PROJECT REPORT

SMART FARMER -IOT BASED SMART FARMING APPLICATION

DOMAIN	INTERNET OF THINGS
TOPIC	SMART FARMER IOT BASED SMART FARMING APPLICATION
TEAM ID	PNT2022TMID53951
TEAM MEMBERS	Helen Soffia J P, Karthick Raja M, Jebastin J, Sharon Sofia S S

SMART FARMER APPLICATION USING INTERNET OF THINGS

TABLE OF CONTENTS

1.INTRODUCTION

1.1 PROJECT OVERVIEW:

Farmers need to monitor crop irrigation level to maintain good crop heath but he finds it difficult to do it alone.

1.2 PURPOSE:

- **IoT-based agriculture system helps the farmer in monitoring different parameters of his field like soil moisture, temperature, and 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.**

2.LITERATURE SURVEY

2.1 EXISTING PROBLEM

S. NO	NAME OF THE PAPER	AUTHOR	YEAR OF PUBLICATION	TECHNOLOGY USED	LIMITATION
1.	Automation in Agriculture and IoT	Vaishali Puranik, Ankit Ranjan, Anamika Kumari	2019	Arduino Circuit, 2X16 Liquid Crystal Display, GSM Module	Cost is high
2.	An IoT Instrumented Smart Agricultural Monitoring and Irrigation System	Anil Kumar Saini, Susmita Banerjee, Himanshu Nigam	2020	ThingSpeak, NodeMCU, Sensor, E-mail	Increased channel maintenance
3.	Smart Agriculture Based on IoT and Cloud Computing	Sriveni Namani, Bilal Gonen	2020	Sky Drone FPV2, Cloud Computing	It requires a strong network
4.	Providing Smart	M.K.Gayatri ,	2015	Sensor module,	There could be

	Agricultural Solutions to Farmers for better yielding using IoT	J.Jayasakthi, Dr.G.S.Anandha Mala		a Processor module, Communication module	wrong analysis of weather conditions
5.	Managing Crop for Indian Farming Using IOT	S. Geetha, P. Deepalaksh m I, Shilpa Pande	2019	Sensors, Arduino Micro controller, Data Transmission	Complex for uneducated person
6.	Smart Farm Monitoring Using Raspberry Pi, and Arduino	Siwakorn Jindarat, Pongpisitt Wuttidittac hotti	2015	Embedded System, Raspberry Pi, Arduino, Android, Smart Phone	Expensive

2.2 REFERENCES

- Sinung Suakanto, Ventje J. L. Engel, Maclaurin Hutagalung and Dina Angela, "Sensor networks data acquisition and task management for decision support of smart agriculture", 2016 International Conference on Information Technology Systems and Innovation (ICITSI) Bandung – Bali, pp. 24-27, Oct.

2016.

- Chetan Dwarkani M, R Ganesh Ram, S Jagannathan, and R. Priyatharshini, "Smart agriculture system using sensors for agricultural task automation", 2015 IEEE International Conference on Technological

Innovations in ICT for Agriculture and Rural Development (TIAR 2015).

- Nikesh Gondchwar and R. S. Kawitkar, "IOT-based smart agriculture", International Journal Of

Advanced Research in Computer and Communication Engineering (IJARCCE), vol. 5, no. 6, Jun. 2016. Show Context Google Scholar.

- Manakant Intarakamhaeng et al., "The Model Farm Management Automation Technology with RFID" in , Pathumthani:Office of Science and Technology, 2008.
- K K Namala, Krishna Kanth Prabhu A V, Anushree Math, Ashwini Kumari, and Supraja Kulkarni,

"Smart Irrigation with Embedded System", IEEE Bombay Section Symposium (IBSS), June 2017.

2.3 PROBLEM STATEMENT DEFINITION

PROBLEM STATEMENT 1

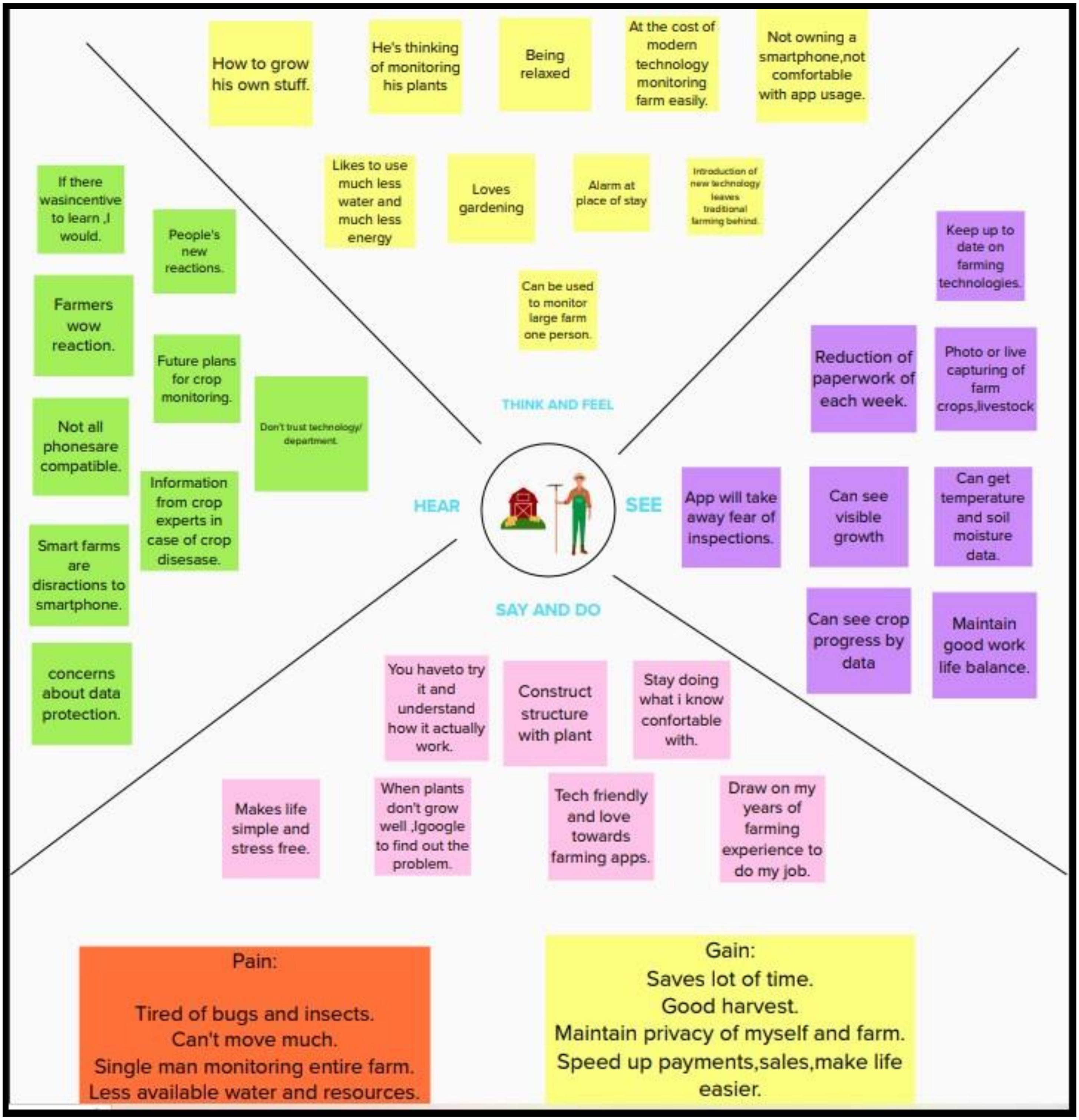
PROBLEM STATEMENT 2

PROBLEM STATEMENT 3

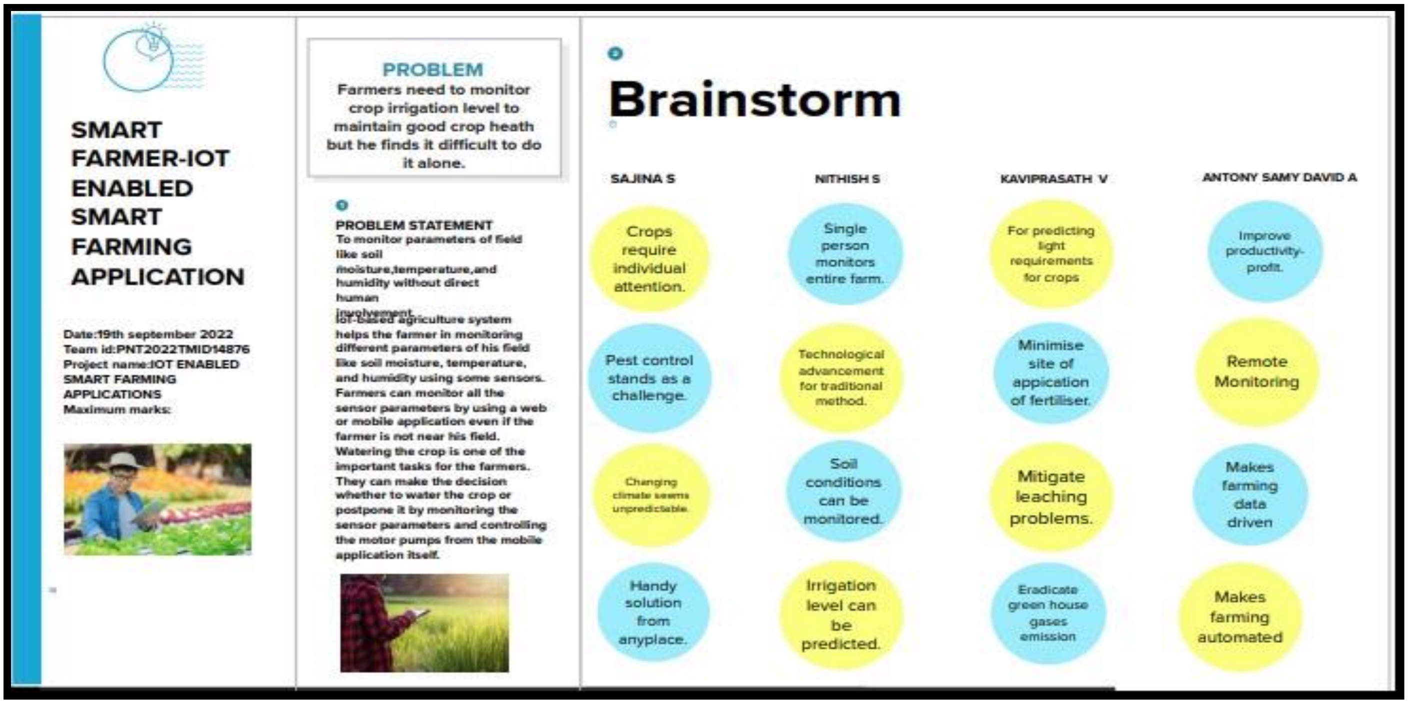
PROBLEM STATEMENT 4

PROBLEM STATEMENT 5

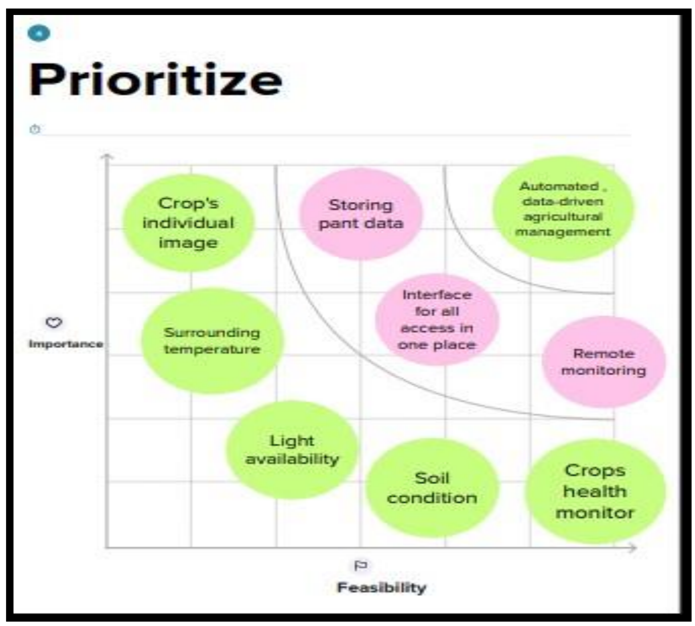
3.1 EMPATHY MAP CANVAS



BRAINSTORMING



3.2 IDEATION AND BRAINSTORMING



3.3 PROPOSED SOLUTION

S. NO	PARAMETER	DESCRIPTION
1.	Problem Statement (Problem to be solved)	To enable farmers to remotely monitor the crops and field using smart devices.
2.	Idea / Solution description	We propose a solution using sensors and cloud data storage and an mobile application which helps farmers monitor the crops condition like temperature,soil moisture,humidity
3.	Novelty / Uniqueness	Precision agriculture is a farming management concept where we apply precision measurements based on soil variations,whereas smart farming focuses on accessing and applying data.But digital data from smart farming can be used for informing precision farming.
4.	Social Impact / Customer Satisfaction	Farmers state that it gives them a picture of what's happening on the ground with constant data sent to connected devices 24/7.It helps them track,recover,monitor,gives notification when anything is out of range.
5.	Business Model (Revenue Model)	It is estimated globally smart agriculture market revenue in 2019 is USD 11.9 Billion. It is estimated that new smart frams will feed our population which may explode to 9.6 billion by 2050. Global smart agriculture market review is predicted as 25.3 Billion USD by 2027. The compound annual growth rate over this forecasted period is 11.4%.
6.	Scalability of the Solution	Can helps to monitor giving five kilometer tracking range. Can be done with continuous readings on temperature,gas,humdity,pH,smoke detection,water and fuel levels

3.4 PROBLEM SOLUTION FIT

Define CS, fit into CC

1. CUSTOMER SEGMENT(S) CS

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

My customer is Farmer .

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.

- Crop Disease.
- Soil Erosion.
- Irrigation based on crop requirement.
- Protect crops from wild animals.

5. AVAILA Take a screenshot AS

- Besides manual irrigation - plant required level water sensor can be used.
- Manual Identification of disease is an alternative to machine vision equipment to track the disease.

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.

- Issues on water availability on each crops.
- Cattle get lost in grazing.
- Cultivating Crops near forest.
- Crops devastated by diseases and soil erosion.

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 doesn't get their right share on the crops they sell.
- There is also sudden fall in crops and also diseased crop sale becomes farmer's invested money priceless.

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. Greenpeace)

Directly Related:

- Find out machine vision equipment installer , calculate the usage and benefits.

Indirectly Related:

- Associated customers spend free time on volunteering work (Manual Disease Tracking).

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

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.

- By seeing other farmer installing GPS tracker for locating their sheeps.
- Reading a article on healthy crops and their method of cultivation.
- Awarness program by VAO on agriculture.

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.

- Crop Disease Tracking - Machine Vision based AI equipment.
- Lost of Cattle - GPS Tracker.
- Protecting Crops from Wild Animals - Sensors for detecting wild animals(Radars and etc...)

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:

- Machine Equipment tracking of crops disease.
- Sensor values with threshold valves need to be pointed.

Offline:

- Manually track the cattle.

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 :
Suffer —--> due to devastating effects on crops —-> Money spent on crops becomes priceless.

After:
Confident enough to handle the situation —> Profit.

4.REQUIREMENT ANALYSIS

4.1 FUNCTIONAL REQUIREMENT

FR No.	Functional Requirement (Epic)	Sub Requirement (Story / Sub-Task)
FR-1	Data Collection	The parameters like temperature, humidity, and soil moisture is measured and collected.
FR-2	Device Communication	The device will subscribe to the commands from the mobile application and control the motors accordingly
FR-3	API development	APIs are developed using Node-RED service for communicating with Mobile Application
FR-4	Mobile App	A mobile application is developed using the MIT App inventor to monitor the sensor parameters and control the motors.
FR-5	IBM Cloud services Configuration	Create IBM Watson IoT Platform Create a device & configure the IBM IoT Platform Create Node-RED service Create a database in Cloudant DB to store all the sensor parameters.
FR-6	Mobile Application Requirements	The mobile app should have the following features Display the sensor parameters Buttons for controlling the motors Should communicate with the IBM cloud using APIs to get the sensor data and send the commands

4.2 NON FUNCTIONAL REQUIREMENTS

FR No.	Non-Functional Requirement	Description
FR-1	Usability	The application must be useful to all sorts of people, Its complexity level should be low and should be usable by uneducated farmers. It should be simple rather than confusing
FR-2	Security	Since it involves cloud storage of gathered sensor data, which could be misused, Data handling must be highly secure.
FR-3	Reliability	Since it is used for remote monitoring, It can be used in cases where a single farmer is managing the entire farm, Data should be more accurate and should not be misleading.

FR-4	Performance	Highly effective monitoring, tracking, and recovery of farm assets, tracking range should be greater than at least 5km. Continuous readings on temperature,gas,humidity,pH,smoke detection ,water and fuel levels are necessary.
FR-5	Availability	It should monitor water level, fuel level, electric fence-theft monitoring, temperature, humidity, tractor guidance, GPS tags, soil moisture, and toxic gases.
FR-6	Scalability	It should be made used in remote areas where technological
		advancements have not even been raised and should deliver a more productive and sustainable form of agriculture.

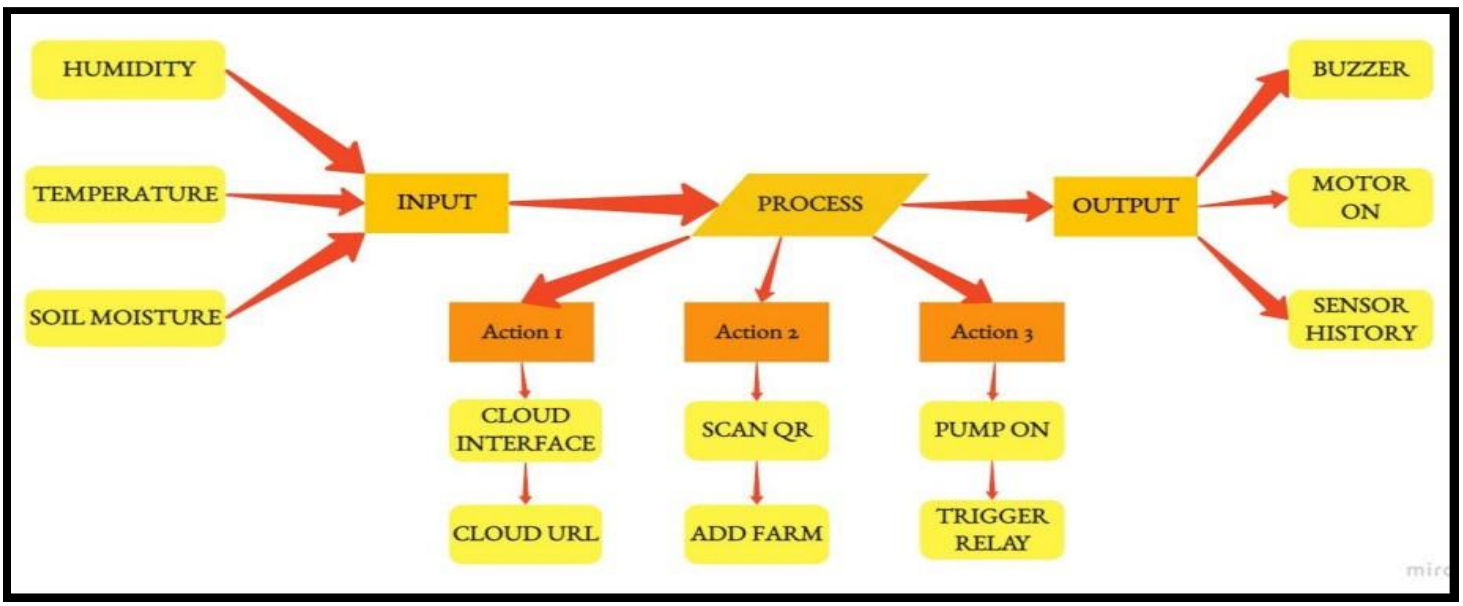
5. PROJECT DESIGN

5.1 DATA FLOW DIAGRAMS

PROJECT FLOW:

- The parameters like temperature, humidity, and soil moisture are updated to the Watson IoT platform
- The device will subscribe to the commands from the mobile application and control the motors accordingly
- APIs are developed using Node-RED service for communicating with Mobile Application ● A mobile application is developed using the MIT App inventor to monitor the sensor parameters and control the motors.

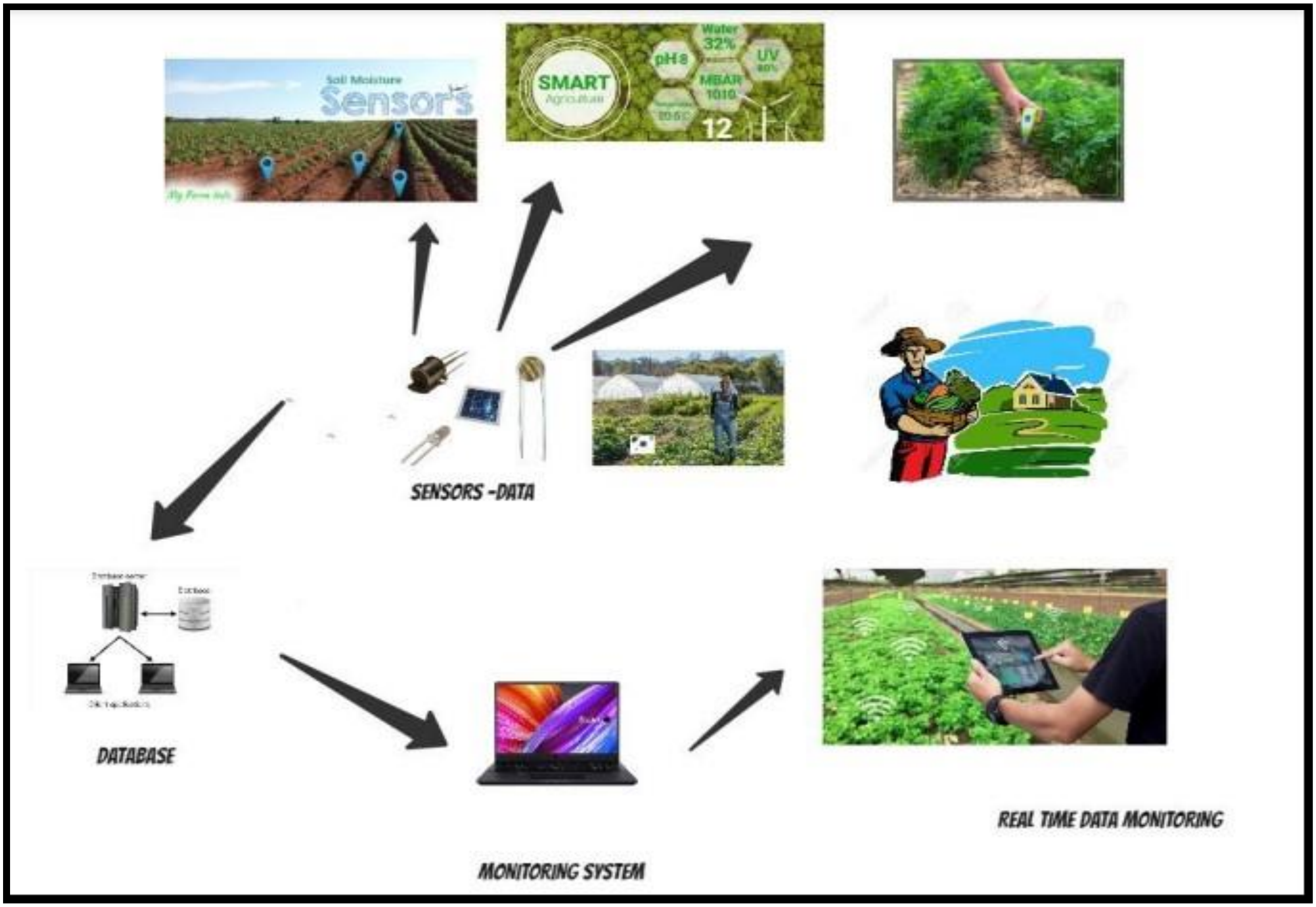
DATA FLOW DIAGRAM:



5.2 SOLUTION AND TECHNICAL ARCHITECHTURE

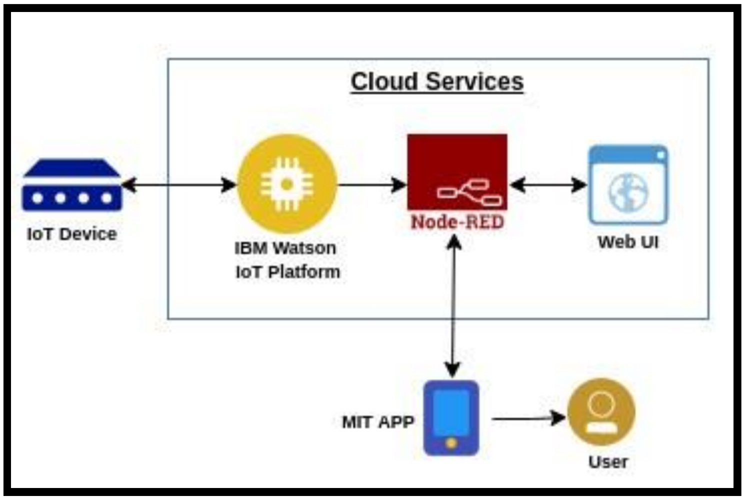
SOLUTION ARCHITECHTURE:

- **IoT-based agriculture system helps the farmer in monitoring different parameters of his field like soil moisture, temperature, and 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 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.**



TECHNICAL ARCHITECHTURE:

PROJECT FLOW:



- The parameters like temperature, humidity, and soil moisture are updated to the Watson IoT platform ● The device will subscribe to the commands from the mobile application and control the motors accordingly
- APIs are developed using Node-RED service for communicating with Mobile Application
- A mobile application is developed using the MIT App inventor to monitor the sensor parameters and control the motors.
- To accomplish this, we have to complete all the activities and tasks listed below:
- Create and configure IBM Cloud Services
- Create IBM Watson IoT Platform
- Create a device & configure the IBM IoT Platform
- Create Node-RED service
- Create a database in Cloudant DB to store all the sensor parameters
- Develop a python script to publish and subscribe to the IBM IoT platform
- Configure the Node-RED and create APIs for communicating with mobile application ● Develop a mobile application to display the sensor parameters and control the motors

COMPONENTS AND TECHNOLOGIES:

S. NO	Component	Description	Technology
1.	User Interface	Web UI, He can select the button to read the value of the selected button.	MIT APP
2.	Application Logic-1	The parameters like temperature, humidity, and soil moisture are updated to the Watson IoT platform	Watson IoT platform (Python Script)
3.	Application Logic-2	Configure the Node-RED and create APIs for communicating with mobile application	Node-RED
4.	Application Logic-3	Create IBM Watson IoT Platform	IBM Watson Assistant
5.	Cloud Database	Create and configure IBM Cloud Services	IBM Cloudant etc.
6.	File Storage	Create a database in Cloudant DB to store all the sensor parameters	IBM Block Storage or Other Storage Service or Local Filesystem

APPLICATION CHARACTERISTICS:

S. NO	Characteristics	Description	Technology
1.	Open-Source Frameworks	Python Script , Arduino IDE Code	Python IDE, Arduino IDE
2.	Security Implementations	Since it involves cloud storage of gathered sensor data, which could be misused, Data handling must be highly secure.	SHA-512, RIPEMD-180.
3.	Scalable Architecture	It should be made used in remote areas where technological advancements have not even been raised and should deliver a more productive and sustainable form of agriculture.	Highly Stable Network Connectivity

4.	Availability	It should monitor water level, fuel level, electric fence-theft monitoring, temperature, humidity, tractor guidance, GPS tags, soil moisture, and toxic gases.	Sensors
5.	Performance	Highly effective monitoring, tracking, and recovery of farm assets, tracking range should be greater than at least 5km. Continuous readings on temperature,gas,humidity,pH,smoke detection ,water and fuel levels are necessary	Sensors

5.3 USER STORIES

List of all the user stories for the Smart farming application are as follows;

User Type	Function al Require me nt (Epic)	User Story Numbe r	User Story / Task	Acceptance criteria	Priority	Release
Farmer - Mobile user	End UserMobile app	USN-1	I have to check the temperature value of my field.	Click on the button to view the temperature.	High	Sprint-1
		USN-2 I	I have to monitor the soil moisture content near my crops.	Click on the button to view the moisture content	High	Sprint-1
		USN-3 I	I have to measure the humidity conditions for crop storage.	Click on the button to view the crop storage..	Low	Sprint-2
		USN-4 I	I have to measure the current temperature and compare it with previous temperature.	Click on the option to compare results.	Medium	Sprint-1
		USN-5	I have to visualize the graph of crop production.	Click on the graph button to visualize the results.	High	Sprint-1

6 PROJECT PLANNING AND SCHEDULING

6.1 SPRINT PLANNING AND ESTIMATION:

Sprint - 1	Hardware	USN-1	Sensors and Wi-Fi module with python code	2	High	Helen Soffia J P (Leader)
Sprint - 2	Software	USN-2	IBM Watson IOT Platform, Workflows for IOT scenarios	2	High	Karthick Raja M (Member 1)
			using Node-Red			
Sprint - 3	MIT App	USN-3	To develop a mobile application using MIT.	2	High	Jebastin J (Member 2)
Sprint - 4	Web UI	USN-4	To make the user interact with software.	2	High	Sharon Sofia S S V (Member 3)

Project Tracker, Velocity & Burndown Chart:

Sprint	Total Story Points	Duration	Sprint start date	Story points(completed) as onplanned end date	Sprint release date(Actual)	Sprint end date
Sprint-1	20	6 Days	24 Oct 2022	20	29 Oct 2022	29 Oct 2022
Sprint-2	20	6 Days	31 Oct 2022	20	5 Nov 2022	5 Nov 2022
Sprint-3	20	6 Days	07 Nov 2022	20	12 NOV 2022	12 NOV 2022
Sprint-4	20	6 Days	14 Nov 2022	20	14 NOV 2022	14 NOV 2022

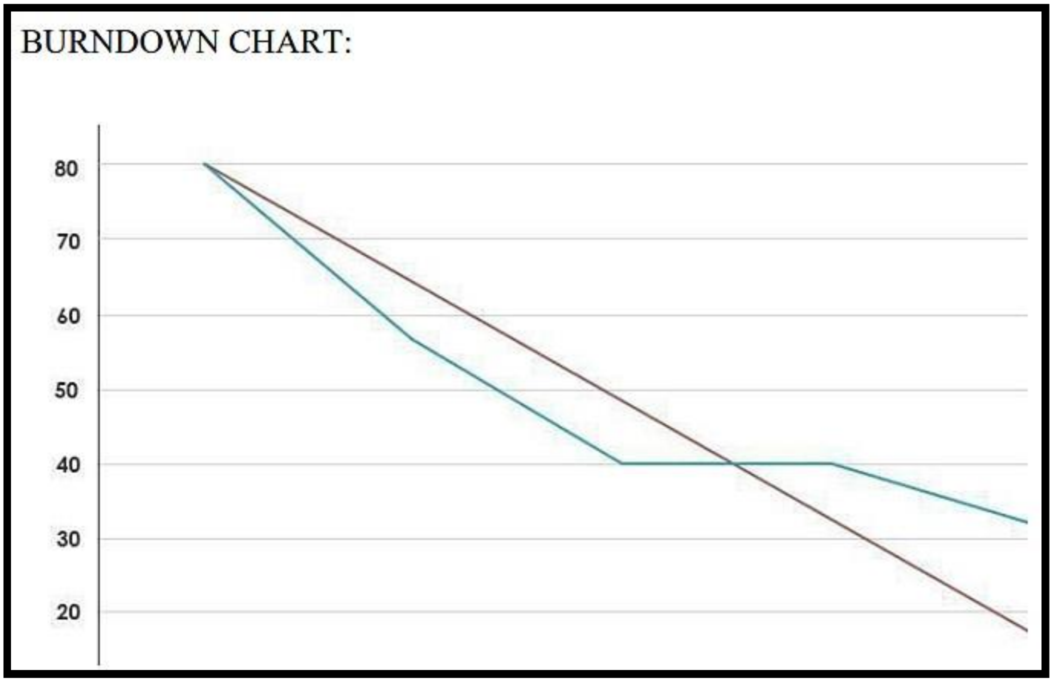
VELOCITY:

AV for sprint 1= Sprint Duration /velocity =20/6=3

AV for sprint 2= Sprint Duration/Velocity=20/6=3

AV for Sprint 3=Sprint Duration/Velocity=20/6=3

AV for Sprint 4=Sprint Duration/Velocity=20/6=3



6.2 SPRINT DELIEVERY SCHEDULE

S.NO	ACTIVITY TITLE	ACTIVITY DESCRIPTION	DURATION
1	Understanding the project	Assign ed 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 assignments	1 week

2	Staring The Project	We the Team Members were Assigned all the Tasks Based on Sprints and 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 1 week within certain limit it should be favorable to every person	1 week

7.CODING AND SOLUTIONING

7.1 FEATURE -1 SOIL MOISTURE DETECTION 7.2 FEATURE-2 HUMIDITY DETECTION 7.3 FEATURE -3 TEMPERATURE DETECTION 7.4 FEATURE-4 MOTOR ON AND OFF

PYTHON CODE:

Goal:

To develop the python code to publish and subscribe to the commands from the IBM cloud.

PROGRAM:

```
import wiotp.sdk.device
import time
import OS
import datetime
import random
myConfig = {
"identity": {
"orgId": "023f97"
"typeId": "NodeMCU"
"deviceId": "12345"
},
"auth":{
"token": "CT8N7Sz?giHVFxk-V?"
}
}
client = wiotp.sdk.device.DeviceClient {config =myConfig, logHandlers=None}
client.connect ()
def myCommandCallhack (cmd) :
print ("Message received from IBM IOT Platform: %s" %cmd.data [' command' ])
m=cmd. data [' command' ]
if (m== "motoron"):
    print ("Motor is switched on")
elif (m=="motoroff"):
    print ("Motor is switched OFF")
print ("")
while True:
soil=random.randint (0,100)
temp=random.randint (-20,125)
hum=random.randint (0,100)
myData={'soil_moisture': soil, 'temperature':temp, 'humidity' :hum}
client.publishEvent (eventId="status", msgFormat="json", data=myData, gos=0, onPublish=None)
```

```
print ("Published data Successfully: %s", myData)
time.sleep (2)
client.commandCallback = myCommandCallback
client.disconnect ()
```

8. TESTING

8.1 TEST CASES

I. IBM Watson IOT service:

Goal:

To create an IBM Watson IOT service and create a device using it.

Steps to create an IBM Watson IOT service:

- **Click on catalog in IBM cloud account.**
- **Click on services.**
- **Enter as Internet of thing platform.**
- **Enter region and pricing plan.**
- **Enter service name and click create.**
- **Click on launch.**
- **Then IBM Watson OT platform opens.**
- **Click on sign in.**
- **Enter IBM Id.**
- **Enter Password.**
- **Then you can access IBM Watson IOT platform.**

Steps to create a device:

- **Click on devices in IBM Watson IOT platform.**
- **Choose to create a device.**
- **Enter the device type as Node MCU.**
- **Enter the device ID as 12345.**
- **Click next.**
- **Enter device credentials (optional).**
- **Click next.**
- **Enter the authentication token (optional).**

- Click on continue.
- Click on next.
- Click finish

Device is created successfully, and we can see device credentials

Organization ID	**023f97**
Device Type	Node MCU
Device ID	12345
Authentication Method	Use- token- auth
Authentication Token	CT8N7Sz?giHVFxk-V?

II. Creation of Node – Red Service:

Goal:

To create a Node Red service.

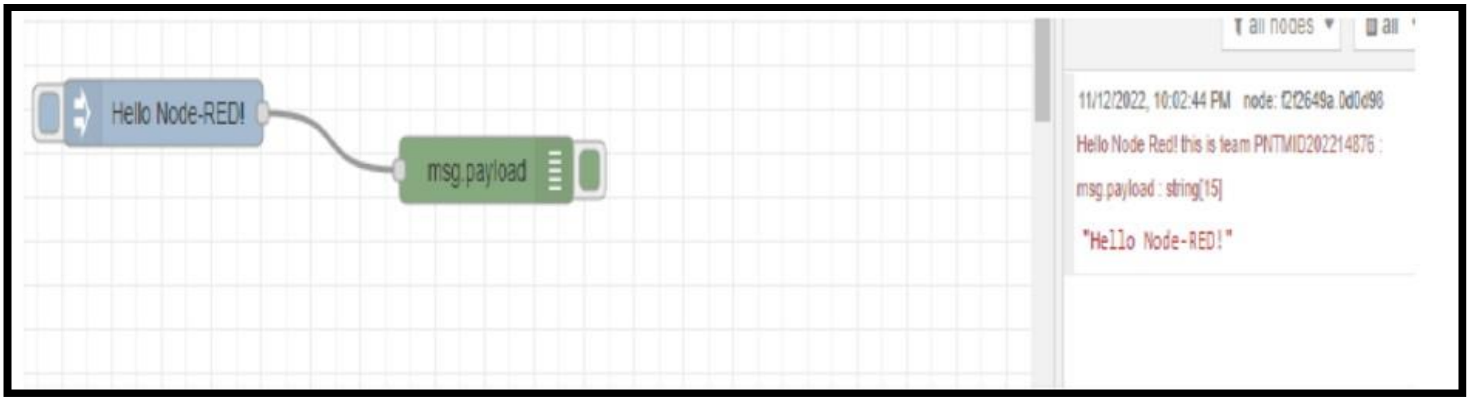
Steps to create a Node-Red service:

- Click on catalog in IBM cloud account.
- Click on services.
- Enter as Node red service.

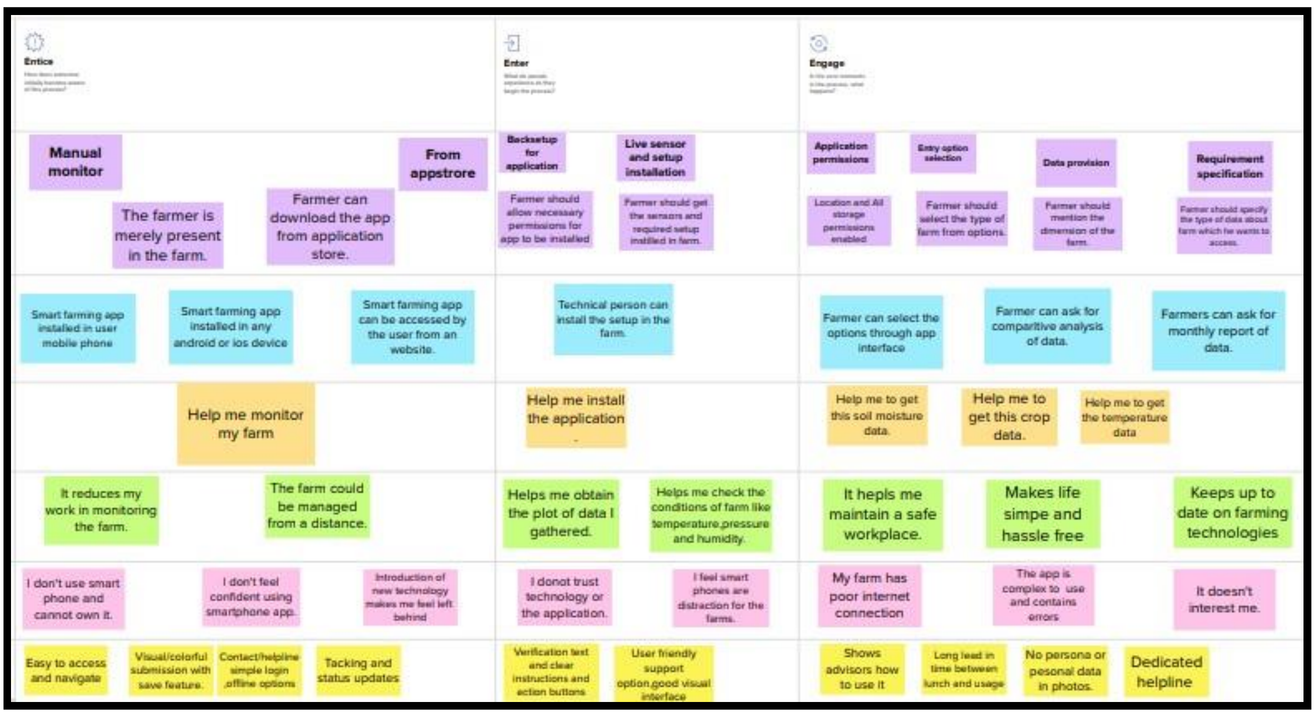
- Node red app opens click on get started.
- Enter app name as default.
- Enter region as London.
- Choose pricing plan as lite.
- Click create.
- You will be redirected to a new page.
- Click on deploy your app.
- Choose cloud foundry.
- Enter IBM API key (by clicking new+).
- Choose memory size as default.
- Enter region as London.
- Click next.
- Click create.
- Status will be updated after creation.
- Click on App URL.
- Click next.
- Choose not recommended.
- Click next.
- You will see Node red page.
- Go to your node red flow editor.
- In the left panel choose nodes.
- In the right panel choose context mode.
- In hello node red inject node enter the data as string and choose to repeat as none.
- Click done.
- Click debug node. ● Choose to deploy.
- When you click button on inject node you can see the message in debug console.

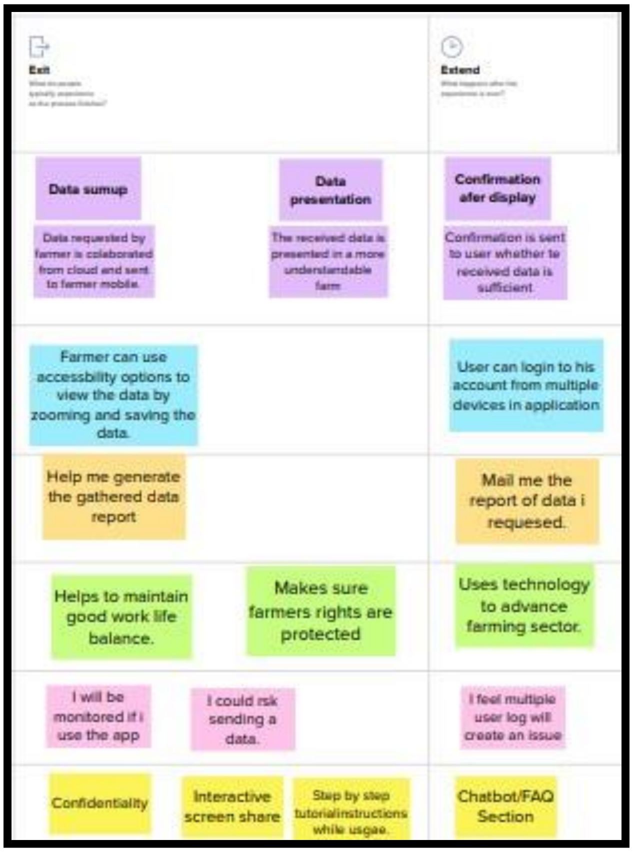
Account Creation:

Interface:



8.2 USER ACCEPTANCE TESTING

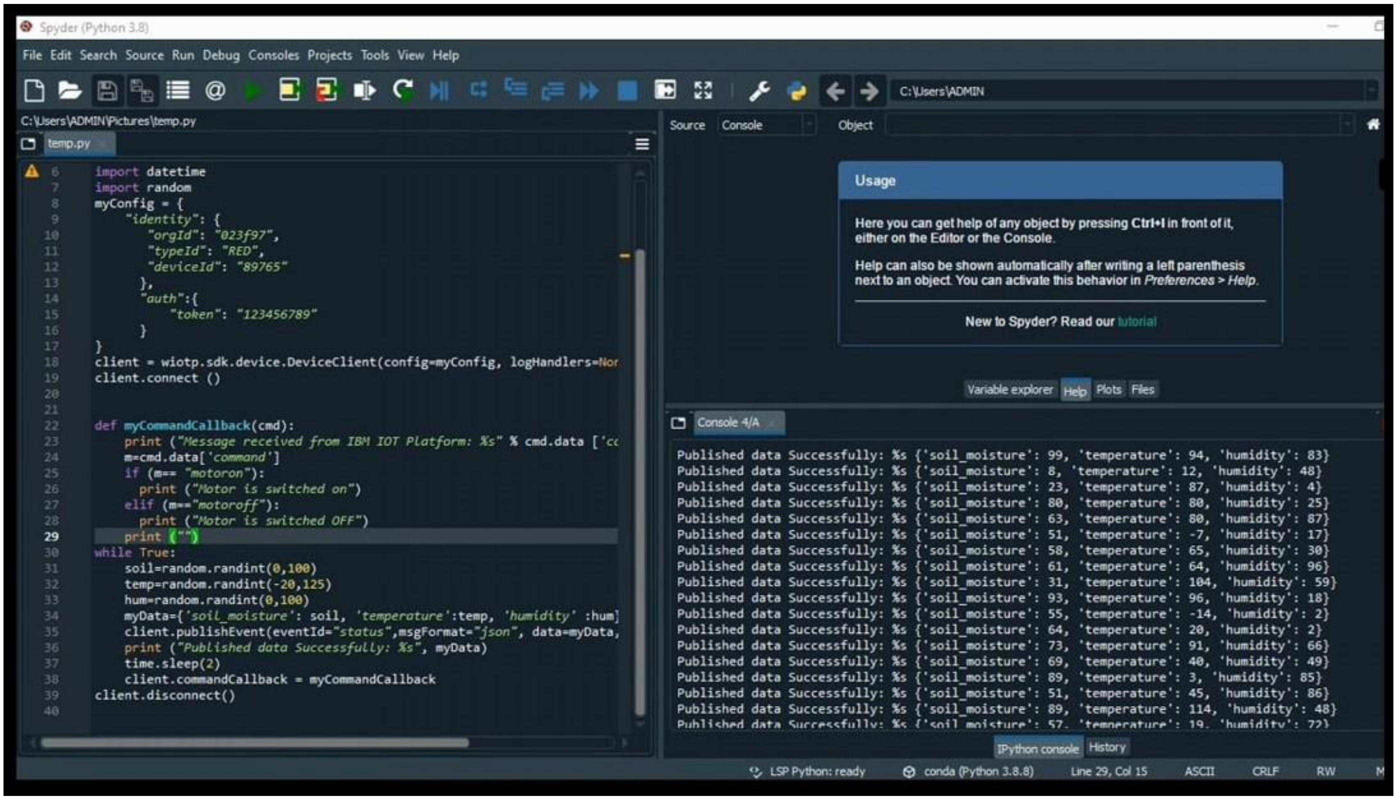


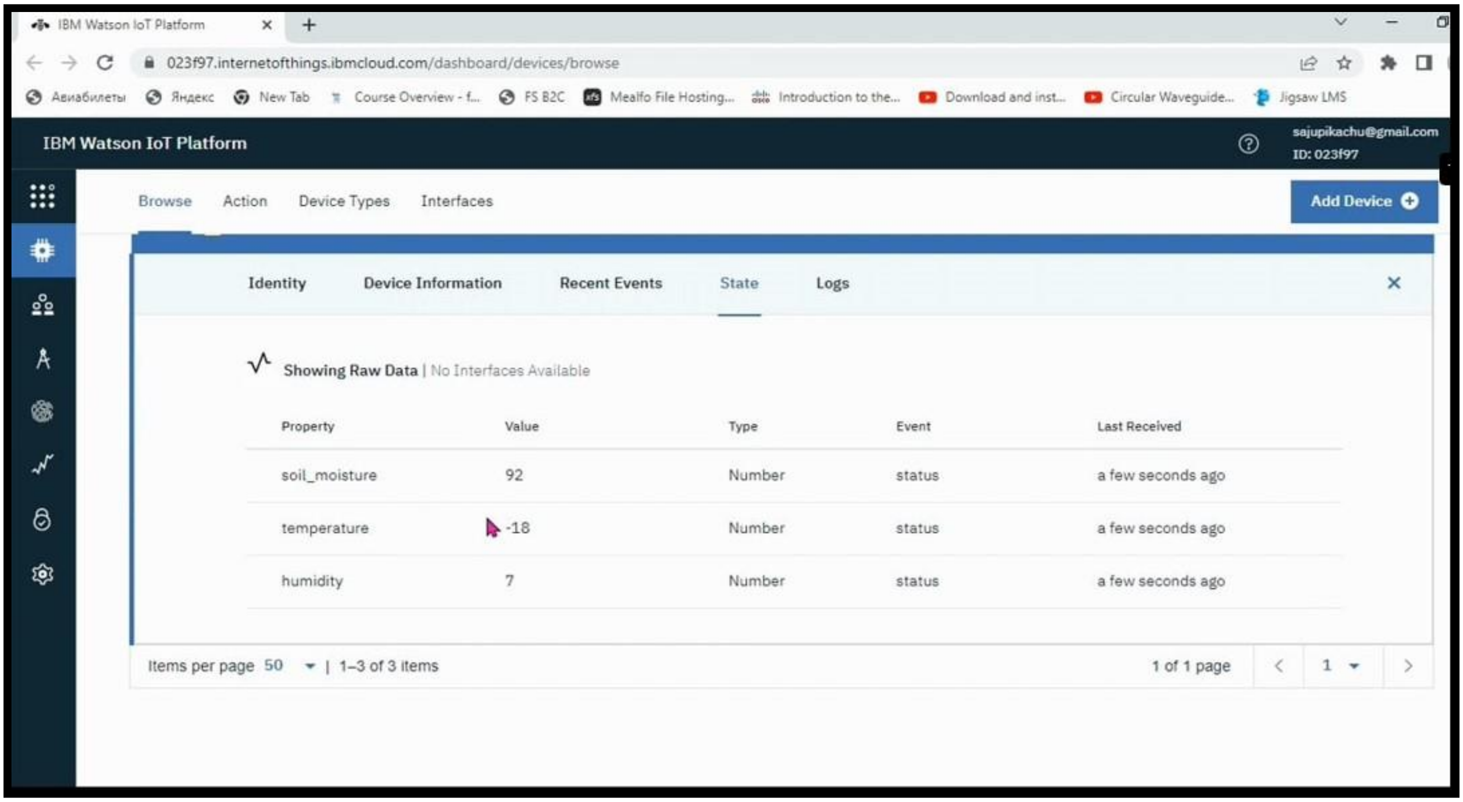


9.RESULTS

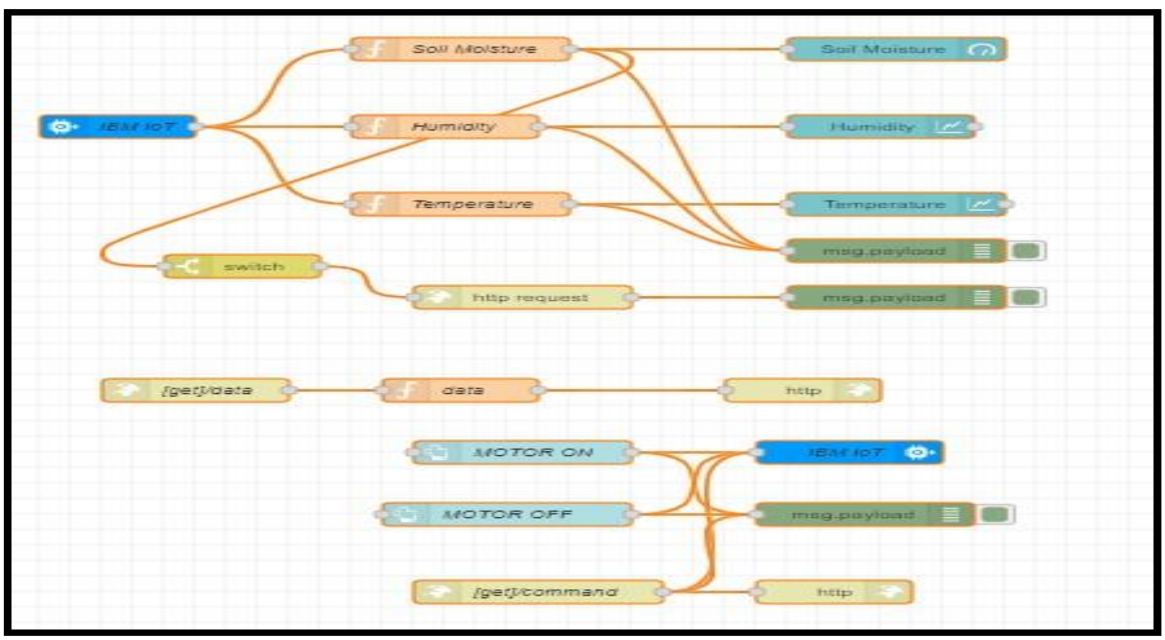
9.1 PERFORMANCE METRICS

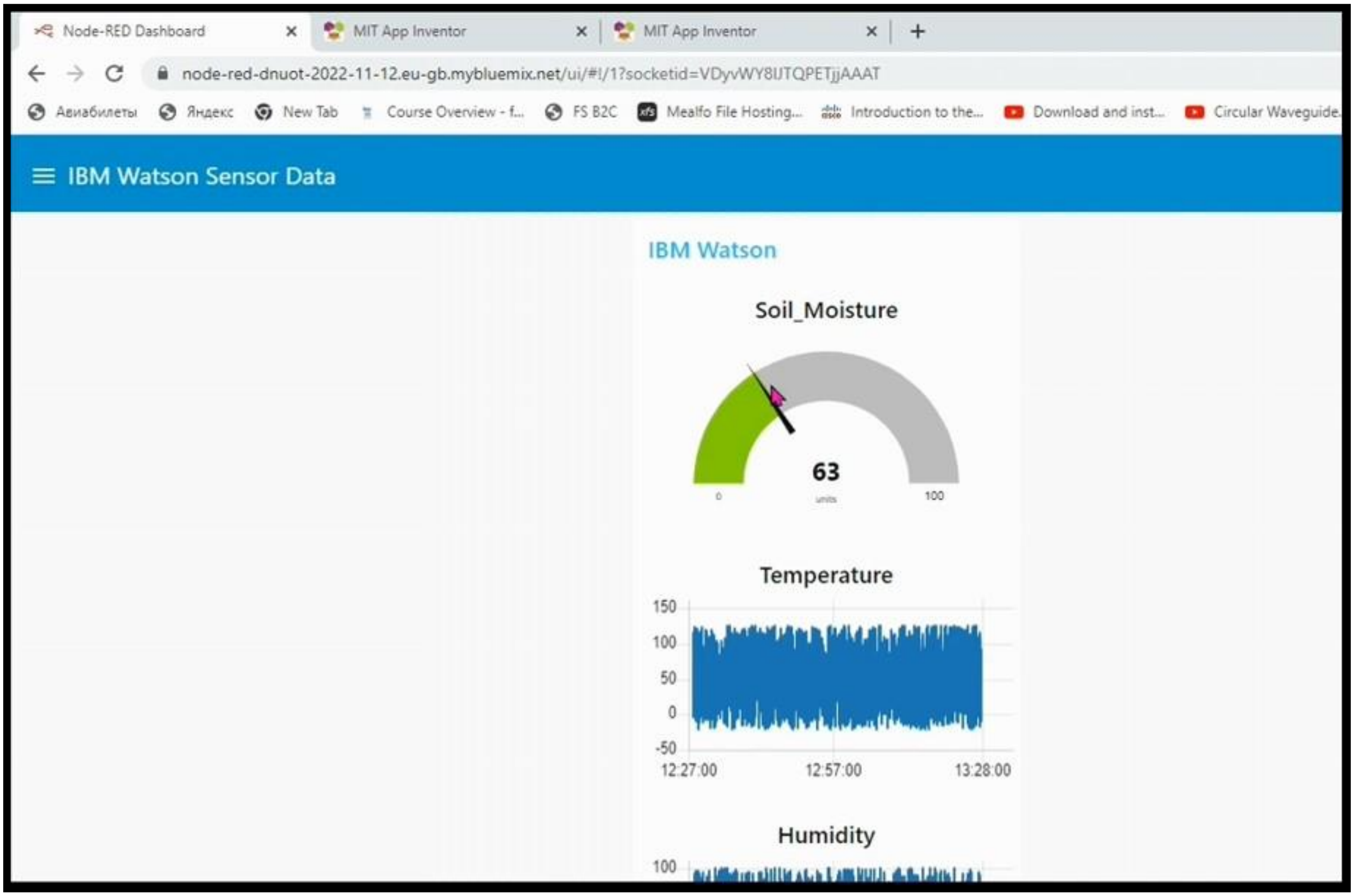
PYTHON CODE RESULTS:

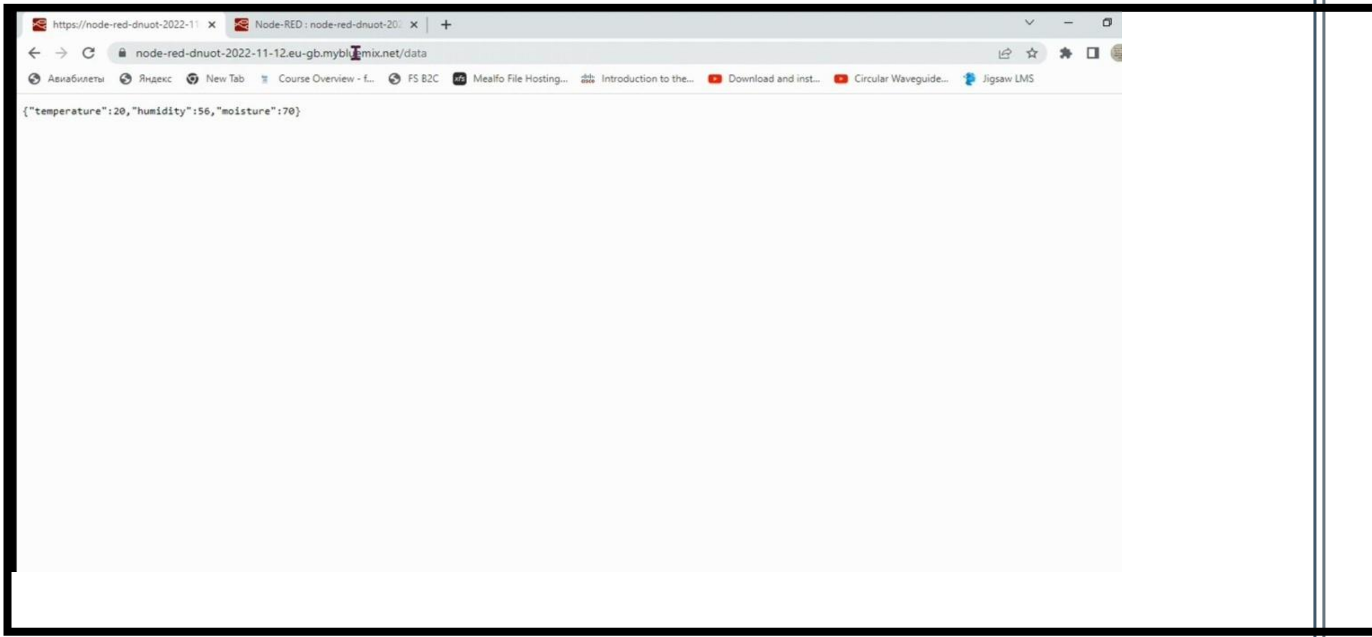




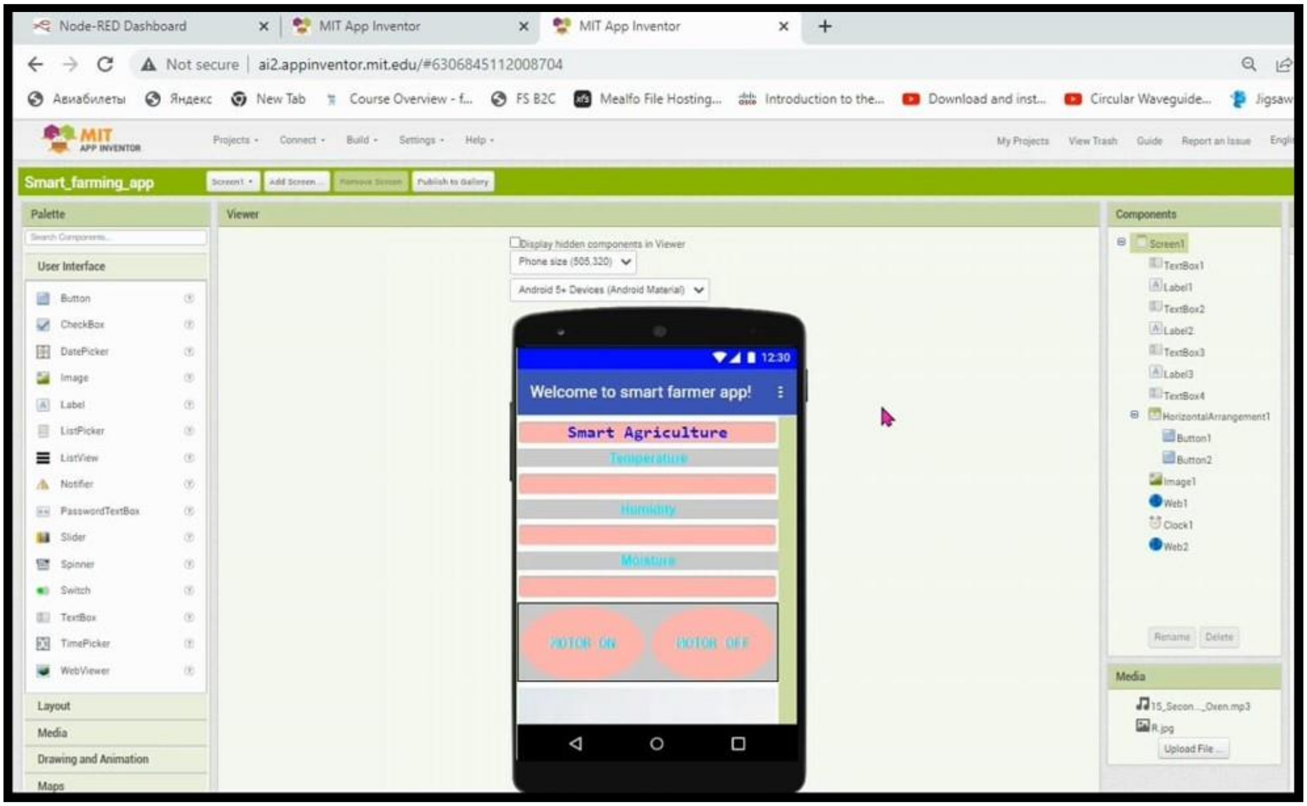
WEB APPLICATION NODE RED FLOW:

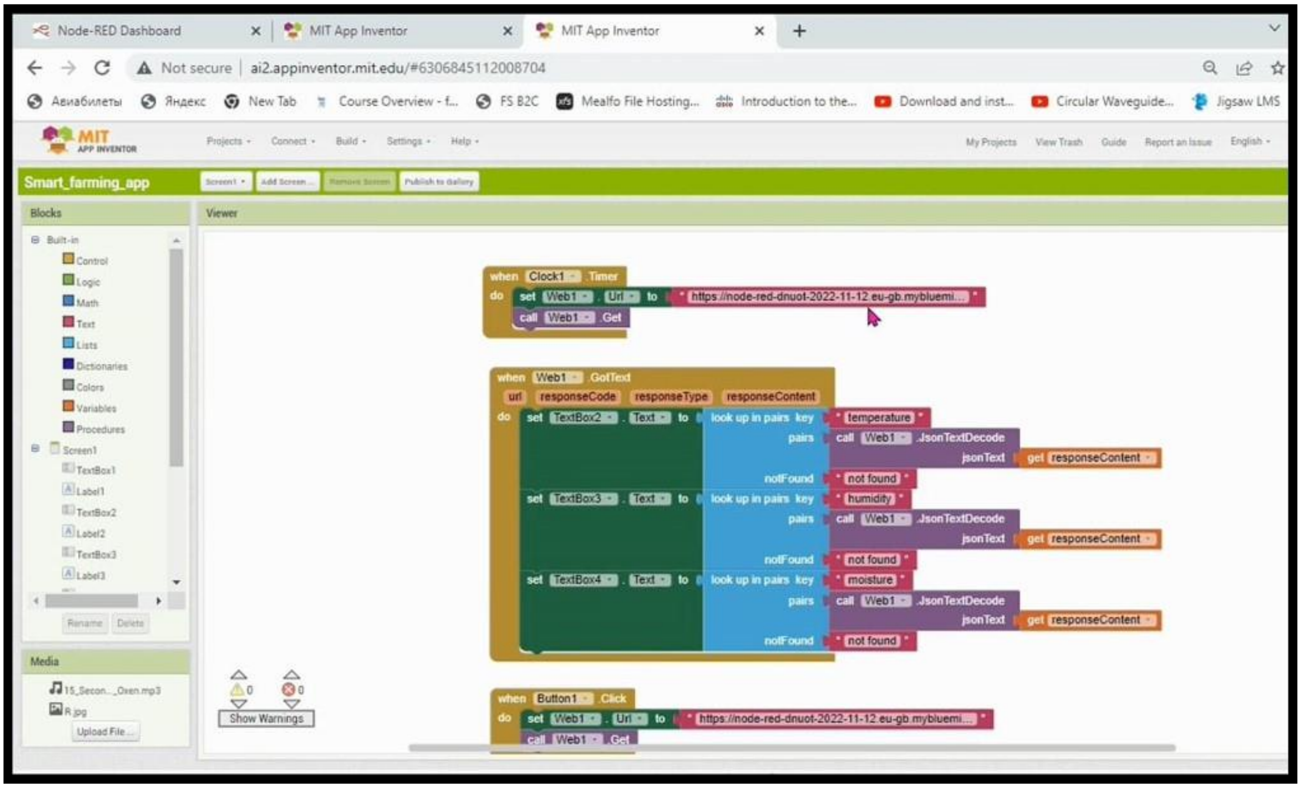


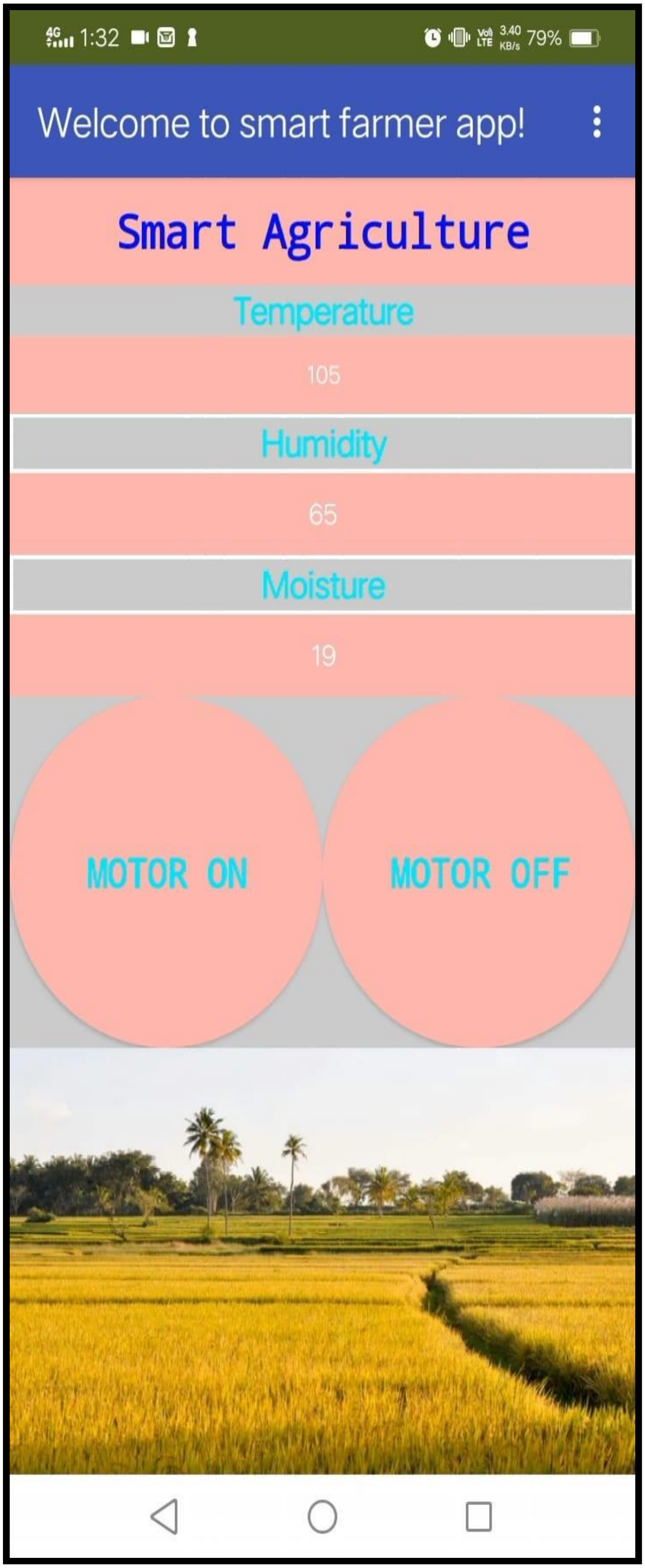

Node-RED Dashboard
MIT App Inventor
MIT App Inventor
node-red-dnuot-2022-11-12.eu-gb.mybluemix.net/ui/#!/1?socketid=VDyvWY8IJTQPETjjAAAT
IBM Watson Sensor Data
IBM Watson
Soil_Moisture
63
0
100
Temperature
150
100
50
0
-50
12:27:00
12:57:00
13:28:00
Humidity
100

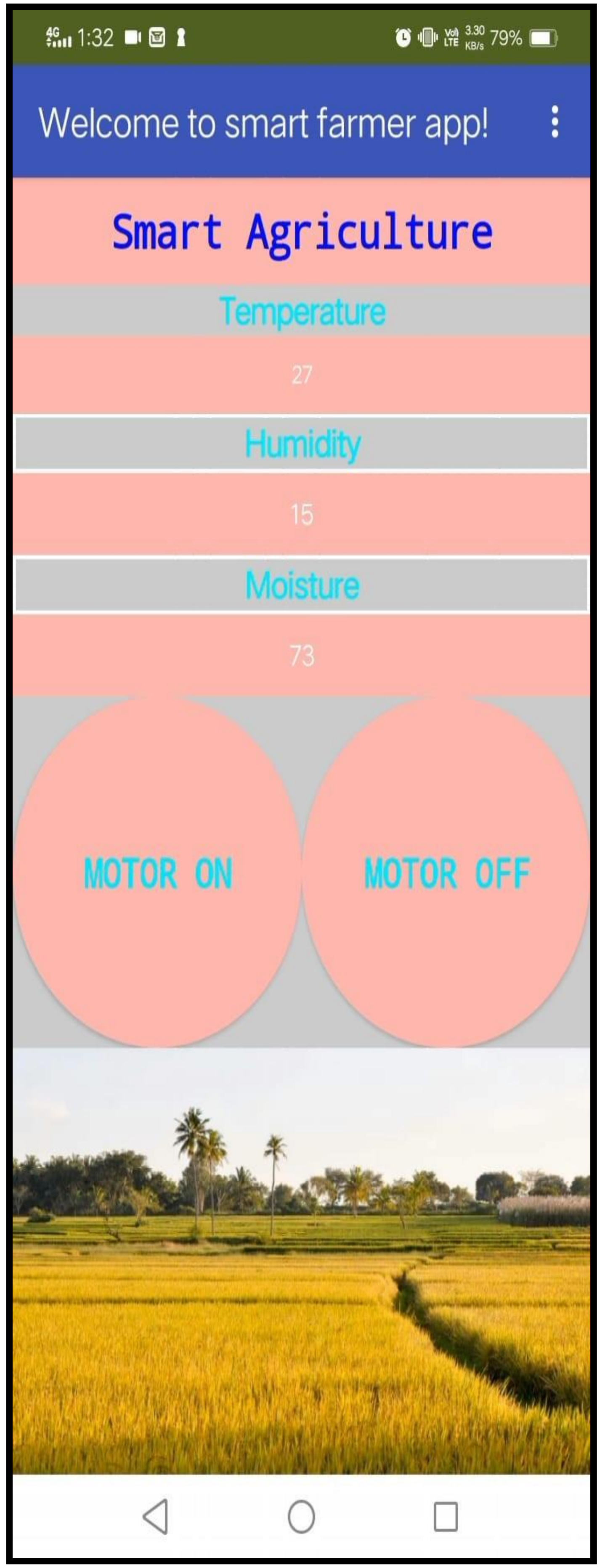

node-red-dnuot-2022-11-12.eu-gb.mybluemix.net/data
{"temperature":20,"humidity":56,"moisture":70}

MOBILE APPLICATION:




Node-RED Dashboard
MIT App Inventor
MIT App Inventor
Not secure
ai2.appinventor.mit.edu/#6306845112008704
Авиабилеты
Яндекс
New Tab
Course Overview - f...
FS B2C
Mealfo File Hosting...
Introduction to the...
Download and inst...
Circular Waveguide...
Jigsaw LMS
MIT APP INVENTOR
Smart_farming_app
Blocks
Viewer
Built-in
Control
Logic
Math
Text
Lists
Dictionaries
Colors
Variables
Procedures
Screen1
TextBox1
Label1
TextBox2
Label2
TextBox3
Label3
Media
Upload File ...
when Clock1 .Timer
do set Web1 . Url to "https://node-red-dnuot-2022-11-12.eu-gb.mybluemi..."
call Web1 .Get
when Web1 .GotText
url responseCode responseType responseContent
do set TextBox2 . Text to look up in pairs key "temperature"
pairs call Web1 .JsonTextDecode
jsonText get responseContent
notFound "not found"
set TextBox3 . Text to look up in pairs key "humidity"
pairs call Web1 .JsonTextDecode
jsonText get responseContent
notFound "not found"
set TextBox4 . Text to look up in pairs key "moisture"
pairs call Web1 .JsonTextDecode
jsonText get responseContent
notFound "not found"
Show Warnings
when Button1 .Click
do set Web1 . Url to "https://node-red-dnuot-2022-11-12.eu-gb.mybluemi..."
call Web1 .Get


1:32
79%
Welcome to smart farmer app!
Smart Agriculture
Temperature
105
Humidity
65
Moisture
19
MOTOR ON
MOTOR OFF


1:32
79%
Welcome to smart farmer app!
Smart Agriculture
Temperature
27
Humidity
15
Moisture
73
MOTOR ON
MOTOR OFF

ADVANTAGES:

- One of the really good things about this branch of farming is that it allows for Soil Sensing.
- This aspect of smart farming gives room for you as a farmer to test your soil for information and also measure it for a wide range of important and nutritious constituents necessary in securing the good health of your farm produce.
- Soil sensing is also employe to appropriately control the application of real-time variable rate equipment. This allows you to understand the scale of your grounds, making you also, in this process, device effective ways of conserving necessary farming resources like water, fertilizer and so on.
- So, with this, you only have to apply fertilizers and pesticides where you need to apply them so as not to negatively affect your plants.
- You also get to conserve seeds, fertilizer, water, etc., and still even maximize yields at the end of the day.
- You also get to get important information about the amount of air and the levels of air, sound, humidity, and temperature of your environment.
- Smart farming is a wonderful option if you want to save the cost of electricity.
- It allows for the use of solar-powered tools like pumps that save your expenditure.
- It is cost-effective as it somewhat reduces the spending usually generated by farmers in maintaining their capital-intensive techs.
- Smart agriculture makes use of AI to improve the process of wireless monitoring, regulation and data collection.
- With these inputs on your farm, all thanks to smart farming, you can be sure of highquality crop production and delivery.

DISADVANTAGES:

- One huge disadvantage of smart farming is that it requires an unlimited or continuous internet connection to be successful.
- This means that in rural communities, especially in the developing countries where we have mass crop production, it is completely impossible to operate this farming method.
- In places where internet connections are frustratingly slow, smart farming will be an impossibility.

- **As pointed out earlier, smart farming makes use of high techs that require technical skill and precision to make it a success.**
- **It requires an understanding of robotics and ICT. ● However, many farmers do not have these skills.**
- **Even finding someone with this technical ability is difficult or even expensive to come by, at most.**
- **And, this can be a discouraging factor hindering a lot of promising farmers from adopting it**

11.CONCLUSION

Agriculture offers an opportunity to improve the lives of millions of food-insecure people and help countries develop economies that create jobs and raise incomes.Smart farming stands as an opportunity to improve the livelihood of farmers and rural people.

12.FUTURE WORKS

The agricultural folks can develop once the techniques are refined to guide poorness mitigation and rising the specification of the individuals.smart farming has a real potential to deliver a more productive and sustainable form of agricultural production, based on a more precise and resourceefficient approach. New farms will finally realize the eternal dream of mankind. It'll feed our population, which may explode to 9.6 billion by 2050.

13.APPENDIX

SOURCE CODE

```
#pip install wiotp-sdk #pip
install OS import
wiotp.sdk.device  import
time  #import OS import
datetime  import random
myConfig = {
  "identity": {
    "orgId": "023f97",
    "typeId": "RED",
    "deviceId": "89765"
```

```
        },
        "auth":{
          "token": "123456789"
        }
    }
    client = wiotp.sdk.device.DeviceClient(config=myConfig, logHandlers=None) client.connect ()


    def myCommandCallback(cmd):
      print ("Message received from IBM IOT Platform: %s" % cmd.data ['command'])
      m=cmd.data['command']
      if (m== "motoron"):
        print ("Motor is switched on")
      elif (m=="motoroff"):
        print ("Motor is switched OFF")
      print ("") while
    True:
      soil=random.randint(0,100)
      temp=random.randint(-20,125)
      hum=random.randint(0,100)
      myData={'soil_moisture': soil, 'temperature':temp, 'humidity' :hum}
      client.publishEvent(eventId="status",msgFormat="json", data=myData, qos=0, onPublish=None)
      print ("Published data Successfully: %s", myData)
      time.sleep(2)
      client.commandCallback = myCommandCallback client.disconnect()
```

GITHUB LINK:

https://github.com/Jebastin-123/IBM-Project-30057-1660139111