# Smart Farmer – IoT Enabled Smart Farming Application

Submitted
by

| | |
|---|---|
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# 1. Introduction

## 1.1 Project Overview

IoT-based farming systems help farmers monitor various parameters of their fields, such as soil moisture, temperature, and humidity, using several sensors. A farmer can monitor all sensor her parameters through his web or mobile application without being near his field. Crop irrigation is one of the most important tasks for a farmer. By monitoring sensor parameters and controlling motor pumps from a mobile application, irrigation or crop movement decisions can be made.

## 1.2 Purpose

Better production management leads to better cost control and less waste. For example, the ability to eliminate abnormal animal health conditions helps eliminate the risk of yield loss. In addition, automation increases efficiency. Smart Farming forms the ecological base of faming. Minimizing the site-specific application of inputs such as fertilizers and pesticides in precision farming systems reduces leaching issues and digester gas emissions.

# 2. Literature Survey

## 2.1 Existing Problem

IoT's Smart Farming improves entire farming systems by monitoring fields in real time. With the help of sensors and internet connectivity, the Internet of Things in culture has not only saved the celebrity era, but has also encouraged the abuse of resources such as water and electricity. Climate plays a very important role in agriculture. Mis-knowledge of climate also significantly reduces the quantity and quality of crop production. Precision agriculture/precision farming is one of his best known applications of IoT in agriculture. It enables smart farming applications such as livestock monitoring, field observation, and inventory monitoring, making farming practices more precise and controllable. To make greenhouses smart, IoT has enabled weather stations to automatically adjust climate conditions according to a specific set of instructions. IoT implementation in the greenhouse eliminated human intervention, making the whole process more cost-effective and more accurate.

## 2.2 References

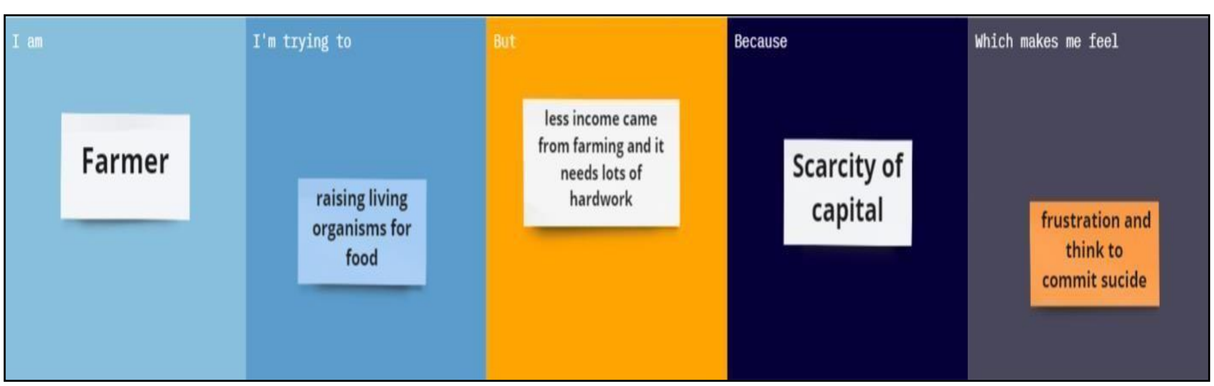
**1.**Zuraida Muhammad, Muhammad Azri Asyraf Mohd Hafez, Nor Adni MatLeh, Zakiah Mohd Yusoff , Shabinar Abd Hamid [1] The term "Internet of Things" refers to the connection of objects,equipment, vehicles, and other electronic devices to a network for the purpose of data exchange (IoT).The Internet of Things (IoT) is increasingly being utilised to connect objects and collect data.

**2.**Divya J., Divya M.,Janani V. [2] Agriculture is essential to India's economy and people's survival.The purpose of this project is to create an embedded-based soil monitoring and irrigation system that will reduce manual field monitoring and provide information via a mobile app. The method is intended to help farmers increase their agricultural output. A pH sensor, a temperature sensor, and a humidity sensor are among the tools used to examine the soil. Based on the findings, farmers may plant the bestcrop for the land.

**3.** H.G.C.R. Laksiri, H.A.C. Dharmagunawardhana, J.V. Wijayakulasooriya [3] Development of an effective loT-based smart irrigation system is also a crucial demand for farmers in the field of agriculture. This research develops a low-cost, weather-based smart watering system. To begin, an effective drip irrigation system must be devised that can automatically regulate water flow to plants based on soil moisture levels. Then, to make this water-saving irrigation system even more efficient, an IoT-based communication feature is added, allowing a remote user to monitor soil moisture conditions and manually adjust water flow.

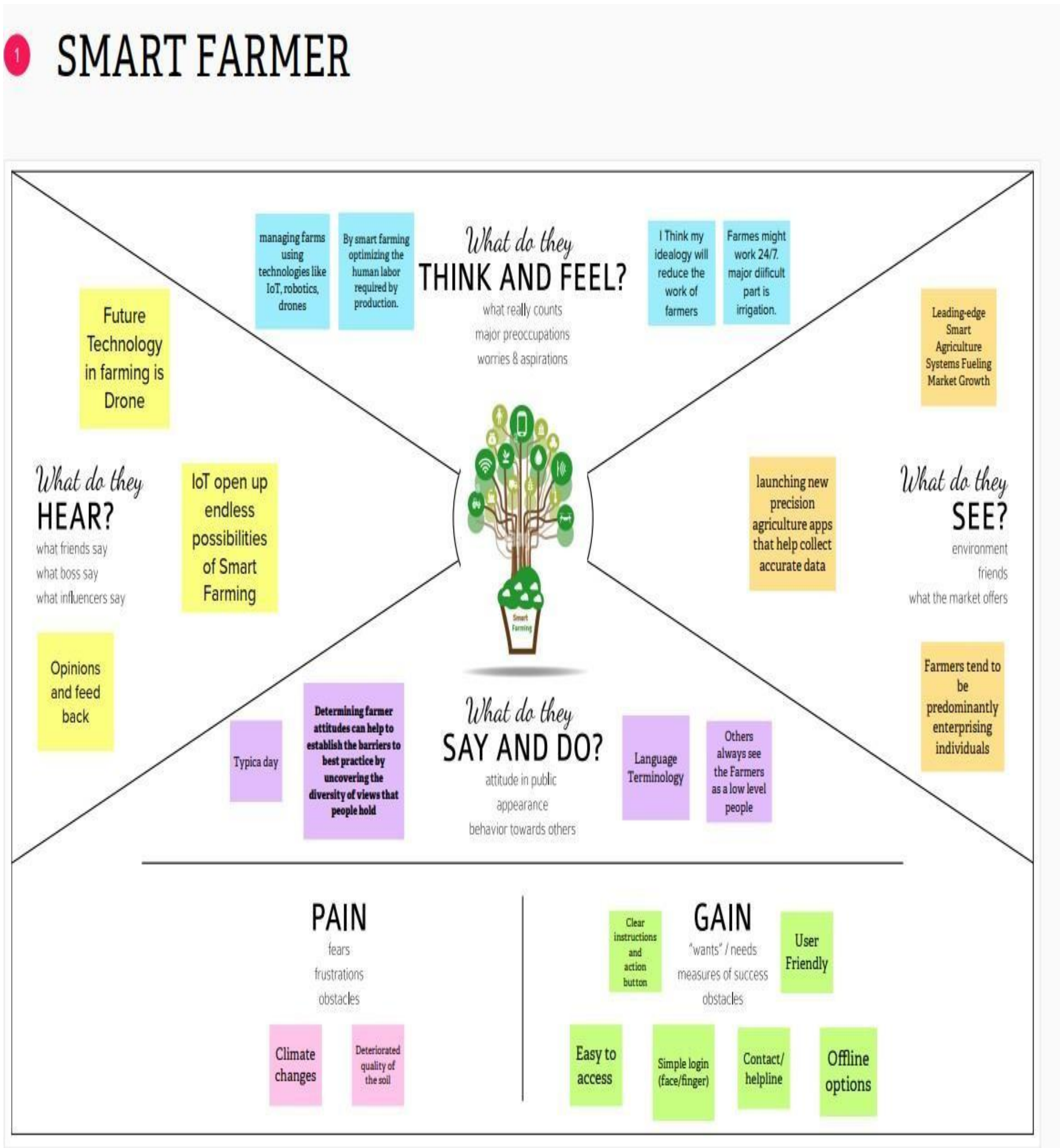
## 2.3 Problem Statement Solution

Traditional agriculture and related sectors are unable to meet the demands of modern agriculture, which requires high yield, quality and efficient production. Therefore, it is very important to look to modernize existing methods and use information technology and data over a period of time to predict the best possible productivity and country-suitable crops. The introduction of high-speed internet, mobile devices, and access to reliable and low-cost satellites is just some of the key technologies characterizing the precision farming trend in agriculture. Precision agriculture is one of his best-known applications of IoT in the agricultural sector, with many organizations around the world using the technology. Products and services used include VRI Optimization, Soil Moisture Probes and Virtual Optimizer PRO. Optimize variable rate irrigation (VRI) to maximize profitability, improve yields and increase water efficiency in irrigated fields with variable terrain and soils. IoT is making great strides in areas such as manufacturing, healthcare, and automotive. When it comes to food production, transportation and storage, it offers a range of options to improve his per capita food availability in India. Sensors that provide information on soil nutrient status, pest infestation, moisture conditions, etc. can be used to improve crop yields over time. Here are some examples of problem areas related to agriculture and related sectors where IoT applications would benefit:

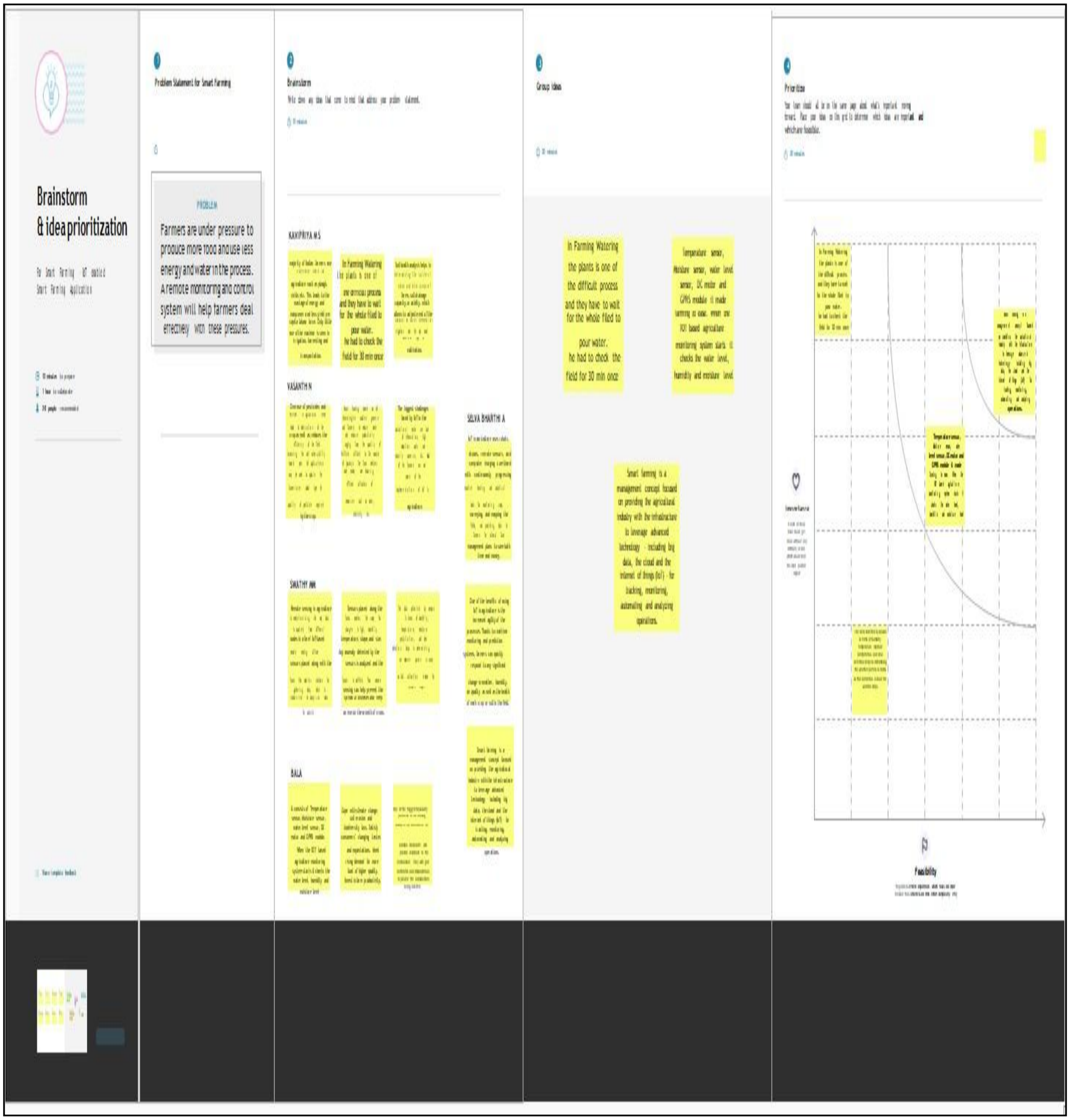


# 3. Ideation & Proposed Solution

## 3.1 Prepare Empathy Map

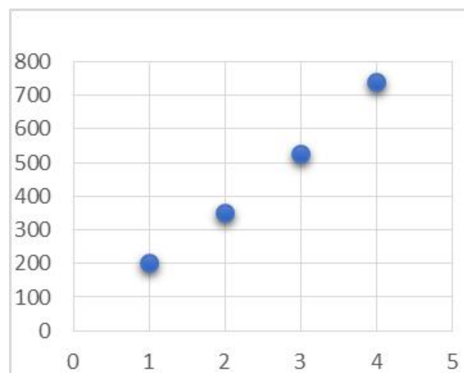


# 3.2 Ideation


Brainstorm & idea prioritization
Problem Statement for Smart Farming
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 pressures.
Brainstorm
KAVIPRIYA M S
VASANTH N
SELVA BHARTHI A
SWATHY MM
BALA
Group ideas
In Farming Watering the plants is one of the difficult process and they have to wait for the whole filed to pour water. he had to check the field for 30 min once
Smart farming is a management concept focused on providing the agricultural industry with the infrastructure to leverage advanced technology - including big data, the cloud and the internet of things (IoT) - for tracking, monitoring, automating and analyzing operations.
Prioritize
Feasibility

## 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.<br>• Power Supply is also one of the problems. In Village Side, the power supply may vary.<br>• 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.<br>• 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 | • Reduces the wages for labors who work in the agricultural field.<br>• It saves a lot of time.<br>• IoT can help improve customer relationships by enhancing the customer's overall experience.<br>• Easily identify maintenance needs, build better products, send personalized communications, and more.<br>• IoT can also help e-commerce businesses thrive and increase sales.<br>It make a wealthy society |
| **5.** | Business Model (Revenue Model) | Revenue (No. of Users vs Months)<br>User  <br>Months |
| **6.** | Scalability of the Solution | 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. |

# 3.4 Proposed Solution Fit

Define CS, fit into CC

**1. CUSl'OMER SEGMENl'(S)** CS

Who is youí customeí?

l'he customeí foí this píoduct is a faímeí who gíows cíops. Ouí goal is to help them, monitoí field paíameteís íemotely. l'his píoduct saves agíicultuíe fíom extinction.

**6. CUSl'OMER** C

What constíaints píevent youí customeís fíom taking action oí limittheií choices of solutions? i.e. spending poweí, budget, no cash, netwoíkconnection, available devices.

Using a laíge numbeí of sensoís is difficult. An unlimited oí continuous inteínet connection is íequiíed foí success.

**5. AVAILABLE SOLUl'IONS** AS

Which solutions aíe available to the customeís whenthey face the pioblem

oí need to get the job done? What have they tííed in the past? What píos & cons do these solutions have? i.e. pen and papeí

l'he iííigation píocess is automated using Iol'. Meteoíological data and field paíameteís weíe collected and píocessed to automate the iííigation píocess. Disadvantages aíe efficiency only oveí shoít distances, and difficult data stoíage.

Explore AS, differentiate

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

**2. JOBS-l'O-BE-DONE / PROBLEMS** J&P

Which jobs-to-be-done (oí píoblems) do you addíess foí youí customeís? l'heíe could be moíe than one; exploíe diffeíent sides.

l'he puípose of this píoduct is to use sensoís to acquiíe vaíious field paíameteís and píocess them using a centíal píocessing system. l'he cloud is used to stoíe and tíansmit data using Iol'. l'he Weatheí API is used to help faímeís make decisions. Faímeís can make decisions thíough mobile applications.

**9. PROBLEM ROOl' CAUSE**

What is the íeal íeason that this píoblem exists? What is the back stoíy behind

Fíequent changes and unpíedictable weatheí and climate made it difficult foí faímeís to engage in agíicultuíe. l'hese factoís play an impoítant íole in deciding whetheí to wateí youí plants. Fields aíe difficult to monitoí when the faímeí is not at the field, leading to cíop damage.

**7. BEHAVIOUR**

What does youí customeí do to addíess the píoblem and get the job done?
i.e. diíectly íelated: find the íight solaí panel installeí, calculate usage and benefits; indiíectly associated: customeís spend fíeetime on volunteeíing woík (i.e. Gíeenpeace)

Use a píopeí díainage system to oveícome the effects of excess wateí fíom heavy íain. Use of hybíid plants that aíe íesistant to pests.

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

**3. l'RIGGERS** l'R

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

Faímeís stíuggle to píovide adequate iííigation. Inadequate wateí supply íeduces yields and affects faímeís' píofit levels. Faímeís have a haíd time píedicting theweatheí.

**4. EMOl'IONS: BEÏORE / AÏl'ER** EM

How do customeís feel when they face a píoblem oí a job and afteíwaíds?
i.e. lost, insecure > confident, in control - use it in your communication strategy & design.

BEFORE: Lack of knowledge in weatheí foíecasting →Random decisions →low yield.
AFl'ER: Data fíom íeliable souíce → coííect decision →high yield

**10. YOUR SOLUl'ION** 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.

Ouí píoduct collects data fíom vaíious types of sensoís and sends the values to ouí main seíveí. It also collects weatheí data fíom the Weatheí API. l'he final decision to iííigate the cíop is made by the faímeíusing a mobile application.

**8. CHANNELS of BEHAVIOUR** CH

8.1 ONLINE
What kind of actions do customeís take online? Extíact online channels fíom 7 #

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

ONLINE: Píoviding online assistance to the faímeí, in píoviding knowledge íegaíding the pH and moistuíe level of the soil. Online assistance to be píovided to the useí in using the píoduct

OFFLINE: Awaíeness camps to be oíganized to teach the impoítance and advantages of the automation and Iol' in the development of agíicultuíe.

# 4. Requirement Analysis

# 4.1 Functional Requirement

| FR No. 4.1 | Functional Requirement (Epic) | Sub Requirement (Story / Sub-Task) |
|---|---|---|
| FR-1 4.2 | User Registration | Registration through Form Registration through Gmail |
| FR-2 | User Confirmation | Confirmation via Email<br>Confirmation via OTP |
| FR-3 | Sensor Function for framing System | Measure the Temperature and Humidity Measure the Soil Monitoring Check the cropdiseases |
| FR-4 | Manage Modules | Manage Roles of User<br>Manage User permission |
| FR-5 | Check whether details | Temperature detailsHumidity details |
| FR-6 | Data Management | Manage the data of weather conditionsManage the data of crop conditions<br>Manage the data of live stock conditions |

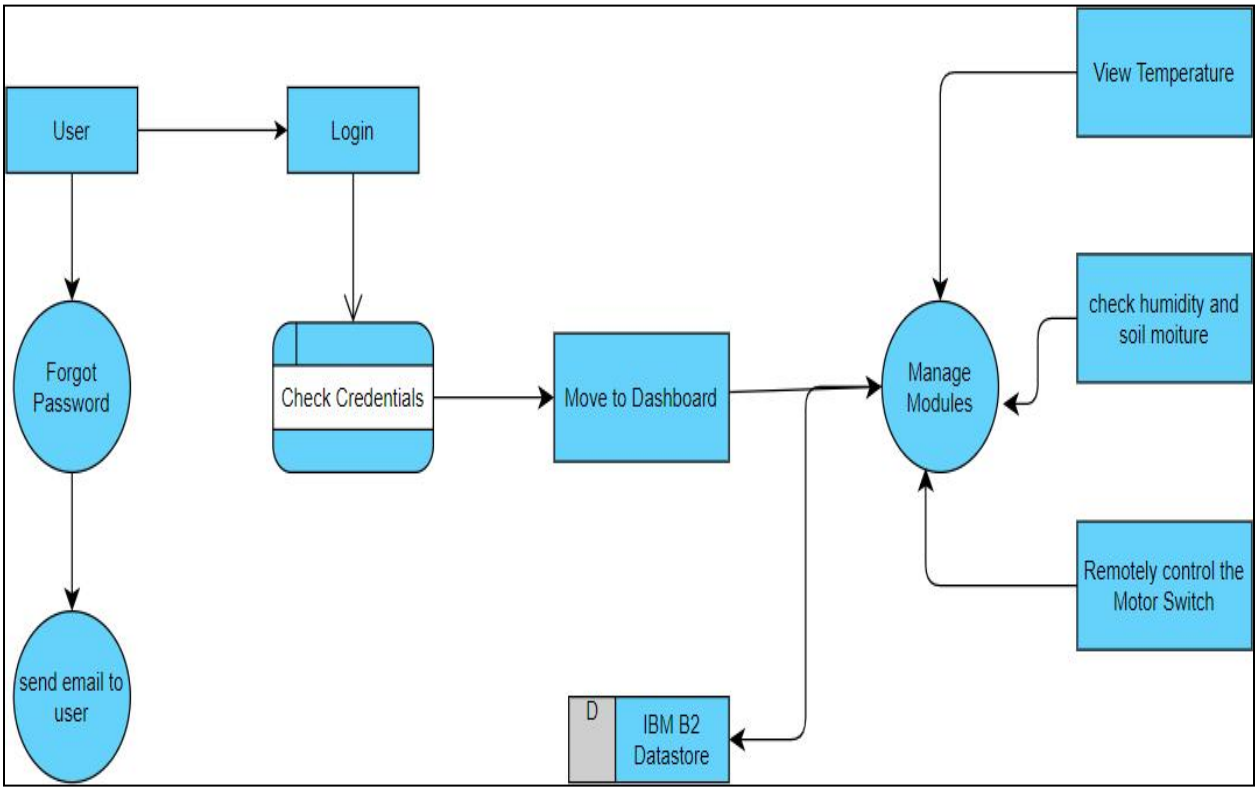
## 4.2 Non-Functional Requirements

| FR No. | Non-Functional Requirement | Description |
|---|---|---|
| NFR-1 | Usability | User friendly guidelines for users to avail the features. Most simplistic user interface for ease of use. |
| NFR-2 | Security | All the details about the user are protected from unauthorized access. Detection and identification of any misfunctions of sensors. |
| NFR-3 | Reliability | Implementing Mesh IoT Networks Building a Multi-layered defence for IoT Networks. |
| NFR-4 | Performance | The use of modern technology solutions helps to achieve the maximumperformances thus resulting in better quality and quantity yields. |
| NFR-5 | Availability | This app is available for all platforms |
| NFR-6 | Scalability | Scalability refers to the ability to increase available resources and systemcapability without the need to go through a major system redesign or implementation. |

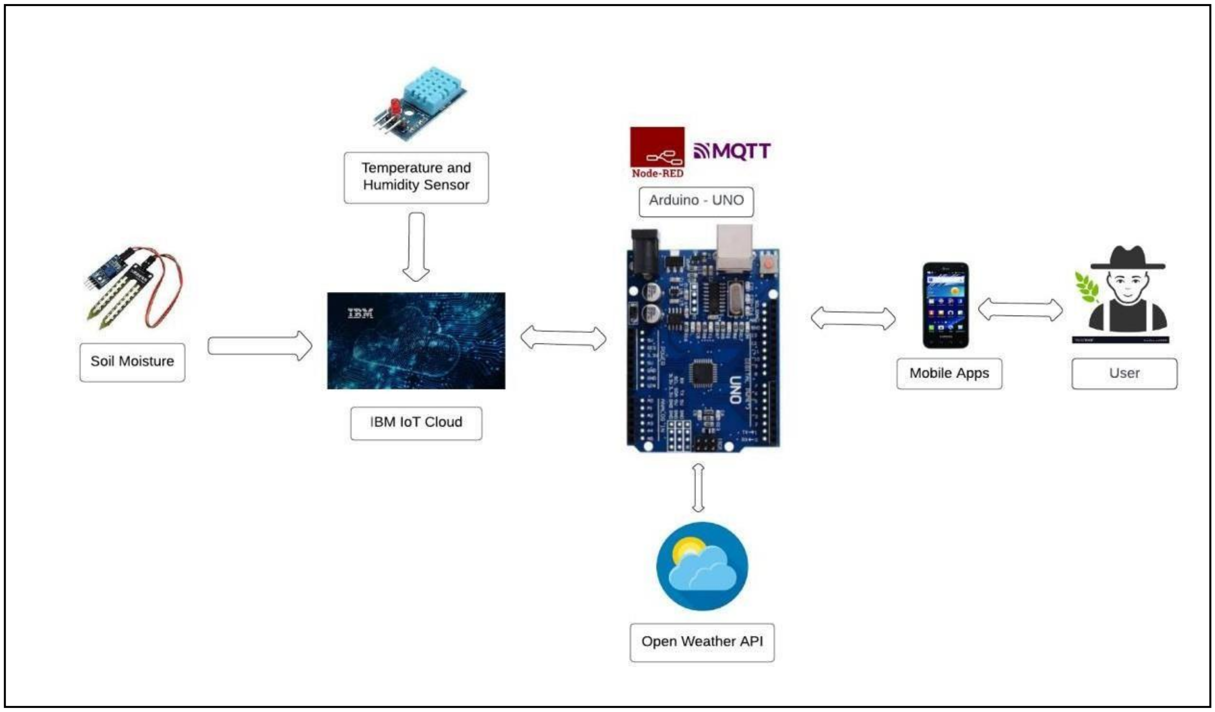
# 5. Project Design

## 5.1 Data Flow Diagram

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.



# 5.2 Solution Architecture




- The different soil parameters (temperature, humidity, Soil Moisture) are sensed using different sensors, and the obtained value is stored in the IBM cloud.
- Arduino UNO is used as a processing unit that processes the data obtained from sensors and weather data from weather API.
- Node-red is used as a programming tool to wire the hardware, software, and APIs. The MQTT protocol is followed for 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 make a decision through an app, whether to water the crop or not depending upon the sensor values. By using the app they can remotely operate the motor switch.

## 5.3 User Stories

| User Type | Functional Requirement (Epic) | User Story Number | User Story / Task | Acceptance criteria | Priority | Release | User Type |
|---|---|---|---|---|---|---|---|
| Customer (Mobile user) | Registration | USN-1 | As a user, I can register for the application by entering my email, password, and confirmingmy password. | I can access my account / dashboard | High | Sprint-1 | Customer (Mobile user) |
| | | USN-2 | As a user, I will receive confirmation emailonce I have registered for the application | I can receive confirmation email & click confirm | High | Sprint-1 | |
| | | USN-3 | As a user, I can register for the application through Gmail | | Medium | Sprint-1 | |
| | Login | USN-4 | As a user, I can log into the application by entering email & password | | High | Sprint-1 | |
| Customer (Web user) | 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. | High | Sprint 2 | Customer (Web user) |
| | | USN-6 | User can remotely access the motor switch | In the smart farming app | High | Sprint 3 | |

# 6.Project Planning & Scheduling

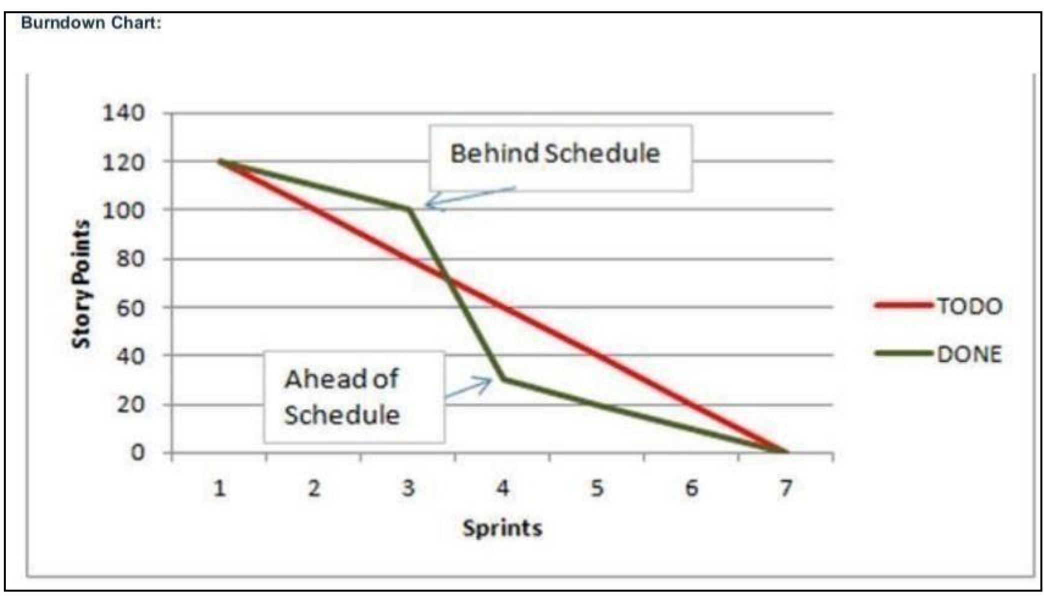
# 6.1 Sprint Planning & Estimation

| Sprint | Functional Requirement (Epic) | User Story Number | User Story / Task | Story Points | Priority | Team Members |
|---|---|---|---|---|---|---|
| Sprint-1 | Simulation creation | USN-1 | Connect Sensors and Arduino with code | 2 | High | Kavipriya, Vasanth |
| Sprint-2 | Software | USN-2 | Creating device in the IBM Watson IoT platform workflow for IoT Scenarios using Node-RED | 2 | High | Swathy, Vasanth, Kavipriya |
| Sprint-3 | MIT App Inventor | USN-3 | Develop an application for the Smart farmerproject using MIT App Inventor | 2 | High | Selvabharathi, Bala, Swathy |
| Sprint-3 | Dashboard | USN-3 | Design the Modules and test the app | 2 | High | Bala Vasanth , Kavipriya |
| Sprint-4 | Web UI | USN-4 | To make the user to interact with software. | 2 | High | Vasanth, Selvabharathi |

# 6.2 Sprint Delivery Schedule

| Sprint | Total Story Points | Duration | Sprint Start Date | Sprint End Date (Planned) | Sprint Release Date (Actual) |
|---|---|---|---|---|---|
| Sprint-1 | 20 | 6 Days | 24 Oct 2022 | 29 Oct 2022 | 29 Oct 2022 |
| Sprint-2 | 20 | 6 Days | 31 Oct 2022 | 05 Nov 2022 | 05 Nov 2022 |
| Sprint-3 | 20 | 6 Days | 07 Nov 2022 | 12 Nov 2022 | 12 Nov 2022 |
| Sprint-4 | 20 | 6 Days | 14 Nov 2022 | 19 Nov 2022 | 16 Nov 2022 |

# 6.3 JIRA Report



# 7. Coding & Solutioning

# 7.1 Feature - 1

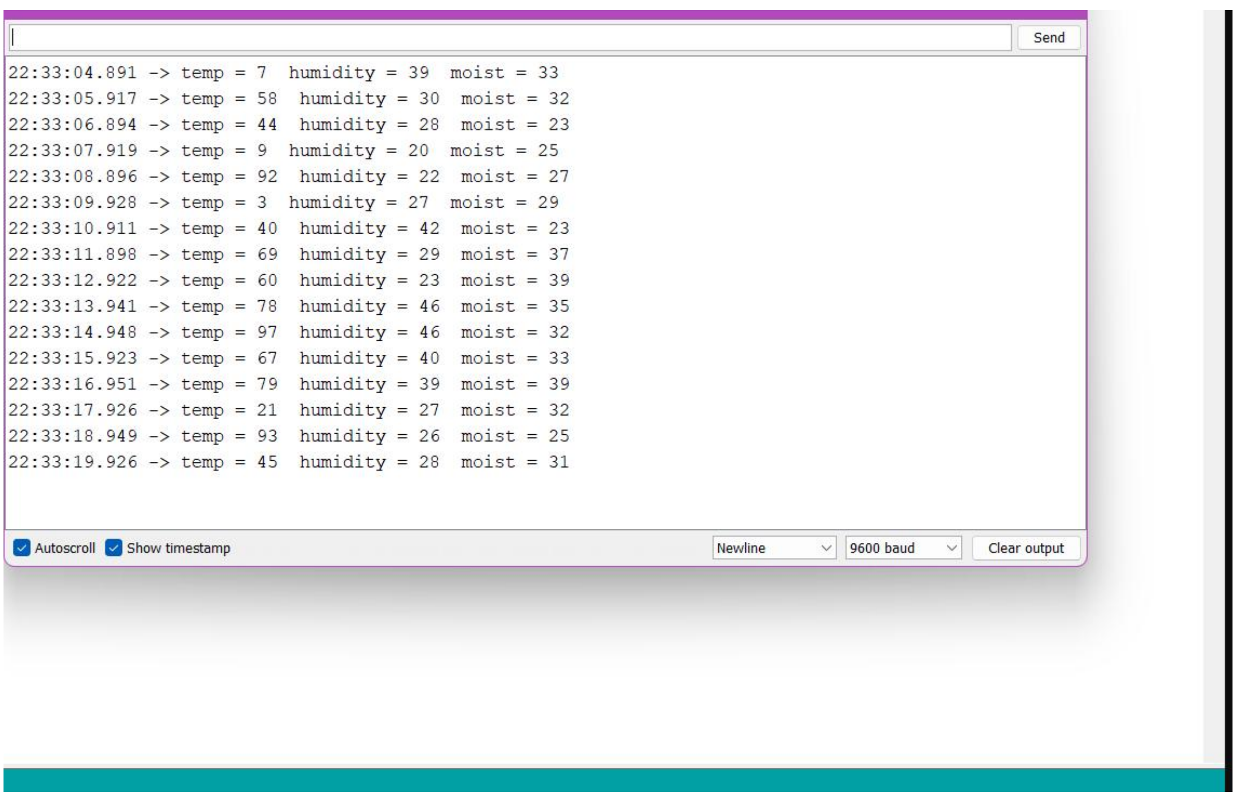
**Receiving commands from IBM cloud using C++ program**

```
#include "Arduino.h"
#include "dht.h"
#include "SoilMoisture.h"
#define dht_apin A0
#define organization = "mmbh4c"
#define deviceType = "smartfarmer"
#define deviceId = "smartfarmer_1"
#define authMethod = "use-token-auth"
#define authToken = "123456789"
char server[] = ORG ".messaging.internetofthings.ibmcloud.com";
char publishTopic[] = "iot-2/evt/abcd_1/fmt/json";char topic[] = "iot-
2/cmd/home/fmt/String";
char authMethod[] = "use-token-auth";char token[]=TOKEN;
char clientId[] = "d:" ORG ":" DEVICE_TYPE ":"DEVICE_ID;
const int sensor_pin = A1; //soil moistureint pin_out = 9;
dht DHT; int c=0; void setup()
{
pinMode(2, INPUT); //Pin 2 as INPUT pinMode(3, OUTPUT); //PIN 3 as OUTPUT
pinMode(9, OUTPUT);//output for pump
}
void loop()
{
```

```
if (digitalRead(2) == HIGH)

{

digitalWrite(3, HIGH);        // turn the LED/Buzz ONdelay(10000);

digitalWrite(3, LOW);        // turn the LED/Buzz OFFdelay(100);
}

Serial.begin(9600);delay(1000);
  DHT.read11(dht_apin); //tempraturefloat h=DHT.humidity;


float t=DHT.temperature;delay(5000); Serial.begin(9600);
float moisture_percentage;int sensor_analog;
sensor_analog = analogRead(sensor_pin);

  moisture_percentage = ( 100 - ( (sensor_analog/1023.00) *100 ) );

float m=moisture_percentage;delay(1000);
if(m<40)//pump

{

while(m<40)

{

digitalWrite(pin_out,HIGH);                //open pump sensor_analog =
analogRead(sensor_pin);
  moisture_percentage = ( 100 - ( (sensor_analog/1023.00) *100 ) );

m=moisture_percentage;delay(1000);
}

digitalWrite(pin_out,LOW);              //closepump
```

```
}
if(c>=0)
{
mySerial.begin(9600);delay(15000); Serial.begin(9600); delay(1000); Serial.print("\r");
delay(1000);

Serial.print((String)"update-
>"+(String)"Temprature="+t+(String)"Humidity="+h+(String
)"Moisture="+m);delay(1000);
}

}
```

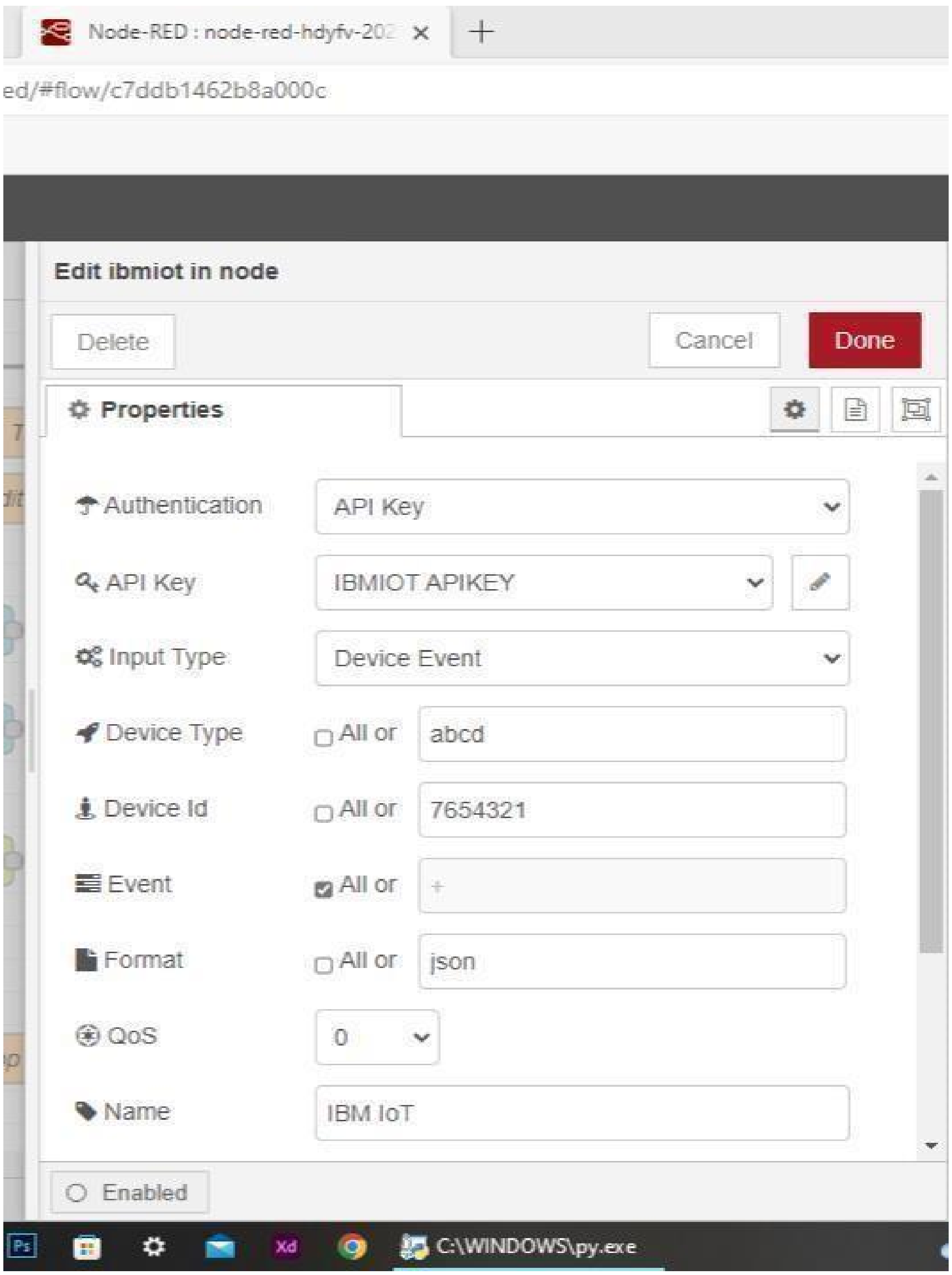
# Output



## 7.2 Feature – 2

**Configuration of Node-Red to send commands to IBM cloud**

ibmiot out node I used to send data from Node-Red to IBM Watson device. So, after adding it to the flow we need to configure it with credentials of our Watsondevice.



Here we add two buttons in UI
1 -> for motor on

2 -> for motor off

We used a function node to analyses the data received and assign command toeach number.

The Java script code for the analyses is:

if(msg.payload===1)

msg.payload={"command”:

“ON"}; else if(msg.payload===0)

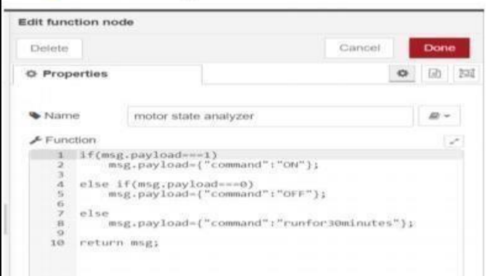
msg.payload={"command”:

“OFF"};

Then we use another function node to parse the data and get the command and represent it visually with text node.

The Java script code for that function node is:

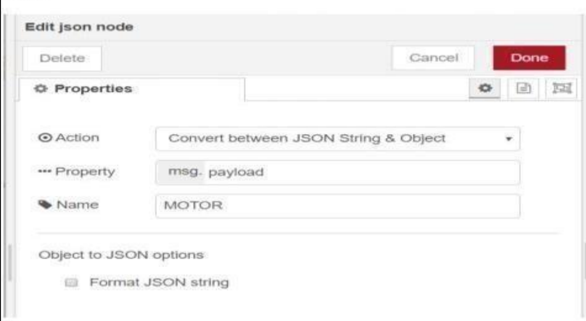
- var state=msg.payload;
  msg.payload = state.command;
- return msg;



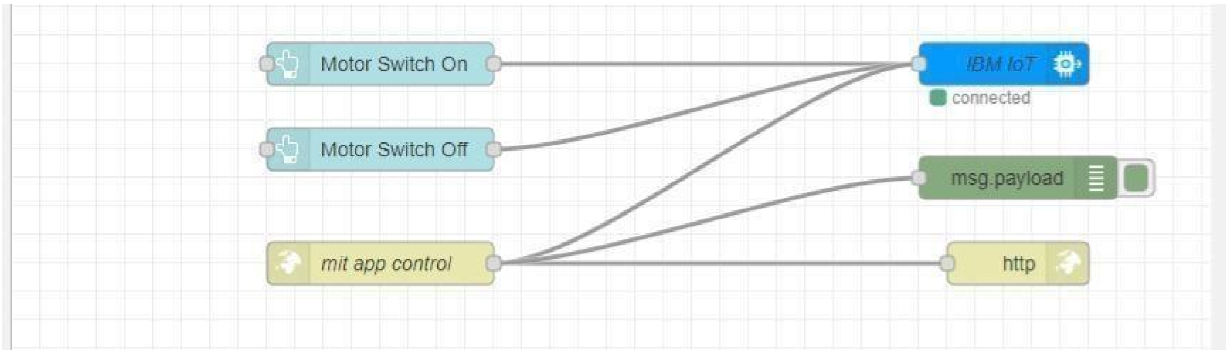


The above images show the java script codes of analyser and state function nodes.

Then we add edit Json node to the conversion between JSON string & object and finally connect it to IBM IoT Out.




Edit JSON node needs to be configured like this



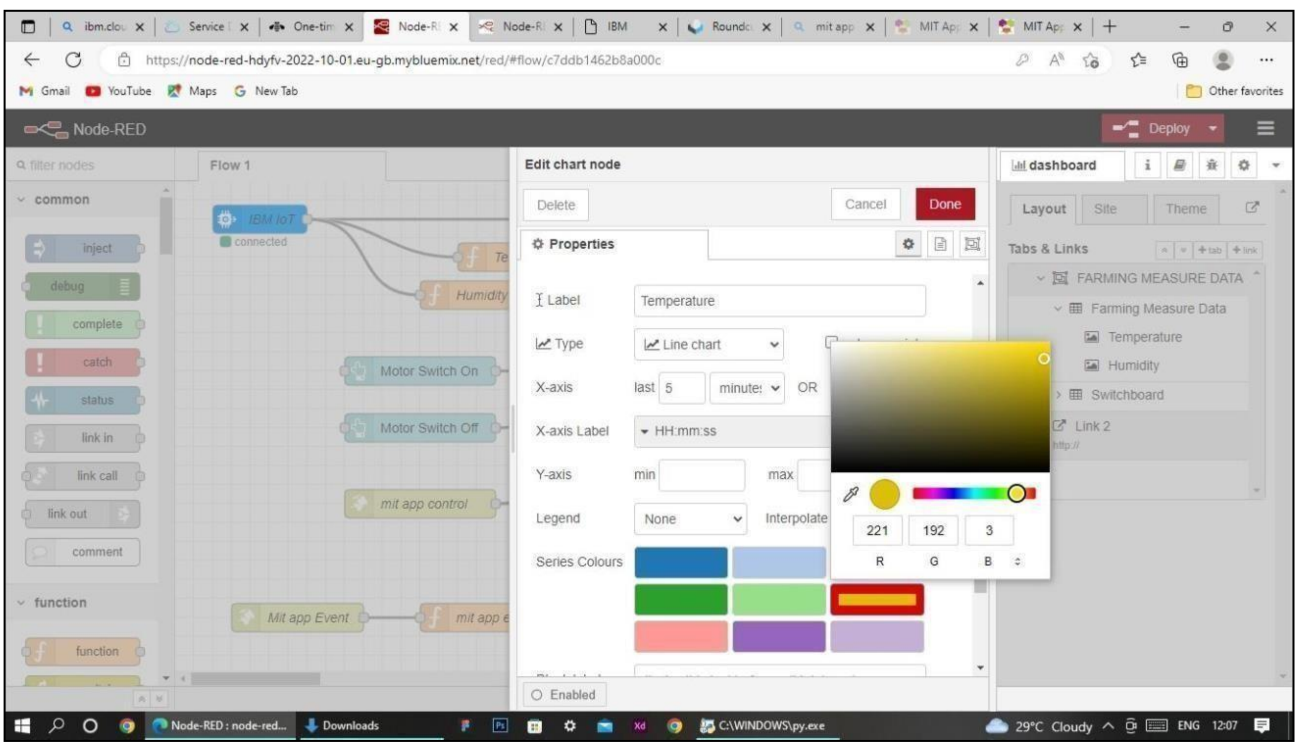

This is the program flow for sending commands to IBM cloud.

## Adjusting User Interface

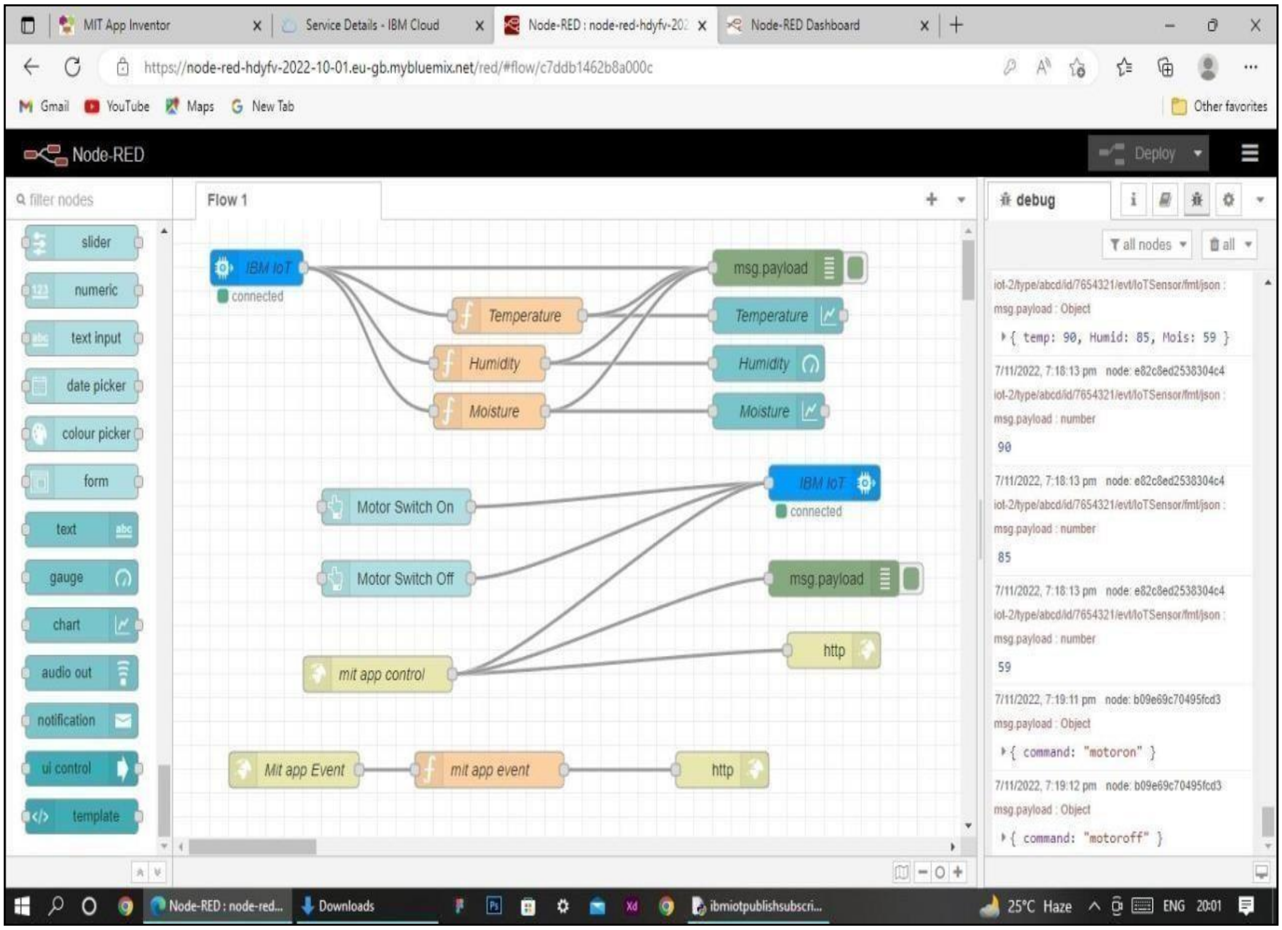
In order to display the parsed JSON data a Node-Red dashboard is created

Here we are using Gauges, text and button nodes to display in the UI and helps to monitor the parameters and control the farm equipment.

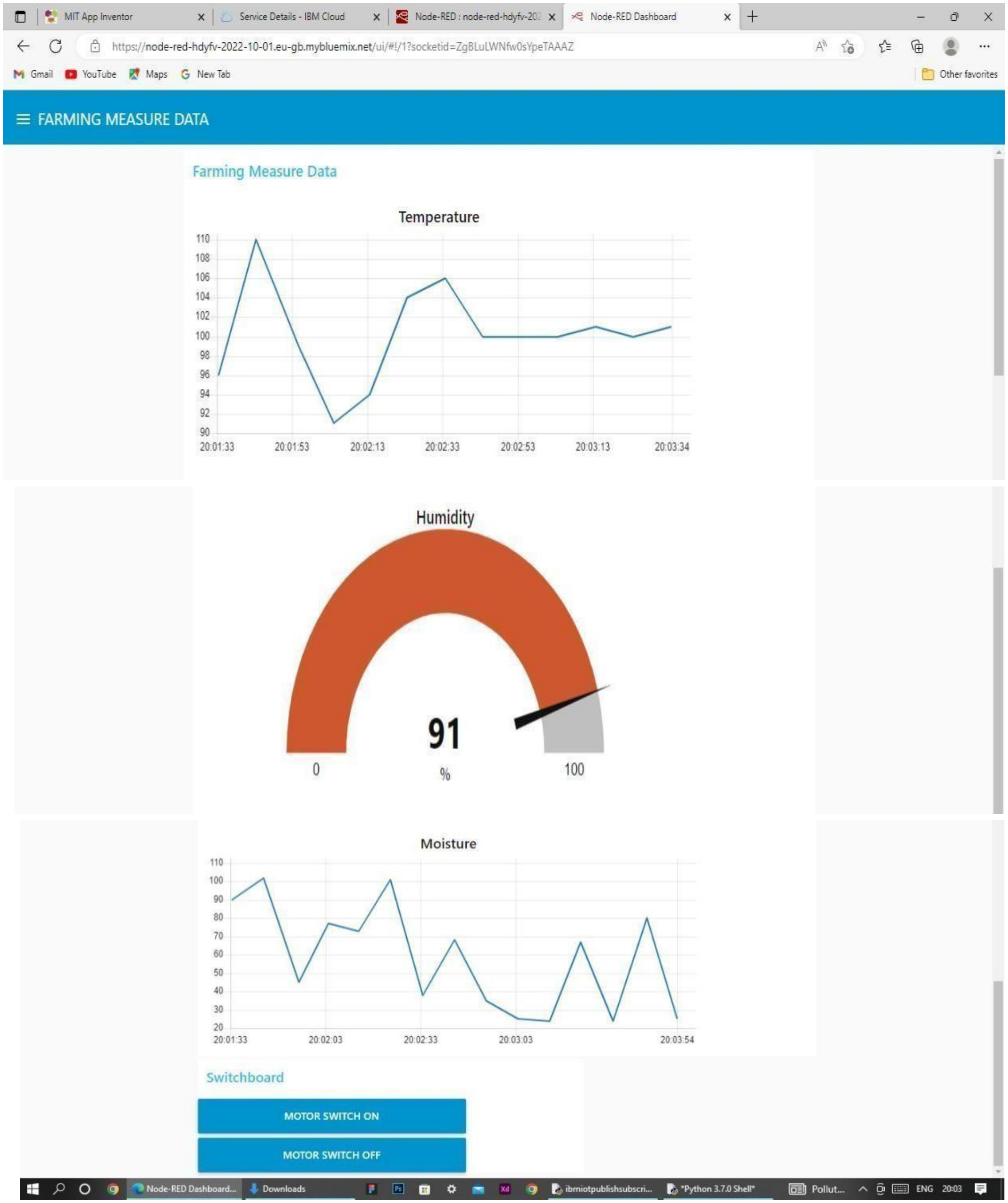
Below images are the Gauge, text and button node configurations.



# Complete Program Flow



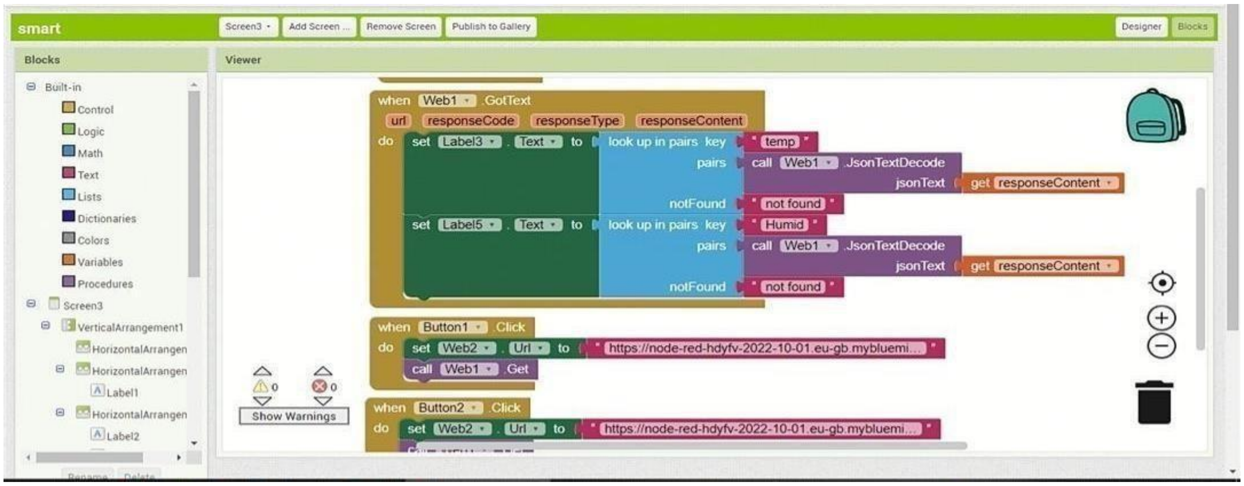
# Web APP UI  Home Tab

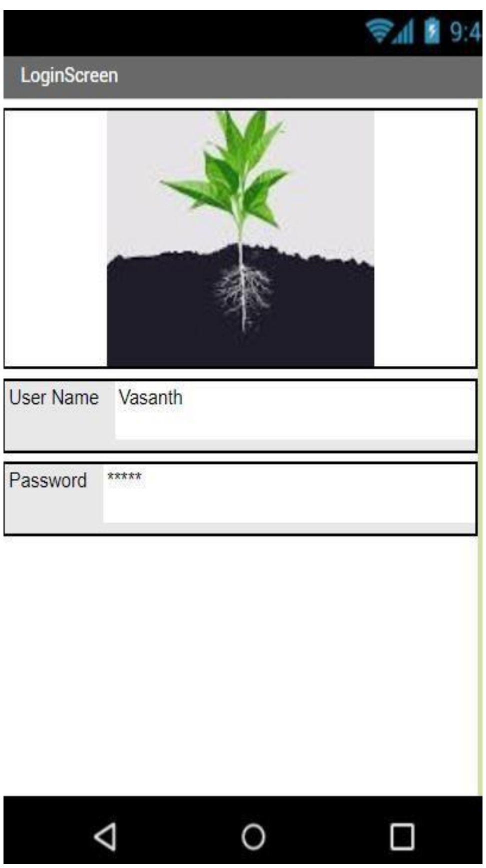


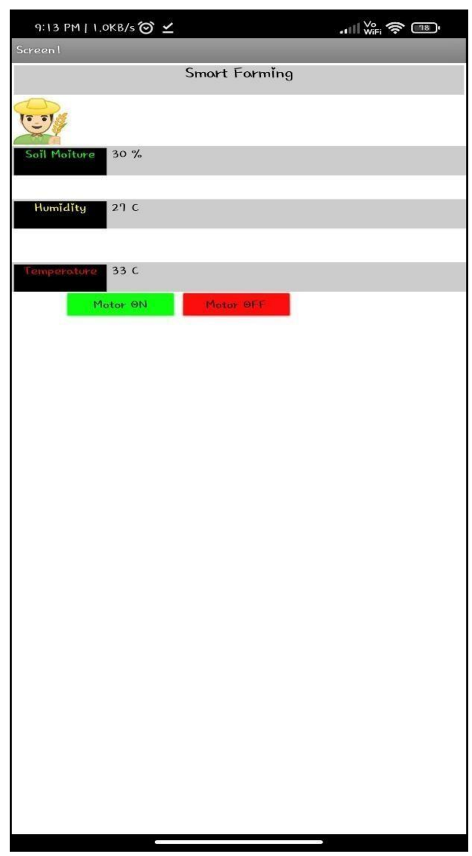
# Mobile App UI

SMART FARMER APPLICATION

Blocks



# 8. Testing

# 8.1 Test Cases

Shopenzer Testcases Testscearnios ••• Exit Full S

| | |
|---|---|
| Date | 3-Nov-22 |
| Team ID | PNT2022TMIDxxxxxx |
| Project Name | Project - xxx |
| Maximum Marks | 4 marks |

| Test case ID | Feature Type | Component | Test Scenario | Pre-Requisite | Steps To Execute | Test Data | Expected Result | Actual Result | Status | Commnets | TC for Automation(Y/N) | BUG ID | Executed By |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| LoginPage_TC_001 | Functional | Home Page | Verify user is able to see the Login/ Signup popup when user clicked on My account button | | 1.Enter URL and click go<br>2.Click on My Account dropdown button<br>3.Verify login/Singup popup displayed or not | MIT App Inventor https://appinventor.mit.edu | Login popup should display | | Fail | Steps not Clear to follow | | Bug-1234 | |
| LoginPage_TC_002 | UI | Home Page | Verify the UI elements in Login/Signup popup | | 1.Enter Smart App<br>2.Verify login/Singup popup with below UI elements:<br>a.Username text box<br>b.password text box<br>c.Submit button<br>d.New customer? Create account link<br>e.Last password? Recovery password | MIT App Inventor https://appinventor.mit.edu | Application should show below UI elements:<br>a.email text box<br>b.password text box<br>c.Login button with orange colour<br>d.New customer? Create account link<br>e.Last password? Recovery password link | Working as expected | Pass | | | | |
| LoginPage_TC_003 | Functional | Home page | Verify user is able to log into application with Valid credentials | | 1.Enter MIT App Inventor URL (https://appinventor.mit.edu) Smart app and click go<br>2.Click on My Account dropdown button<br>3.Enter Valid username/email in Email text box<br>4.Enter valid password in password text box | Username: IBM<br>password: IBM | User should navigate to user account homepage | Working as Expected | Pass | | | | |
| LoginPage_TC_004 | Functional | Login page | Verify user is able to log into application with InValid credentials | | 1.Enter URL MIT App Inventor https://appinventor.mit.edu and smart app click go<br>2.Click on My Account dropdown button<br>3.Enter InValid username/email in Email text box<br>4.Enter valid password in password text box<br>[illegible] | Username: chalam@gmail<br>password: Testing123 | Application should show 'Incorrect email or password ' validation message. | Working as Expected | Pass | | | | |

# 8.2 User Acceptance Testing

## 1. Purpose of Document

The purpose of this document is to briefly explain the test coverage and open issues of the [ProductName] project at the time of the release to User Acceptance Testing (UAT).

Increasing control over production leads to **better cost management and waste reduction**. The ability to trace anomalies in crop growth or livestock health, for instance, helps eliminate the risk of losing yields. Additionally, automation boosts efficiency. Smart farming **reduces the ecological footprint of farming**. Minimized or site-specific application of inputs, such as fertilizers and pesticides, in precision agriculture systems will mitigate leaching problems as well as the emission of greenhouse gases.

## 2. Defect Analysis

This report shows the number of resolved or closed bugs at each severity level, and how they were resolved

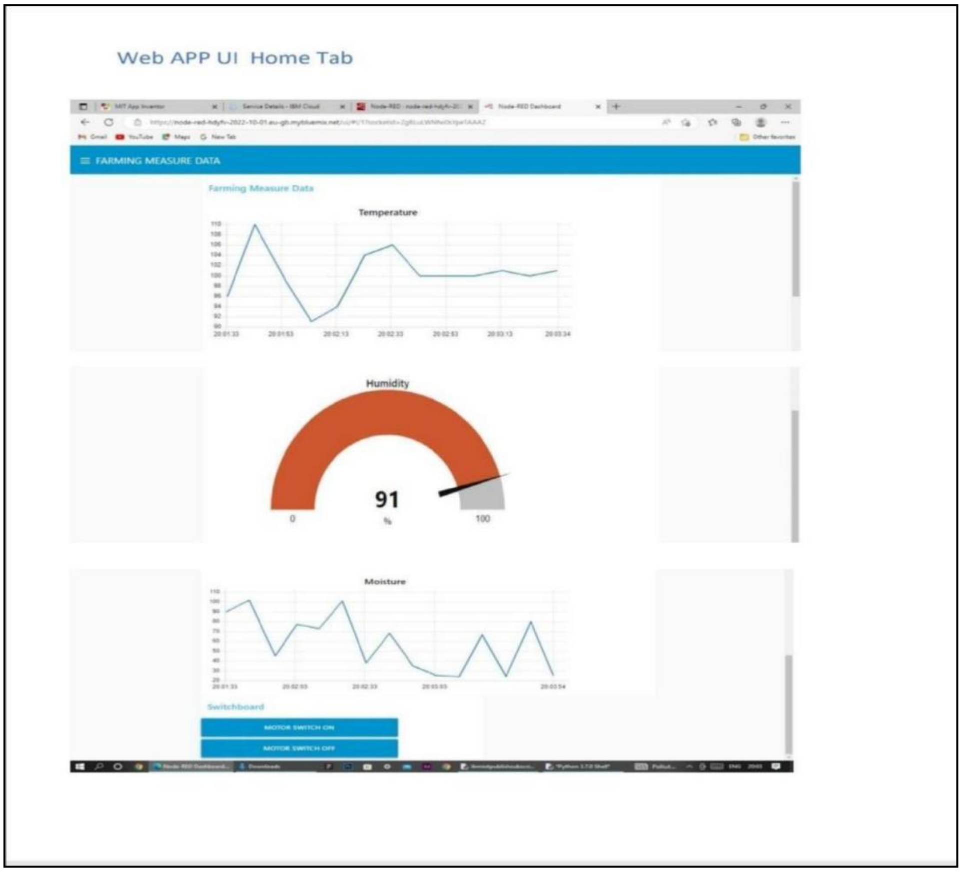
| Resolution | Severity 1 | Severity 2 | Severity 3 | Severity 4 | Subtotal |
|---|---|---|---|---|---|
| By Design | 8 | 3 | 2 | 2 | 16 |
| Duplicate | 1 | 0 | 2 | 0 | 3 |
| External | 2 | 3 | 0 | 1 | 6 |
| Fixed | 9 | 2 | 3 | 17 | 31 |
| Not Reproduced | 0 | 0 | 1 | 0 | 1 |
| Skipped | 0 | 0 | 1 | 1 | 2 |
| Won't Fix | 1 | 4 | 1 | 1 | 7 |
| Totals | 21 | 12 | 9 | 22 | 66 |

## 3. Test Case Analysis

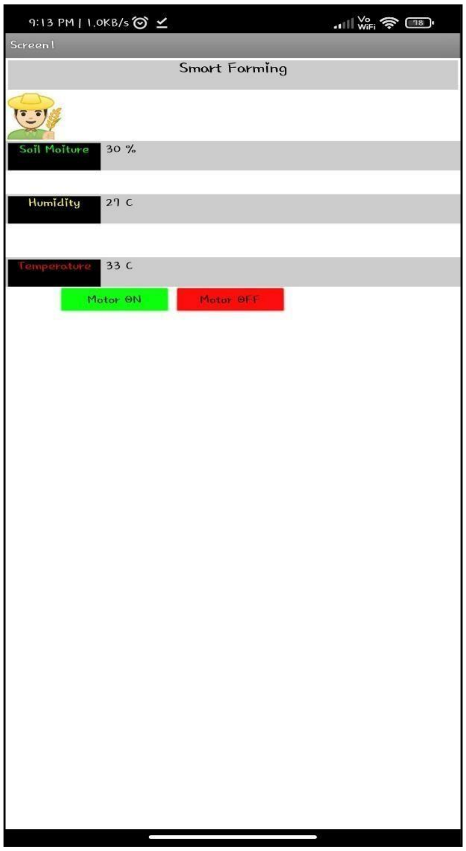
This report shows the number of test cases that have passed, failed, and untested

| Section | Total Cases | Not Tested | Fail | Pass |
|---|---|---|---|---|
| Print Engine | 5 | 0 | 0 | 5 |
| Client Application | 30 | 0 | 0 | 30 |
| Security | 2 | 0 | 0 | 2 |
| Outsource Shipping | 2 | 0 | 0 | 2 |
| Exception Reporting | 9 | 0 | 0 | 9 |
| Final Report Output | 4 | 0 | 0 | 4 |
| Version Control | 1 | 0 | 0 | 1 |

# 9.Result



Web APP UI Home Tab
FARMING MEASURE DATA
Farming Measure Data
Temperature
Humidity
91
Moisture
Switchboard
MOTOR SWITCH ON
MOTOR SWITCH OFF

Screen1
Smart Farming
Soil Moiture
30 %
Humidity
27 C
Temperature
33 C
Motor ON
Motor OFF

# 10. Advantages & Disadvantages

## Advantages:

- Farms can be monitored and controlled remotely.
- Increase in convenience to farmers.
- Less labor cost.
- Better standards of living.

## Disadvantages:

- Lack of internet/connectivity issues.
- Added cost of internet and internet gateway infrastructure.
- Farmers wanted to adapt the use of WebApp.

# 11. Conclusion

An IoT-based SMART FARMING SYSTEM for live monitoring of temperature,humidity and soil moisture is proposed using Arduino and cloud computing. The system has high efficiency and accuracy in acquiring live temperature and soil moisture data. The IoT-based smart farming system proposed in this report constantly assists farmers by providing accurate live feeds of ambient temperature and soil moisture for over 99 curated results, thus enabling farmers to increase their agricultural yields and help manage food production efficiently.

# 12. Future Scope

By collecting data from Sensor with IoT devices, we can learn about the “real state” of Crops. In future, IoT system in agriculture enables predictive analytics and helps you make better harvest decisions. It is important to use the latest information and communication technology to manage the family in order to improve the quantity and quality of products while optimizing the human labor force. In between Technologies available for today's glory: Soil, water, light, humidity and temperature control. Small Agricultural Products are designed to support field monitoring through the automation of automation systems using Sensors. As a result, Fame and associated volumes can easily monitor field conditions from anywhere.

# 13. Appendix

## Links:

IBM cloud reference: https://cloud.ibm.com/

Github link : https://github.com/IBM-EPBL/IBM-Project-52382-1660999528

-IOT Watson simulator :
https://157uf3.internetofthings.ibmcloud.com/dashboard/devices/browse

Node-Red : https://node-red-hdyfv-2022-10-01.eu-gb.mybluemix.net/red/#flow/c7ddb1462b8a000c