SMART FARMER – IOT ENABLE SMART FRAMING APPLICATION

IBM NALAIYATHIRAN (HX8001) PROJECT REPORT

Submitted by

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BONAFIDE CERTIFICATE

Certified that this project report " **SMART FARMER – IOT ENABLE SMART FRAMING APPLICATION"** is the bonafide work of **"MOHANA PRIYA K (211719106052), MONISH KUMAR V (211719106053), SANJAY KUMAR K (211719106071), SWETHA G (211719106086)",** who carried out the project work under my supervision.

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INTERNAL EXAMINER **EXTERNAL EXAMINER**

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INTRODUCTION

Internet of Things (IoT) technology has brought revolution to each and every field of common man’s life by making everything smart and intelligent. IoT refers to a network of things which make a selfconfiguring network. The development of Intelligent Smart Farming IoT based devices is day by day turning the face of agriculture production by not only enhancing it but also making it cost-effective and reducing wastage. The aim / objective of this report is to propose IoT based Smart Farming System assisting farmers in getting Live Data (Temperature, Soil Moisture) for efficient environment monitoring which will enable them to increase their overall yield and quality of products. The IoT based Smart Farming System being proposed via this report is integrated with Arduino Technology mixed with different Sensors and a Wifi module producing live data feed that can be obtained online using MIT app inventor.

LITERATURE SURVEY

1.TOPIC : IoT-Enabled Smart Agriculture

AUTHOR : Vu Khanh Quy , Nguyen Van Hau , Dang Van

DESCRIPTION : The growth of the global population coupled with a decline in natural resources, farmland, and the increase in unpredictable environmental conditions leads to food security is becoming a major concern for all nations worldwide. These problems are motivators that are driving the agricultural industry to transition to smart agriculture with the application of the Internet of Things (IoT) and big data solutions to improve operational efficiency and productivity. The IoT integrates a series of existing state-of-the-art solutions and technologies, such as wireless sensor networks, cognitive radio ad hoc networks, cloud computing, big data, and end-user applications. This study presents a survey of IoT solutions and demonstrates how IoT can be integrated into the smart agriculture sector. To achieve this objective, we discuss the vision of IoT-enabled smart agriculture ecosystems by evaluating their architecture (IoT devices, communication technologies, big data storage, and processing), their applications, and research timeline. In addition, we discuss trends and opportunities of IoT applications for smart agriculture and also indicate the open issues and challenges of IoT application in smart agriculture. We hope that the findings of this study will constitute important guidelines in research and promotion of IoT solutions aiming to improve the productivity.

2.TOPIC : Smart Farm Monitoring Using Raspberry Pi and Arduino

AUTHOR : Siwakorn Jindarat, Pongpisitt Wuttidittachotti

DESCRIPTION : This study aimed to investigate an establishment using an Intelligent System which employed an Embedded System and

Smart Phone for chicken farming management and problem solving using Raspberry Pi and Arduino Uno. An experiment and comparative analysis of the intelligent system was applied in a sample chicken farm in this study. The findings of this study found that the system could monitor surrounding weather conditions including humidity, temperature, climate quality, and also the filter fan switch control in the chicken farm. The system was found to be comfortable for farmers to use as they could effectively control the farm anywhere at anytime, resulting in cost reduction, asset saving, and productive management in chicken farming.

PUBLISHED IN : 2015 IEEE 2015 International Conference on computer

3. TOPIC : Smart Agriculture Monitoring System Using IOT

AUTHOR : Tanuj Manglani, Aman Vaishnav , Ajayraj Singh

DESCRIPTION : The New beginning of computing technology is arriving such as the Internet of Things (IoT). It is a kind of Global Neural Network the cloud that interfaces various gadgets. Human life and the way work have been revolutionized by the Internet in the past decade. Currently, IoT is changing the trends of human life as the use of emerging technologies which consist of heterogeneous communication devices is increasing. IoT are relevant in different strategies of agriculture. India has agriculture as its essential occupation. As per IBEF (India Brand Equity Foundation), 58% individuals living in rural areas in India are reliant upon agriculture. The agricultural advancement is sped up with the increment in the profitability and up gradation of the plantation frameworks. The IoT has the capacity to change the world. In any case, the use of innovation like IoT in agriculture could have the best effect. Smart Agriculture is an idea wherein data and correspondence innovation is carried out to deal with every one of the exercises and cycles identified with the agriculture space. With the quick improvement of the world population, huge space of land is used to foster lodging and the capacity of creating food is decreased.

Farming has gotten essential in present pattern and keeps food on the tables. Farming with IoT helps in moderating the lack of food by requesting the current land for more grounded usage at least expense. Smart agriculture is an idea that rapidly snaps on the agricultural field. In this paper present a novel design that are developing an automated system which is able to control the crop monitoring of the agriculture lands, which is quite difficult for human beings.

PUBLISHED IN : Published in: 2022 International Conference on Electronics and Renewable Systems (ICEARS)

4.TOPIC : Automation in Agriculture and IoT

AUTHOR : Vaishali Puranik, Sharmila , Ankit Ranjan

DESCRIPTION : Almost everything around us is touch by digitisation. The role the Technology has to play in agriculture sector is becoming more and more visible day by day. Since year of its inception communication has played an important part in agriculture, it was not just limited to in area of crop diagnostics but it has played pivotal role in the modification of age old agricultural practices. One can also witness development in various methodologies and technologies being used in the agricultural system. On the contrary, the agriculture sector in India is witnessing losing ground every day that has affected the production capacity of the ecosystem. There is an emerging need to solve the problem in the said domain to restore vibrancy and put it back on higher growth. A large-scale agricultural system requires a lot of maintenance, knowledge, and supervision. In the given paper we are aiming to automate the Maintenance, Control of Insecticides and pesticides, Water Management and Crop Monitoring.

Published in: 2019 4th International Conference on Internet of Things: Smart Innovation and Usages (IoT-SIU)

5.TOPIC : Smart Agriculture System Using IoT and Cloud computing

AUTHOR : Sandeep Rathor; Shalini Kumari

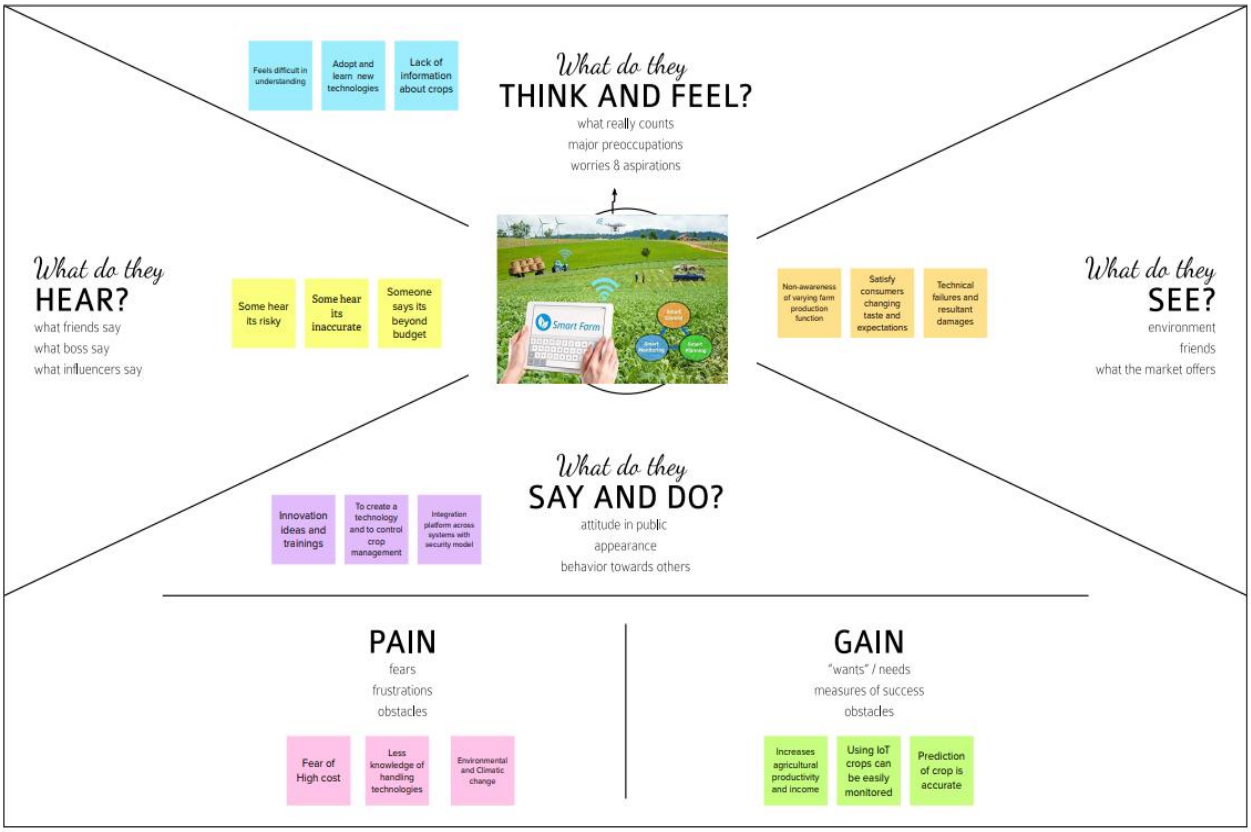
DESCRIPTION : Agriculture is integral to all of us. The traditional practices involved in agriculture don't give us the best output in terms of productivity. But the technology available today can harness the true potential of any farm-land. As the population is increasing, the exploitation of resources is increasing and with limited resources, we have to produce the maximum yield. Therefore, it becomes essential that we deploy technology to our help. IOT - Internet of Things is a technology that can help us. It makes things smart by connecting physical devices to the internet. Smart systems provide accurate and up-to-date information that enables systematic decision making. IoT in combination to cloud computing can help us revive the agriculture industry.

Published in: 2021 5th International Conference on Information Systems and Computer Networks (ISCON)

IDEATION & PROPOSED SOLUTION

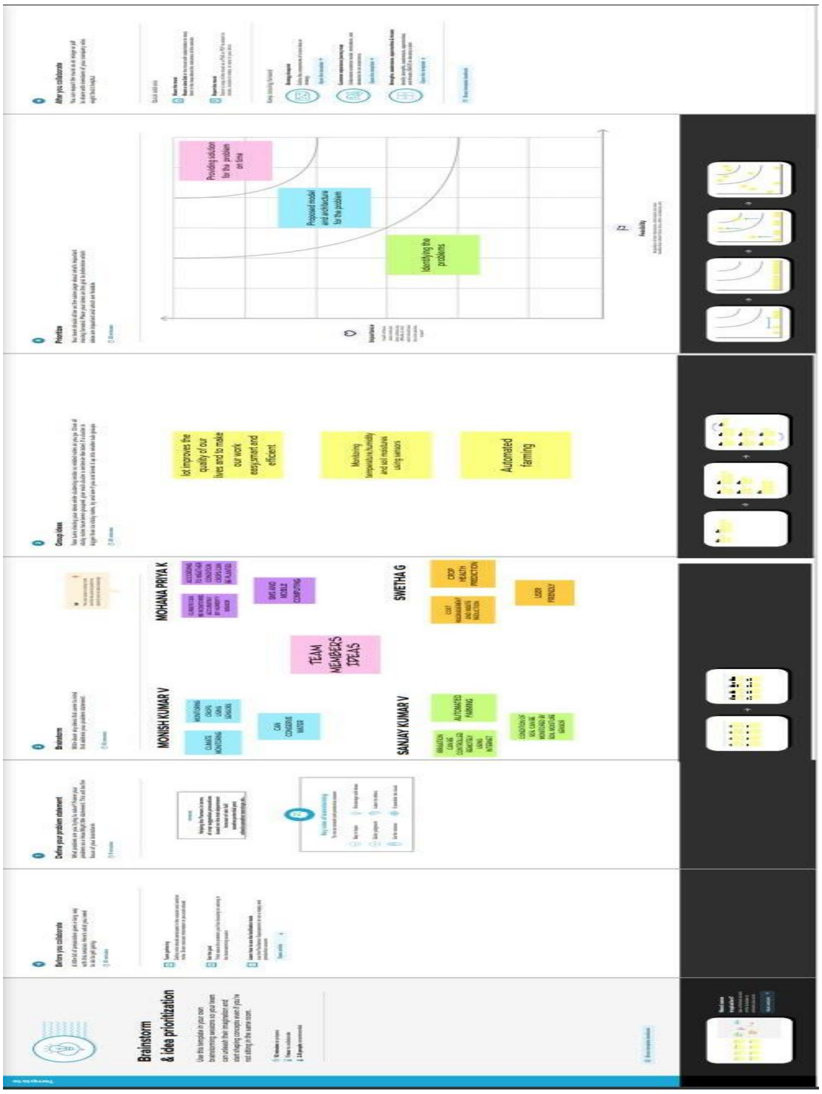
1. Empathy Map Canvas:

An empathy map is a collaborative tool teams can use to gain a deeper insight into their customers. Much like a user persona, an empathy map can represent a group of users, such as a customer segment. The empathy map was originally created by [Dave Gray] and has gained much popularity within the agile community.



2.Ideation & Brainstorming:

Ideation essentially refers to the whole creative process of coming up with and communicating new ideas. Ideation is innovative thinking, typically aimed at solving a problem or providing a more efficient means of doing or accomplishing something. It encompasses thinking up new ideas, developing existing ideas, and figuring out means or methods for putting new ideas into practice. Ideation is similar to a practice known as brainstorming..



PROPOSED SOLUTION

To provide efficient decision support system using wireless sensor network which handle different activities of farm and gives useful information related to farm such as Soil moisture, Temperature and Humidity content . Smart Agricultural System solutions provide an integrated IoT platform in agriculture that allows farmers to use different types of sensors and used to collect the information of various parameter and analyse real-time data in order to make informed decisions.

IoT based smart framing for Live Monitoring of Temperature and Soil Moisture has been proposed using Arduino and Cloud Computing . The System has high efficiency and accuracy in fetching the live data of temperature and soil moisture. The IoT based smart farming System being proposed via this report will assist farmers in increasing the agriculture yield

REQUIREMENT ANALYSIS

Functional Requirements:

Following are the functional requirements of the proposed solution.

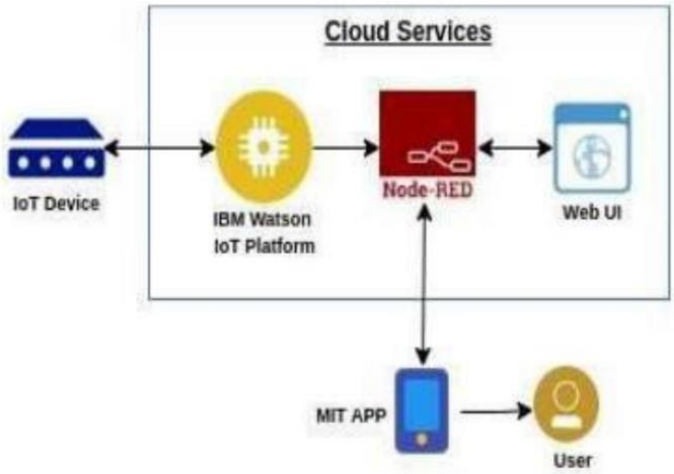
FR No.	Functional Requirement (Epic)	Sub Requirement (Story / Sub-Task)
FR-1	IoT devices	Sensors and Wifi module.
FR-2	Software	Web UI, Node-red, IBM Watson, MIT app

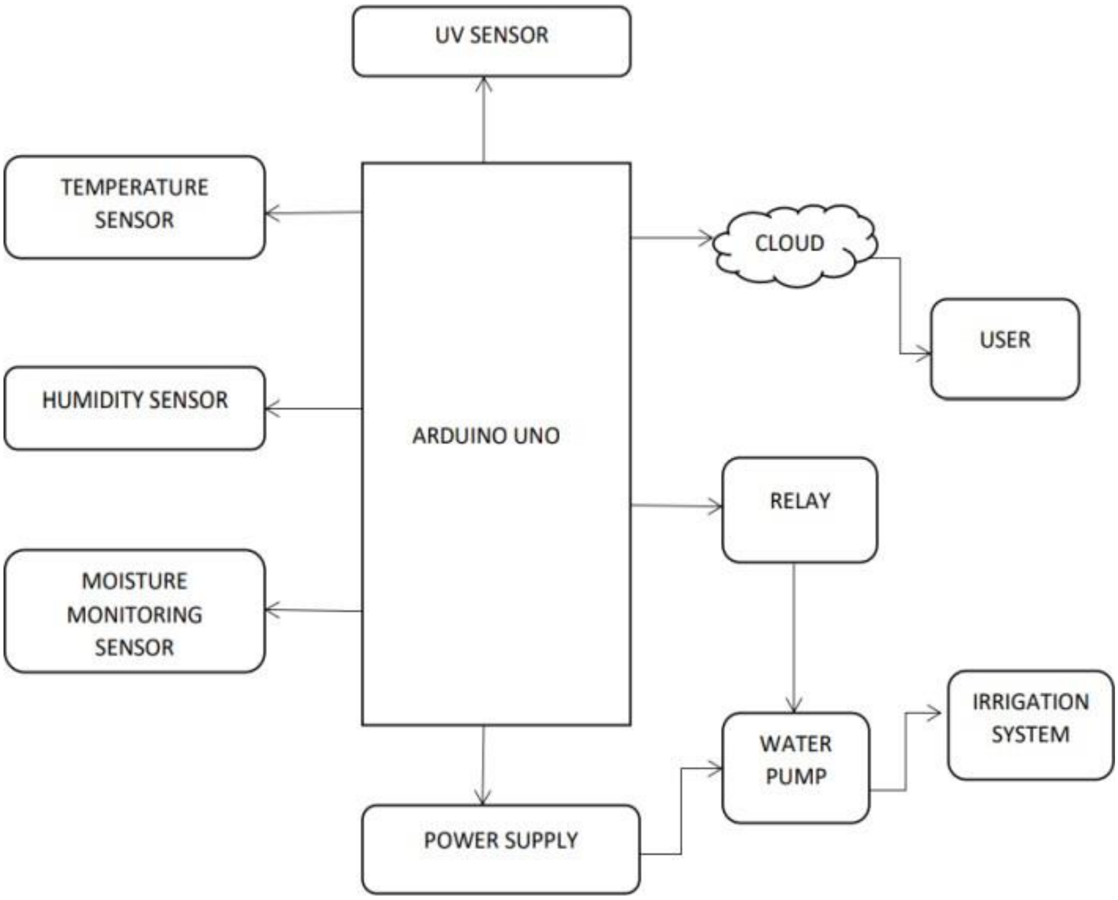
Non-functional Requirements:

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

FR No.	Non-Functional Requirement	Description
NFR-1	**Usability**	Time consumability is less, Productivity is high.
NFR-2	**Security**	It has high 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 and many new constraints can be added.

PROJECT DESIGN





User Stories

User Type	Functional Requirement	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 email, password and confirming my password.	I can access my account/ dashboard	High	Sprint-1
	Permission	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
Customer (Web user)	Login	USN-3	As a user, I can log into the application by entering email & password.	I can register & access the dashboard with Login	High	Sprint-2
	Check credentials	USN-4	As a user, I can register for the application through mobile application	Temperature and Humidity details	Medium	Sprint-1
	Dashboard	USN-5	As a user can view the dashboard and this dashboard include the check roles of access and then move to the manage modules.	I can view the dashboard in this smart farming application system.	Medium	Sprint-1
Customer care Executive	MIT app	USN-6	To make the user to interact with the software.	Database to store in cloud services.	High	Sprint-1
Administrator	IOT devices	USN-7	As a user once view the manage modules this describes the manage system admins and Manage Roles of user and etc...,		Medium	Sprint-1
	Log out	USN-8	Exit	Sign out	High	Sprint-1

PROJECT PLANNING & SCHEDULING

Product Backlog, Sprint Schedule, and Estimation

Sprint	Functional Requirement (Epic)	User Story Number	User Story / Task	Story Points	Priority	Team Members
Sprint-1	Interfacing Sensors and Motor Pump and IBM cloud	USN-1	Develop a python Code to Interface Sensorsand Motor Pump and IBM cloud.	20	High	Mohanapriya K (member 2)
Sprint-2	Node-Red	USN-2	Develop a we b Application Using a Node-Red.	20	High	Swetha G (member 3)
Sprint-3	Mobile Application	USN-3	Develop a mobile Application using MIT-App Inventor.	20	High	Monish Kumar V (Leader)
Sprint-4	Integration & Testing	USN-4	Integrating Python Script, Web application &Mobile App	20	Medium	Sanjay Kumar V (member 1)

Project Tracker, Velocity & Burndown Chart

Sprint	Total Story Points	Duration	Sprint Start Date	Sprint End Date (Planned)	Story Points Complet ed	Sprint Release Date (Actual)
Sprint-1	20	6 Days	24/10/22	29 Oct 2022	20	29 Oct 2022
Sprint-2	20	6 Days	31/10/22	05 Nov 2022	20	05 Nov 2022
Sprint-3	20	6 Days	07/11/22	12 Nov 2022	20	11 Nov 2022
Sprint-4	20	6 Days	14/11/22	19 Nov 2022	20	17 Nov 2022

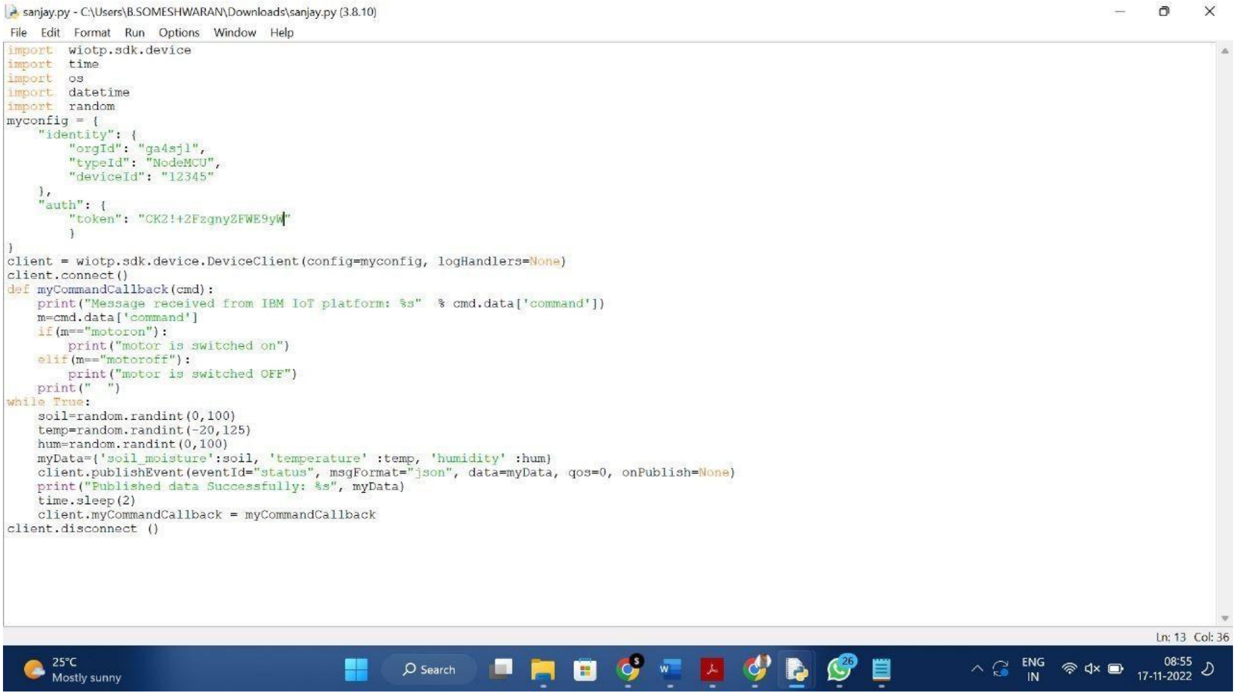
CODING & SOLUTIONING

Python Code:

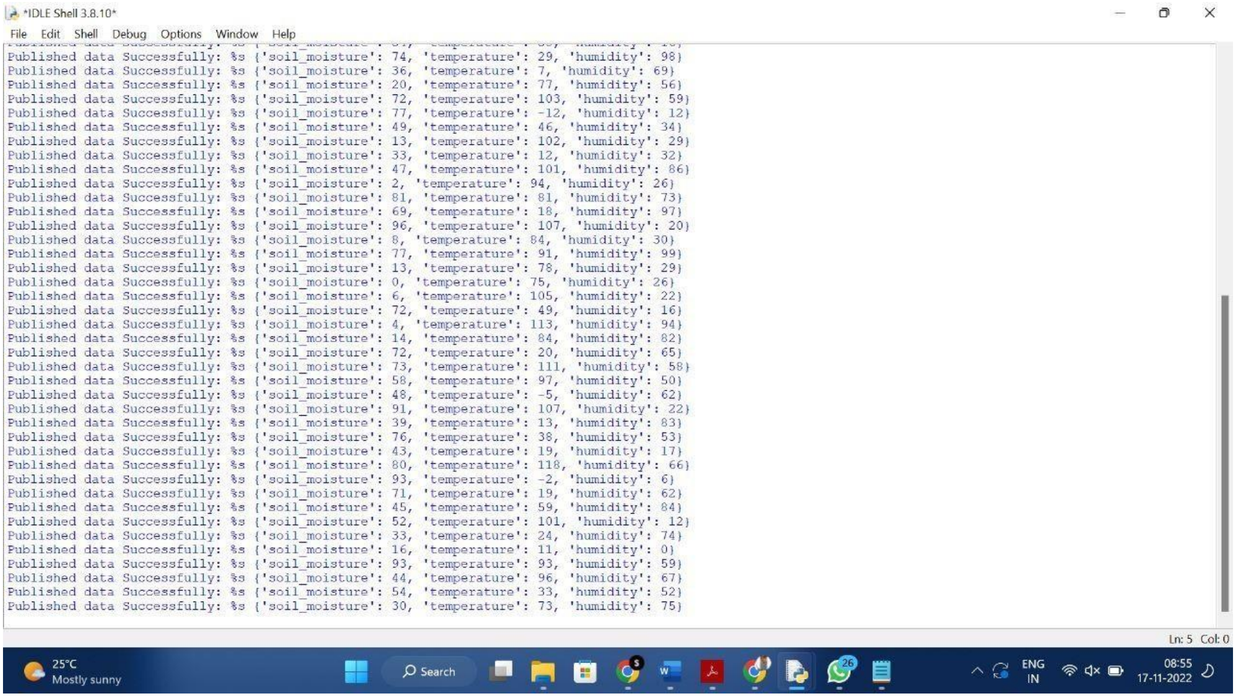
- For Connecting IBM Cloud
- For NODE RED
- Weather Map Information
- MIT App Inventor

Python Code:

```
import wiotp.sdk.device
import time
import  os
import datetime
import random
myconfig = {
   "identity": {
      "orgId": "ga4sjl",
      "typeId": "NodeMCU",
      "deviceId": "12345"
   },
   "auth": {
      "token": "CK2!+2FzgnyZFWE9yW"
      }
}
client = wiotp.sdk.device.DeviceClient(config=myconfig, logHandlers=None)
client.connect()
def myCommandCallback(cmd):
   print("Message received from IBM IoT platform: %s" % cmd.data['command'])
   m=cmd.data['command']
   if(m=="motoron"):
      print("motor is switched on")
   elif(m=="motoroff"):
      print("motor is switched OFF")
   print(" ")
while True:
   soil=random.randint(0,100)
   temp=random.randint(-20,125)
   hum=random.randint(0,100)
   myData={'soilmoisture':soil, 'temperature' :temp, 'humidity' :hum}
   client.publishEvent(eventId="status", msgFormat="json", data=myData, qos=0,
onPublish=None)
   print("Published data Successfully: %s", myData)
   time.sleep(2)
   client.myCommandCallback = myCommandCallback
client.disconnect ()
```



Running of programs :

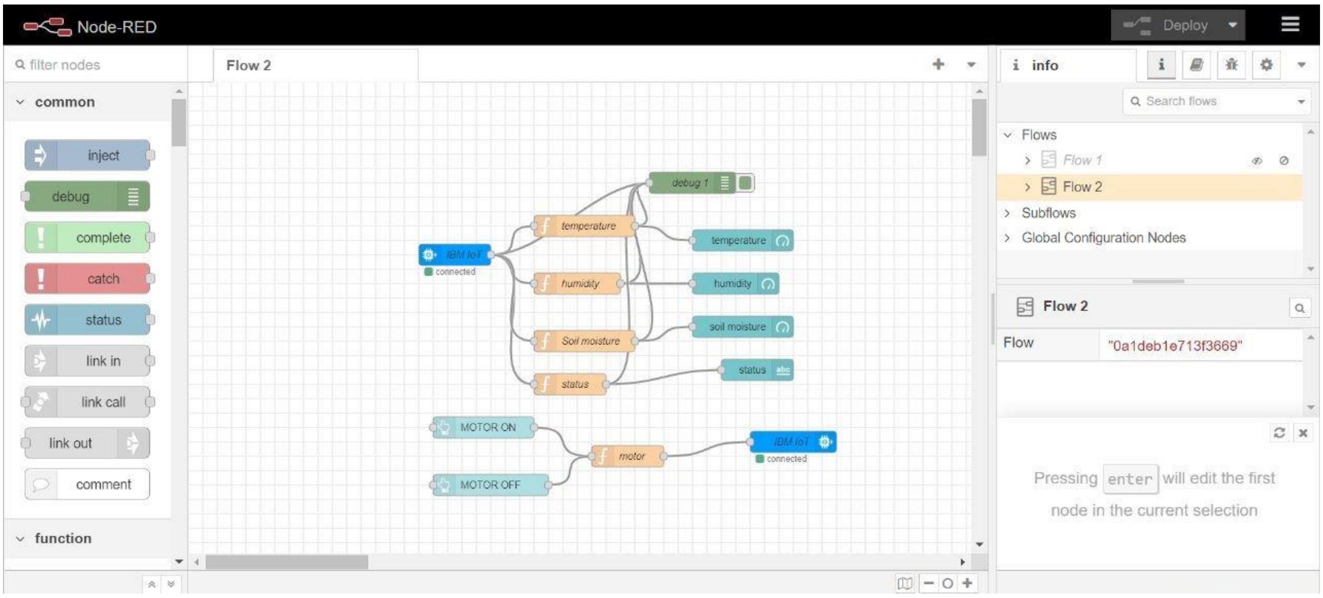


TESTING & RESULTS

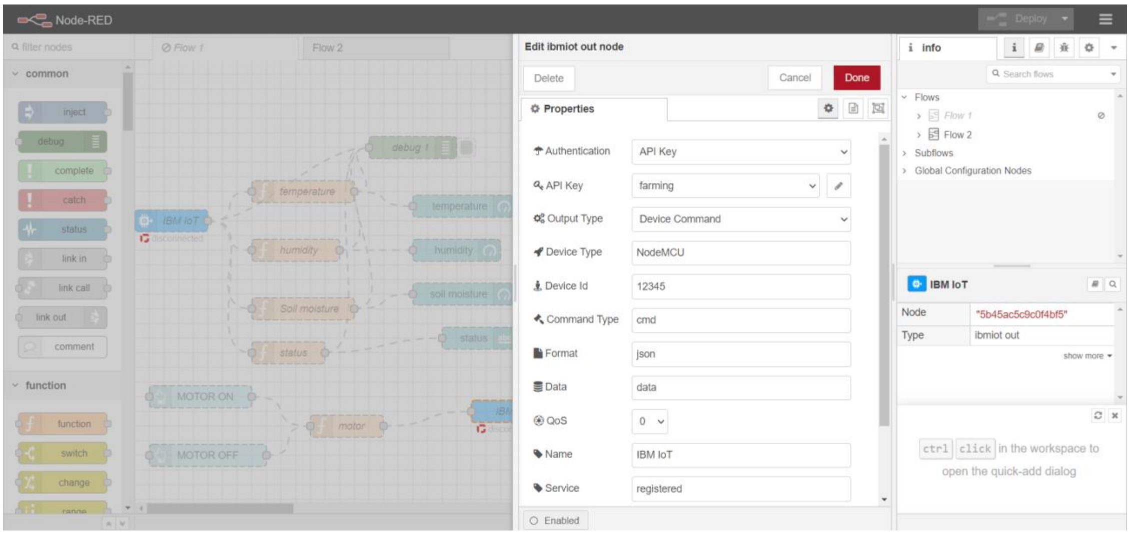
NODE RED Flow Connections

- **Interfacing IBM Cloud**
- **Intefacing & Getting Sensor Datas**
- **Connecting MIT App Inventor**
- **Weather Map Parameters**

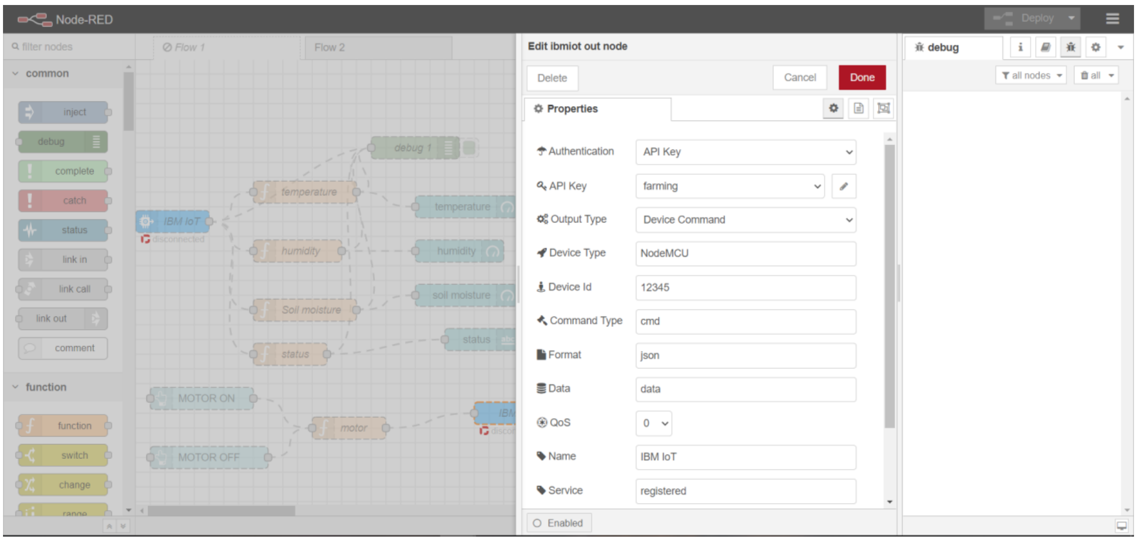
Flow:1



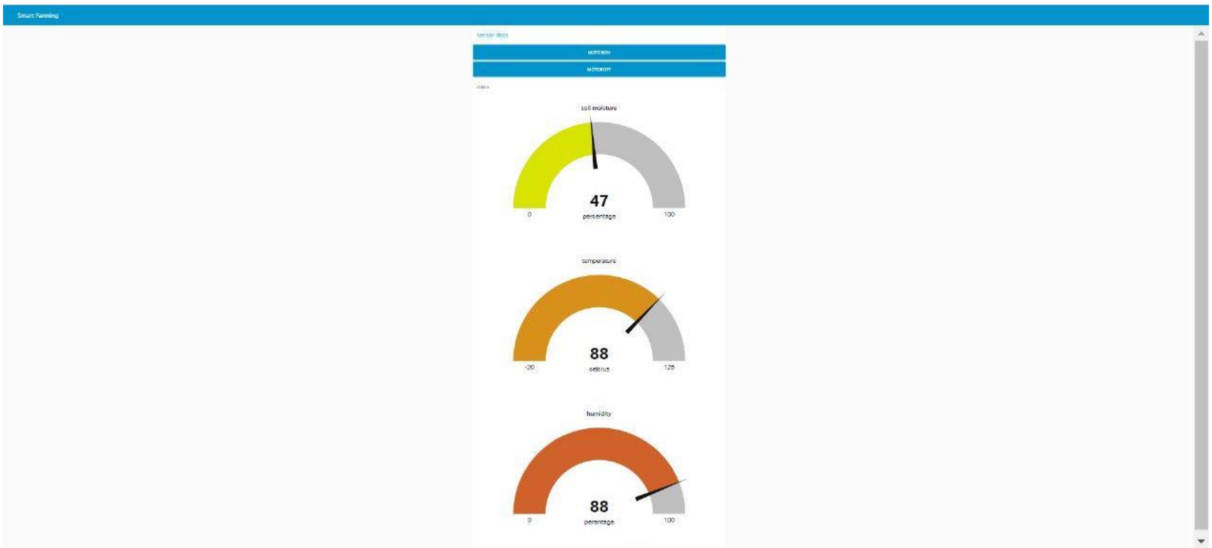
Flow:1 Configuring All Nodes With IBM IOT Platform



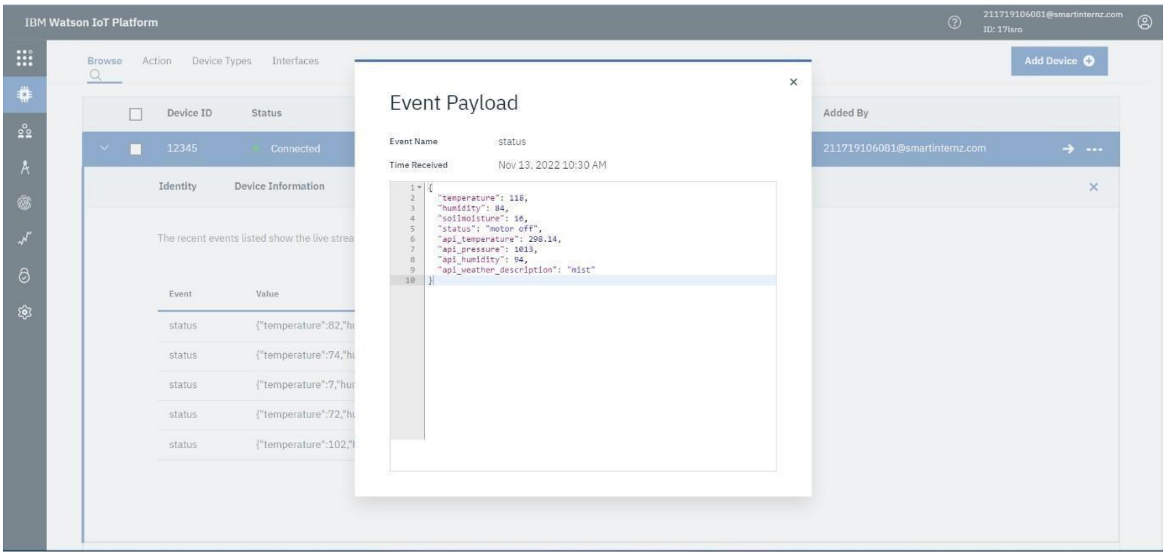
Flow:2 Configuring All Nodes With IBM IOT Platform



Web UI Output

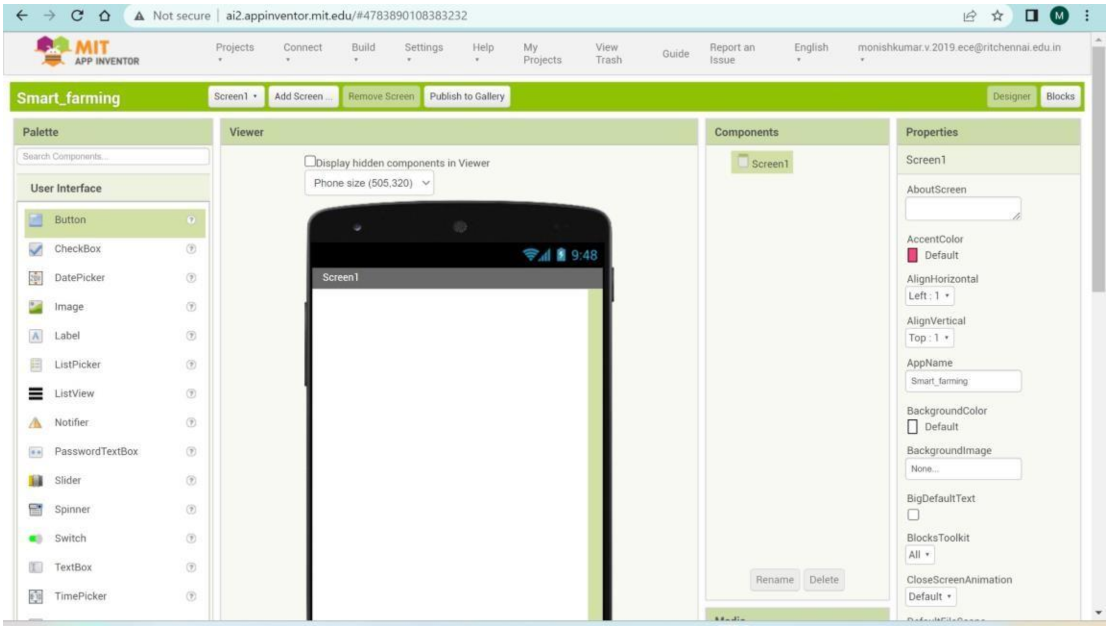


IBM Watson IoT Platform Device Connect & Live Data

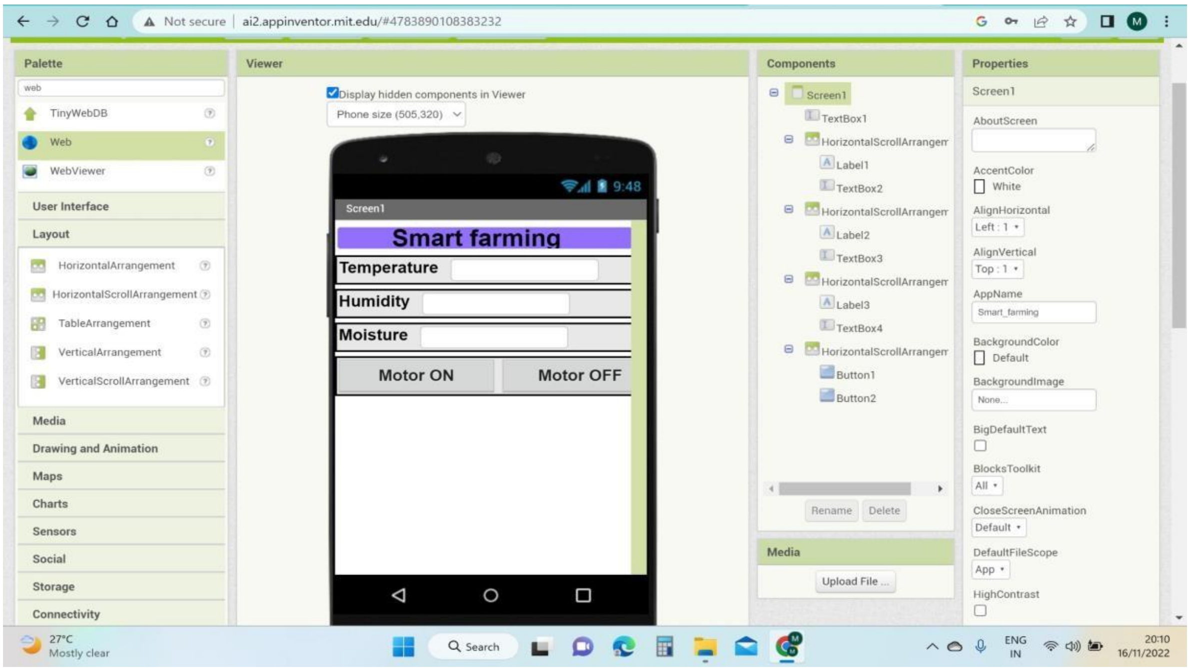


MIT APP INVENTOR

Step 1: Login Into MIT App Inventor

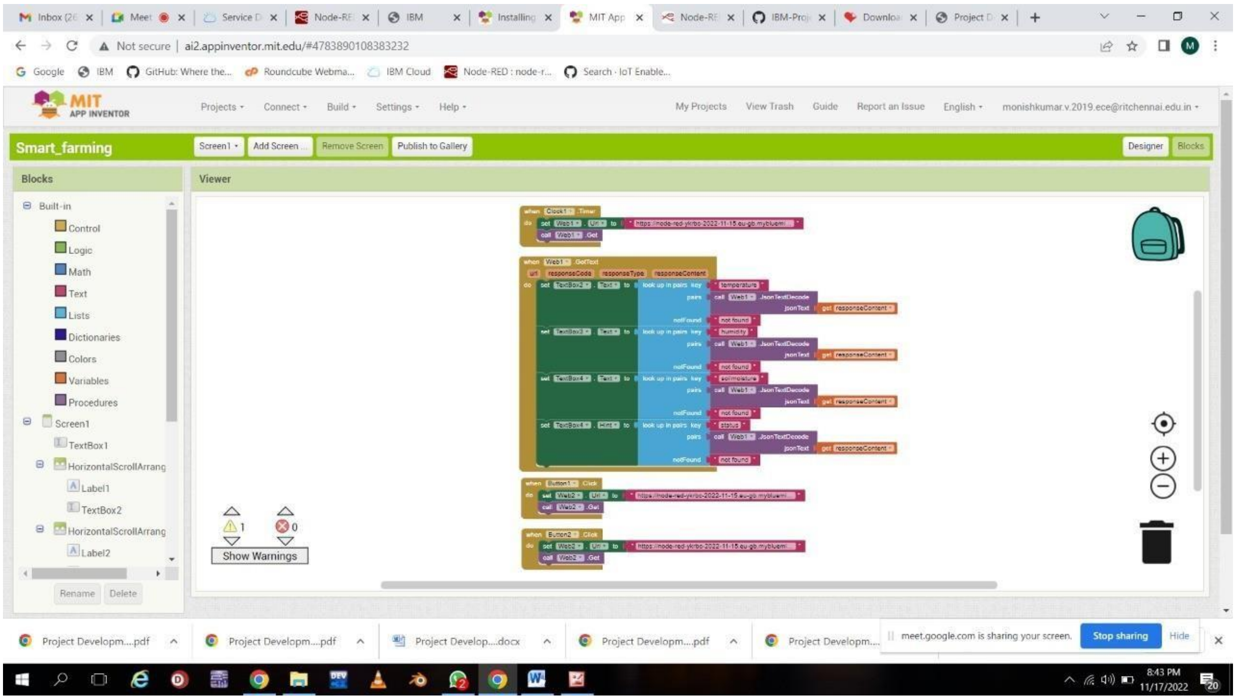


Step 2: Create Your User Interface By Using the Preset Tools

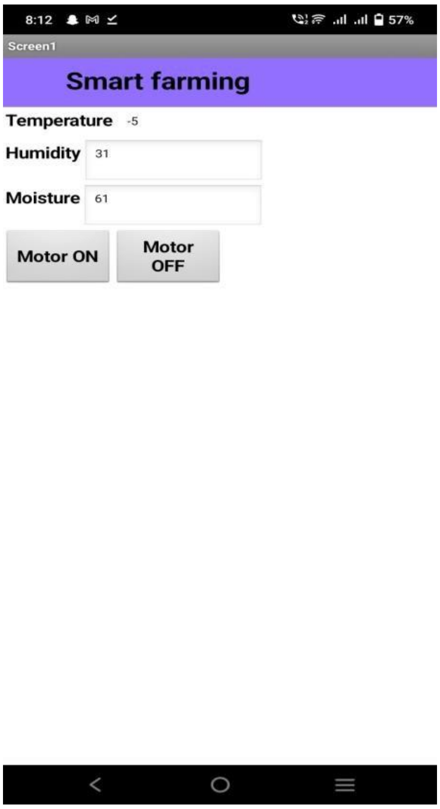


Step 3: Back End Process

- Specify the Cloud URL Details to Receive the Date From Node Red.
- Commend Request From App To Node RED to Turn ON /OFF Motor.
- Weather API Data is Displaced From Node RED.



Step 4: Live Output In Mobile Application



ADVANTAGES & DISADVANTAGES

Advantages -- A remote control system can help in working irrigation system valves dependent on schedule. Irrigating remote farm properties can be exceptionally troublesome and labor-intensive. It gets hard to comprehend when the valves were started and whether the ideal measure of water was distributed. For situations where a quick reaction is required, manual valve actuation may not be conceivable constantly. Thus, remote observing and control of irrigation systems, generators or wind machines or some other motor-driven hardware become the next logical step. Various sensors will help to increase the productivity and customers can be benifeted.

Disadvantages: Cost, Reliability, Increased channel maintenance

CONCLUSION

IoT based SMART FARMING SYSTEM for Live Monitoring of Temperature and Soil Moisture has been proposed using Arduino and Cloud Computing . The System has high efficiency and accuracy in fetching the live data of temperature and soil moisture. The IoT based smart farming System being proposed via this report will assist farmers in increasing the agriculture yield and take efficient care of food production as the System will always provide helping hand to farmers for getting accurate live feed of environmental temperature and soil moisture with more than 99% accurate results.

FUTURE SCOPE

Future work would be focused more on increasing sensors on this system to fetch more data especially with regard to Pest Control and by also integrating GPS module in this system to enhance this Agriculture IoT Technology to full-fledged Agriculture Precision ready product

APPENDIX

https://careereducation.smartinternz.com/Student/externships_workspace_info/22560

https://cloud.ibm.com/

https://node-red-ykrbc-2022-11-15.eu-gb.mybluemix.net/red/#flow/dd4caa875910d6a1

https://github.com/IBM-EPBL/IBM-Project-22560-1659853866

https://drive.google.com/file/d/1crG5YinXiXWZQZfu_iX7rR1UpeHjqoDc/view?usp=share_link