PROJECT REPORT

Project Name: SMARTFARMER- IOT ENABLED SMART FARMING APPLICATION

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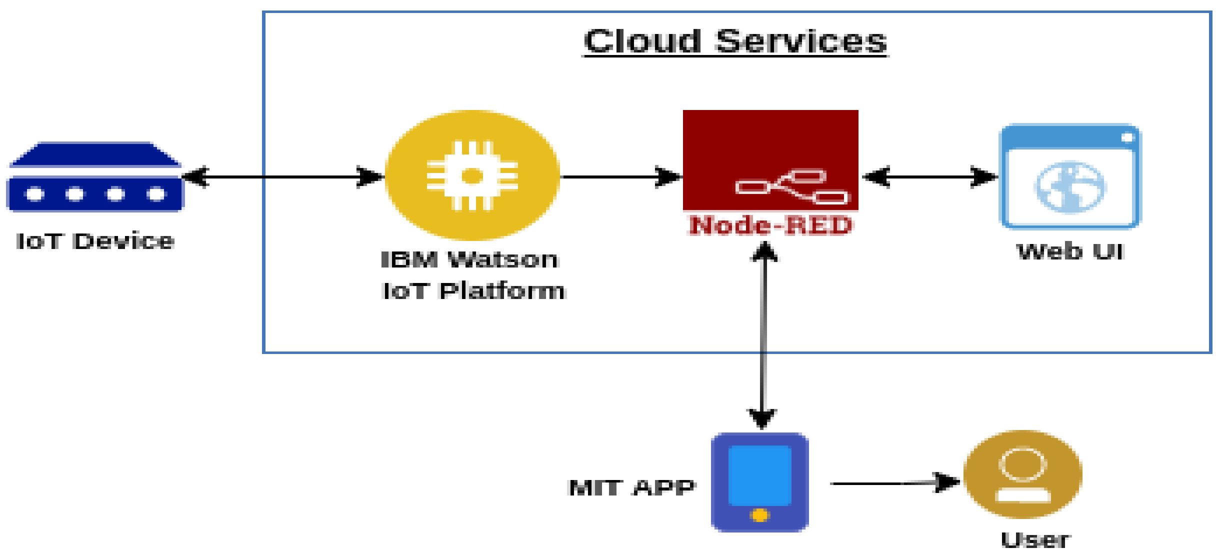
1.INTRODUCTION

1.1 Project Overview

Agriculture is an important industry as well as the foundation of the economy. Agriculture automation is a major concern and emerging topic for all countries. The world's population is rapidly increasing, and as the population grows, the demand for food increases. The developing need for food, as well as changing consumer demands, have made it extremely difficult for the agriculture industry to develop techniques and practices that will allow them to fully satisfy the increasing needs and requirements. One of the most essential sectors in society is agriculture, where it fosters the improvements made. Thus, it is vital to ensure that upgrades are made in this industry to improve its general outcomes and results. Food production technology should foster major improvement and innovation to fulfil the customers' advancing needs. It is critical to make use of the agricultural resources since most of the countries rely on the agricultural sector. Smart irrigation is emerging as new scientific disciplines that use data-intensive methods to increase agricultural productivity while reducing its environmental impact. Modern agricultural operations generate data from a variety of sensors, leading to a better understanding of both the operation environment and the operation activities. This enables more accurate and efficient decision-making. In addition, this allows optimizing resources and achieving the intended objectives from this sector. The water is conserved when implementing these technologies in irrigation systems such that it plays as an important contributor to Sustainable Development Goals (SDGs) under the United Nations specifically Goal 6 and Target 6.4. The SDGs related to water and the environment could be achieved when implementing smart irrigation systems to attain sustainable benefit and better planet for all. SDG 6 is about clean water and sanitation for all, the different targets and indicators of SDG 6 are linked to all water functions and services, considering irrigation. The target 6.4 deals with water scarcity and refers to two main indicators which are water use efficiency and water stress (WS). The quality of the assessment of this indicator depends primarily on the quality of available water data. Therefore, the call for healthier and more sustainable food systems is placing new demands on how irrigation is developed and managed.

IoT-based agriculture system helps the farmer in monitoring different parameters of his field like soil moisture, Temperature, humidity using some sensors. Farmers can monitor all the sensor parameters by using a web or mobile application even if the farmer is not near his field. Wateringthe crop is one of the important tasks for the farmers. They can make the decision whether to water the crop or postpone it by monitoring the sensor parameters and controlling the motor pumps from the mobile application itself.



1.2 **Purpose**

The smart agriculture model main aim to avoid water wastage in the irrigation process. It is low cost and efficient system Is shown below. It includes NodeMCU, Arduino Nano, sensors like soil moisture and

Dht11, solenoid valves, relays , we can use wokwi to stimulate inputs and develope an application to connect with farmer where they can use it in a simple manner

2.LITERATURE SURVEY

2.1 Existing problem

The author describes [1] The farming of agriculture has started past 12000 years back,

Neolithic age gave birth of civilization, Farming and later being continued as traditional farming practices. India being an agrarian's country, Mostly Indian farming are dependent on rains, soil, dampness and environment challenges. Our farmers upgraded to modern state of art technology in cultivation. Globally the IoT systems has contributed its application in many fields and proven to be successful. It is the time that Indian farmer need to introduce the Smart Agricultural systems for higher crop yield.The author describes [2] Farming is the backbone of the economy and it is the fundamental method for occupation. The large population of the world depends on farming for living day to day life. Around 70% of the Indian population depends on cultivation. Most of the cultivation cannot be productive only by physical activities so have to be handled by innovative technologies. Therefore, they use IoT innovation and SMS notification to address the critical part of farming. The past method of incorporating a keen water supply system with smart ideas. This undertaking is a follow up to a past method whose highlight features incorporates a keen water system with excellent control and insightful basic leadership in terms of exact continuous field information which regulates temperature, moisture and soil dampness of a particular crop. Controlling of every one of these activities will be monitored by PC with Internet and the tasks being performed by interfacing sensors and Arduino. With the observation results decisions are to be made.

The productivity with compilation of data from sensors, actuators and modern electronic gadgets the farmer can monitor agricultural fields. Smart Agriculture can forecast weather data, switching ON the pump motor acknowledging the dampness of soil terms of moisture levels with help of sensors which are interfaced to process module Arduino-UNO. The Smart agriculture system can be operated from anywhere with help of networking technology. On joining process in research and development in Smart Agriculture& Artificial Intelligence can be cutting edge technology in data compiling and resource optimization. The pest & insects controls that protects damaging the crop and also optimisation resources utilisation can be breakthrough.

The author describes [3] Internet of Things (IoT) technology has brought revolution to each and every field of the 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 an 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 from Thingsspeak.com. The product being proposed is tested on Live Agriculture Fields giving high accuracy over 98% in data feeds.

The author describes Today's different types of technologies, techniques and tools are used in the agriculture sector. To improve productivity, efficiency and reduce the time, cost and human intervention, there is a need for a new technology called the Internet of Things. To automate the agricultural activities like water management, soil monitoring, crop management, livestockmonitoring etc. different types of sensors are used. Smart Greenhouses protect the plants from extreme weather. To control all these operations remote smart devices, computers connected with the internet, sensor, camera, micro-controller etc. are used. Growth in the agriculture sector affects the economic condition of the country. This paper focuses on the Role of IoT in Agriculture that defines Smart Farming.

- It is not a secure system.

• There is no motion detection for protection of agriculture field.
• Automation is not available.

2.2 References

[1]Adithya Vadapalli (2021). Internet-of-Things (IoT) based Smart Agriculture in India-An Overview. International Journal of Advance Research in Science and Engineering (2319-8354)

[2] Dahane, A., Benameur, R., Kechar, B., & Benyamina, A. (2020, October). An IoT based smart farming system using machine learning. In *2020 International Symposium on Networks, Computers and Communications (ISNCC)* (pp. 1-6). IEEE.

[3] Farooq, M. S., Riaz, S., Abid, A., Abid, K., & Naeem, M. A. (2019). A Survey on the Role of IoT in Agriculture for the Implementation of Smart Farming. *Ieee Access*, *7*, 156237-156271.

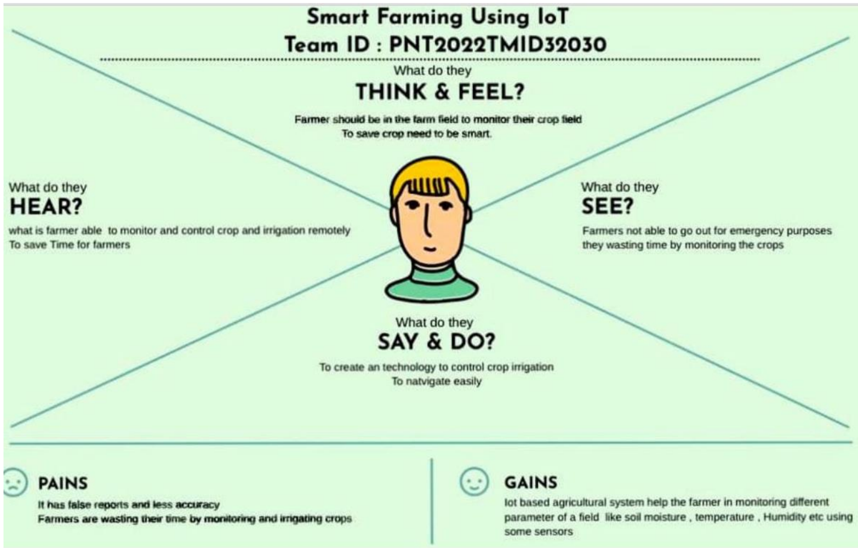
[4] Farooq, M. S., Sohail, O. O., Abid, A., & Rasheed, S. (2022). A survey on the role of iot in agriculture for the implementation of smart livestock environment. *IEEE Access*, *10*, 9483-9505

2.3 **Problem Statement Definition**

Farmers are to be present at farm for its maintenance irrespective of the weather conditions. They have to ensure that the crops are well watered and the farm status is monitored by them physically. Farmer have to stay most of the time in field in order to get a good yield. In difficult times like in the presence of pandemic also they have to work hard in their fields risking their lives to provide food for the people in our country so we are asked to develop a module to help them.

3.IDEATION & PROPOSED SOLUTION

3.1 Empathy Map Canvas



This is the empathy map which was created by my team

3.2 **Ideation and Brainstorming**

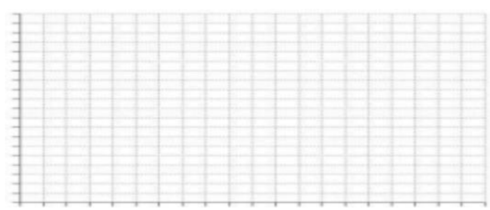
Introduction on Internet of Things (IoT), application of IoT in agricultural field to improve the yield and quality by reducing the cost is provided. The sensors which are used in the architecture are discussed briefly and the process of transmission of data from the agriculture field to the central system is explained. The proposed system advantages are included. In addition, open research issues, challenges, and future of IoT in agricultural field are highlighted.

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.

We can take smart farming a step further by automating several parts of farming, for example smart irrigation and water management. We can apply predictive algorithms on microcontrollers or SoC to calculate the amount of water that will be required today for a particular agriculture field. Say, if there was rain yesterday and the quantity of water required today is going to be less. Similarly, if humidity was high the evaporation of water at upper ground level is going to be less, so water required will be less than normal, thus reducing water usage.

3.3 Proposed Solution

S.No	**Parameter**	Description
1.	Problem Statement (Problem to be solved)	• Watering the field is a difficult process, Farmers have to wait in the field until the water covers the whole farm field. • Power Supply is also one of the problems. In Village Side, the power supply may vary. • The Biggest Challenges Faced by IoT in the Agricultural Sector are Lack of Information, High Adoption, Cost and Security Concerns, etc
2.	Idea / Solution description	• As is the case of precision Agriculture Smart Farming Technique Enables Farmers better to monitor the fields and maintain the humidity level accordingly. • The Data collected by sensors, In terms of humidity, temperature, moisture, and dew detections help in determining the weather pattern in Farms. So cultivation is done for suitable crops.

3.	Novelty / Uniqueness	ALERT MESSAGE – IoT sensor nodes collect information from the farming environment, such as soil moisture, air humidity, temperature, nutrient ingredients of soil, pest images, and water quality, then transmit collected data to IoT backhaul devices. REMOTE ACCESS – It helps the farmer to operate the motor from anywhere
4.	Social Impact / Customer Satisfaction	Smart farming helps farmers to better understand the important factor such as water, topology, aspect ,vegetation and soil best use of scarce resources with in their production environment and manage these in environmental and economical sustainable manner economically.
5.	Business Model(Revenue Model)	Revenue (No. of Users vs Months) 
6.	Scalability of the solution	Case studies have shown precision irrigation has a 5%-8% impact on yield and a similar impact on operating costs. Smart farm’s systems can be retrofitted on existing sites and provide immediate impact with a very short

3.4 Problem Solution Fit

1.Customer Segments Farmers who trying to produce maximum yield	**2.Problems/Pains** • Improper watering to the plants. • Wastage of water. • Requires protecting crops form wild animals attacks, birds and pests.
3.Triggers to act • By sensing the climate. • Regulating the waterflow with respect to weather.	**4.Emotions** • Mental frustrations due to insufficient production of crops. • Felt smart enough to follow the available technologies with minimum cost.
5.Available Solutions • Automation in irrigation • Alarm system to give alert while animal attacks the crop. • CCTV camera to monitor and supervise the crops.	**6.Customer Limitations** • Limited supervision. • Lack of man power. • Limited financial constrains.
7.Behaviour • Consumes more time in crop land. • suggestions from surrounding peoples and implement recent technologies. • Searching for an alternative solution for an existing solution.	**8.Channels of Behaviour** • Using different platforms/social media to describe the working and uses of smart farming applications. • Giving awareness among farmers about the application of the device.
9.Problem root/Cost • Frequent changes and unpredictable weather and climate made it difficult for farmers to engage in agriculture • This factors play an important role in deciding whether to water your plants.	**10.Your Solution** • Our product collects data from various types of sensors and send the values to our main server. • It also collects weather data from the weather API.

• Fields are difficult to monitor when the farmer is not in the field ,leading to crop damage.	• The final decision to irrigate the crop is made by the farmer using mobile application.

4.REQUIREMENT ANALYSIS

4.1 Functional Requirements

FR No.	Functional Requirement (Epic)	Sub Requirement (Story / Sub-Task)
FR-1	User Registration	Registration through any mails
FR-2	User Confirmation	Confirmation via Email Confirmation via OTP Confirmation via device
FR-3	Log in to system	Check Credentials Check Roles of Access.
FR-4	Manage Modules	Manage System Admins Manage Roles of User Manage User permission
FR-5	Check whether details	Temperature details Humidity details
FR-6	Log out	Exit

4.2 Non Functional Requirements

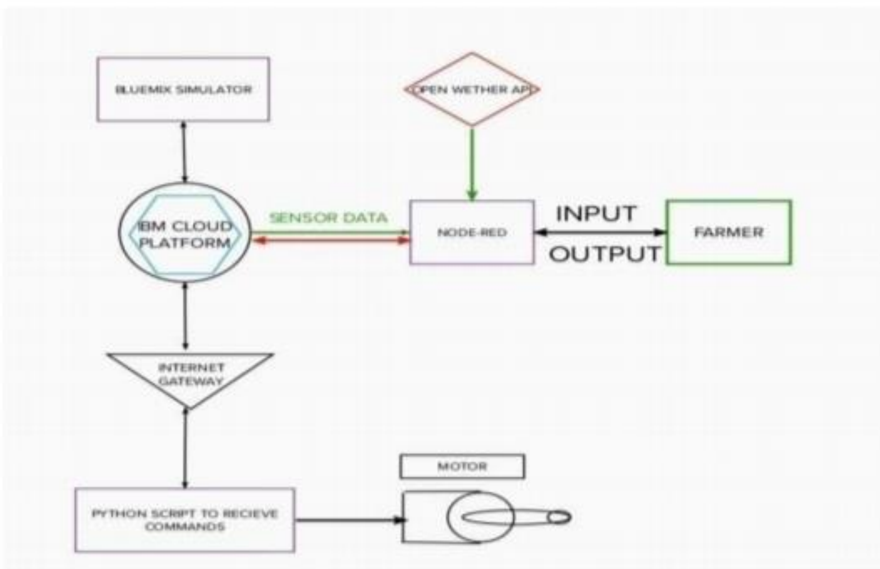
FR No.	Non-Functional Requirement	Description
NFR-1	Usability	It includes easy i n learn ability, efficiency in use, remember skill, lack of errors

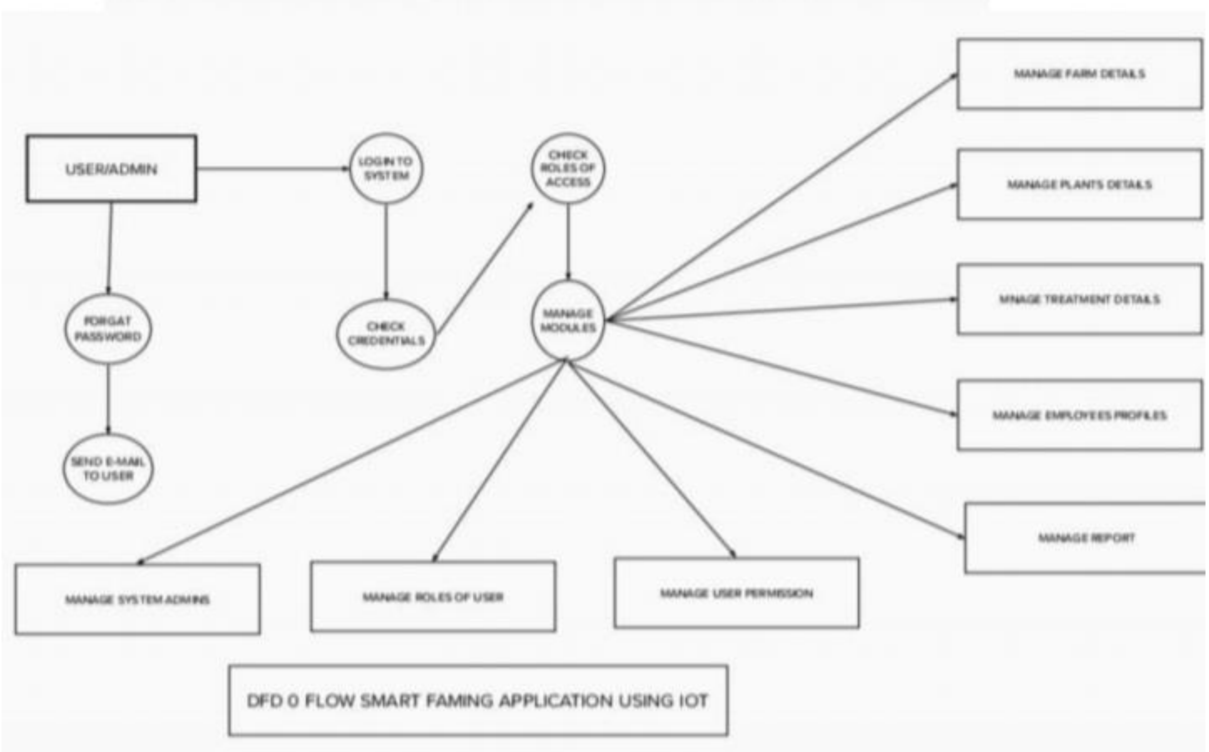
		in operation and subjective pleasure.
NFR-2	Security	Sensitive and private data must be protected from their production until the decision-making and storage stages.
NFR-3	Reliability	The shared protection achieves a better trade-off between costs and reliability. The model uses dedicated and shared protection schemes to avoid farm service outages.
FR-4	Performance	The idea of implementing integrated sensors with sensing soil and ambient parametersin farming will be more efficient for overall monitoring of crops.
NFR-5	Availability	Automatic adjustment of farming equipment made possible by linking information like crops/weather and equipment to auto-adjust temperature, humidity, etc
NFR-6	Scalability	Scalability is a major concern for IoT platforms. It has shown that different architectural choices of IoT platforms affect system scalability and that automaticreal time decision-making is feasible in an environment composed of dozens of thousand.

5.PROJECT DESIGN

5.1 Data Flow Diagrams

A Data Flow Diagram (DFD) is a traditional visual representation of the information flows within a system. A neat and clear DFD can depict the right amount of the system requirement graphically. It shows how data enters and leaves the system, what changes the information, and where data is stored





The different sensors used to measure soil moisture , temperature ,humidity , weather and stored the data in IBM CLOUD

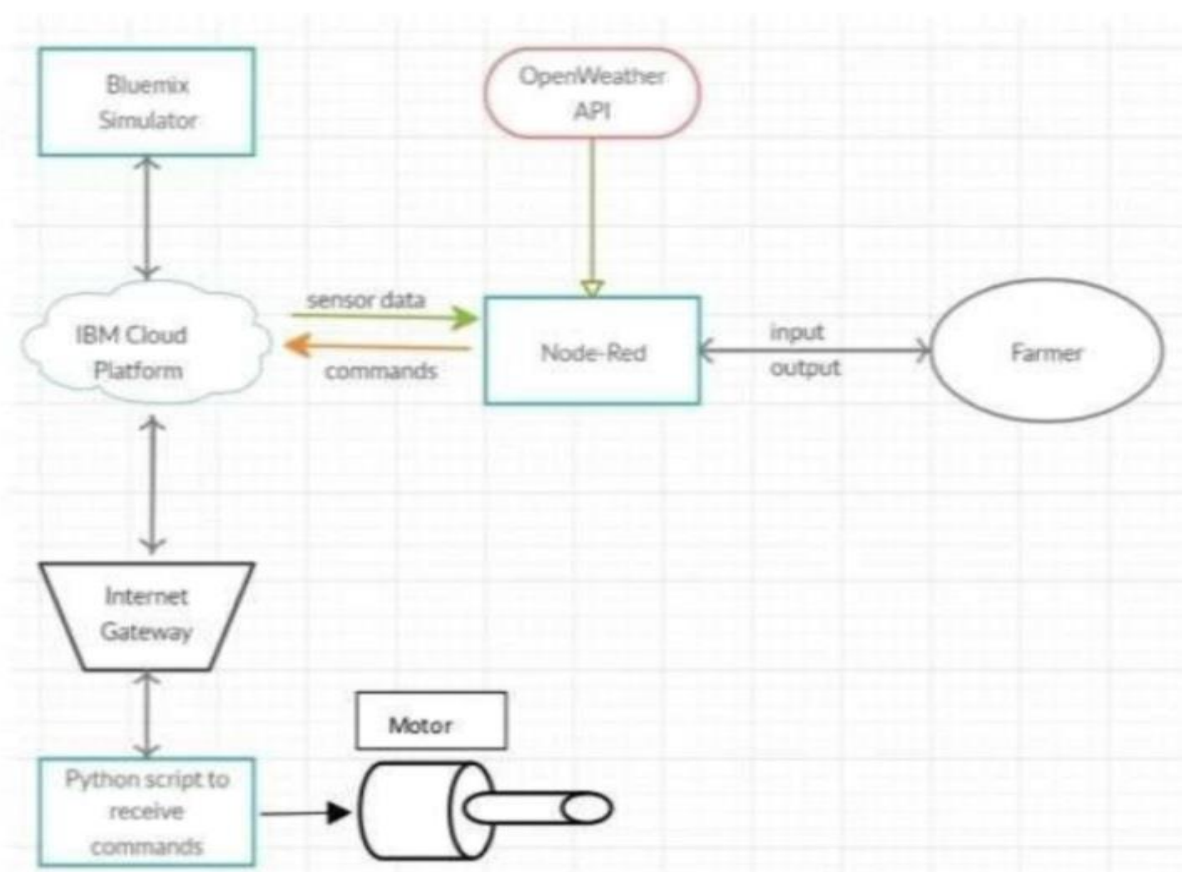
• Arduino UNO is used as a processing Unit that process the data obtained from the sensors and whether data from the weather API.

• NODE-RED is used as a programming tool to write the hardware, software, and APIs. The MQTT protocol is followed for the communication.

• All the collected data are provided to the user through a mobile application that was developed using the MIT app inventor. The user could plan through an app, weather to water the crop or not depending upon the sensor values. By using the app they can remotely operate to the motor switch which is watering the plant

5.2 Solution and Technical Architecture

The Deliverable shall include the architecture diagram as below and information as per the table 1 and table 2.



Guidelines:

1. Include all the processes (As an application logic / Technology Block)
2. Provide infrastructural demarcation(Local/Cloud)
3. Incdicate external interfaces(third party API's etc.)
4. Indicate Data Storage components/services
5. Indicate interface to machine learning models(if applicable)

Table 1: Components and Technologies

Sl. No	Component	Description	Technology
1	User Interface	How user interacts with application e.g. WebUI, Mobile App.	HTML, CSS, JavaScript / Angular Js / React Js etc.
2	Application Logic-1	Logic for a process in the application	Python
3	Application Logic-2	Logic for a process in the application	IBM Watson IOT service
4	Application Logic-3	Logic for a process in the application	IBM Watson Assistant
5	Database	Data Type, Configurations etc.	My SQL, No SQL, etc.
6	Cloud Database	Database Service on Cloud	IBM Cloud
7	File Storage	File storage requirements	IBM Block Storage or Other Storage Service or Local File system
8	External API-1	Purpose of External API used in the application	IBMWeather API, etc
9	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 frameworks used	Technology of Open source framework
2	Security Implementations	Sensitive and private data must be protected from their production until the decision-making and storage stages.	e.g. Node-Red, Open weather App API,MIT App Inventor, etc.
3	Scalable Architecture	scalability is a major concern for IoT platforms. It has been shown that different architectural choices of IoT platforms affect system scalability and that automatic real time decision-making is feasible in an environment composed of dozens of thousand.	Technology used
4	Availability	Automatic adjustment of farming equipment made possible by linking	Technology used

		information like crops/weather and equipment to auto-adjust temperature, humidity, etc	
5	Performance	The idea of implementing integrated sensors with sensing soil and environmental or ambient parameters in farming will be more efficient for overall monitoring.	Technology used

User Stories:

Use the below template to list all the user stories for the product.

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 email, password, and confirming my password	I can access my account / dashboard	High	Sprint-1
		USN-2	As a user, I will receive confirmation emailonce I have	I can receive confirmation email &	High	Sprint-1

			registered for the application	click confirm		
		USN-3	As a user, I can register for the applicationthrou gh Facebook I can register & access the dashboard with Facebook	Login	Low	Sprint-2
		USN-4	As a user, I can register for the applicationthrou gh Gmail		Mediu m	Sprint-1
	Login	USN-5	As a user, I can log into the application byentering email & password		High	Sprint-1
	Dashboard					
Customer (Web user)						
Customer Care Executive						
Administrat or						

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	Simulation Creation	USN-1	Connect sensors , arudino,esp8266,cloud	2	High	Anshio renin
Sprint -1	Software	USN-2	Develop an application with MIT App inventor (Login page with firebase)	2	High	Manikandan
Sprint -2	Software	USN-3	Application development for project	2	High	kiruthika
Sprint -3	Software	USN-4	Establishing Node-Red connection	2	Medium	sunmathi
Sprint -3	Software	USN-5	Connecting application with Node-Red and further application development	2	High	Sunmathi Kiruthika Manikandan Anshio
Sprint -4	Testing	USN-6	Connect stimulation using WOKWI for checking output	2	High	Manikandan Kiruthika Sunmathi Anshio renin

6.2 Sprint Delivery Schedule

Sprint	Total Story Points	Duration	Sprint Start Date	Sprint End Date(Planned)	Story Points Completed (as on	Sprint Release Date(Actual)

					Planned End Date)	
Sprint-1	16	5 Days	25 Oct 2022	29 Oct 2022		31 Oct 2022
Sprint-2	16	8 Days	31 Oct 2022	07 Nov 2022		08 Nov 2022
Sprint-3	16	6 Days	09 Nov 2022	13 Nov 2022		14 Nov 2022
Sprint-4	8	6 Days	15 Nov 2022	17 Nov 2022		17 Nov 2022-18 Nov 2022

7. CODING AND SOLUTIONING (Explain the Features added in the Project along with code)

7.1 Feature 1

```
import time
import sys
import ibmiotf.application
import ibmiotf.device
organization = "xhlz7n"
deviceType = "ibmoutput"
deviceId = "ibmoutput"
authMethod = "token"
```

```
authToken = "ZtXo!ssQ9fZ+jdnoXx"
def myCommandCallback(cmd):
    print("Command received: %s" % cmd.data)
    if cmd.data['command']=='ON':
     print("MOTOR ON IS RECEIVED")
     time.sleep(1)
     print("MOTOR STARTED")
    elif cmd.data['command']=='OFF':
     print("MOTOR OFF IS RECEIVED")
     time.sleep(1)
     print("MOTOR STOPPED")
    elif cmd.data['command']=='runfor30minutes':
     print("MOTOR RUNS FOR 30 MINUTES")
     print("MOTOR STARTED")
for i in range(1,31):
    print("%d minutes to stop"%(30-i)) # use time.sleep(60) for delay of one minute
    print("MOTOR STOPPED")
try:
    deviceOptions = {"org": organization, "type": deviceType, "id": deviceId, "auth-
method":
    authMethod, "auth-token": authToken}
    deviceCli = ibmiotf.device.Client(deviceOptions)
except Exception as e:
    print("Caught exception connecting device: %s" % str(e))
sys.exit()
deviceCli.connect()
while True:
  deviceCli.commandCallback = myCommandCallback
  deviceCli.disconnect()
```

8.Testing

8.1 Test case

Web application using Node Red

By using sensors stimulator program to get output randomly for temperature, humidity, soil moisture and connect them with the device credentials

OrgID: xhlz7n,

Api key: a-xhlz7n-qlpqdlk0oo

Api token : lzwf0ESiqGkQQcPg*G

Device type: iotsensor ,

Device ID : iotsensor

Device Token : 2x_okYGd6qMY77S(S7

You can see the received data in graphs by creating cards in Boards tab:

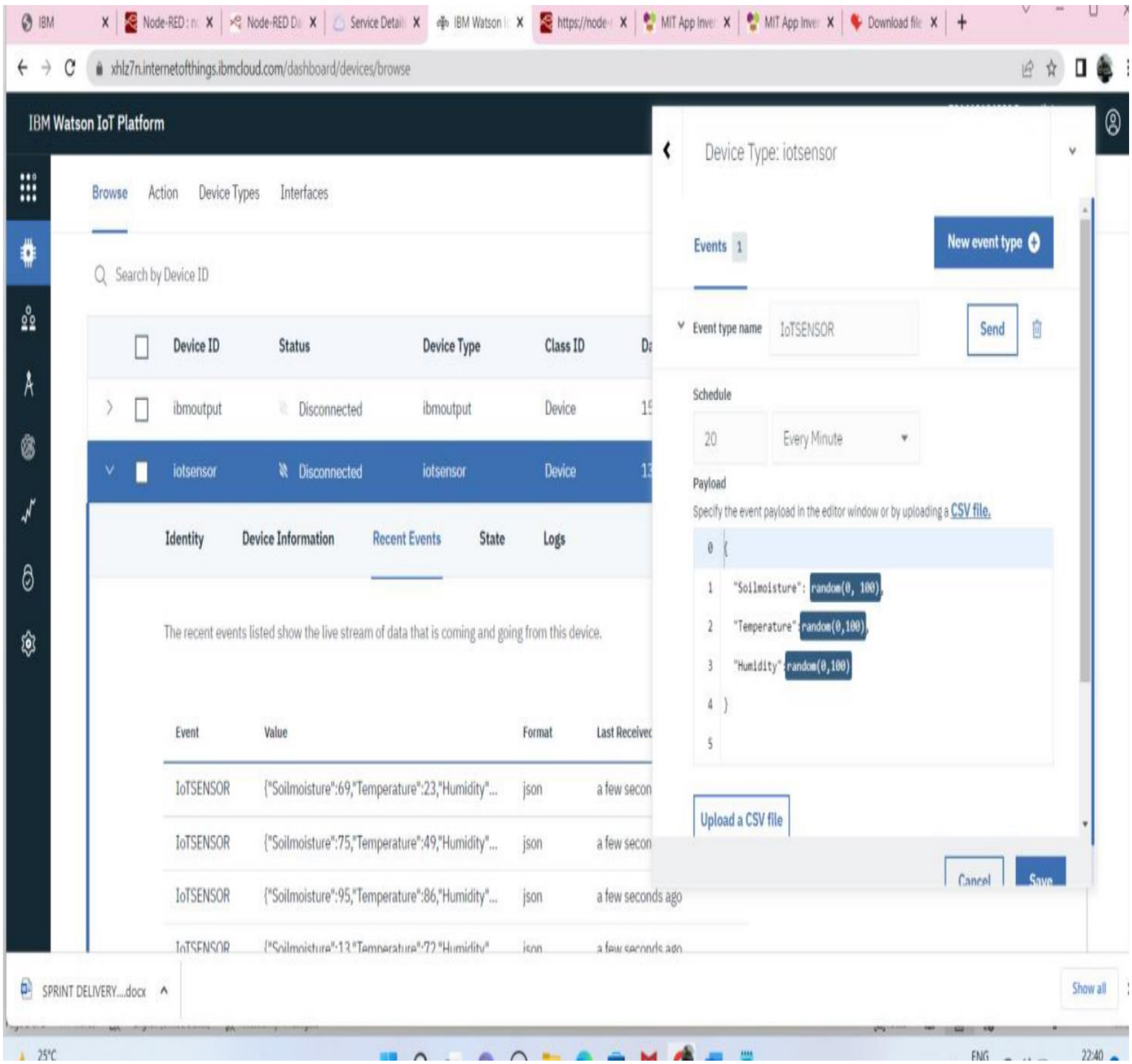
- To view in board need to add and create new boards with stimulated output value
- The values can be seen in recent tab

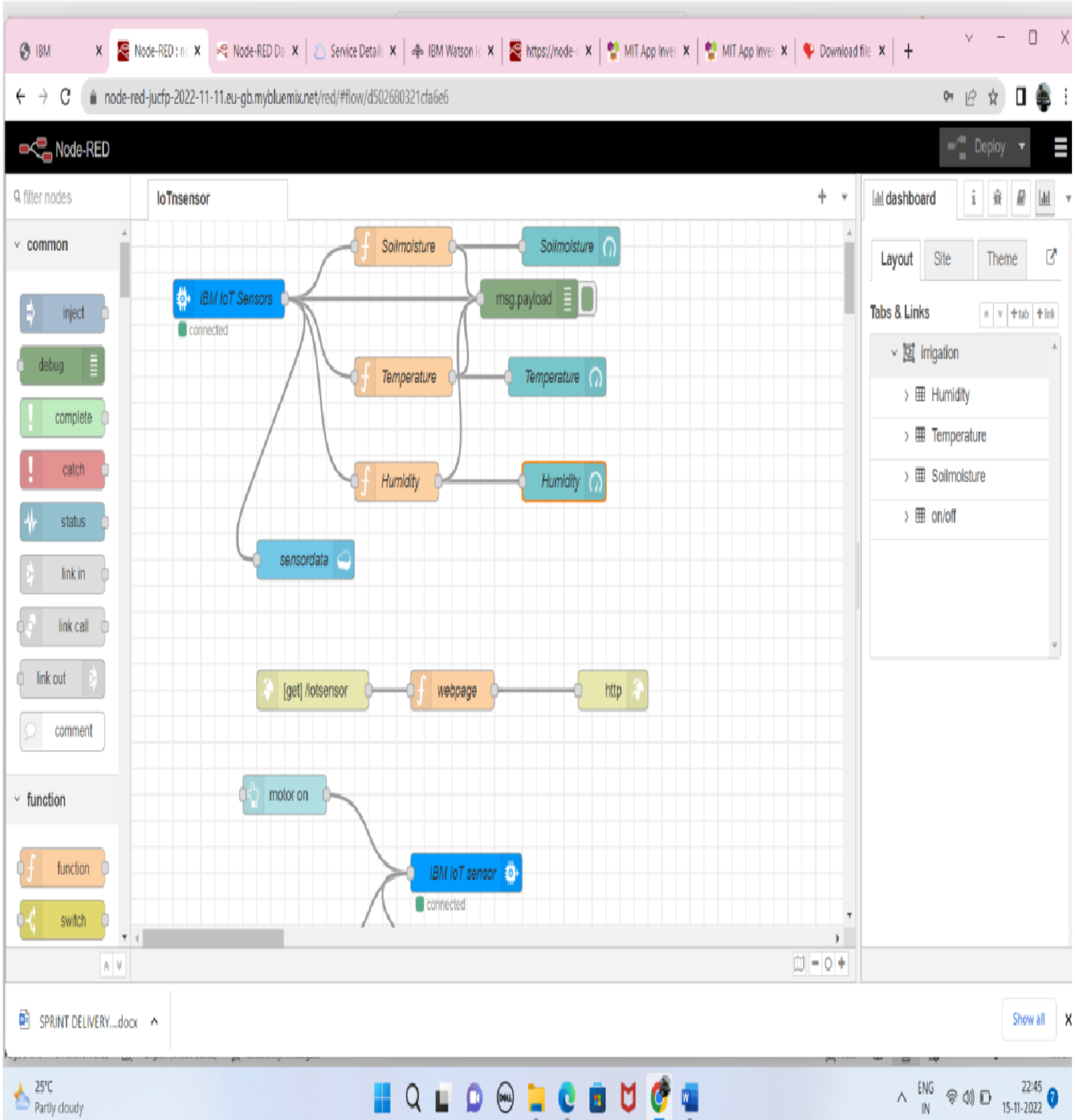
Configuration of Node-Red to collect IBM cloud data :

The node IBM IoT App In is added to Node-Red workflow. Then the appropriatedevice credentials obtained earlier are entered into the node to connect and fetch device telemetry to NodeRed.

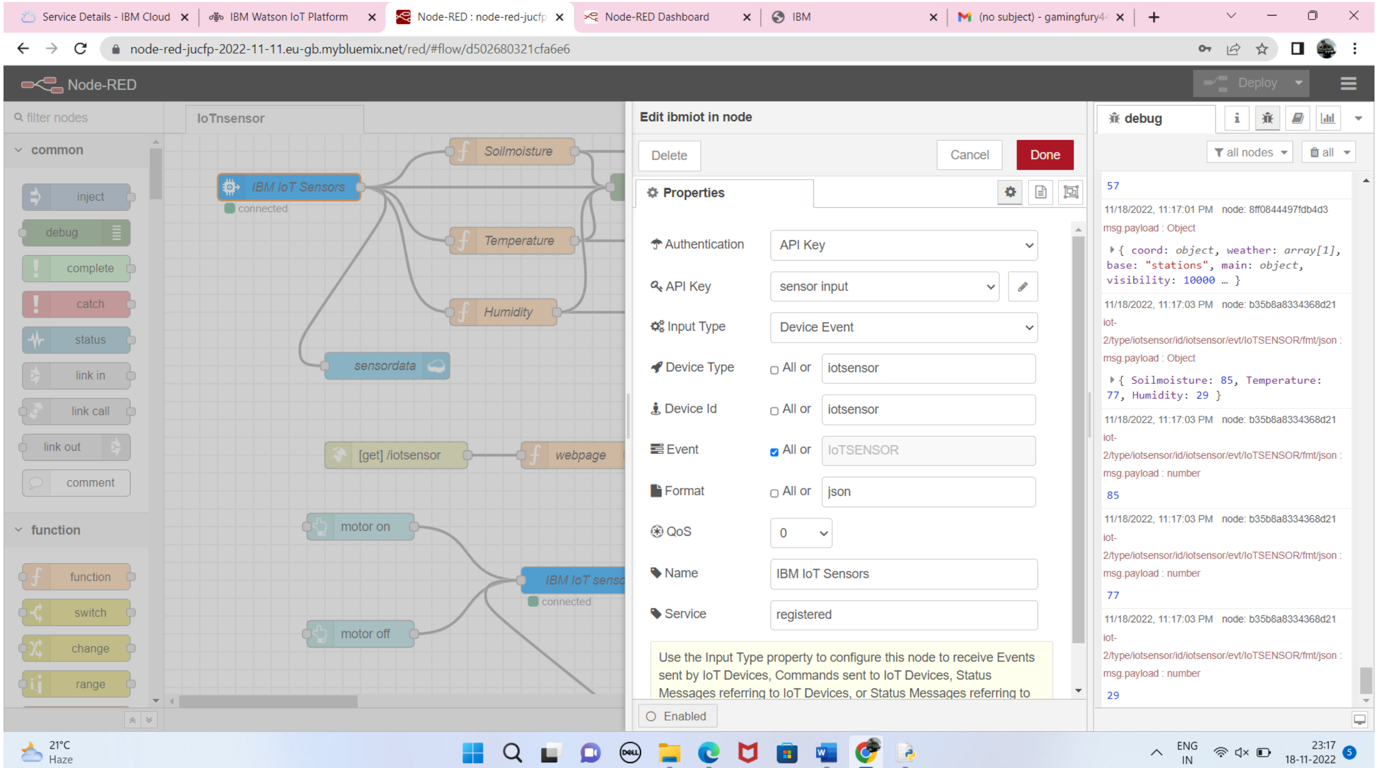
And coonected openweather API with the http request to generate the data of a location

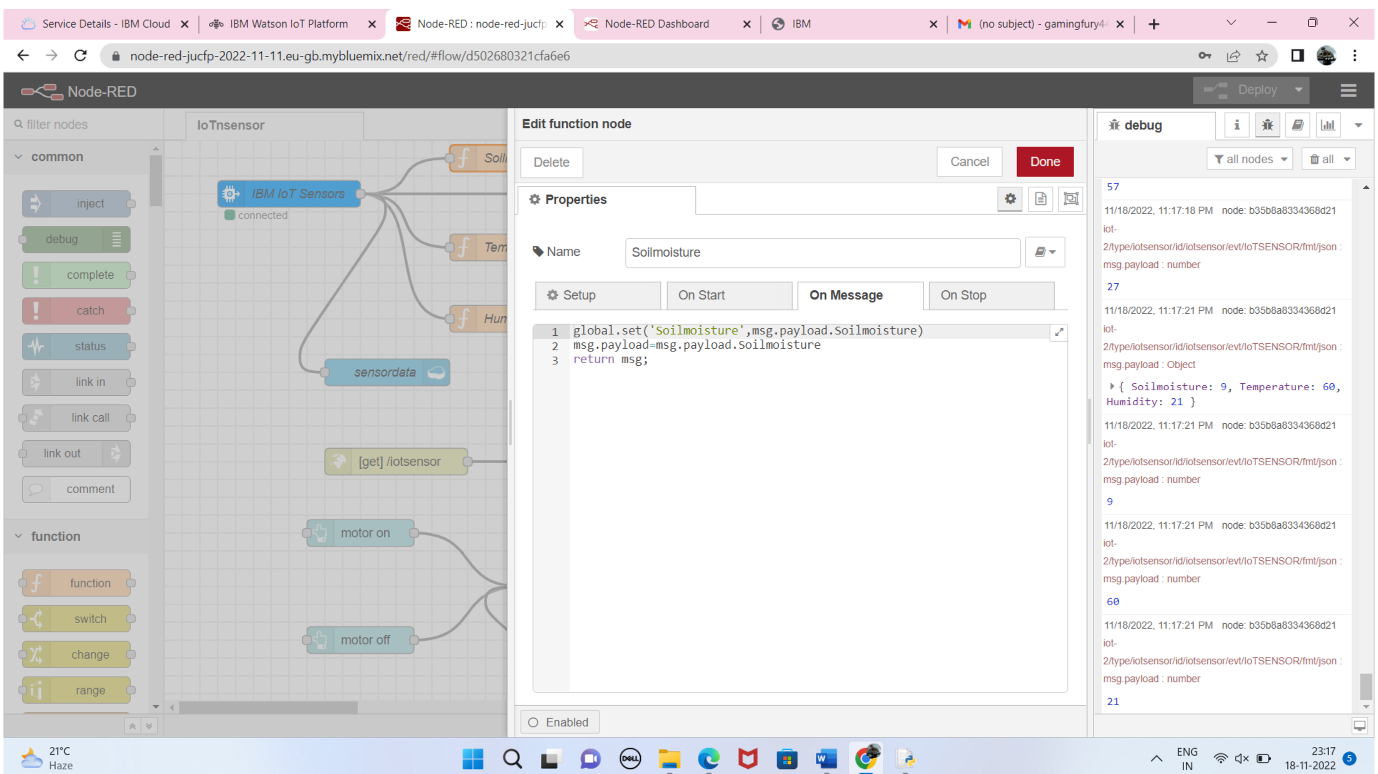
http://api.openweathermap.org/data/2.5/weather?q=erode,in&appid=b35d78d080636812518bcb784dad5903

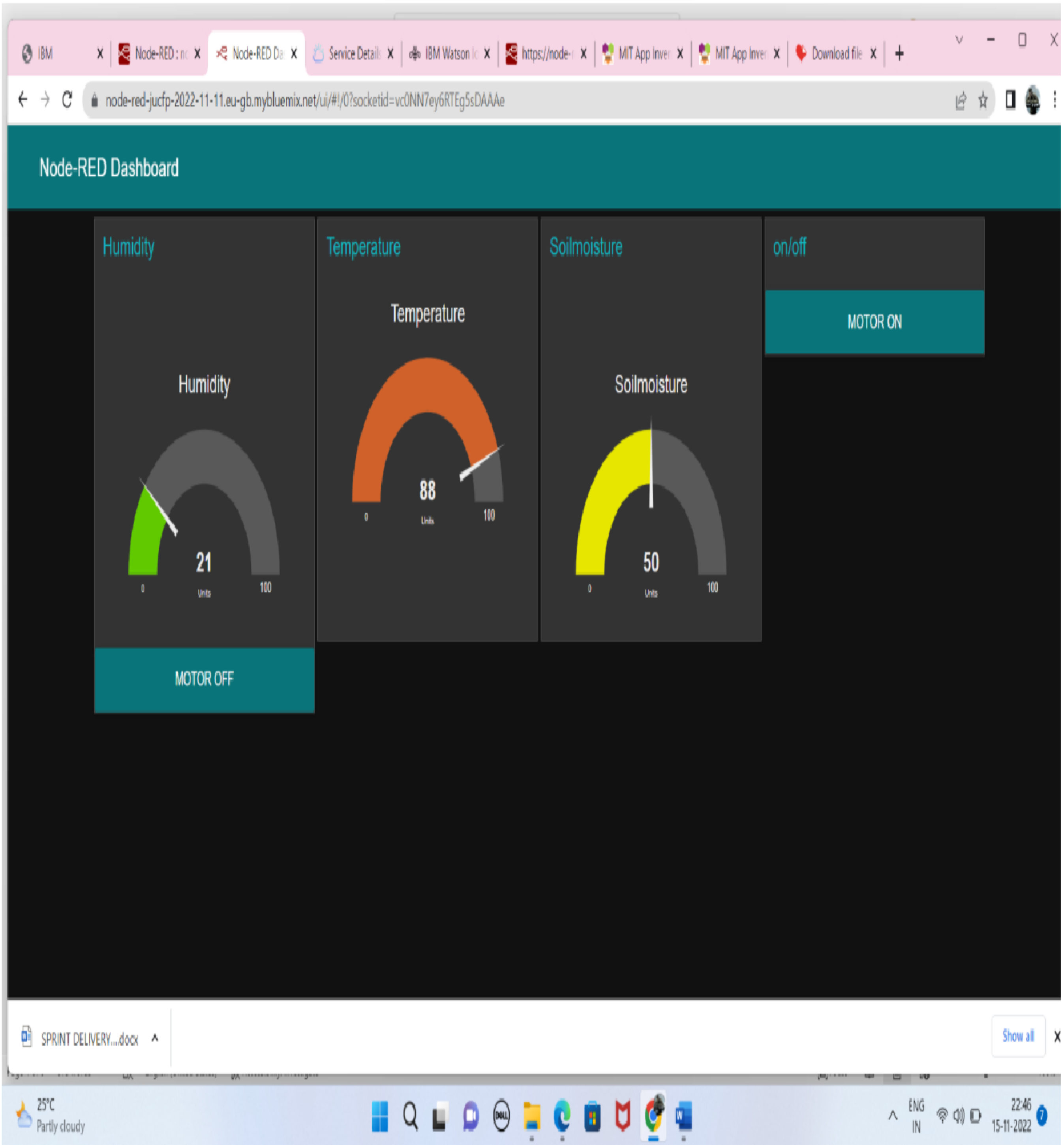




node-red-jucfp-2022-11-11.eu-gb.mybluemix.net/red/#flow/d502680321cfa6e6
Node-RED
Deploy
IoTnsensor
Soilmoisture
IBM IoT Sensors
connected
msg.payload
Temperature
Humidity
sensordata
[get] /iotsensor
webpage
http
motor on
IBM IoT sensor
common
inject
debug
complete
catch
status
link in
link call
link out
comment
function
switch
dashboard
Layout
Site
Theme
Tabs & Links
Irrigation
Humidity
Temperature
Soilmoisture
on/off
SPRINT DELIVERY....docx
Show all
25°C
Partly cloudy
22:45
15-11-2022


Node-RED
IoTnsensor
IBM IoT Sensors
connected
Soilmoisture
Temperature
Humidity
sensordata
[get] /iotsensor
webpage
motor on
motor off
Edit ibmiot in node
Delete
Cancel
Done
Properties
Authentication
API Key
API Key
sensor input
Input Type
Device Event
Device Type
All or
iotsensor
Device Id
All or
iotsensor
Event
All or
IoTSENSOR
Format
All or
json
QoS
0
Name
IBM IoT Sensors
Service
registered
Use the Input Type property to configure this node to receive Events sent by IoT Devices, Commands sent to IoT Devices, Status Messages referring to IoT Devices, or Status Messages referring to
Enabled
debug
11/18/2022, 11:17:03 PM node: b35b8a8334368d21
iot-2/type/iotsensor/id/iotsensor/evt/IoTSENSOR/fmt/json : msg.payload : Object
{ Soilmoisture: 85, Temperature: 77, Humidity: 29 }

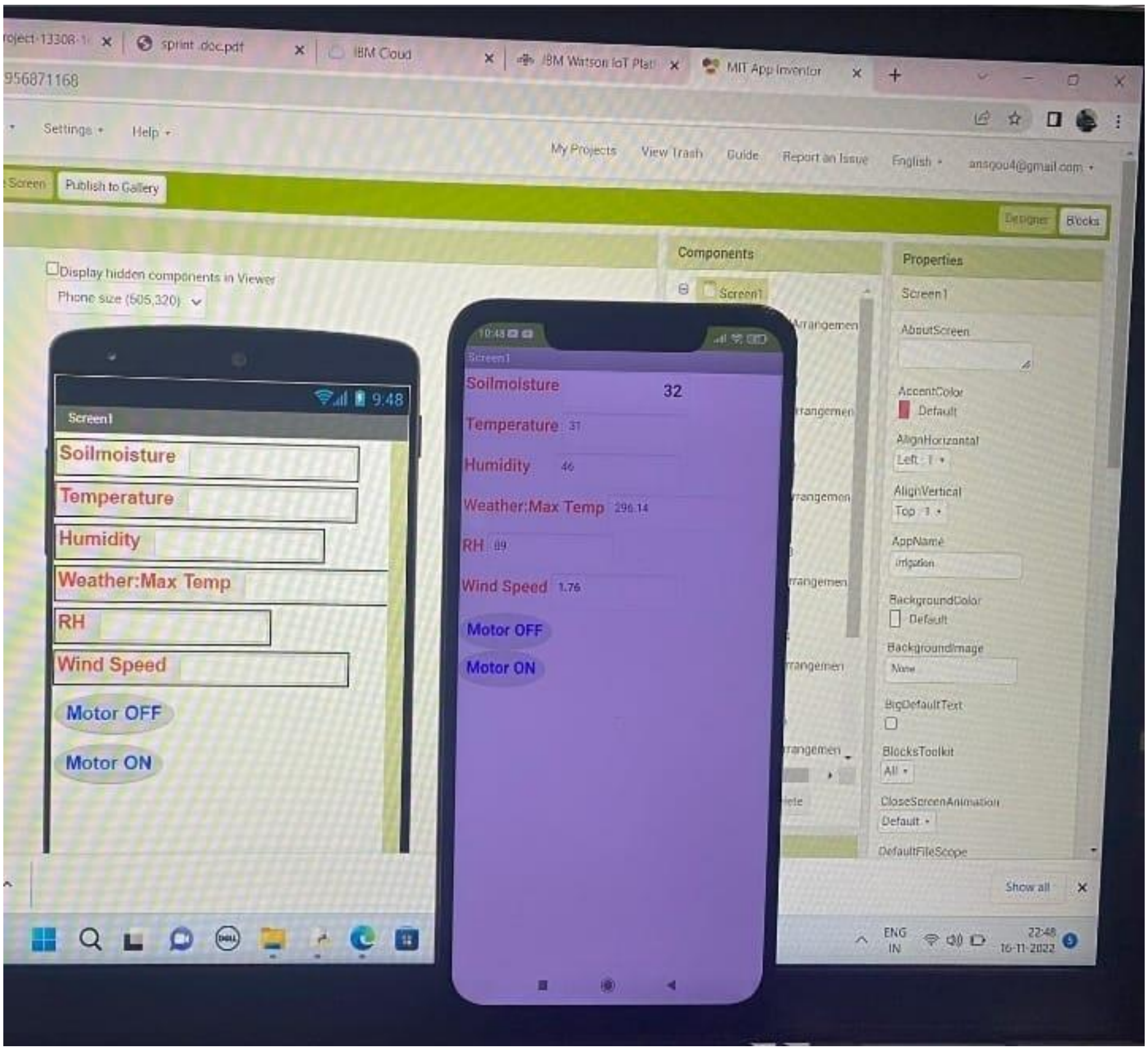

Edit function node
Delete
Cancel
Done
Properties
Name
Soilmoisture
Setup
On Start
On Message
On Stop
global.set('Soilmoisture',msg.payload.Soilmoisture)
msg.payload=msg.payload.Soilmoisture
return msg;
Enabled
debug
11/18/2022, 11:17:21 PM node: b35b8a8334368d21
iot-2/type/iotsensor/id/iotsensor/evt/IoTSENSOR/fmt/json : msg.payload : Object
{ Soilmoisture: 9, Temperature: 60, Humidity: 21 }



node-red-jucfp-2022-11-11.eu-gb.mybluemix.net/ui/#!/0?socketid=vc0NN7ey6RTEg5sDAAAe
Node-RED Dashboard
Humidity
Humidity
21
0
Units
100
MOTOR OFF
Temperature
Temperature
88
0
Units
100
Soilmoisture
Soilmoisture
50
0
Units
100
on/off
MOTOR ON
SPRINT DELIVERY....docx
Show all
25°C
Partly cloudy
ENG
IN
22:46
15-11-2022

8.2. User acceptance testing

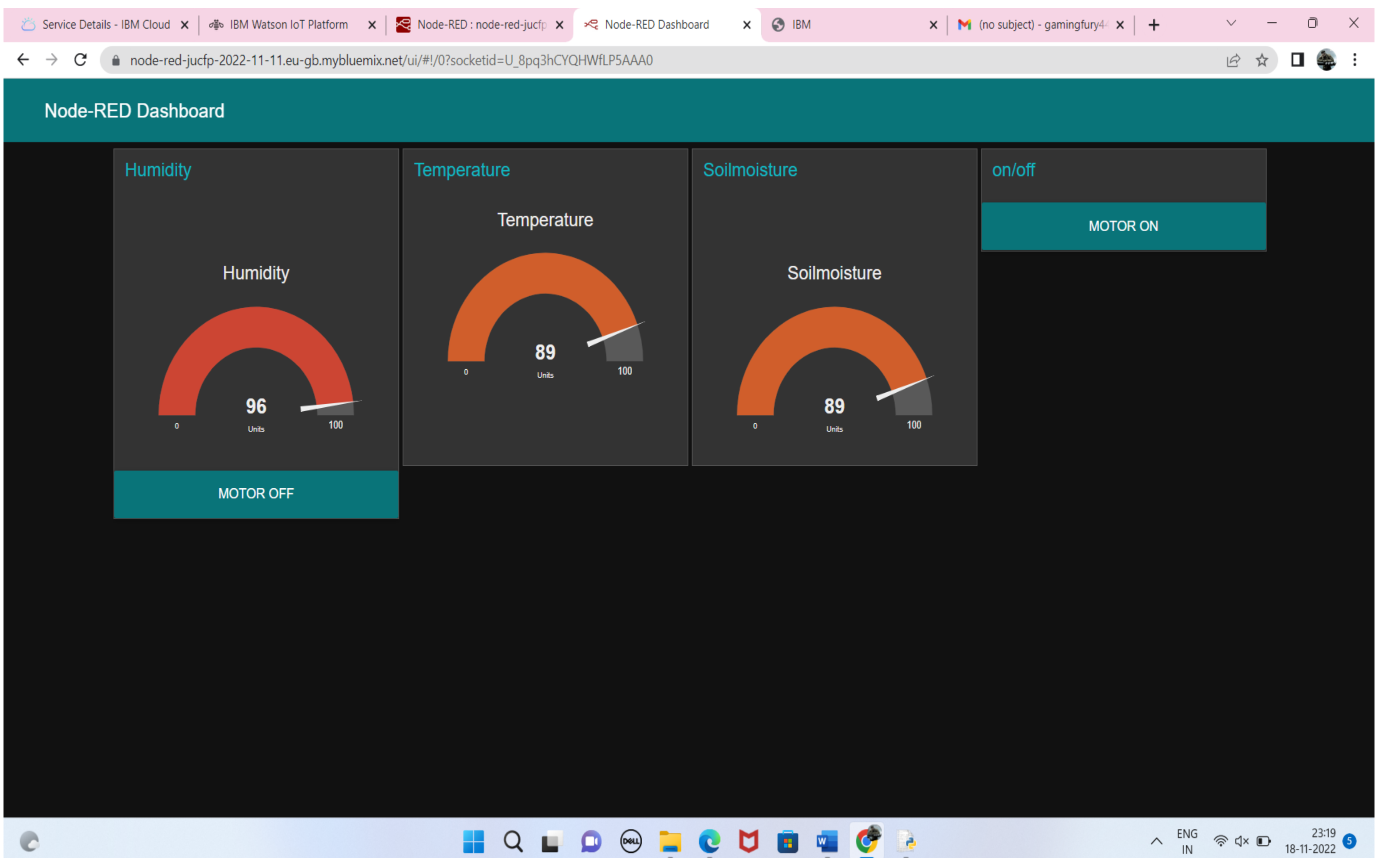
The module test by connecting my Android mobile with MIT app inventor by MIT AI companion app downloaded in playstore



9.Results

9.1.Performance Metrics

The below image represents the graphical representation of the humidity and temperature, soilmoisture which has created by our sensor stimulator in which we can ON/OFF Motor when we needed.



10.Advantages and Disadvantages

- Improved productivity of staff and reduced human labor
- Efficient operation management
- Better use of resources and assets
- Cost-effective operation
- Improved work safety
- Thorough marketing and business development
- Improved customer service and retention
- Better business opportunities

- Farmer need to check their phone regularly
- They were within the location
- Farmers need continuous internet facility

9 CONCLUSION

Farmers can benefit greatly from an IoT-based smart agriculture system. As a result of the lack of irrigation, agriculture suffers. Climate factors such as humidity, temperature, and moisture can be adjusted dependent on the local environmental variables. Thistechnology also detects animal invasions, which are a major cause of crop loss. This technology aids in the scheduling of irrigation based on present data from the field and records from a climate source. It helps in deciding the farmer to whether to do irrigation or not to do. Continuous internet connectivity is required for continuous monitoring of data from sensors. This also can be overcome by using GSM unit as an alternative of mobile app. By GSM, SMS can be sent to farmers phone.

10 FUTURE SCOPE

In the current project we have implemented the project that can protect and maintain the the crop. In this project the farmer monitor and control the field remotely. In future we can add or update few more things to this project

. • We can create few more models of the same project ,so that the farmer can have information of a entire.

• We can update the this project by using solar power mechanism. So that the power supply from electric poles can be replaced with solar panels. It reduces the power line cost. It will be a one time investment. We can add solar fencing technology to thisproject.

• We can use GSM technology to this project so that the farmers can get the information directly to his home through SMS. This helps the farmer to get information if there is a internet issues.

• We can add camera feature so that the farmer can monitor his field in real time. This helps in avoiding thefts.

11. APPENDIX

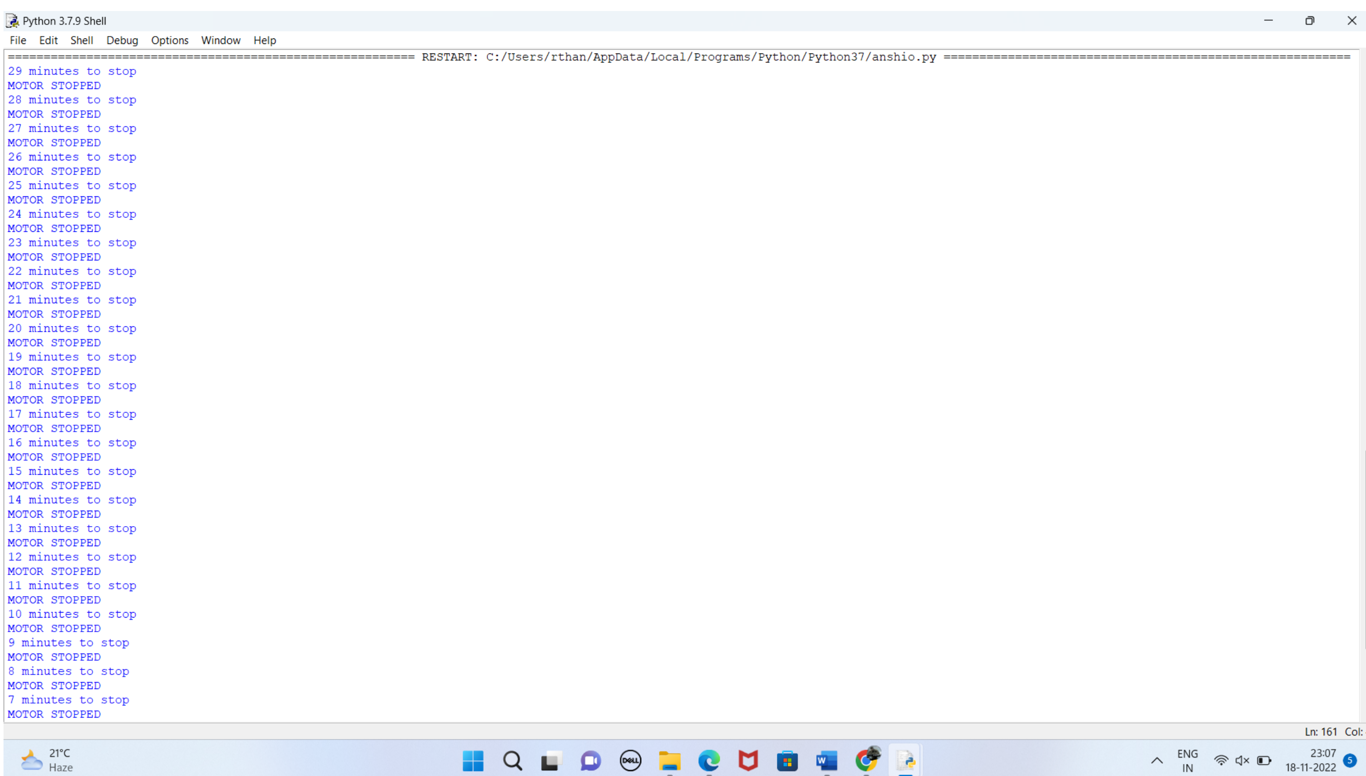
Source Code

```
import time

import sys
```

```
import ibmiotf.application

import ibmiotf.device

organization = "xhlz7n"

deviceType = "ibmoutput"

deviceId = "ibmoutput"

authMethod = "token"

authToken = "ZtXo!ssQ9fZ+jdnoXx"

def myCommandCallback(cmd):

    print("Command received: %s" % cmd.data)

    if cmd.data['command']=='ON':

     print("MOTOR ON IS RECEIVED")

     time.sleep(1)

     print("MOTOR STARTED")

    elif cmd.data['command']=='OFF':

     print("MOTOR OFF IS RECEIVED")

     time.sleep(1)

     print("MOTOR STOPPED")

    elif cmd.data['command']=='runfor30minutes':

     print("MOTOR RUNS FOR 30 MINUTES")

     print("MOTOR STARTED")

for i in range(1,31):

    print("%d minutes to stop"%(30-i)) # use time.sleep(60) for delay of one minute
```

```
    print("MOTOR STOPPED")
try:
    deviceOptions = {"org": organization, "type": deviceType, "id": deviceId, "auth-method":
    authMethod, "auth-token": authToken}
    deviceCli = ibmiotf.device.Client(deviceOptions)
except Exception as e:
    print("Caught exception connecting device: %s" % str(e))
sys.exit()
deviceCli.connect()
while True:
  deviceCli.commandCallback = myCommandCallback
  deviceCli.disconnect()
```

Output:



Node-red:

https://node-red-jucfp-2022-11-11.eu-gb.mybluemix.net/

Open weather API:

http://api.openweathermap.org/data/2.5/weather?q=erode,in&appid=b35d78d080636812518bcb784dad5903

Github link:

https://github.com/IBM-EPBL/IBM-Project-13308-1659516211

Project Demo link:

Youtube:

https://youtu.be/XjOPRWEAVHY

drive:

https://drive.google.com/file/d/1YQOq8s6c96DgI981iGwl_J08_PO6qgrq/view?usp=drivesdk

MIT app inventor:

http://ai2.appinventor.mit.edu/#6202651956871168

THANKYOU