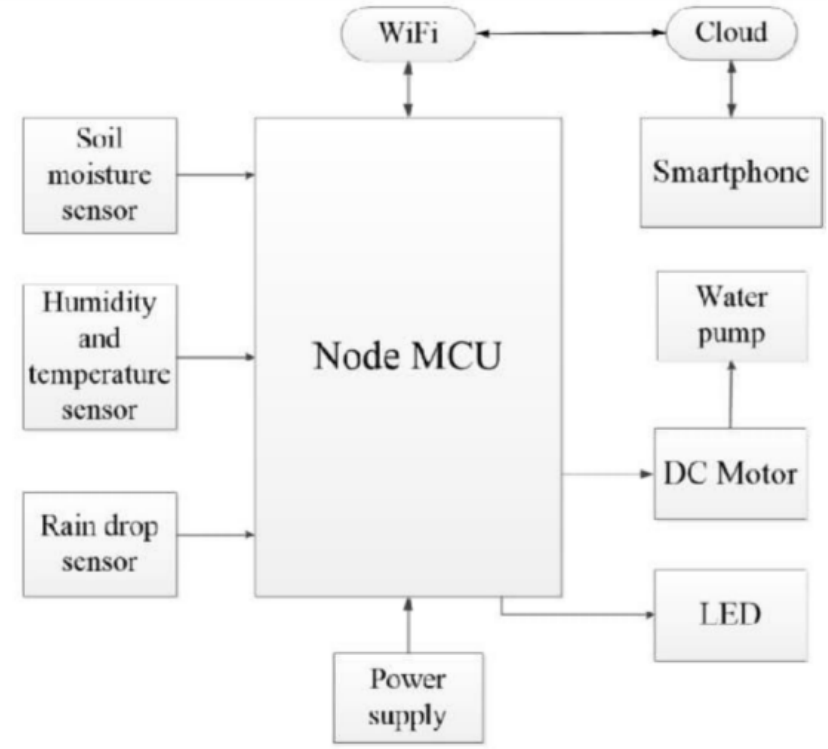
4.2Non-Functional requirements

FR No.	Non-Functional Requirement	Description
NFR-1	**Usability**	Time consumability is less, Productivity is high.
NFR-2	**Security**	It has low level of security features due to integration of sensor data.
NFR-3	**Reliability**	Accuracy of data and hence it is Reliable.
NFR-4	**Performance**	Performance is high and highly productive.
NFR-5	**Availability**	With permitted network connectivity the application is accessible
NFR-6	**Scalability**	It is perfectly scalable many new constraints can be added

5.PROJECT DESIGN:

5.1 DATA FLOW DIAGRAMS:

Data Flow Diagrams:



1. User configures credentials for the node MCU and starts the app.
2. User selects the needed information in the app.
3. MCU links with hardware that extracts output from the hardware product.
4. Valid real time data is displayed in the output.

User Stories:

1. User selects the needed information in the app.
2. MCU links with hardware that extracts output from the hardware product.
3. Valid real time data is displayed in the output.

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 E-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
		USN-3	As a user, I can register for the application through Facebook	I can register & access the dashboardwith Facebook Login	Low	Sprint-2
		USN-4	As a user, I can register for the application through Gmail		Medium	Sprint-1
	Login	USN-5	As a user, I can log into the application by entering email & password		High	Sprint-1
	Dashboard	USN-6	As a user ,I can view the increase	I can use this dashboard	High	Sprint1

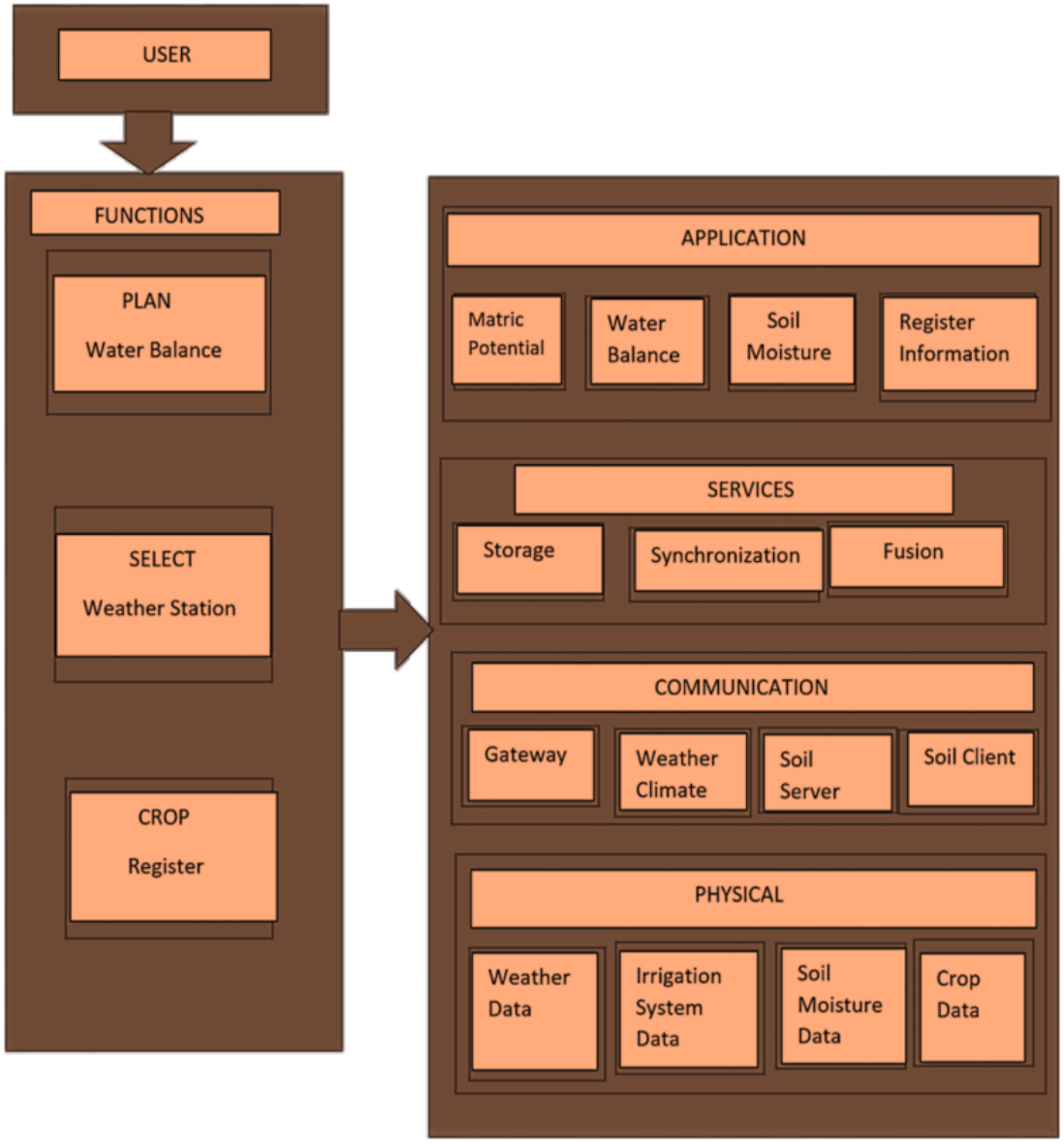
			In production level	to see the production level as it result in the improvement of smart farming		
		USN-7	As a user, Ican see the nearerfield location as the sensor alerts the farmer.	I can view the nearest farming field location.	High	Sprint1
		USN-8	As a user ,I can view thecontact number of nearest production yields and wanted farming areascontact number also available for	I can access the contact number	Low	Sprint-2

			any queries			
		USN-9	As a user ,I can view the notification bar if I missed to Consider the production level.	I can view the notification they will notify real time data	High	Sprint1
Customer (Web User)		USN-10	As a user, I can make a query or related doubts to the web developer as message option is available	I can make query related issues	High	Sprint1
Customer care executive		USN-11	Customer care number is provided in the dashboard	I can make a call to customer care	Low	Sprint2
Administration		USN-12	As a admin, I can view the	I wasnotified at	High	Sprint1

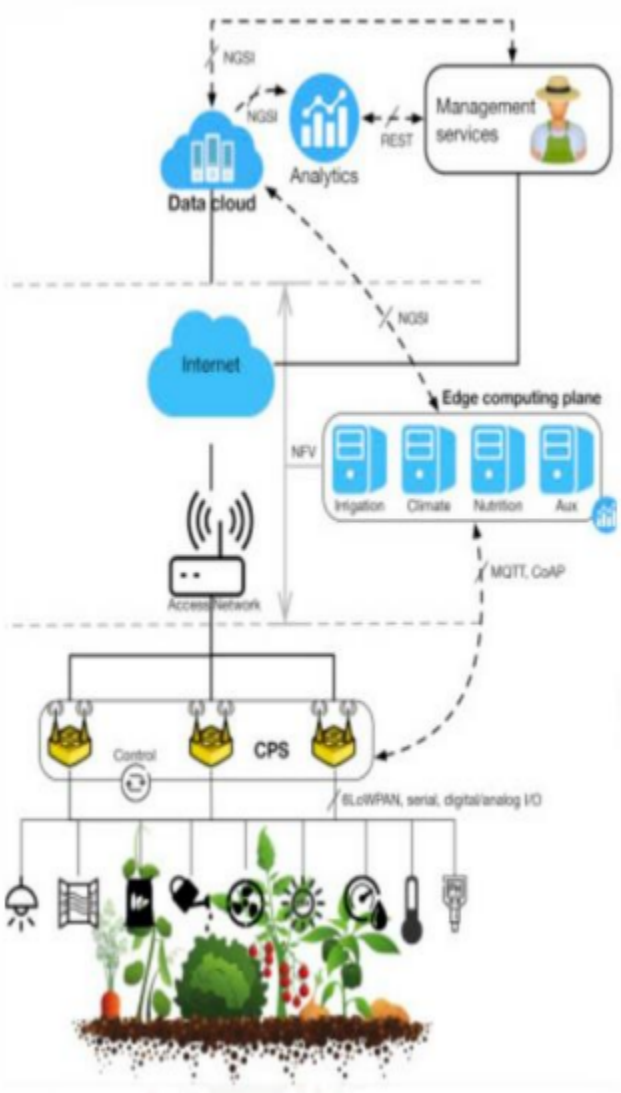
			attacker details	the time of Admin dealing with attacker.		

5.2 SOLUTION AND TECHNICAL ARCHITECTURE:

SOLUTION ARCHITECTURE DIAGRAM:



TECHNICAL ARCHITECTURE:



Components and Technologies:

S.No	Component	Description	Technology
1.	User Interface	How user interacts with application e.g. Web UI, Mobile App, Chat box etc.	HTML, CSS, JavaScript 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	Sensor ,gateway are connected to Watson IOT platform	IBM Watson Assistant
5.	Database	Data Type, Configurations etc.	MySQL, NSQL, etc.
6.	Cloud Database	From Watson IOT platform data are sent securely upto the cloud using the open, light weight MQTT	IBM DB2, IBM Cloud etc.
7.	File Storage	File storage requirements	IBM Block Storage or Other Storage Service or Local File system
8.	External API-1	APIs are used so that your apps can access and use your live and historical data	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.

Table-2: Application Characteristics:

S.No	Characteristics	Description	Technology
1.	Open-Source Frameworks	List the open-source framework used Tinkercard	Technology of open source framework Arduino, Node-Red
2.	Security Implementations	Segment which data and networks IoT devices can access, and use firewalls to stop intrusions	Node-Red, open weather App API, Firewall
3.	Scalable Architecture	Scalability will be key ton handling the explosive growth in the IoT.	Developing Microservices Architecture, Adopting multi data storage technology
4.	Availability	Automatic adjustment of farming equipment is made possible by linking information like weather and equipment to auto adjust temperature ,humidity etc..	IBM Watson services
5.	Performance	Idea of implementing integrated sensors with sensing soil and environmental in farming will be more	IBM Watson services

6.PROJECT PLANNING AND SCHEDULING:

6.1 SPIRINT PLANNING AND ESTIMATION:

MILESTONE	ACTIVITY TITLE	ACTIVITY DESCRIPTION	DURATION
Pre requisites	1) IBM Cloud Services 2) MIT App Inventor 3) Software 4) Create an account in Fast2sms Dashboard	1)You Need to have basic knowledge of the following cloud services: • IBM Watson IoT platform • Node-Red service • Cloudant DB 2)Sign in for MIT App inventor using Gmail Id 3) Instal the python IDE 4) Create an account in Fast2sms.com	1 week

Develop a Mobile Application	**1) Develop a Mobile Application**	**1)Develop the mobile Application using MIT App inventor which should display all thew sensor parameters and have the buttons to control the motors**	**5 weeks**

Ideation Phase	**1)Literature Survey on the selected project and Information Gathering** **2) Prepare Empathy Map** **3) Ideation**	**1) You are expected to collect the relevant information on project usecase , refer the existing solutions, technical papers, research publications, etc** **2)You are expected to prepare the empathy map canvas to capture the user pains and gains , prepare list of problem statements** **3)You are expected to list the ideas by organising the brainstorming session**	**1 week**
Project Design Phase I	**1)Proposed Solutions** **2)Problem Solution Fit** **3) Solution Architecture**	**1) To prepare the proposed solution document which includes the novelty, feasibility of idea , business model, social impact, scalability of solution, etc** **2) To prepare problem solution fit document and submit for review** **3) To prepare solution architecture document and submit for review**	**1 week**

Project Design Phase II	**1)Customer Journey 2)Functional Requirement 3) Data Flow Diagrams 4) Technology Architecture**	**1) Cusomer journey maps to understand the user interactions 2) To prepare the functional requirement document 3) To Prepare the dataflow diagrams and submit for review 4) To draw the technology architecture diagram**	**2 week**
Project Planning Phase	**1)Prepare Milestone & Activity list 2)Sprint Delivery plan**	**1) To prepare the milestones and activity list of the project 2) To prepare the sprint delivery plan**	**1 week**
Project Development Phase	**1)Project Development-Delivery of sprint 1 2)Project Development – Delivery of sprint 2 3)Project Development-Delivery of sprint 3 4)Project Development-Delivery of sprint 4**	**1) To develop & Submit the developed code by testing it.**	**1 week**

Project Tracker, Velocity & Burndown Chart: (4 Marks)

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-2	20	6 Days	31 Oct 2022	05 Nov 2022	20	05 Nov 2022
Sprint-3	20	6 Days	07 Nov 2022	12 Nov 2022	20	12 Nov 2022
Sprint-4	20	6 Days	14 Nov 2022	19 Nov 2022	20	19 Nov 2022

Sprint	Functional Requirement (Epic)	User Story Number	User Story / Task	Story Points	Priority	Team Members
Sprint-1	Create And Configure IBM cloud Services	USN-1	In this we, create and configure the IBM cloud services which are being used in completing this project	8	High	Celsia Threas .A, Mansa .R,Nimshia .S, Nandhini .M.M
Sprint-2	Develop A Python Script To Publish And Subscribe To IBM IoT platform	USN-2	In this we develop the python Script to publish the data and Subscribe the data from the IBM Watson IoT platform	8	High	Celsia Threas .A, Mansa .R,Nimshia .S, Nandhini .M.M
Sprint-3	Build a Web Application using Node-RED Service	USN-3	In this we build a Web Application using NodeRED ,configure the Node-Red and create APIs for communicating with mobile Application	5	Medium	Nandhini .M.M, Mansa .R, Nimshia .S
Sprint-4	Develop A Mobile Application	USN-4	In this ,develop a mobile application using MIT app inventor	5	Medium	Mansa .R, Nimshia .S, Celsia Threas. A

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)

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

CONCLUSION:

IoT in agriculture uses robots,drones,remote sensors and computer imaging combined with continuously progressing machine learning and

analytical tools for monitoring crops,surveying,and mapping the fields .Smart farming reduces the ecological footprint of farming.Minimized or site-specific applications of inputs, such as fertilizers and pesticides in precision agriculture systems will mitigate leaching problems as well as the emission of green house gases.
It provides data to farmers for rational farm management plans to save both time and money.

Team Id: PNT2022TMID34125

GitHub Link:https://github.com/IBM-EPBL/IBM-Project-40357-1660628629