V.S.B ENGINEERING COLLEGE

ELECTRONICS AND COMMUNICATION ENGINEERING

PROJECT REPORT

IOT Based Smart Crop Protection System For Agriculture

Submitted by

Team ID : PNT2022TMID33612

Team Leader : Siva Kavya D

Team Member 1 : Vinotha M

Team Member 2 : Teenal R

Team Member 3: Sinega P

TABLE OF CONTENTS

CHAPTER 1

INTRODUCTION

1.1 PROJECT OVERVIEW

The Smart protection system defines that this project help to farmer for the protection of a farm. The smart farming system is useful for watering the plants as it calculates the amount of moisture present in the soil and then proceeds to the further commands. We are using a relay module to control the water pump. This system can work automatically and there is no need for interference.The main objective is to apply the system for improvement of health of the soil and hence the plant via Internet of Things.

1.2 PURPOSE

The purpose of the smart farming is to watering the crops as it calculates the amount of moisture present in the soil and then proceeds to the further cammands.By making farming more connected and intelligent, precision agriculture helps reduce overall costs and improve the quality and quantity of products, the sustainability of agriculture and the experience for the consumer. Increasing control over production leads to better cost management and waste reduction.

CHAPTER 2

LITERATURE SURVEY

2.1 EXISTING PROBLEM

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 pressure. Irrigated farms typically deploy a single pump to irrigate 80 to 100 acres of land. Many large farms, therefore, require 40 to 80 or more irrigation pumps spread over hundreds of square miles. Most are pumping ground water for irrigation purposes, most operate in remote fields, and trucks must roll to tend to them.Ideally, each field should get just the right amount of water at just the right time. Under-watering causes crop stress and yield reduction. Overwatering can also cause yield reduction and consumes more water and fuel than necessary and leads to soil erosion and fertilizer, herbicide, and pesticide runoff.

2.2 REFERENCES

1. Zuraida Muhammad,Muhammad Azri Asyraf Mohd Hafez,Nor Adni Mat"Smart Agriculture Using Internet of Things with Raspberry Pi." 2020.

2. Divya J., Divya M.,Janani V."IoT based Smart Soil Monitoring System for Agricultural Production" 2017.

3. G. Sushanth1, and S. Sujatha, "IOT Based Smart Agriculture System"2018.

2.3 PROBLEM STATEMENT

The traditional agriculture and allied sector cannot meet the requirements of modern agriculture which requires high yield, high quality and efficient output. Thus, it is very important to turn towards modernization of existing methods and using the information technology and data over a certain period to predict the best possible productivity and crop suitable on the very particular land.To create an application to measure the soil temperature and humidity.

CHAPTER 3

IDEATION AND PROPOSED SOLUTION

3.1 EMPATHY MAP CANVA

SAYS

- To said the importance of sustainable agriculture.
- To protect the crops in farm area from animals.
- Farmers can monitor the field conditions from anywhere.

THINKS

- Adapting to climate change and extreme events.
- Monitoring the crop fields with the help of sensors.
- Eliminates the need for constant manual monitoring.

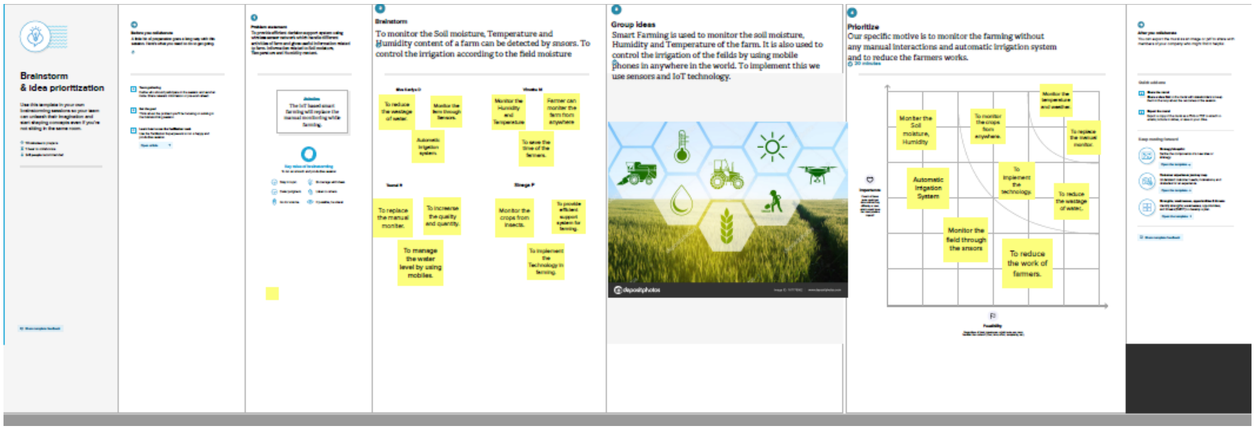
DOES

- Preserve and product the farming
- Manage the quality of air, water and soil.
- Increase energy efficiency in food production .
- Optimize the use of natural resources.

FEELS

- Reduces the human involvement in agricultural activities.
- Helps in obtaining quality crops.
- Feels this technology saves the water.
- Feels it lowers the labours cost.

3.2 IDEATION & BRAINSTORMING



3.3 PROPOSED SOLUTION

S.No.	Parameter	Description
1.	Problem Statement (Problem to be solved)	To provide efficient decision support system using wireless sensor network which handle different activities of farm and gives useful information related to farm. Information related to Soil moisture, Temperature and Humidity content.
2.	Idea / Solution description	In IOT-based smart agriculture, a system is built for monitoring the crop field with the help of sensors (light, humidity, temperature, soil moisture, etc.) and automating the irrigation system.IOT (Internet of things) in an agricultural context refers to the use of sensors, cameras, and other devices to turn every element and action involved in farming into data
3.	Novelty / Uniqueness	This overcomes the manual operations required to monitor and maintain the agricultural farms in both automatic and manual modes. It should be able to measure the increase or decrease in level of water as well as moisture in the soil.
4.	Social Impact / Customer Satisfaction	Smart farming **helps farmers to better understand the important factors such as water, topography, aspect, vegetation and soil types**. This allows farmers to determine the best uses of scarce resources within their production environment and manage these in an environmentally and economically sustainable manner.

5.	Business Model (Revenue Model)	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	It is very adaptive for farmers and it is very efficient in manner.

CHAPTER 4

REQUIREMENT ANALYSIS

4.1 FUNCTIONAL REQUIREMENTS

Functional Requirements:

Following are the functional requirements of the proposed solution:

FR No.	Functional Requirements(Epic)	Sub requirements(Story/Sub Task)
FR1	Resource Discovery	Find the required resources for the farming and intimate to the farmers.
FR2	Resource Management	Manage the resources which is provided by the farmers in an efficient manner.
FR3	Data Management	Maintain the data such as Temperature, Humidity, Weather.
FR4	Event Management	Manage the Farming operations like trilling, planting, spraying and irrigating.
FR5	Code Management	Manage the code to control all the process, save the data etc.
FR6	Reporting	View the water ability report, weather report, temperature report.

NON-FUNCTIONALREQUIREMENTS:

Non- Functional Requirements:

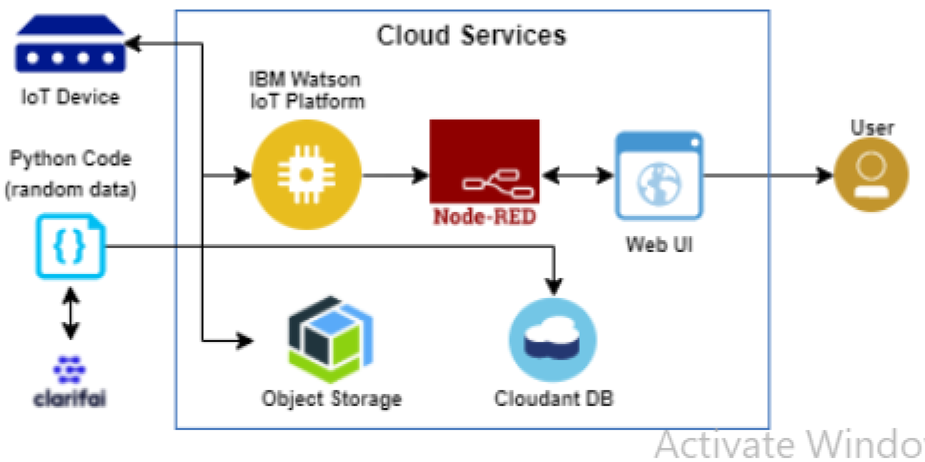
Following are the non- functional requirements of the proposed solution:

FR No.	Non- Functional Requirements	Description
FR1	Usability	The system is user friendly and by making the maximum use of resources.
FR2	Security	This system provides security which is to keep the data in secure manner.
FR3	Reliability	The system's reliability depends on the various factors like ensuring proper validations for each field and form in the system.
FR4	Performance	The system's performance is how fast the system provide the output while giving the input.
FR5	Availability	The system should available for farmers in any time.
FR6	Scalability	The system should give the exact values for humidity, weather.

CHAPTER 5

PROJECT DESIGN

5.1 DATA FLOW DIAGRAM



5.3 USER STORIES

User Type	Functional Requirement	User Story No	User Story/Task	Acceptance Criteria	Priority
Customer (Mobile User)	Registration	USN1	As a user, I need to register for my application by entering email, password and Confirm password.	I can acess my information about my farming through the dashboard.	High
		USN2	As a user, I will receive conformation email once I have registered for the application.	I will receive email and click confirm email.	High
		USN3	As a user, I will register for the application through facebook and through email.	I can register and access the dashboard through the facebook login.	Moderate
Customer (Web User)	Security and Reporting	USN1	As a user, I will also access the application through the website by entering email and password.	Confirm email and verify password.	

CHAPTER 6

PROJECT PLANNING AND SCHEDULING

6.1 SPRINT PLANNING AND 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	Vinotha M Siva Kavya D Sinega P Teenal R
Sprint-1		US-2	Configure the IBM Cloud services which are being used in completing this project.	4	Medium	Vinotha M Siva Kavya D Sinega P Teenal R
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	Vinotha M Siva Kavya D Sinega P Teenal R
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	Vinotha M Siva Kavya D Sinega P Teenal R
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	Vinotha M Siva Kavya D Sinega P Teenal R
Sprint-3		US-2	Create a Node-RED service.	10	High	Vinotha M Siva Kavya D Sinega P Teenal R
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	Vinotha M Siva Kavy Da Sinega P Teenal R
Sprint-3		US-2	After developing python code, commands are received just print the statements which represent the control of the devices.	5	Medium	Vinotha M Siva Kavya D Sinega P Teenal R
Sprint-4		US-3	Publish Data to The IBM Cloud	8	High	Vinotha M Siva Kavya D Sinega P Teenal R
Sprint-4		US-1	Create Web UI in Node- Red	10	High	Vinotha M Siva Kavya D Sinega P Teenal R
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	Vinotha M Siva Kavya D Sinega P Teenal R

6.2 SPRINT DELIVERY SCHEDULE

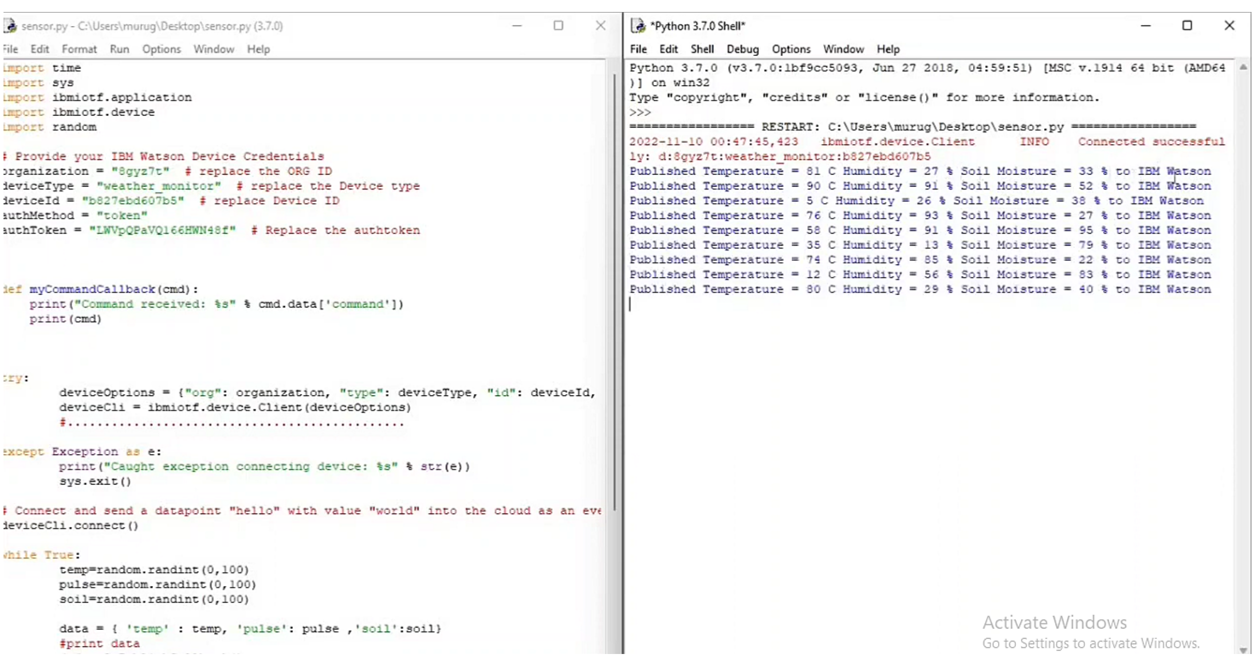
Sprint	Total Story Points	Duration	Sprint Start Date	Sprint End Date (Planned)	Story Points Completed (as on Planned End Date)	Sprint Release Date (Actual)
Sprint-1	20	6 Days	25 Oct 2022	30 Oct 2022	20	30 Oct 2022
Sprint-2	20	6 Days	31 Oct 2022	05 Nov 2022	20	05 Nov 2022
Sprint-3	20	6 Days	09 Nov 2022	14 Nov 2022	20	14 Nov 2022
Sprint-4	20	6 Days	16 Nov 2022	21 Nov 2022	20	21 Nov 2022

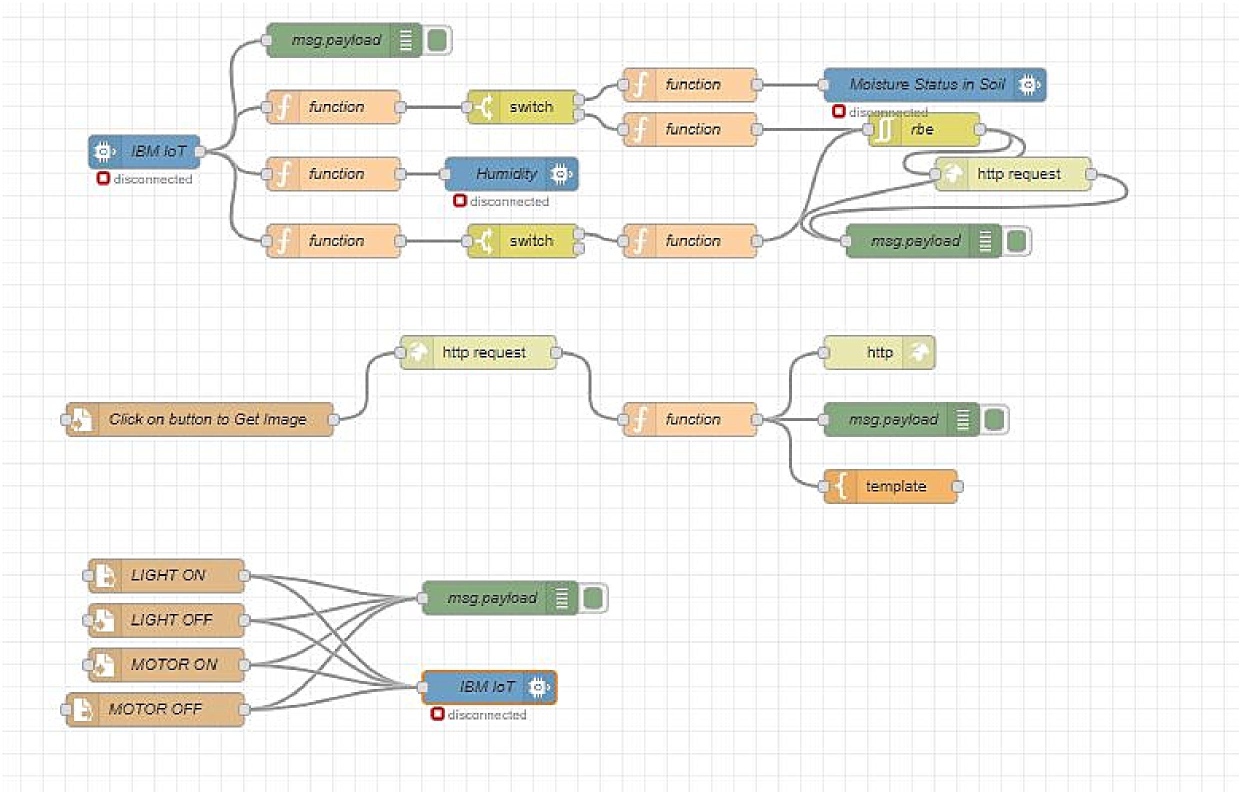
Velocity:
Imagine we have a 10-day sprint duration, and the velocity of the team is 20 (points per sprint). Let's calculate the team's average velocity (AV) per iteration unit (story points per day)

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

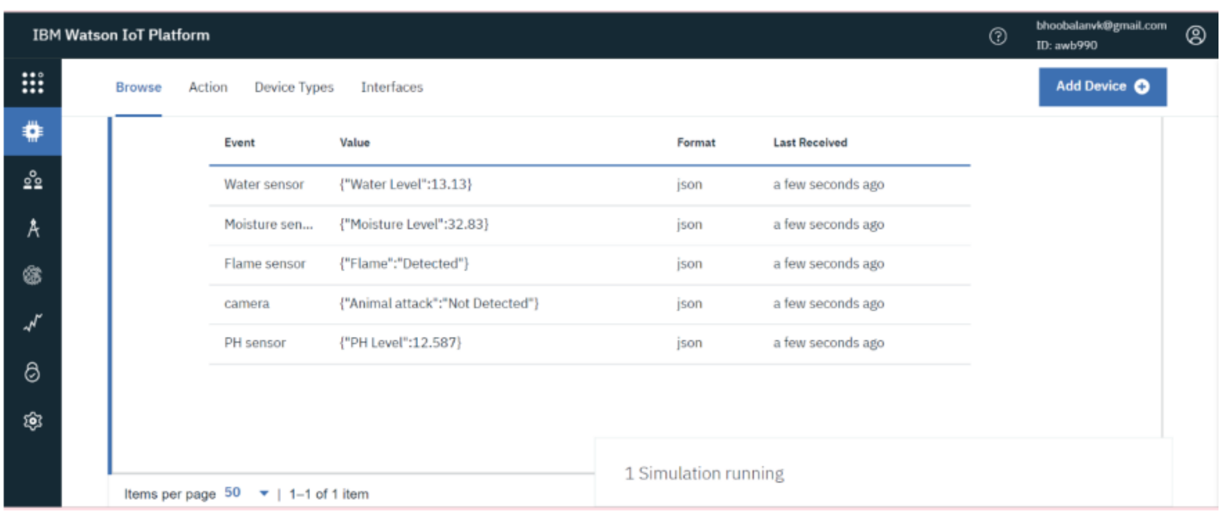
CHAPTER 7

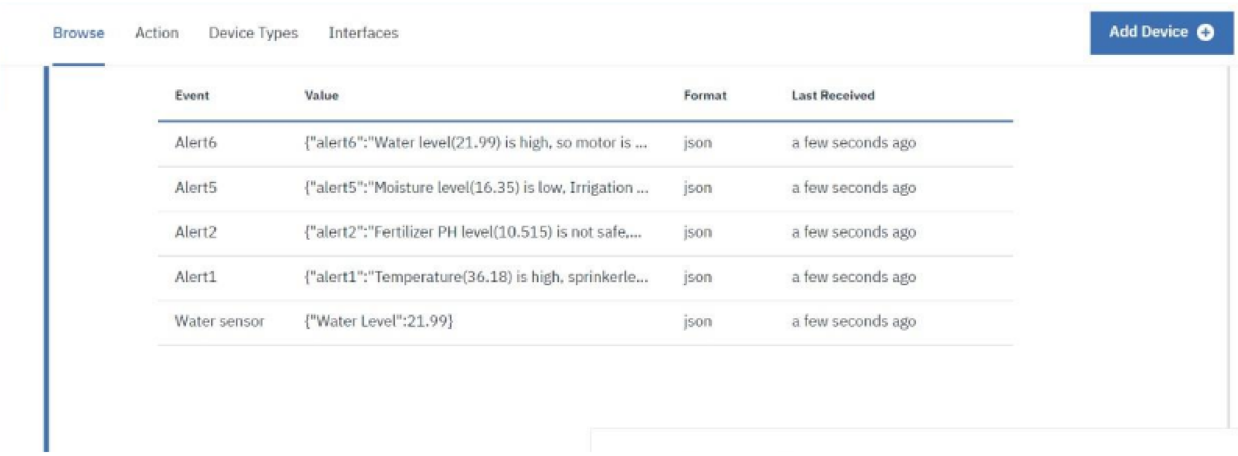
CODING & SOLUTIONING





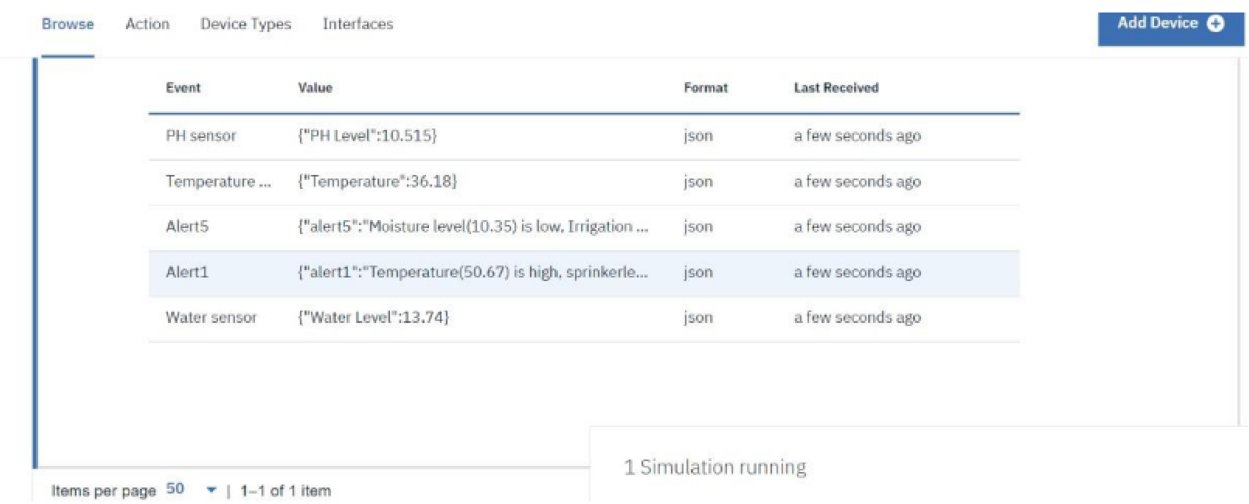
OUTPUTS AND TEST CASES





Browse Action Device Types Interfaces Add Device

Event	Value	Format	Last Received
Alert6	{"alert6":"Water level(21.99) is high, so motor is ...	json	a few seconds ago
Alert5	{"alert5":"Moisture level(16.35) is low, Irrigation ...	json	a few seconds ago
Alert2	{"alert2":"Fertilizer PH level(10.515) is not safe,...	json	a few seconds ago
Alert1	{"alert1":"Temperature(36.18) is high, sprinkerle...	json	a few seconds ago
Water sensor	{"Water Level":21.99}	json	a few seconds ago



Browse Action Device Types Interfaces Add Device

Event	Value	Format	Last Received
PH sensor	{"PH Level":10.515}	json	a few seconds ago
Temperature ...	{"Temperature":36.18}	json	a few seconds ago
Alert5	{"alert5":"Moisture level(10.35) is low, Irrigation ...	json	a few seconds ago
Alert1	{"alert1":"Temperature(50.67) is high, sprinkerle...	json	a few seconds ago
Water sensor	{"Water Level":13.74}	json	a few seconds ago

1 Simulation running

Items per page 50 | 1–1 of 1 item

CHAPTER 10

ADVANTAGES & DISADVANTAGES

ADVANTAGES:

- Intelligent data collection. Sensors installed on IoT devices are able to collect a large volume of useful information for farmers.
- Waste reduction.
- Process automation.

- Animal monitoring.
- Competitive advantage.

DISADVANTAGES:

- For the smart agriculture, Internet of Things is essential which will require artificial intelligence and computer-based intelligence. This cannot be balanced here.
- While the use of smart technology in agriculture is impressive, it does incur a lot of costs.
- There could be wrong Analysis of Weather Conditions.

CHAPTER 11

CONCLUSION

We have designed automated Smart Agriculture system which reduces the time and resources that is required while performing it manually. This system uses the technology of Internet of Things. The system also measure moisture of soil and level of water in fields. This system works well in the ideal conditions and further improvement can be made when the conditions are not ideal like proper illumination or lightning.

FUTURE SCOPE:

- IoT smart agriculture products are designed to **help monitor crop fields using sensors and by automating irrigation systems**. As a result, farmers and associated brands can easily monitor the field conditions from anywhere without any hassle.
- Through collecting data from sensors using IoT devices, you will learn about the real-time state of your crops. The future of IoT in agriculture **allows predictive analytics to help you make better harvesting decisions.**
- **Smart farming is certainly a leading enabler in producing more**

food with less for an increasing world population. In particular, smart farming enables increased yield through more efficient use of natural resources and inputs, and improved land and environmental management.

GITHUB LINK:

https://github.com/IBM-EPBL/IBM-Project-41554-1660642812

PROJECT DEMO: