Project Report

INTRODUCTION

1.1PROJECT OVERVIEW

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. Watering the 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.

1.2PURPOSE

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.

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.

Automatic adjustment of farming equipment made possible by linking information like crops/weather and equipment to auto-adjust temperature, humidity, etc. In large farmland, Internet of Things equipped drone helps to receive the current state of crops and send the live pictures of farmland

LITERATURE SURVEY

LITERATURE SURVEY

2.1 EXISTING SYSTEM

There has been several attempts and solution to help farmers adopt technological practices. Few solutions restricted their performance with just suggestions and alerts. While few employed IoT independent electronics. Few of the cases of previous attempts and researches are described below.

i.“IoT based smart sensors agriculture stick for live

temperature and moisture monitoring using Arduino, cloud computing & solar technology". This work was performed using Cloud computing platform (Things Speak) for data acquisition. The circuit was designed using Arduino and DHT 11 sensors.

ii. "Smart Farming using IoT, a solution for optimally monitoring farming conditions". This work used ESP-32 based IoT platform and Blynk mobile application.

iii. "Smart farming using IoT". The automation and interface part made use of water pump and HTTP protocol for parameters monitoring using website.

The above stated prior works lacked one or two features, which when included could have enhanced the performance. In the first work, including a Raspberry Pi based controller in place of Arduino can help reduce the design area while also providing microcontroller with additional UI and IoT interfaces. In the second stated work, going with MIT app inventor instead of Blynk application can improve the possibility of feature expansion. Farmers or developers won't need to go for a paid version of the app to include new features. In the third work, control of water pump can be enhanced with the use of servo-based water valves to direct and control the flow of water rather than using a bi-stated logic.

2.2 REFERENCES

The following were the source of references:

1. https://www.researchgate.net/publication/313804002_Smart_farming_IoT_based_smart_sensors_agriculture_stick_for_live_temperature_and_moisture_monitoring_using_Arduino_cloud_computing_solar_technology.
2. https://www.sciencedirect.com/science/article/pii/S18770509193 17168

3.“Smart farming: IoT based smart sensors agriculture stick for live temperature and moisture monitoring using Arduino, cloud computing & solar technology”, Anand Nayyar Assistant Professor, Department of Computer Applications & IT KCL Institute of Management and Technology, Jalandhar, Punjab Er. Vikram Puri M.Tech(ECE) Student, G.N.D.U Regional Center, Ladewali Campus, Jalandhar

4. “Smart Farming using IoT, a solution for optimally monitoring farming conditions”, Jash Doshi; Tirth kumar ; Patel Santosh kumar Bharati.

5. “Smart Farming Using IOT”, CH Nishanthi; Dekonda Naveen, Chiramdasu Sai Ram , Kommineni Divya , Rachuri Ajay Kumar; ECE Dept., Teegala Krishna Reddy Engineering College, Hyderabad, India 2,3,4,5student, ECE Dept., Teegala Krishna Reddy Engineering College,Hyderabad, India.

2.3 **PROBLEM STATEMENT DEFINITION**

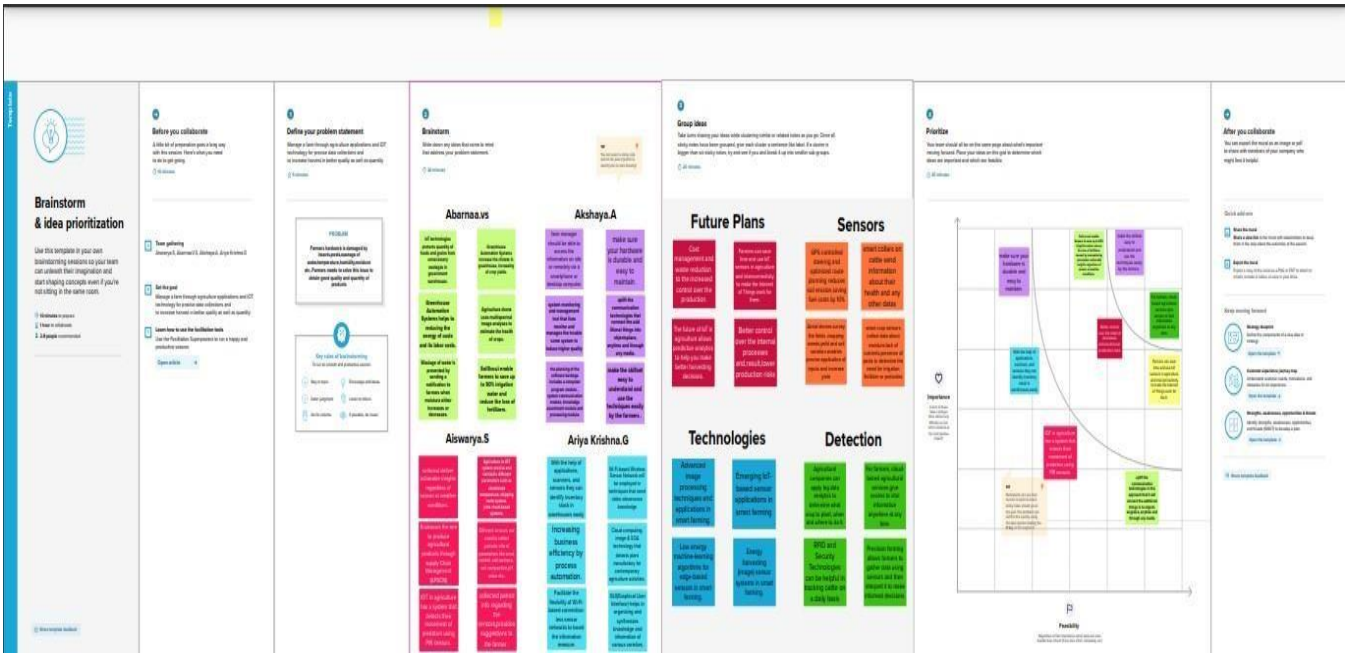
The problem statement in a nutshell covers all the possible technical aspects that can be included by farmer to convert farming in to smart and efficient farming. IoT enabled smart farming, on a wider perspective, concentrates on connecting all the independently operating sub-systems in farming automation into a single entity. IoTbased agriculture system helps the farmer in monitoring different parameters of his field like soil moisture, temperature, and humidity using some sensors. The idea of IoT is further extended with the help of mobile and web application where farmers can monitor all the sensor parameters even if the farmer is not near his field. Watering the 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.

IDEATION AND PROPOSED SOLUTION

3. IDEATION AND PROPOSED SOLUTON

3.1 EMPATHY MAP CANVAS

3.2 IDEATION & BRAINSTORMING

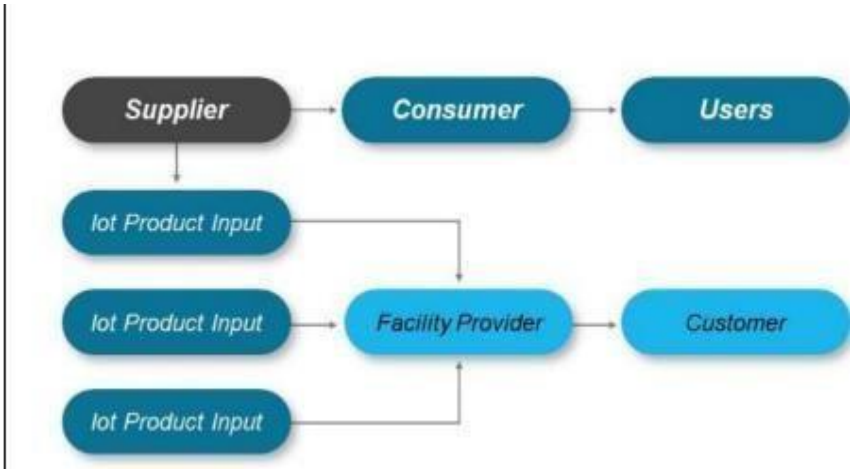


3.3 PROPOSED SOLUTION

S.NO	PARAMETERS	DESCRIPTIONS
1	**Problem Statement (Problem to be solved)**	• **Mostly the farmer pumps the water either much or less to cultivate his field. Therefore result in problem of wastage of water or inadequate to the crops.** • **Farmer's hard work is damage by insects and pests therefore results in big loss to farmers.** • **High reliability is required about weather information which decreases the problems of crop damage.**

		the movement of different parameters such as storehouse temperature, shipping route system, joins cloud-based systems • Maintenance of plants using PIR sensors. • High reliability is required about whether the information which decreases the problems of crop damage. Smart Farming in IOT makes exact delivery of real-time information on the
2	Idea / Solution description	• Agriculture in IOT is connecting with both weather changing, soil quality, labor cost and many more to farmers. Web Map Service and Sensor Observation Service to ensure proper management of water for farming and removes the problem of wastage of water.
3	Novelty / Uniqueness	ALERT MESSAGE: IoT sensor nodes collect information from the farming environment such as soil moisture, air humidity, temperature, nutrient ingredients, pest images, and water quality ,then transmit the collected data to IoT backhaul devices. REMOTE ACCESS: Customized plantation recommendations that includes farmer group of interests and live plantation data in the area. Helps farmers to operate motors from anywhere. PROFIT: Maximum win-win profit mapping between buyers and farmers. • Agriculture in IOT system precise and maintains different parameters such as soil moisture, air humidity, storehouse temperature, shipping route system, joins cloud based systems. It protects the quantity of different foods and grains from unnecessary wastages in government warehouses. • Greenhouse Automation Systems works on all sides the clock to increase the climate in greenhouse, increasing of crop yields, also helps to reducing the energy of costs and its labour costs. • Damage by insects and pests therefore results in big loss to farmers. To prevent this problem IOT in agriculture has a system that detects

4	**Social impact\Customer Satisfaction**	• **Gathers information from various users through preconfigured devices and manages data in cloud database.** • **Provides required information to users automatically.** • **Improve the customer satisfaction through self- management of resources.** • **Easily identify maintenance needs, build better products, send personalized communications, and more.** • **IoT can also help e-commerce businesses thrive and increase sales**
5	**Business Model (Revenue Model)**	**has the potential to make the workplace life and business processes much more productive and efficient," Cronin said. One significant way IoT will increase productivity and efficiency is by making location tracking and location-based services seamless and**

		straightforward. 
6	**Scalability of Solution**	**Increasing the number of sensors had a negligible impact on the Performance of the system, therefore, the proposed platform was scalable.**

3.4 PROBLEM SOLUTION FIT

Project Title: **Project Design Phase-I - Solution Fit Template** **Team ID:** PNT2022TMIDxxxxxx

Define CS, fit into CC

1. CUSTOMER SEGMENT(S) CS

Who is your customer?
i.e. working parents of 0-5 y.o. kids

Our customer of this product is farmer who grows crops. our aim is to help them to harvest good quality foods and save agriculture from extinction.

6. CUSTOMER CONSTRAINTS CC

What constraints prevent your customers from taking action or limit their choices of solutions? i.e. spending power, budget, no cash, network connection, available devices.

Difficult to set up plan.

Difficult to use large number of sensors.

Continuous power supply is required.

Unlimited Internet access is required to succeed.

5. AVAILABLE SOLUTIONS AS

Which solutions are available to the customers when they face the problem
or need to get the job done? What have they tried in the past? What pros & cons do these solutions have? i.e. pen and paper is an alternative to digital notetaking

IoT technologies protects quantity of foods and grains from unnecessary wastages in government warehouses. Greenhouse Automation Systems increase the climate in greenhous, increasing of crop yields,reducing the energy of costs and its labor costs.SoilScout enable farmers to save up to 50% irrigation water and reduce the loss of fertilizers

Explore AS, differentiate

Focus on J&P, tap into BE, understand RC

2. JOBS-TO-BE-DONE / PROBLEMS J&P

Which jobs-to-be-done (or problems) do you address for your customers? There could be more than one; explore different sides.

The purpose is to help farmers to sense various field parameters and the movement of predators by using different sensors. It collect exact datas and cloud is used to store and send data to the server or system, thus provides suggestion to the farmers.

9. PROBLEM ROOT CAUSE RC

What is the real reason that this problem exists?
What is the back story behind the need to do this job?
i.e. customers have to do it because of the change in regulations.

Farmers are not well aware about the modern and advanced technologies.Farmers are not educated enough to understand and use such technologies, unpredictable climate changes and natural calamities Farmers face difficulties in monitoring the field when they are not at field.

7. BEHAVIOUR BE

What does your customer do to address the problem and get the job done?
i.e. directly related: find the right solar panel installer, calculate usage and benefits; indirectly associated: customers spend free time on volunteering work (i.e. Greenpesce)

Getting right seeds,
Sowing in the right time,
Harvesting at in right time and
Marketing for good prize
Use a proper drainage system to overcome the effects of excess water from heavy rain. Use of hybrid plants that are resistant to pests.

Focus on J&P, tap into BE, understand RC

Identify strong TR & EM

3. TRIGGERS TR

What triggers customers to act? i.e. seeing their neighbour installing solar panels, reading about a more efficient solution in the news.

Soil quality, water quality, climate, and terrain are few issues that may impact profits and productivity for farmers in any given growing season.

4. EMOTIONS: BEFORE / AFTER EM

How do customers feel when they face a problem or a job and afterwards?
i.e. lost, insecure > confident, in control - use it in your communication strategy & design.

BEFORE: Lack of knowledge about advanced technology →Random decisions →low yield.
AFTER: Data from reliable source → correct decision →high yield

10. YOUR SOLUTION SL

If you are working on an existing business, write down your current solution first, fill in the canvas, and check how much it fits reality.
If you are working on a new business proposition, then keep it blank until you fill in the canvas and come up with a solution that fits within customer limitations, solves a problem and matches customer behaviour.

With the help of applications, scanners, and sensors are deployed in the cultivated land can identify and collect the exact data and send it to the system. Farm managers are able to access the information on site or remotely via a smartphone or desktop computer. Thus they can easily understand their maintenance needs, better products and more

8.CHANNELS of BEHAVIOUR CH

8.1 ONLINE
What kind of actions do customers take online? Extract online channels from #7

8.2 OFFLINE
What kind of actions do customers take offline? Extract offline channels from #7 and use them for customer development.

ONLINE: Technology is allowing farmers to connect devices to the internet in order to improve agricultural operations. IoT technology is allowing farmers to leverage the internet to reduce waste,better pest control streamline livestock management, and increase productivity.
OFFLINE: Awareness camps to be organized to teach the importance and advantages of the automation and IoT in the development of agriculture.

Identify strong TR & EM

REQUIREMENT ANALYSIS

4. REQUIREMENT ANALYSIS

4.1. FUNCTIONAL REQUIREMENTS

FR No.	Functional Requirement (Epic)	Sub Requirement (Story / Sub-Task)

FR-1	Moisture Detection	**Dielectric sensor measures moisture levels in the soil. The moisture sensors use in connection with rain check locations throughout the farm. This allows for the observation of soil moisture conditions when vegetation level is low**
FR-2	Temperature and Humidity detection	**DHT11 is a Humidity and Temperature Sensor, which generates calibrated digital output. DHT11 can be interface with any microcontroller like Arduino, Raspberry Pi, etc. and get instantaneous results. DHT11 is a low cost humidity and temperature sensor which provides high reliability and long term stability**.
FR-3	Live stock Monitoring	**Iot-enabled livestock management solutions take the guesswork out of herd health. Using a wearable collar or tag, battery-powered sensors monitor the location, temperature, blood pressure and heart rate of animals and wirelessly send the data in near-real-time to farmers' devices.**

4.2. NON-	FR-4	Air flow Detection	**Airflow sensors are used to record the number of gaseous substances present in the soil at a particular landscape after irrigation or to get an overview of the land that is to be cultivated before the seeding process. It determines the optimum pressure required to pump air to aerate the soil and make it more fertile. It is also used to determine the properties of the soil, its compaction, moistureholding capacity, and more.**
	FR-5	Location Detection	**Location sensors determine the range, distance and height of any position within the required area. They take the help of GPS satellites for this purpose.**

FUNCTIONAL REQUIREMENTS

FR No.	Non-Functional Requirement	Description

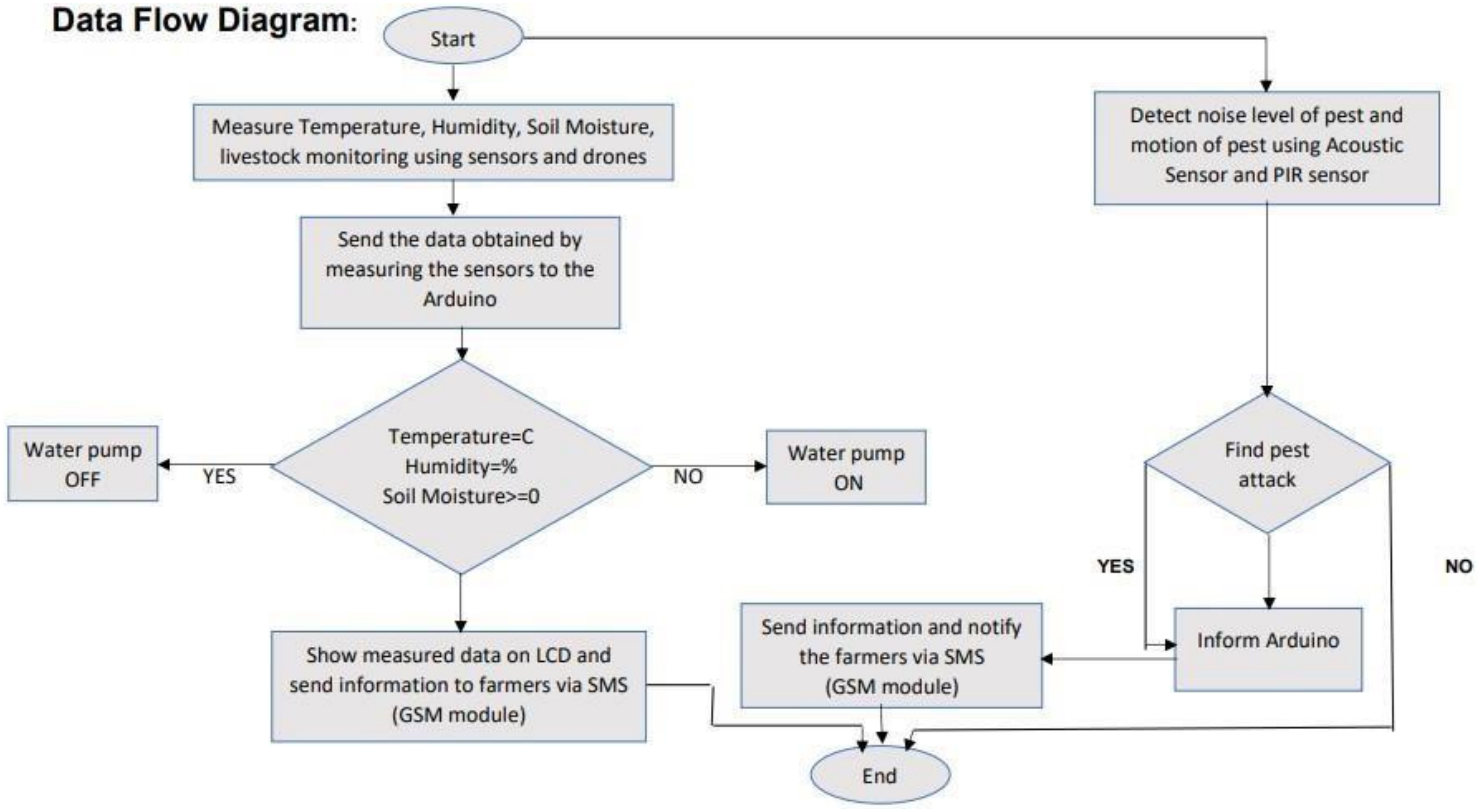
NFR-3	**Reliability**	**Reliability Means Consistency and Accuracy. Reliability ensure that a condition for its users to perform the accomplished in a timely manner, it efficiently. IoT in agriculture uses robots, drones, remote sensors, and computer imaging combined with continuously progressing machine learning and analytical tools for monitoring crops, surveying, and mapping the fields, and providing data to farmers for rational farm management plans to save both time and money.**
NFR-1	**Usability**	**Usability can be described as the capacity of a system to provide a farmer can get a field task tasks safely, effectively, and also reduces lost time and productivity. It is also reliable to environmental conditions but can be affected due to environmental disasters.**
NFR-4	**Performance**	**Performance is high. 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. Has a real potential to deliver a more productive and sustainable form of agricultural production, based on a more precise and resourceefficient approach.**
NFR-2	**Security**	**Potential attacks in various different smart farming systems can lead to serious security issues in the dynamic and distributed cyber-physical environment. These types of threats and attacks can result in severe disruptions of interconnected businesses. These threats are mostly related to cybersecurity, data integrity and data loss. In addition, because of the utilization of heavy machinery connected online, there are many emerging vulnerabilities that can potentially lead to disastrous consequences.**
NFR-5	**Availability**	**Telecommunications technologies such as advanced networking and GPS. Hardware and software for**

		specialized applications and for enabling IoT-based solutions, robotics and automation. This would enable farmers to monitor crops from anywhere.
NFR-6	**Scalability**	**Scalability in smart farming refers to the adaptability of a system to increase the capacity, for example, the number of technology devices such as sensors and actuators, while enabling timely analysis. Cloud computing and edge computing improve the scalability. Cloud computing provides a high level of flexibility by providing remote services for monitoring and managing farm data. Challenges of scalability are identity management and access control, security, privacy, governance, and fault tolerance.**

PROJECT DESIGN

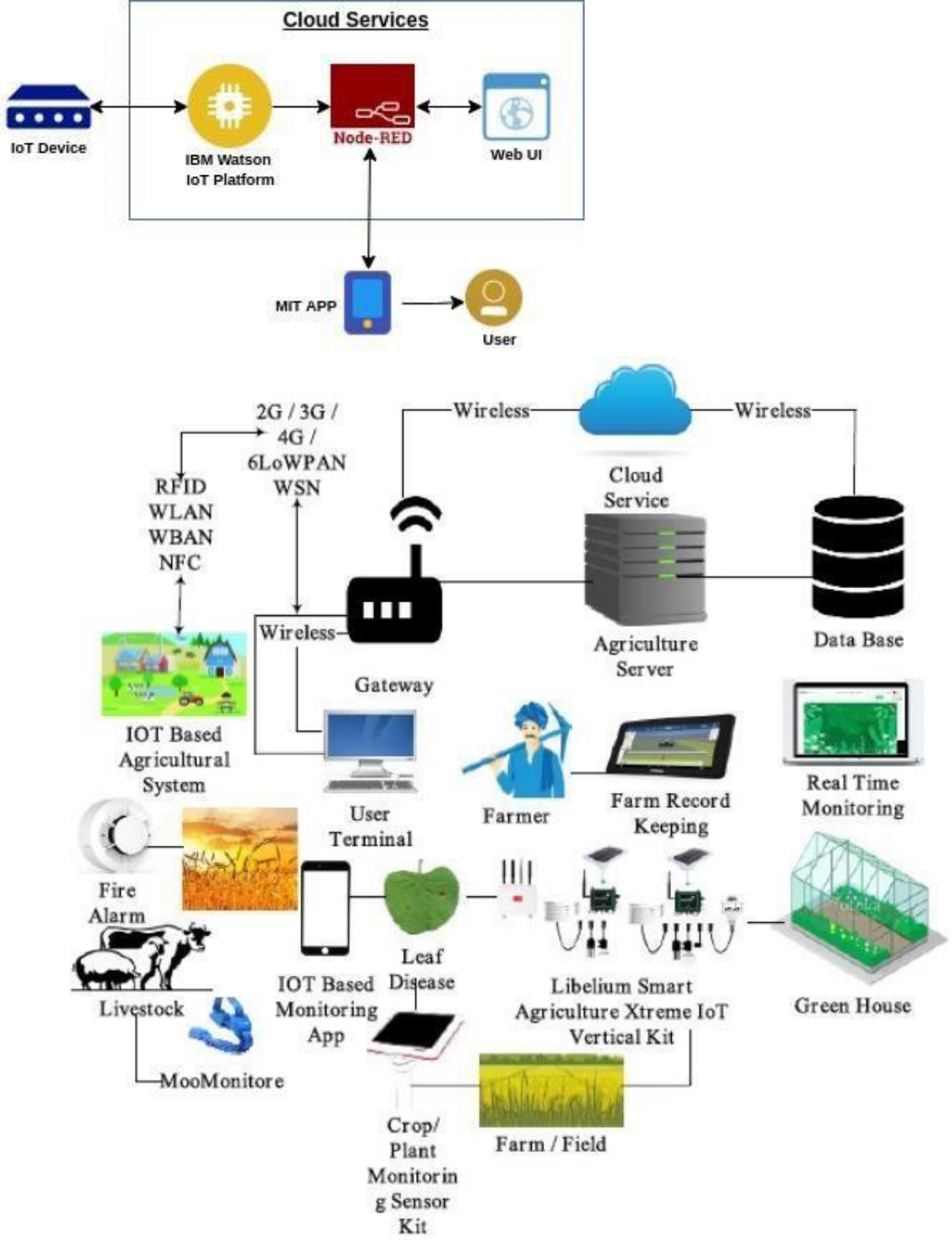
5. PROJECT DESIGN

5.1 DATA FLOW DIAGRAMS



5.2 SOLUTION & TECHNICAL ARCHITECTURE

5.3 USER STORIES


Cloud Services
IoT Device
IBM Watson IoT Platform
Node-RED
Web UI
MIT APP
User
2G / 3G / 4G / 6LoWPAN WSN
RFID WLAN WBAN NFC
Wireless
Wireless
Wireless
Cloud Service
Agriculture Server
Data Base
Gateway
IOT Based Agricultural System
User Terminal
Farmer
Farm Record Keeping
Real Time Monitoring
Fire Alarm
Livestock
MooMonitore
IOT Based Monitoring App
Leaf Disease
Libelium Smart Agriculture Xtreme IoT Vertical Kit
Green House
Crop/ Plant Monitoring Sensor Kit
Farm / Field

User Type	Functional Requirement (Epic)	User Story Number	User Story/Task	Acceptance Criteria	Priority	release
Farmer	Soil Monitoring	USN-1	User can get maximum yield and reduce the disease in crops which are caused due to problems in soil.	Can protect crop from diseases and can maximize the yield.	High	Sprint-1
Farmer	Climate monitoring	USN-2	Help farmers to identify that "what type of climate condition is suited for particular crop".	Farmers get more yield	High	Sprint-2
Farmer	Temperature monitoring	USN-3	It is useful to determine the temperature level thus can provide proper	We can prevent crops from dryness	High	Sprint-1

			amount of water to crops.			
Farmer	**Soil humidity monitoring**	**USN-4**	**DHT Sensor for automatically irrigate water based on the Moisture level in the soil.**	**Can reduce Water Wastage**	**High**	**Sprint-1**
Farmer	**Pest Detection**	**USN-5**	**By a user, I can protect the crops from pest attack by using acoustic and PIR sensors.**	**Can prevent from crop damage by overcoming the pest attack.**	**Medium**	**Sprint-2**
Farmer	**Drones**	**USN-5**	**Flyover field locating weeds pathogens and sick animals which enables**	**Can collect data about the development of crops and their needs.**	**Low**	**Sprint-3**

			precise application of inputs			
Farmer	**Livestock Monitoring**	**USN-5**	**It Helps the farmers to keep a check on their farm animals remotely and alter farmers when a cow develops infections**	**It helps to increase herd survival and milk yield**	**Low**	**Sprint-3**
Farmer	**GSM Module**	**USN-5**	**Used to send alert message to farmers.**	**Farmers can take proper actions to overcome the problem immediately.**	**High**	**Sprint-4**

PROJECT PLANNING AND SCHEDULING

6. PROJECT PLANNING AND SCHEDULING

6.1. SPRINT PLANNING& ESTIMATION

Product Backlog, Sprint Schedule, and Estimation (4 Marks)

Use the below template to create product backlog and sprint schedule

Sprint	Functional Requirement (Epic)	User Story Number	User Story / Task	Story Points	Priority	Team Members
Sprint-1	**Hardware**	SFIEFA-1	**Create a python code.**	**5**	**High**	Aiswarya Abarnaa Akshaya AriyaKrishna
Sprint-1	**Hardware**	SFIEFA-7	Set the sensors and wifi module	**5**	**High**	Aiswarya Abarnaa Akshaya AriyaKrishna

Sprint-1	**Hardware**	SFIEFA-6	Configure sensors and wi-fi module with python code.	**10**	**High**	Aiswarya Abarnaa Akshaya AriyaKrishna
Sprint-2	Software	SFIEFA-2	IBM Watson IoT platform, workflows for IoT scenarios using Node-red.	**5**	**High**	Aiswarya Abarnaa Akshaya AriyaKrishna
Sprint-2	Software	SFIEFA-10	Create IBM Watson IoT Platform	**5**	**High**	Aiswarya Abarnaa Akshaya AriyaKrishna
Sprint-2	Software	SFIEFA-11	Create a device & configure the IBM IoT Platform	**3**	**Medium**	Aiswarya Abarnaa Akshaya AriyaKrishna
Sprint-2	Software	SFIEFA-12	Create Node-RED service	**2**	**Medium**	Aiswarya Abarnaa Akshaya AriyaKrishna

Sprint-2	Software	SFIEFA-13	Create a database in cloudant DB to store all the sensor parameters	**1**	**Low**	Aiswarya Abarnaa Akshaya AriyaKrishna
Sprint 3	MIT app	SFIEFA-3	To develop an mobile application using MIT,	**20**	**High**	Aiswarya Abarnaa Akshaya AriyaKrishna
Sprint-4	Web UI	SFIEFA-4	To make the user to interact with the software.	**4**	**High**	Aiswarya Abarnaa Akshaya AriyaKrishna
Sprint-4	Registration	SFIEFA-16	As a user, I can register for the application by entering my Gmail, email then you can received the OTP or Verification Code.	6	Medium	Aiswarya Abarnaa Akshaya AriyaKrishna
Sprint-4	Registration	**SFIEFA-17**	As a user, I will receive confirmation Gmail or email once I have registered for the application.	1	Low	Aiswarya Abarnaa Akshaya AriyaKrishna

Sprint-4	Registration	**SFIEFA-18**	As a user, I can register for the application through Gmail and phone number.	2	Low	Aiswarya Abarnaa Akshaya AriyaKrishna
Sprint-4	Login	**SFIEFA-19**	As a user, I can log into the application by entering email & password	1	Meduim	Aiswarya Abarnaa Akshaya AriyaKrishna

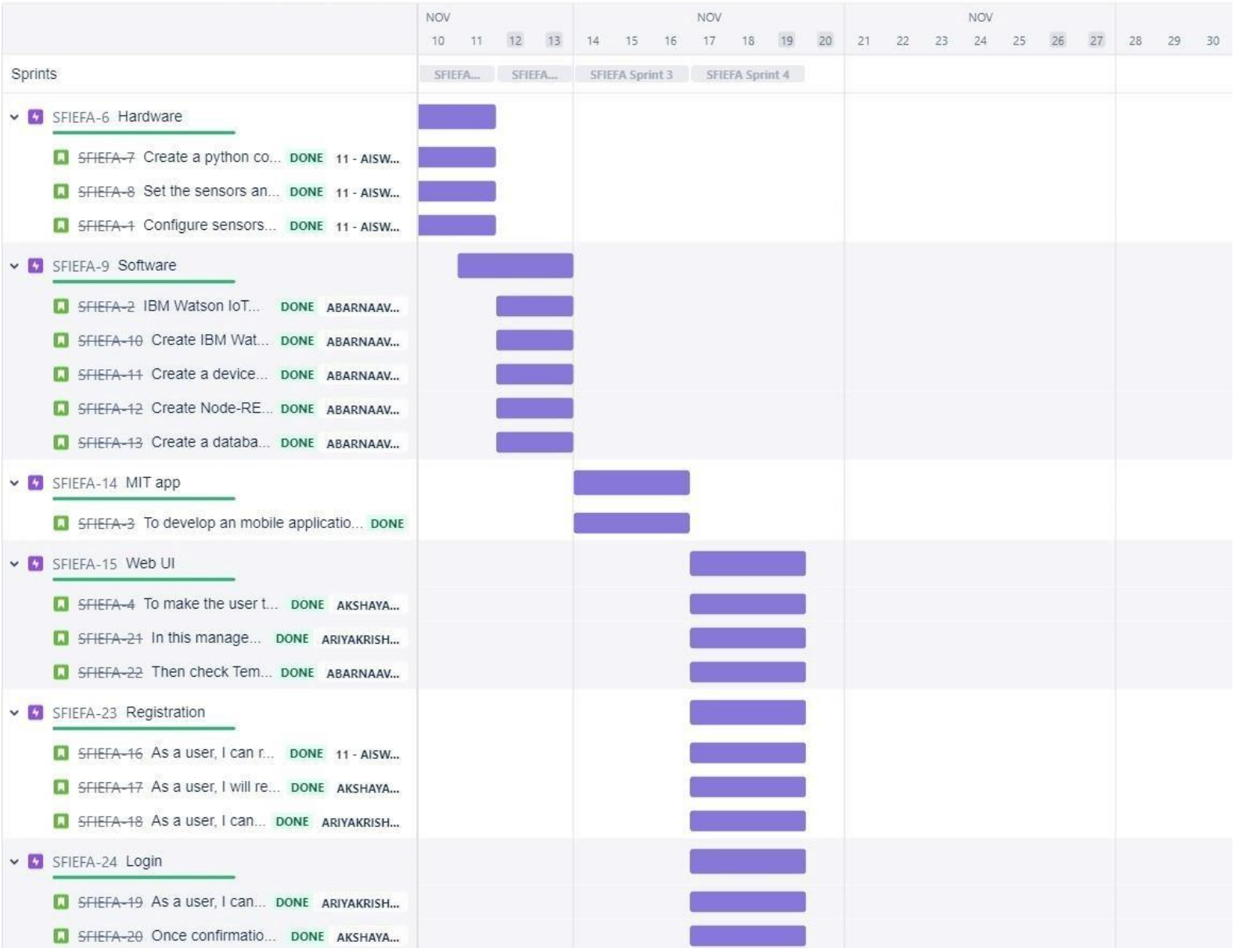
Sprint	**Functional Requirement (Epic)**	**User Story Number**	**User Story / Task**	**Story Points**	**Priority**	**Team Members**
Sprint-4	Login	**SFIEFA-20**	Once confirmation message received after login the system and Check Credentials Once check the credentials after go to the Manage modules.	2	High	Aiswarya Abarnaa Akshaya AriyaKrishna
Sprint-4	Web UI	**SFIEFA-21**	In this manage modules described the below functions like Manage System Admins Manage Roles of User Manage User permission and etc..	2	Medium	Aiswarya Abarnaa Akshaya AriyaKrishna
Sprint-4	Web UI	**SFIEFA-22**	Then check Temperature, humidity and moisture after then logout or exist the application.	2	High	Aiswarya Abarnaa Akshaya AriyaKrishna

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	24 Oct 2022	29 Oct 2022	20	11 Nov 2022
Sprint-2	20	6 Days	31 Oct 2022	05 Nov 2022	20	13 Nov 2022
Sprint -3	20	6 Days	7 Nov 2022	12 Nov 2022	20	16 Nov 2022

Sprint-4	20	6 Days	14 Nov 2022	19 Nov 2022	20	19 Nov 2022

6.3. REPORTS FROM JIRA

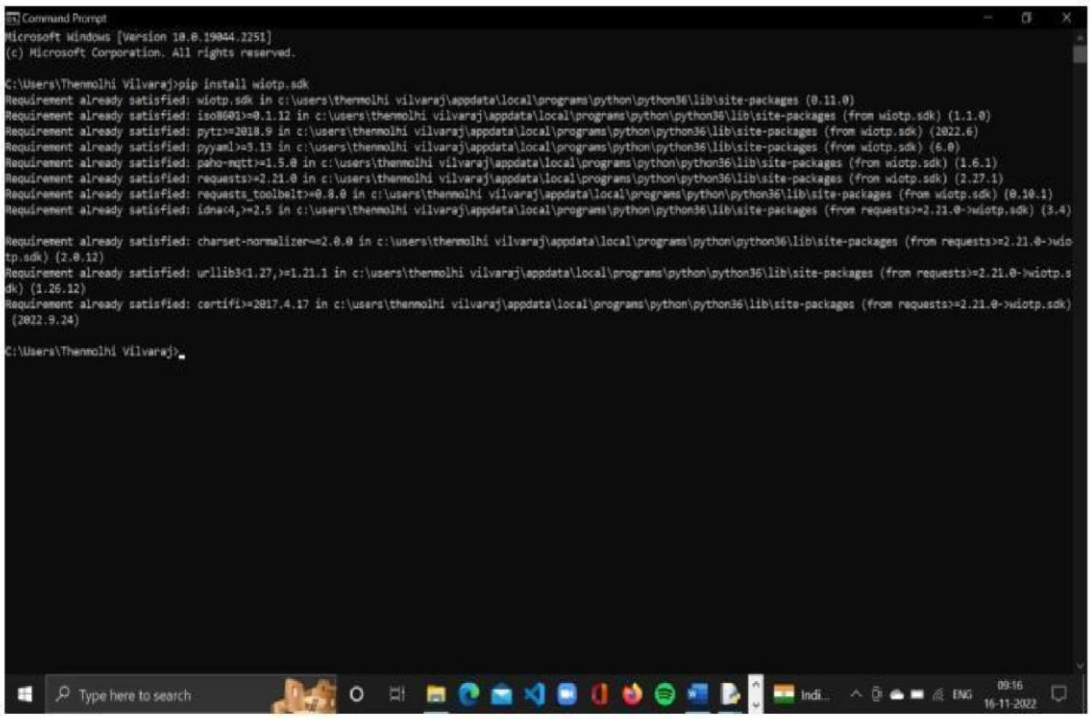


CODING AND SOLUTIONING

7. CODING AND SOLUTIONING

7.1. FEATURE 1

After installation of python version3.6.2 ,we have to install wiotp.sdk package to connect with IBM Watson IoT platform. To install the package open the command prompt window and type the command as pip install wiotp.sdk.



7.2. FEATURE 2

Python code:

```
import time
import sys
import ibmiotf.application
import ibmiotf.device
import random



#Provide your IBM Watson Device Credentials
organization = "b4hkg6"
deviceType = "12345"
deviceId = "54321"
authMethod = "token"
authToken = "cJG?hZd?IkkxL&ZO*b"

# Initialize GPIO



def myCommandCallback(cmd):
    print("Command received: %s" % cmd.data['command'])
```

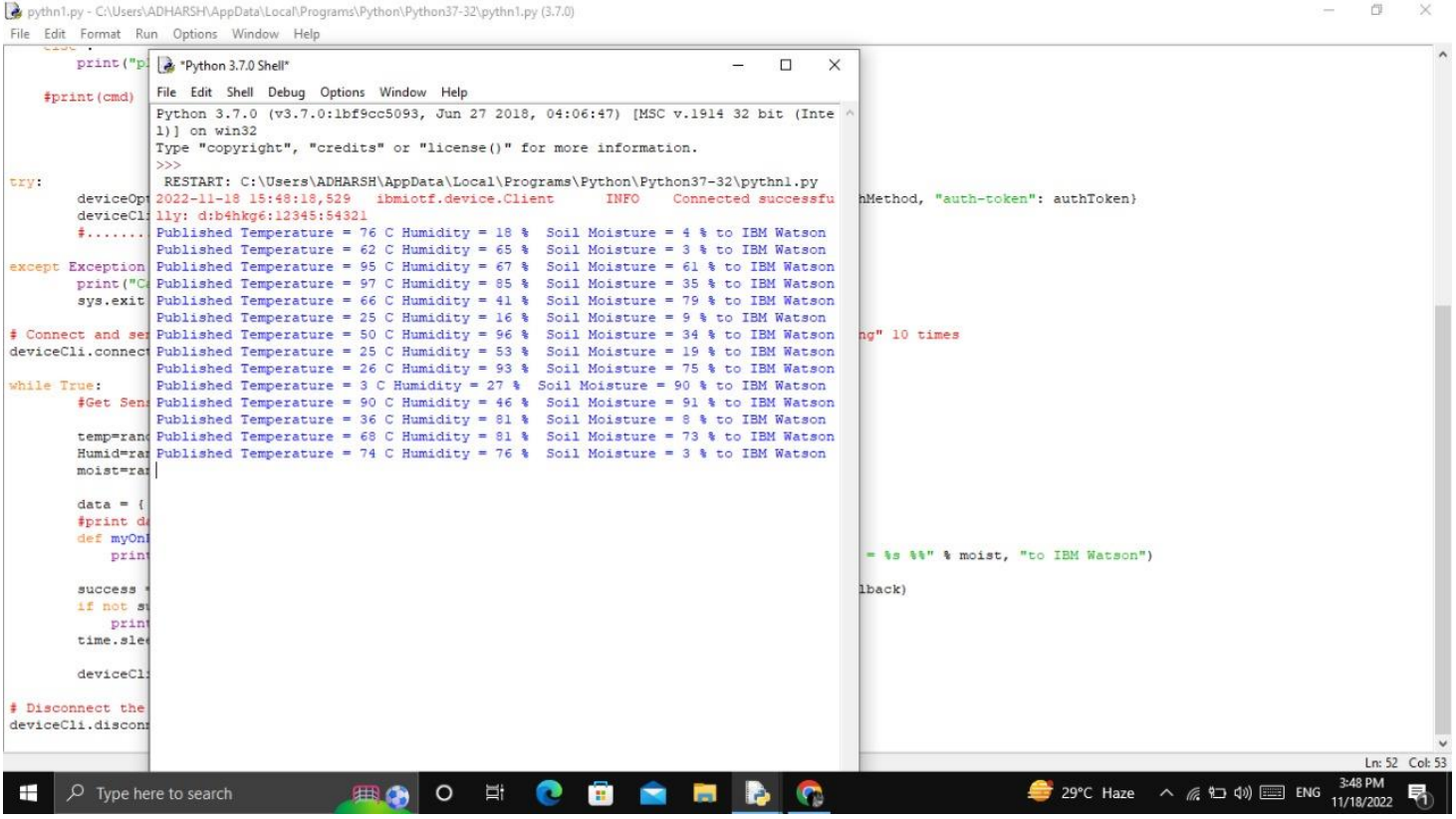
```
   status=cmd.data['command']
   if status=="motoron":
      print ("motor is on")
   elif status=="motor off":
      print ("motor is off")
   else :
      print("please send proper comand")

   #print(cmd)




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()

# Connect and send a datapoint "hello" with value "world" into the cloud as an event of type
"greeting" 10 times
deviceCli.connect()

while True:
      #Get Sensor Data from DHT11

      temp=random.randint(0,100)
      Humid=random.randint(0,100)
      moist=random.randint(0,100)

      data = { 'temp' : temp, 'Humid': Humid,'Soil Moist': moist }
      #print data
      def myOnPublishCallback():
```

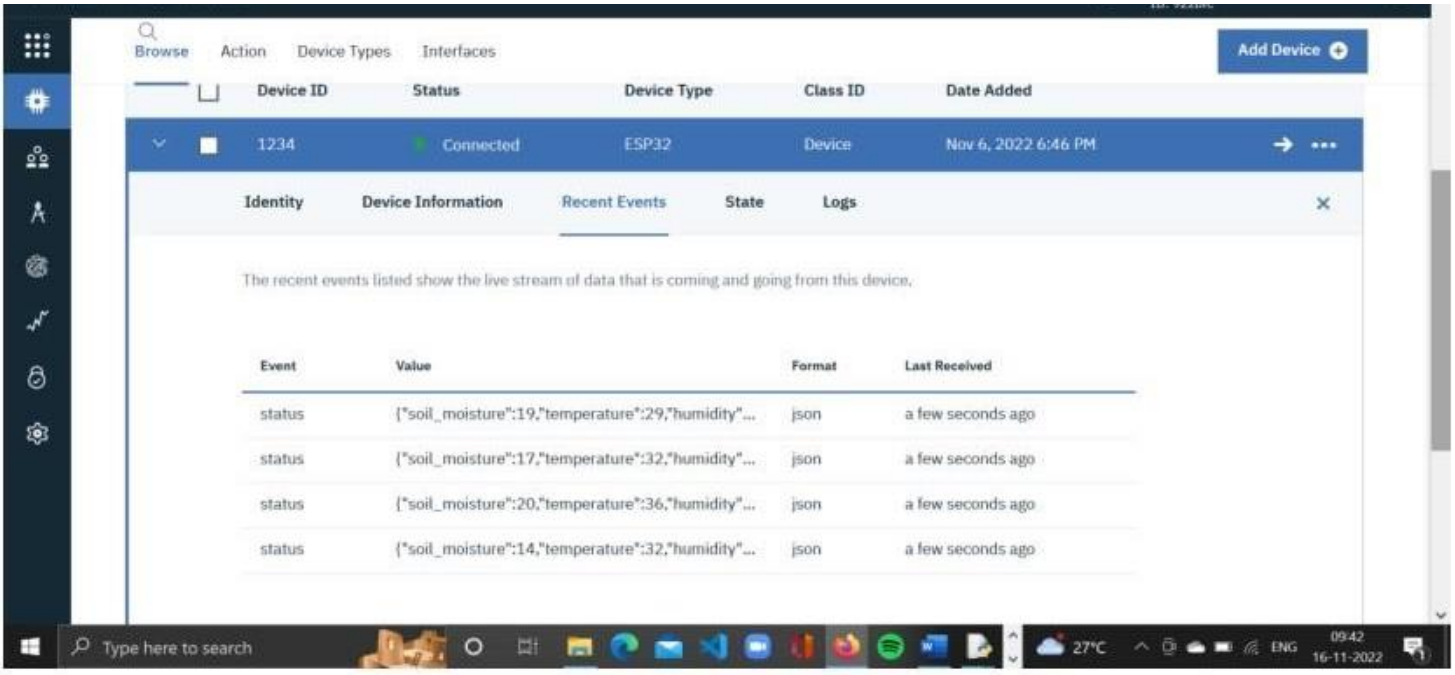
```
        print ("Published Temperature = %s C" % temp, "Humidity = %s %%" % Humid," Soil Moisture = %s %%" % moist, "to IBM Watson")

        success = deviceCli.publishEvent("IoTSensor", "json", data, qos=0, on_publish=myOnPublishCallback)
        if not success:
            print("Not connected to IoTF")
        time.sleep(1)

        deviceCli.commandCallback = myCommandCallback

# Disconnect the device and application from the cloud
deviceCli.disconnect()
```

Output:

We are using IBM Watson IoT platform's device details such as organisation id , device id , device type , authentication token. Parameters like Soil moisture, temperature, humidity, Ph level, co2 are to be monitored by generating random values which decides the switching of the Motor, Delay is given in general.

In the Output screen you can visualize the connectivity to the IBM IoT platform and the values will be generated.

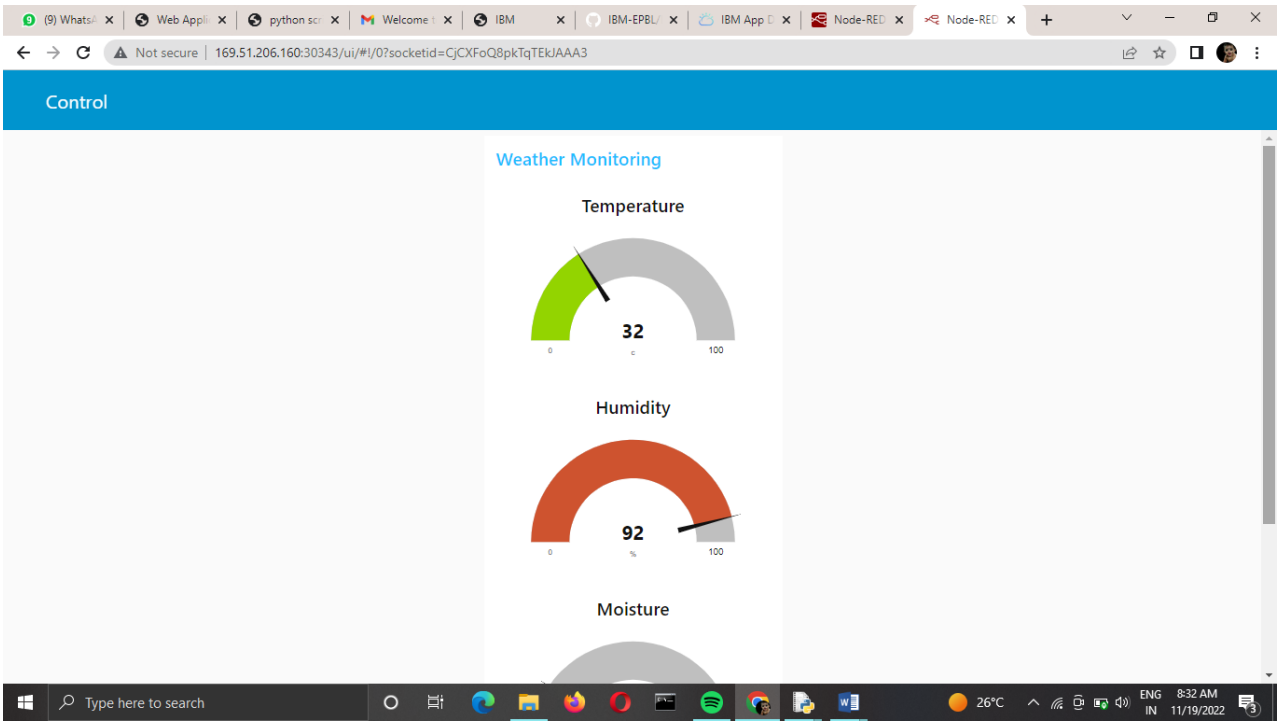


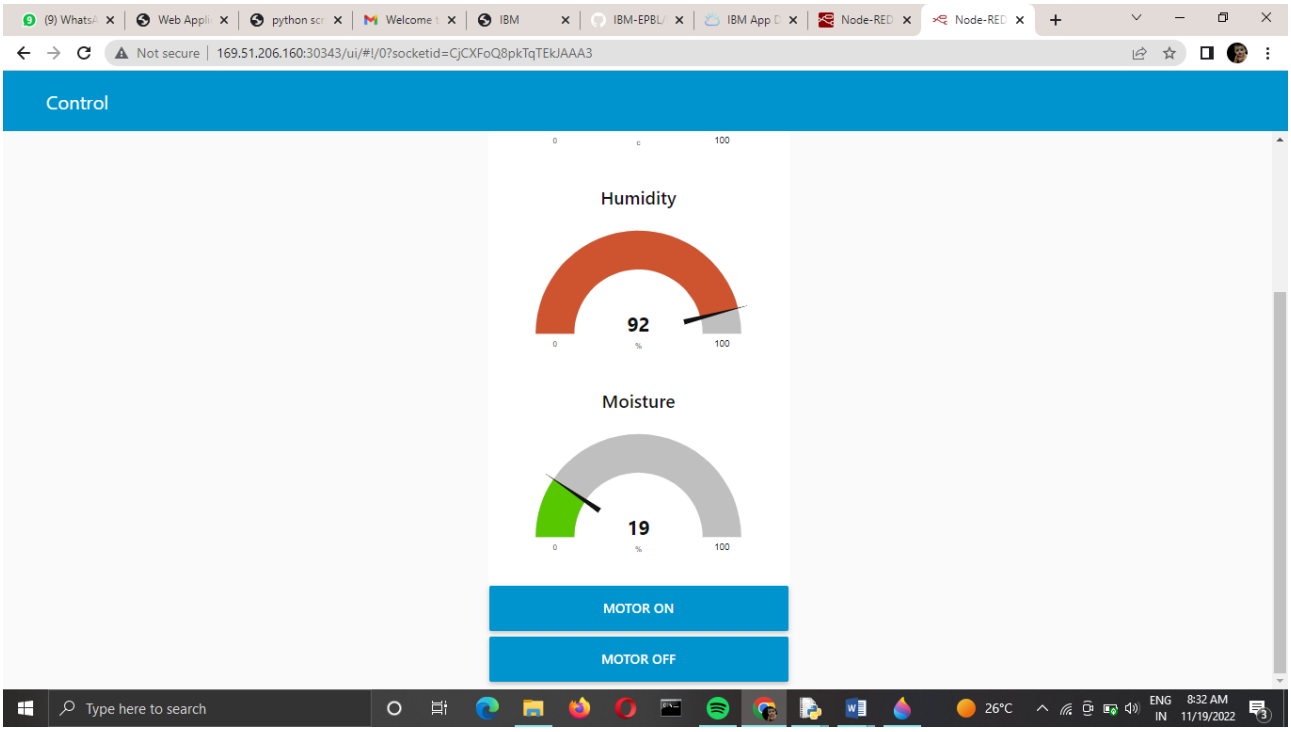


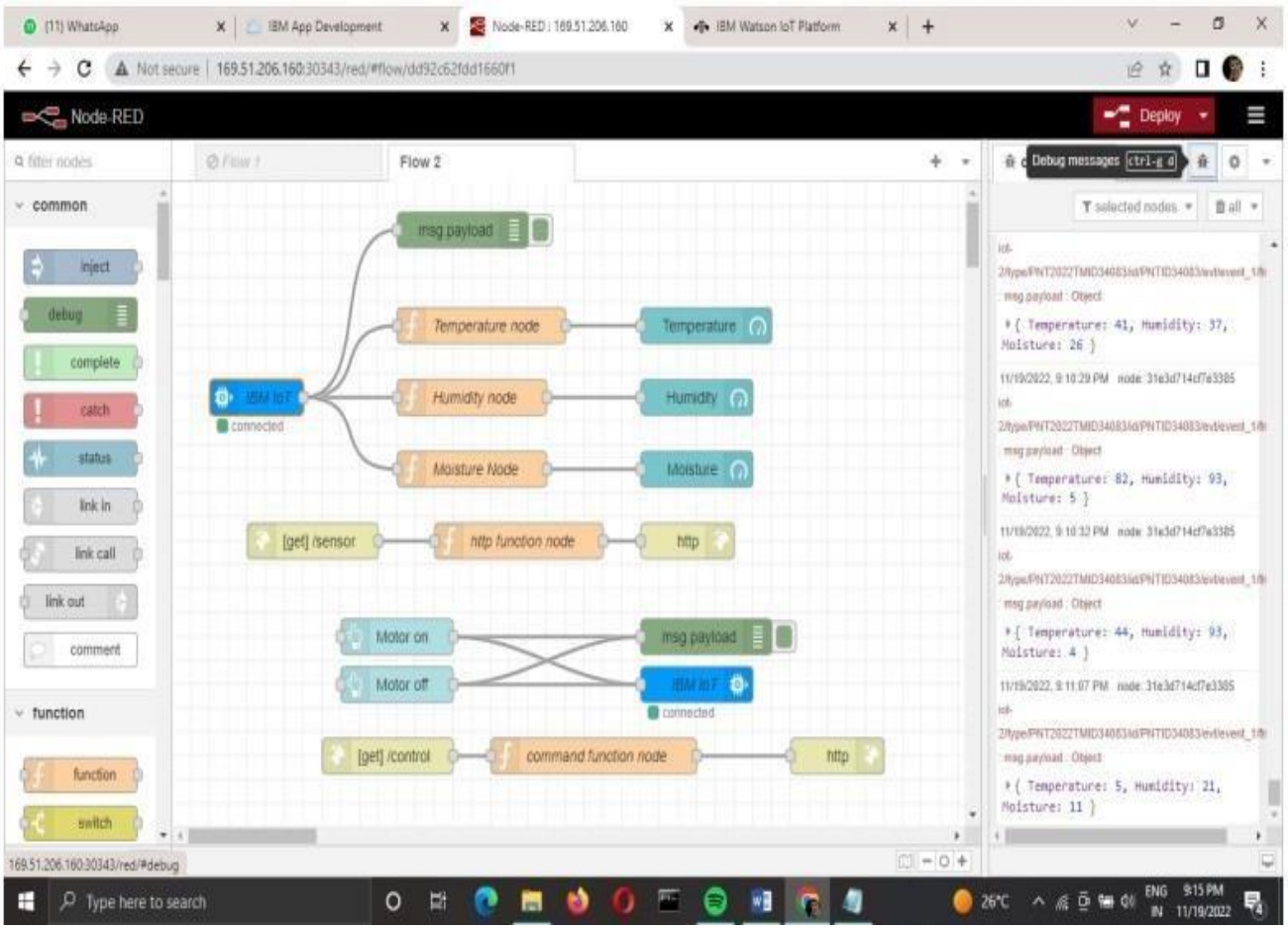
TESTING

8. TESTING

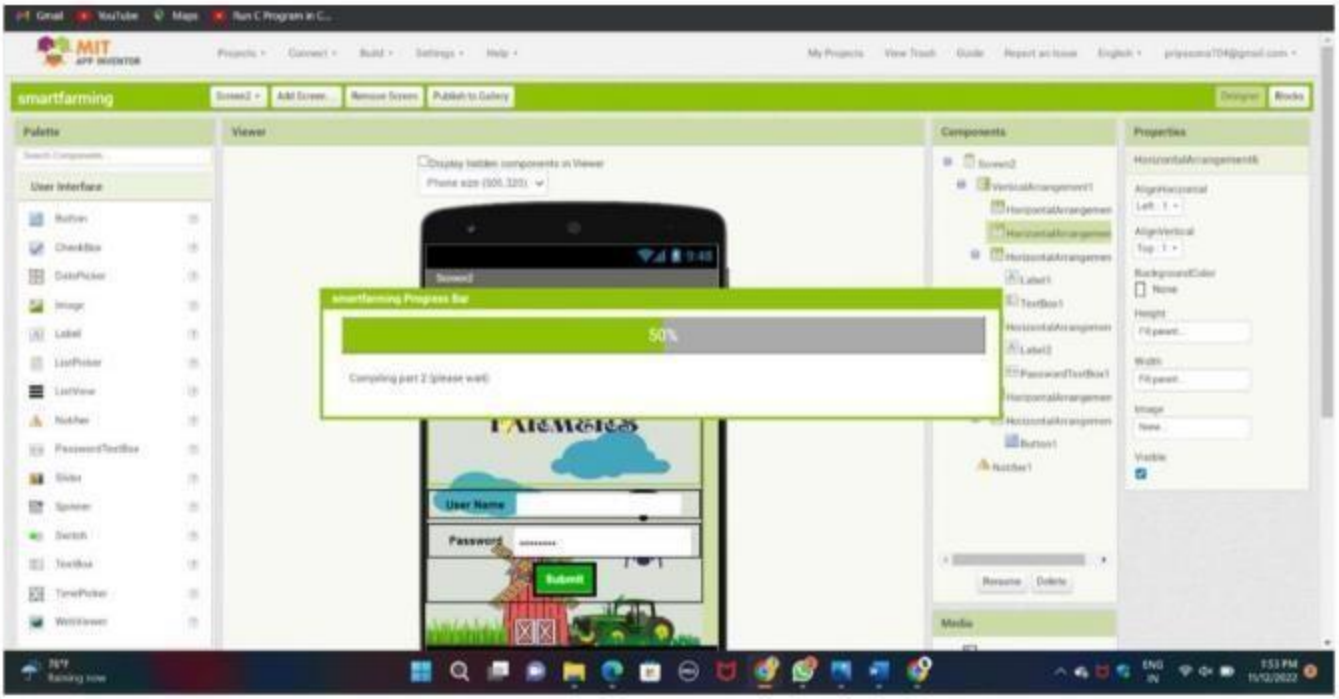
8.1.TEST CASES


Not secure | 169.51.206.160:30343/ui/#!/0?socketid=CjCXFoQ8pkTqTEkJAAA3
Control
Weather Monitoring
Temperature
32
0
100
Humidity
92
%
0
100
Moisture
Type here to search
26°C
ENG
IN
8:32 AM
11/19/2022


Not secure | 169.51.206.160:30343/ui/#!/0?socketid=CjCXFoQ8pkTqTEkJAAA3
Control
Humidity
92
%
0
100
Moisture
19
%
0
100
MOTOR ON
MOTOR OFF
Type here to search
26°C
ENG
IN
8:32 AM
11/19/2022



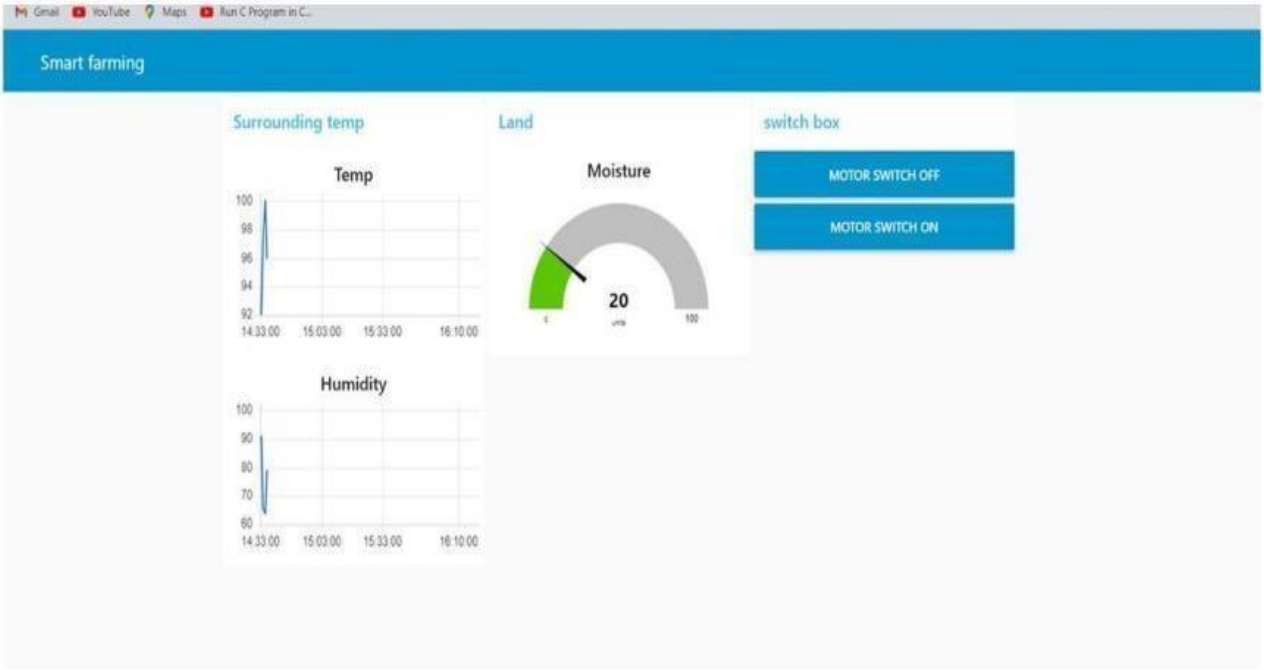
8.2 MIT APP INVENTOR



RESULTS

9. RESULTS

9.1.PERFORMANCE METRICS



ADVANTAGES &DISADVANTAGES

10.ADVANTAGES &DISADVANTAGES

10.1.ADVANTAGES

1. 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.

2. 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 motordriven hardware become the next logical step.

3. Various solutions are available to monitor engine statistics and starting or stopping the engine. When the client chooses to begin or stop the motor, the program transmits a sign to the unit within seconds by means of a mobile phone system.

4. Submersible weight sensors or ultrasonic sensors can screen the degree of tanks, lakes, wells and different kinds of fluid stockpiling like fuel and compost. The product figures volume dependent on the tank or lake geometry after some time. It conveys alarms dependent on various conditions.

10.2.DISADVANTAGES

1. The smart agriculture needs availability of internet continuously. Rural part of most of the developing countries do not fulfil this requirement. Moreover internet connection is slower.

2. The smart farming based equipment require farmers to understand and learn the use of technology. This is major challenge in adopting smart agriculture farming at large scale across the countries.

CONCLUSION

11.CONCLUSION

Farmers can benefit greatly from an IoT-based smart agriculture system. As a result of the lack of Farming irrigation, agriculture suffers. Climate factors such as humidity, temperature, and moisture can be adjusted dependent on the local environmental variables. This technology 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 Smart farming 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 farmer’s phone.

FUTURE SCOPE

12.FUTURE SCOPE

1. In future due to more demand of good and more farming in less time, for betterment of the crops and reducing the usage of extravagant resources like electricity and water IOT can be implemented in most of the places.
2. 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.
3. We can create few more models of the same project, so that the farmer can have information of an entire.
4. We can update 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 this project.
5. 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 an internet issues.
6. We can add camera feature so that the farmer can monitor his field in real time. This helps in avoiding thefts.

APPENDIX

13.APPENDIX

```
import time
import sys
import ibmiotf.application
import ibmiotf.device
import random


#Provide your IBM Watson Device Credentials
organization = "b4hkg6"
deviceType = "12345"
deviceId = "54321"
authMethod = "token"
authToken = "cJG?hZd?IkkxL&ZO*b"

# Initialize GPIO


def myCommandCallback(cmd):
    print("Command received: %s" % cmd.data['command'])
    status=cmd.data['command']
    if status=="motoron":
        print ("motor is on")
    elif status=="motor off":
        print ("motor is off")
    else :
        print("please send proper comand")

    #print(cmd)
```

```
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()
    ...
        print("please send proper comand")

    #print(cmd)



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()

# Connect and send a datapoint "hello" with value "world" into the cloud as an event of type "greeting" 10 times
deviceCli.connect()

while True:
        #Get Sensor Data from DHT11

        temp=random.randint(0,100)
        Humid=random.randint(0,100)
        moist=random.randint(0,100)

        data = { 'temp' : temp, 'Humid': Humid,'Soil Moist': moist }
        #print data
        def myOnPublishCallback():
            print ("Published Temperature = %s C" % temp, "Humidity = %s %%" % Humid," Soil Moisture = %s %%" % moist, "to IBM Watson")

        success = deviceCli.publishEvent("IoTSensor", "json", data, qos=0, on_publish=myOnPublishCallback)
```

```
        if not success:
            print("Not connected to IoTF")
        time.sleep(1)

        deviceCli.commandCallback = myCommandCallback

# Disconnect the device and application from the cloud
deviceCli.disconnect()
```

OUTPUT:

```
Python 3.7.0 (v3.7.0:1bf9cc5093, Jun 27 2018, 04:06:47) [MSC v.1914 32 bit (Inte
l)] on win32
Type "copyright", "credits" or "license()" for more information.
>>>
 RESTART: C:\Users\ADHARSH\AppData\Local\Programs\Python\Python37-32\pythnl.py
2022-11-18 15:48:18,529   ibmiotf.device.Client      INFO    Connected successfu
lly: d:b4hkg6:12345:54321
Published Temperature = 76 C Humidity = 18 %  Soil Moisture = 4 % to IBM Watson
Published Temperature = 62 C Humidity = 65 %  Soil Moisture = 3 % to IBM Watson
Published Temperature = 95 C Humidity = 67 %  Soil Moisture = 61 % to IBM Watson
Published Temperature = 97 C Humidity = 85 %  Soil Moisture = 35 % to IBM Watson
Published Temperature = 66 C Humidity = 41 %  Soil Moisture = 79 % to IBM Watson
Published Temperature = 25 C Humidity = 16 %  Soil Moisture = 9 % to IBM Watson
Published Temperature = 50 C Humidity = 96 %  Soil Moisture = 34 % to IBM Watson
Published Temperature = 25 C Humidity = 53 %  Soil Moisture = 19 % to IBM Watson
Published Temperature = 26 C Humidity = 93 %  Soil Moisture = 75 % to IBM Watson
Published Temperature = 3 C Humidity = 27 %  Soil Moisture = 90 % to IBM Watson
Published Temperature = 90 C Humidity = 46 %  Soil Moisture = 91 % to IBM Watson
Published Temperature = 36 C Humidity = 81 %  Soil Moisture = 8 % to IBM Watson
Published Temperature = 68 C Humidity = 81 %  Soil Moisture = 73 % to IBM Watson
Published Temperature = 74 C Humidity = 76 %  Soil Moisture = 3 % to IBM Watson
```

13.2.GIT HUB LINK

https://github.com/IBM-EPBL/IBM-Project-40159-1660624772