SMARTFARMER - IOT ENABLED SMART FARMING APPLICATION

NALAIYA THIRAN PROJECT BASED LEARNING

Submitted by

DINESH P	(112019104002)
DINESH S	(112019104003)
DINESH KUMAR K	(112019104004)
NISHANTH S	(112019104008)
RAVIVARMA V	(112019104302)

in partial fulfilment for the award of the degree

of

BACHELOR OF ENGINEERING

IN

COMPUTER SCIENCE AND ENGINEERING

JAYA SAKTHI ENGINEERING COLLEGE,

THIRUNIRAVUR

ANNA UNIVERSTIY: CHENNAI 600 025

INDEX

Introduction:

1.1overview:

In this project I have developed a mobile application using which a farmer can monitor the temperature, humidity, pressure and soil moisture parameters along with weather forecasting details. Based on these details he can water the crops by controlling the motors through the app .

1.2Purpose:

Agriculture plays a crucial role in the life of an economy. It is the backbone of our economic system, so improving the quality and way of production is crucial. Here comes the Smart Agriculture system. Smart agriculture helps in automated farming, collection of data from the field and then analyses it so that the farmer can make accurate decision in order to grow high quality crop. IoT based Smart Farming improves the entire Agriculture system by monitoring the field in real-time. With the help of sensors and interconnectivity, the Internet of Things in Agriculture has not only saved the time of the farmers but has also reduced the extravagant use of resources such as Water. and Electricity.

Literature Survey:

2.1 Existing problem

Agriculture is extremely dependent on the climate. Temperature increases and carbon dioxide can boost some crop yields depending on the location; but other conditions must also exist, such as humidity, pressure, and water availability. Although slight warming and more carbon dioxide in the atmosphere could benefit some plants to grow faster, severe warming, floods, and drought would reduce yields. Farmer need to spend a lot of time to maintain these.Heat is not the only extreme weather. Extreme cold can benefit farmers by freezing the soil deep beneath the ground. In parts of the upper Midwest, frost depths exceed 40 inches. A deep frost depth can aid farmers in diverse ways. The cold helps nitrogen that is applied in the fall from vaporizing during the winter. The cycle of freezing and thawing of water helps soften the soil after the thaw. Extreme cold and frozen soils also reduce the survival rate of some insects. Severe weather other than heat and cold can cause loss and devastation to a farm. Most farmers can’t avoid the results of extreme weather. Diverse extreme weather can affect farms in different ways. Because of this, it’s important that farmers have a proper system and need a mobile application to monitor the weather changes and to control the motor.

2.2 Proposed solution

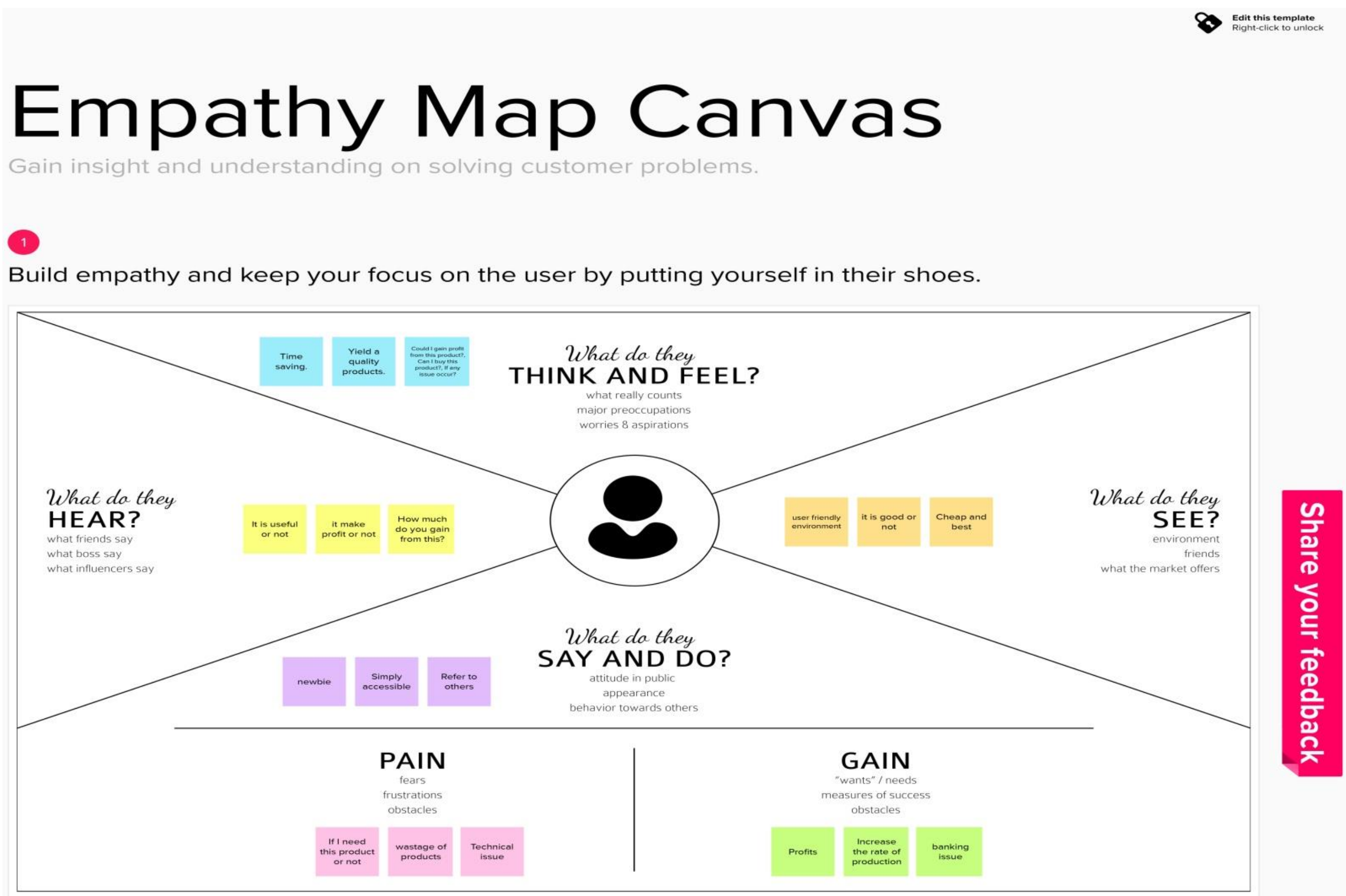
As the climates are changing rapidly and weather is unpredictable, so farmers are facing difficulties so they need a system to tackle this, here we use “open weather API” to get weather information such as temperature, pressure, humidity and weather description at their current location. Based on which they can decide whether to turn on the motors or turn off the motor if needed temperature and moisture sensors from IBM simulator is displayed on UI for monitoring the weather. An algorithm developed with threshold values of temperature, pressure, humidity is programmed to intimate the farmer if weather conditions go bad. He can control motors remotely from any place through IoT. Internet interface that allow data inspection and irrigation scheduling to be programmed through mobile application or NodeRED UI. The technological development in software and hardware make it easy to develop this which can make better monitoring and wireless network made it possible to use in monitoring and control of greenhouse parameter in precision agriculture.

2.3 Problem Statement Definition

Customer Problem Statement Template: Surya is a farmer, his brother completed Engineering course streamed in Electronic & Communication Engineering. His brother gave him the idea to improve agriculture with the help of the technology he learnt. It also helps him in reducing manpower. His brother is working on a new idea to improve the irrigation facility, soil fertility and crop rotation. This problem can be actively solved with the help of the application he is building.

3. IDEATION & PROPOSED SOLUTION

3.1 Empathy Map Canvas



3.3 Proposed Solution

Smart Farming has enabled farmers to reduce waste and enhance productivity with the help of sensors (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.

3.4 Problem Solution fit

Increasing incomes:

Agricultural transformation is very slow in India. Therefore, the process of generating higher income from agriculture is also slow. Production increase was the main objective than raising incomes. agricultural diversification in favor of high value commodities and the development of value chains by linking production and marketing centers; and finally, developing mechanisms to ensure minimum support prices in the event of crash in farm harvest prices.

Reducing risks in agriculture:

The risks farmers face have been increasing for years. Both production and price risks are creating ongoing agrarian distress. The incidences of droughts, floods, temperature fluctuations, and unseasonal rains and hailstorms are increasing and adversely affecting agricultural production. But even during normal years, farm harvest prices have fallen steeply, badly affecting farmer incomes. Such an approach could bundle promotion of climate-smart agriculture with value added weather advisory services and effective implementation of agricultural insurance, helping to ensure minimum support prices.

4. REQUIREMENT ANALYSIS

4.1 Functional requirement

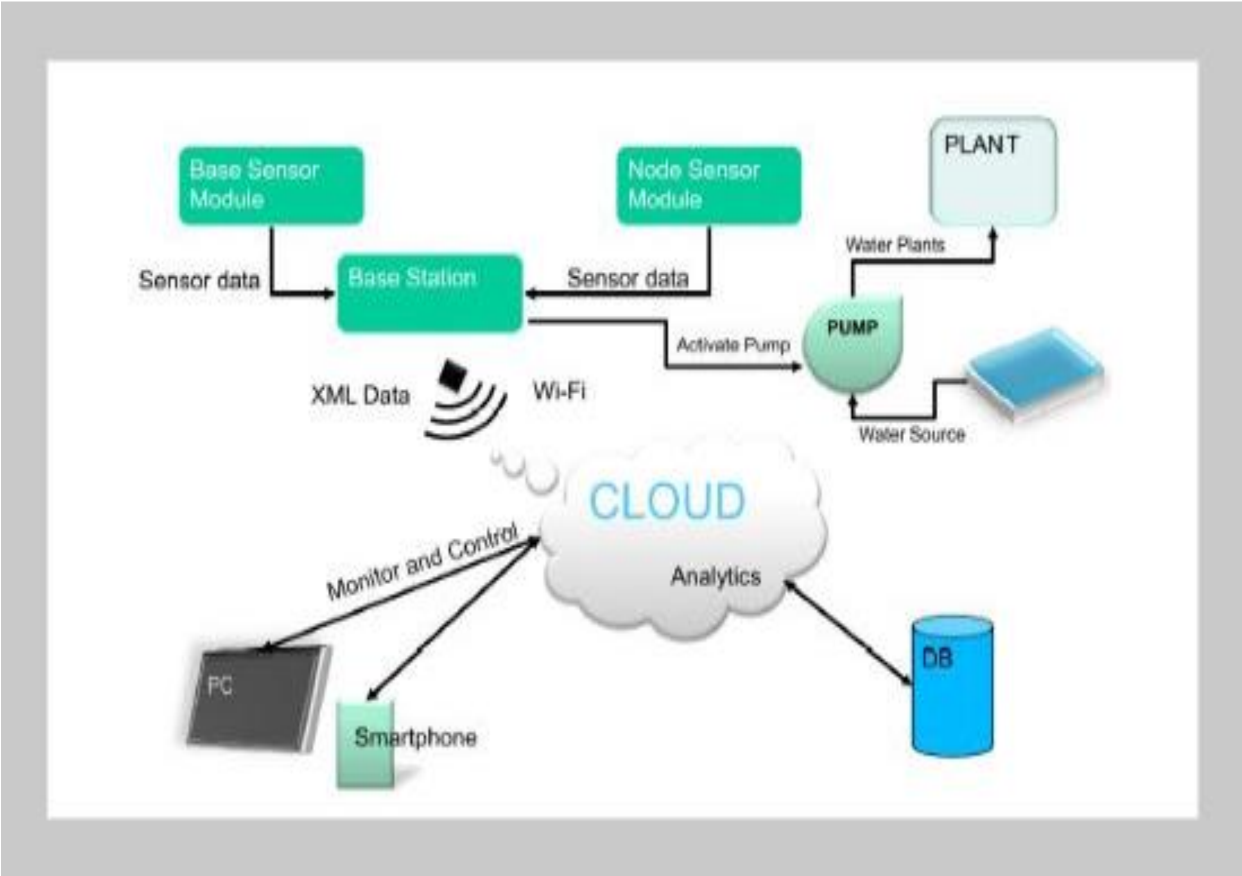
In this project, we are going to build a Smart Farming System using IoT. The objective of this project is to offer assistance to farmers in getting Live Data (Temperature, Humidity, Soil Moisture, Soil Temperature) for efficient environment monitoring which will enable them to increase their overall yield and quality of products. This smart agriculture using IoT system powered by NodeMCU consists of a DHT11 sensor, Moisture sensor, DS18B20 Sensor Probe, LDR, Water Pump, and 12V led strip. When the IoT-based agriculture monitoring system starts, it checks the Soil moisture, temperature, humidity, and soil temperature. It then sends this data to the IoT cloud for live monitoring. If the soil moisture goes below a certain level, it automatically starts the water pump. We previously build Automatic Plant Irrigation System which sends alerts on mobile but doesn’t monitor other parameters. Apart from this, Rain alarm and soil moisture detector circuit can also be helpful in building Smart Agriculture Monitoring System.

Components Required for Smart Agriculture System Hardware:

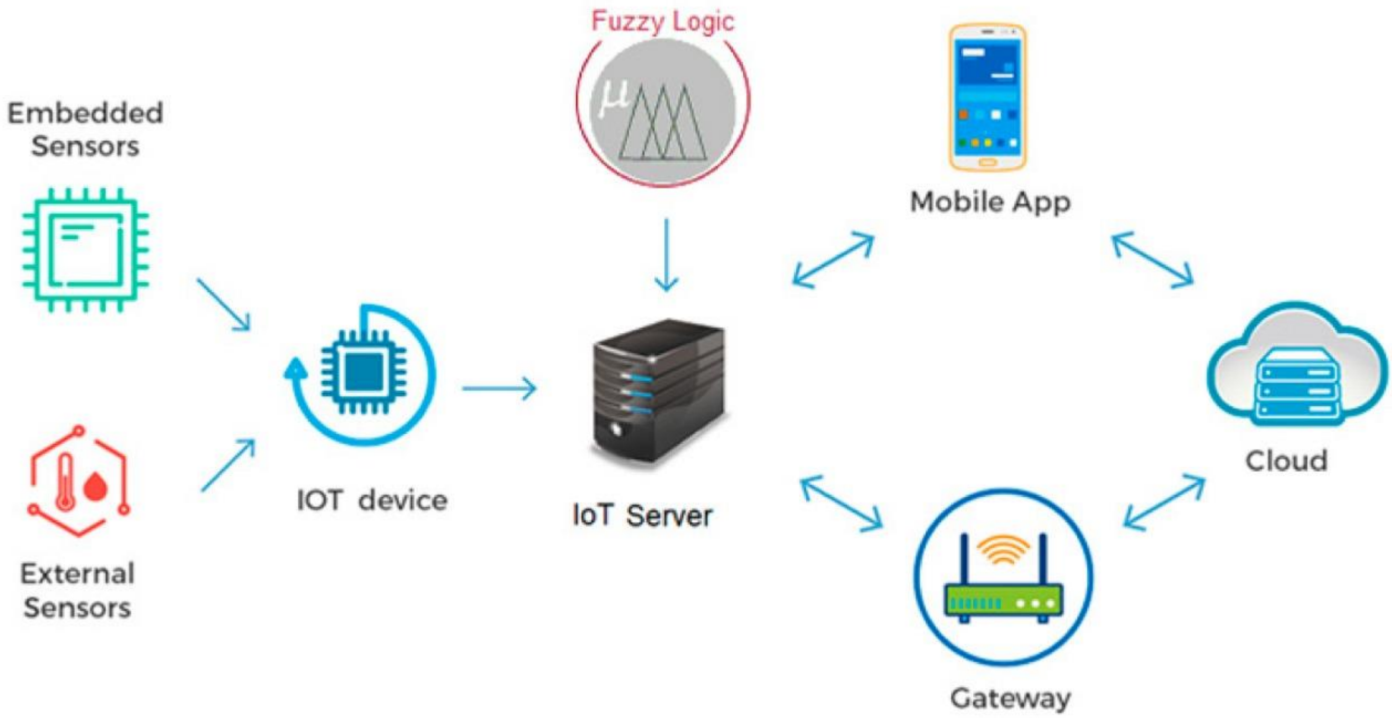
- NodeMCU ESP8266
- Soil Moisture Sensor
- DHT11 Sensor
- DS18B20 Waterproof Temperature Sensor Probe
- LDR
- Submersible Mini Water Pump
- 12V LED Strip
- 7805 Voltage Regulator
- Resistor (4.7K, 10K)
- Capacitor (0.1µF, 10 µF)

5. PROJECT DESIGN

5.1 Data Flow Diagrams



5.2 Solution & Technical Architecture



6. PROJECT PLANNING & SCHEDULING

6.1 Milestone & Activity List

S.NO	ACTIVITYTITLE	ACTIVITY DESCRIPTION	DURATION
1	Understanding the project	Assign the team members after that create repository in the GitHub and then assign task to each member and guide them how to access the GitHub while submitting the assignment	1 week
2	Staring The Project	Team Members to Assign All the Tasks Based on Sprint sand Work on It Accordingly.	1 week

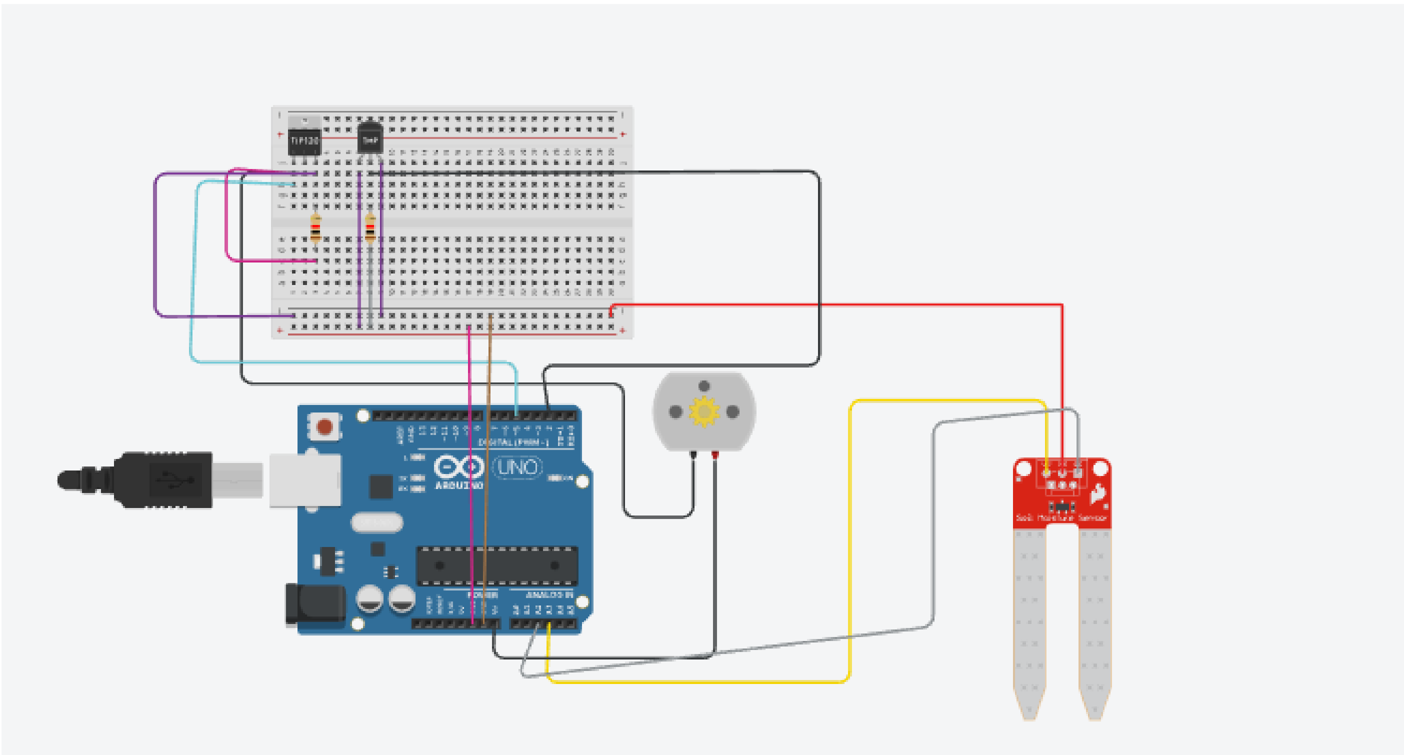
3	Completing Every Task	Team Leader should ensure that whether every team member have completed the assigned task or not	1 week
4	Stand Up Meetings	Team Lead Must Have a Stand -Up Meeting with The Team and Work on The Updates and Requirement Session	1 week
5	Deadline	Ensure that team members are completing every task within the deadline	1 week
6	Budget and Scope of project	Analyze the overall budget which must be within certain limit it should be favorable to every person	1 week

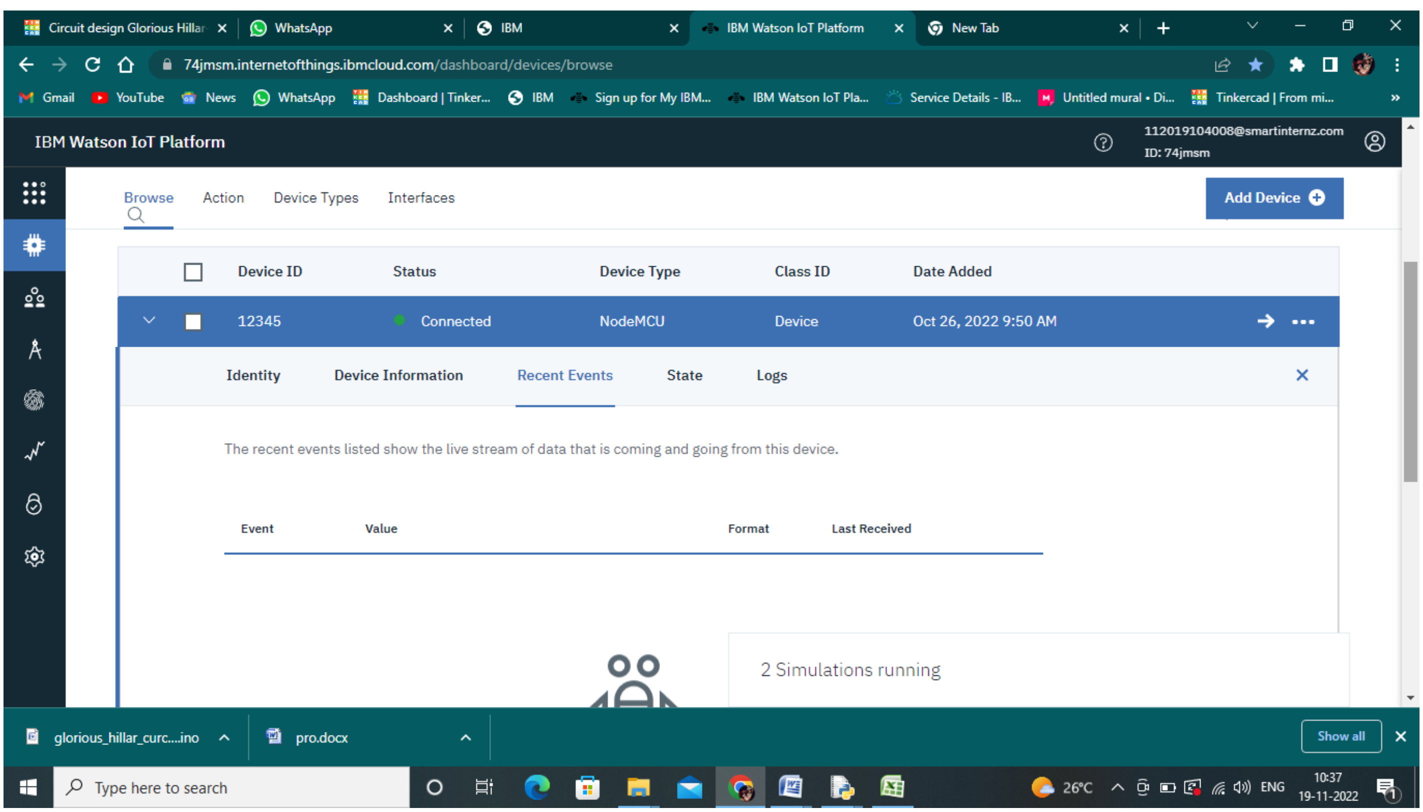
7. CODING

```
const int sensor_pin = A1;
int c=0;
void setup()
{
pinMode(2, INPUT);
 pinMode(3, OUTPUT);
}
void loop()
{
if (digitalRead(2) == HIGH)
{
digitalWrite(3, HIGH);
  delay(10000);
  }
Serial.begin(9600);
delay(1000);
Serial.begin(9600);
float moisture_percentage;
```

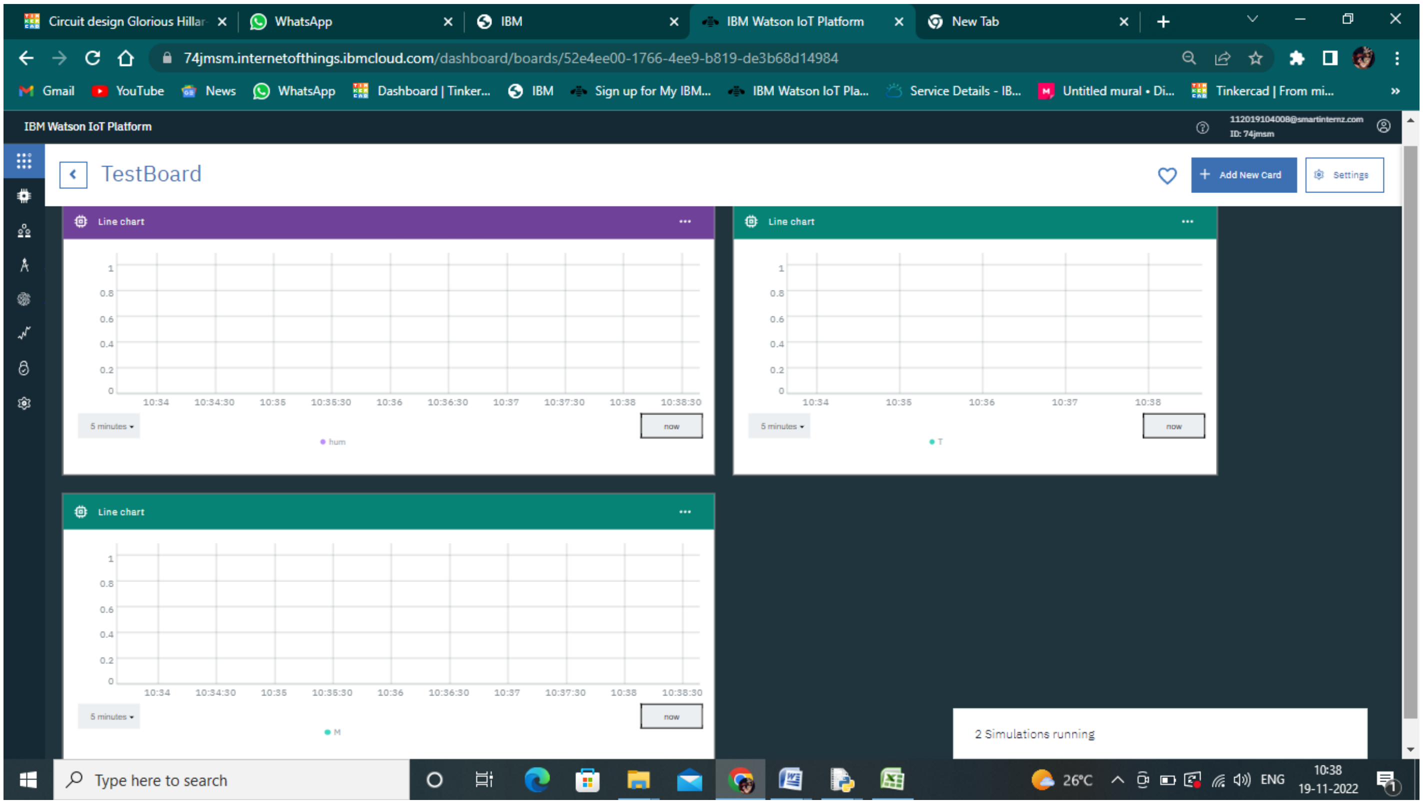
```
 int sensor_analog;
sensor_analog = analogRead(A2);
moisture_percentage = ( 100 - ( (sensor_analog/1023.00) *100 ) );
float m=moisture_percentage;
  delay(1000);
if(m<40)
{
while(m<40)
{
 digitalWrite(3,HIGH);
sensor_analog = analogRead(sensor_pin);
moisture_percentage = ( 100 - ( (sensor_analog/1023.00) *100 ) );
m=moisture_percentage;
delay(1000);
}
digitalWrite(3,LOW);
}
if(c>=0)
{
  Serial.begin(9600);
  delay(15000);
Serial.begin(9600);
  delay(1000);
Serial.print("\r");
  delay(1000);
delay(1000);
}
}
```

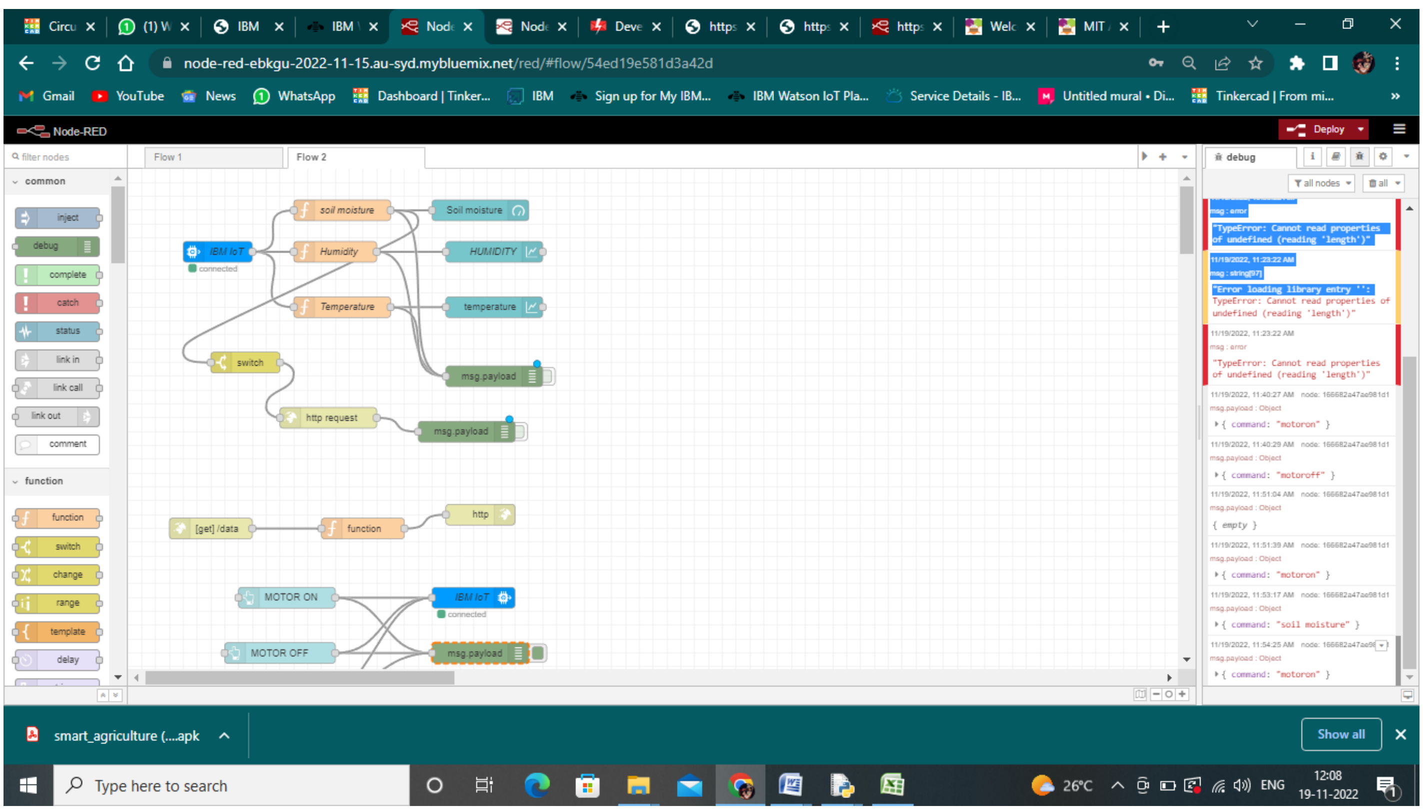
8. APPENDIX

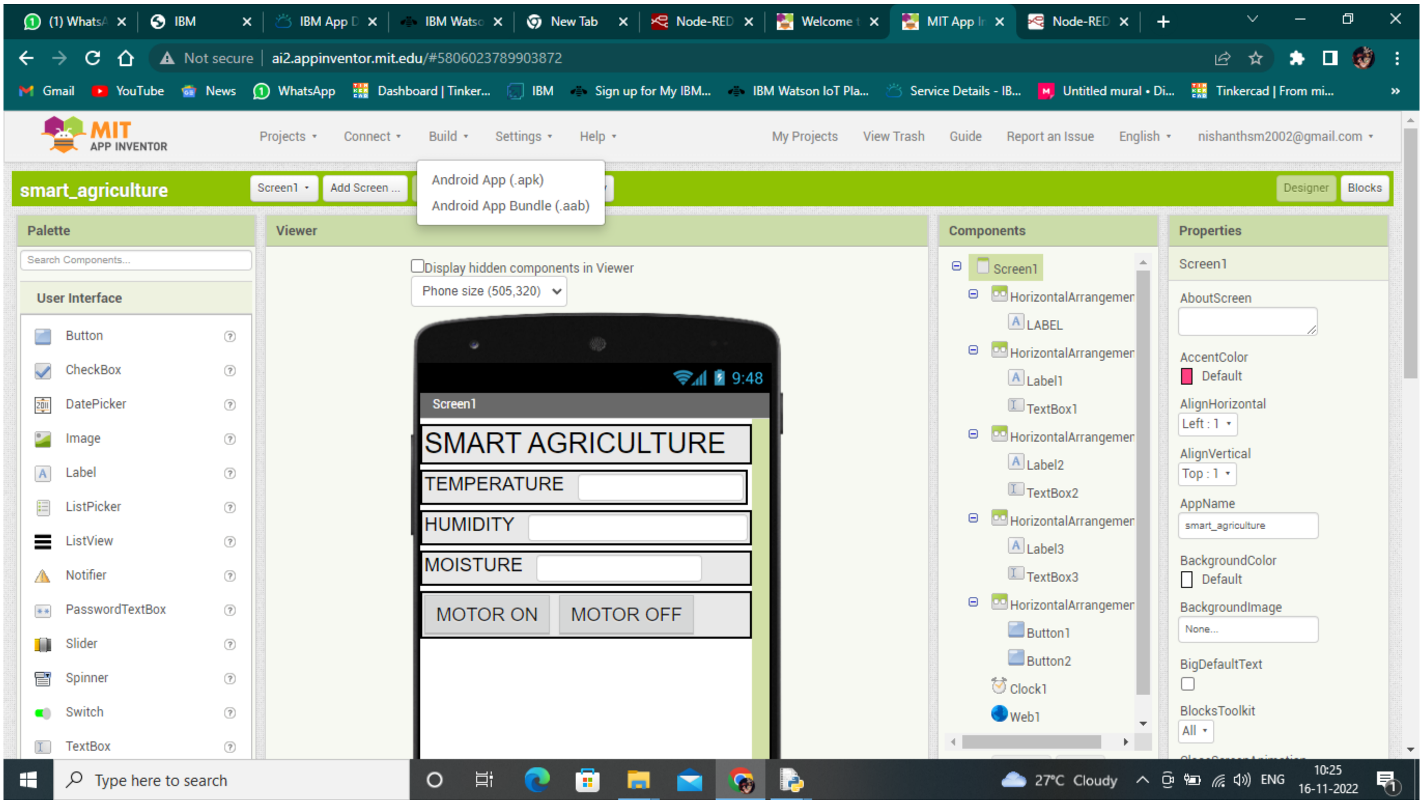


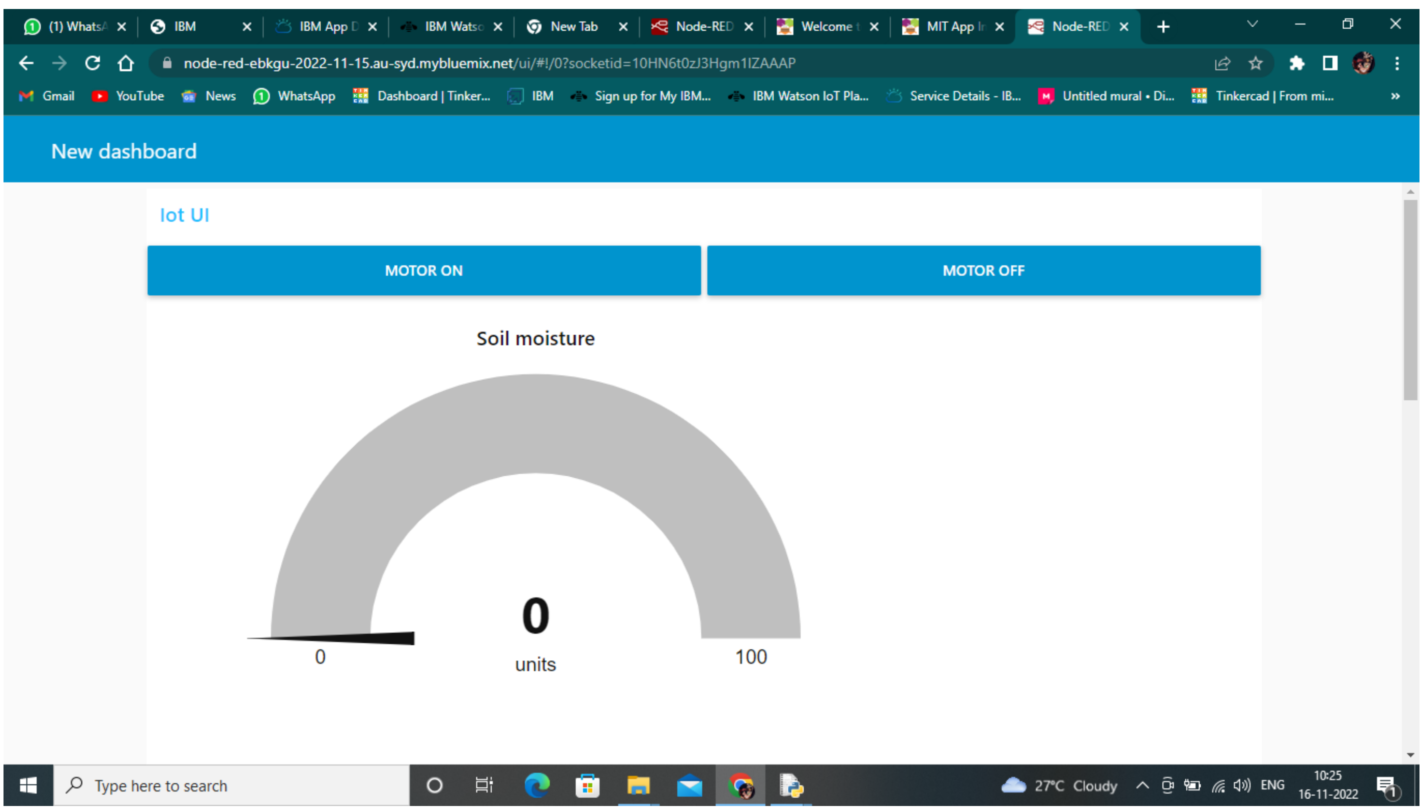


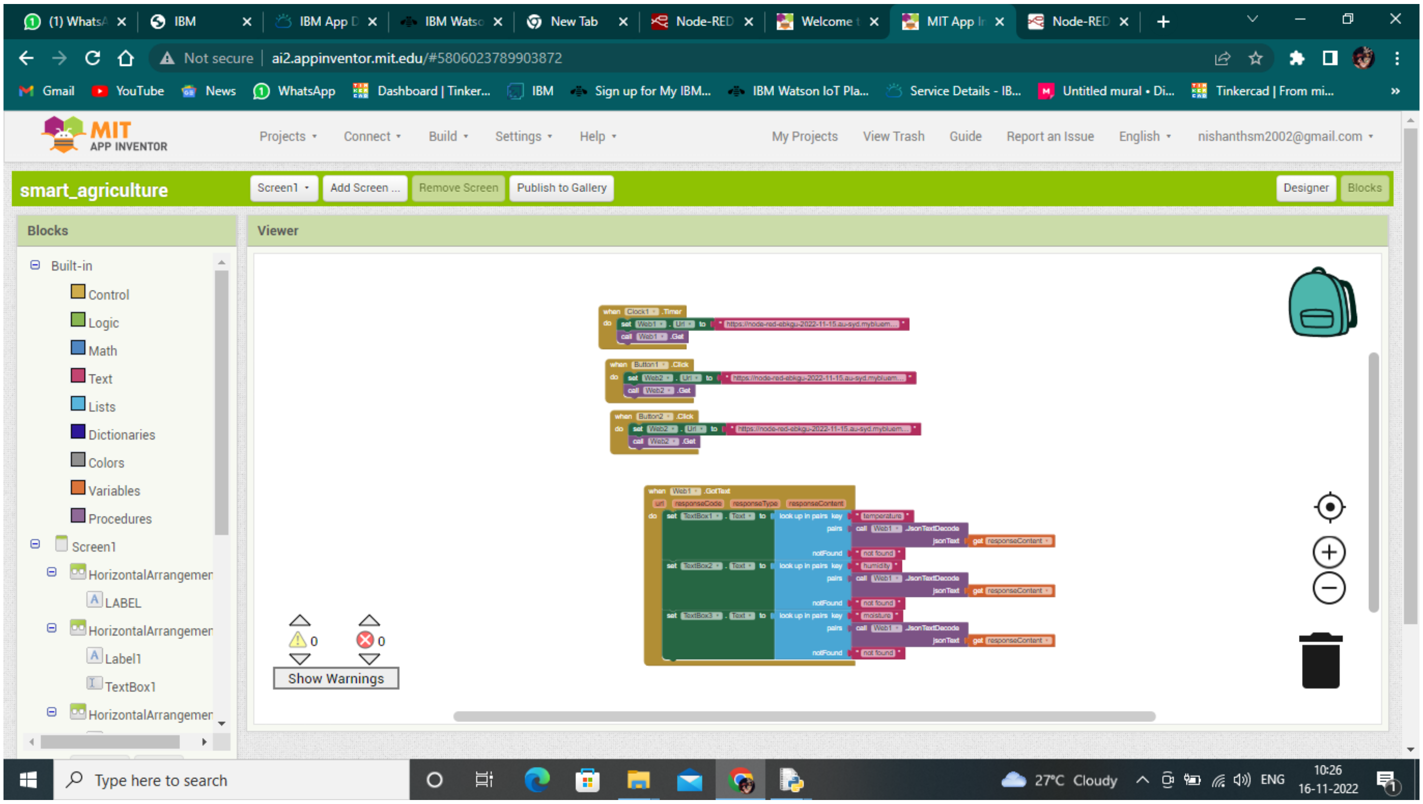
IBM Watson IoT Platform
Browse
Action
Device Types
Interfaces
Add Device
Device ID
Status
Device Type
Class ID
Date Added
12345
Connected
NodeMCU
Device
Oct 26, 2022 9:50 AM
Identity
Device Information
Recent Events
State
Logs
The recent events listed show the live stream of data that is coming and going from this device.
Event
Value
Format
Last Received
2 Simulations running

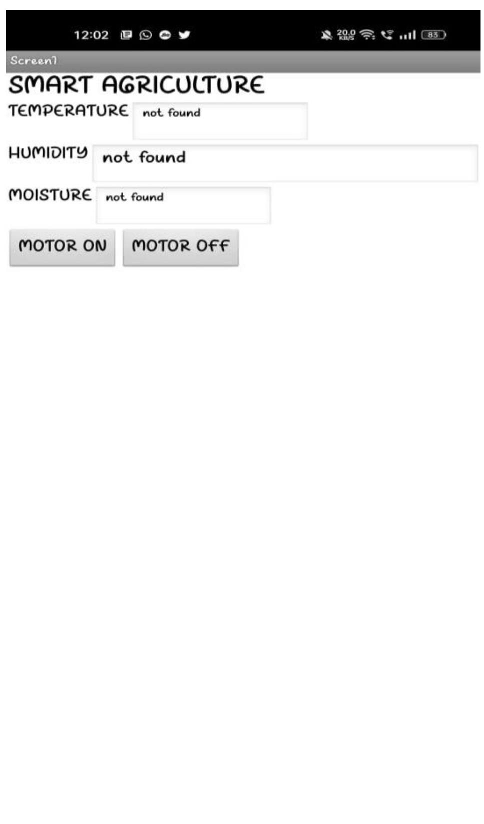

74jmsm.internetofthings.ibmcloud.com/dashboard/boards/52e4ee00-1766-4ee9-b819-de3b68d14984
IBM Watson IoT Platform
TestBoard
Add New Card
Settings
Line chart
hum
Line chart
T
Line chart
M
2 Simulations running
Type here to search
26°C
ENG
10:38
19-11-2022


node-red-ebkgu-2022-11-15.au-syd.mybluemix.net/red/#flow/54ed19e581d3a42d
Node-RED
Deploy
Flow 1
Flow 2
debug
IBM IoT
soil moisture
Humidity
Temperature
Soil moisture
HUMIDITY
temperature
msg.payload
switch
http request
[get] /data
function
http
MOTOR ON
MOTOR OFF
smart_agriculture (....apk
Show all
Type here to search
26°C
ENG
12:08
19-11-2022






smart_agriculture
Screen1
Add Screen ...
Remove Screen
Publish to Gallery
Designer
Blocks
Viewer
Built-in
Control
Logic
Math
Text
Lists
Dictionaries
Colors
Variables
Procedures
Show Warnings


SMART AGRICULTURE
TEMPERATURE
not found
HUMIDITY
not found
MOISTURE
not found
MOTOR ON
MOTOR OFF

GITHUB LINK:

https://github.com/IBM-EPBL/IBM-Project-13104-1659511000.git