

IOT ENABLED SMART FARMING APPLICATION

NALAIYA THIRAN PROJECT BASED LEARNING

Project

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1. Introduction

1.1 Project Overview

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. [1.2. Purpose](#)

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. Literature Survey

2.1 Existing Problem

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. Climate plays a very critical role for farming. And having improper knowledge about climate heavily deteriorates the quantity and quality of the crop production.

Precision

Agriculture/Precision Farming is one of the most famous applications of IoT in Agriculture. It makes the farming practice more precise and controlled by realizing smart farming applications such as livestock monitoring, vehicle tracking, field observation, and inventory monitoring. To make our greenhouses smart, IoT has enabled weather stations to automatically adjust the climate conditions according to a particular set of instructions. Adoption of IoT in Greenhouses has eliminated the human intervention, thus making entire

process cost-effective and increasing accuracy at the same time.

2.2 References

- 1) Sustainable agriculture by the Internet of Things – A practitioner's approach to monitor sustainability progress. 2022, Computers and Electronics in Agriculture.
- 2) The Interplay between the Internet of Things and agriculture: A metric analysis and research agenda. 2022, International Journal of Intelligent Networks.
- 3) Agriculture 4.0 and its Barriers in the Agricultural Production Chain Development in Southern Brazil. 2022, SSRN
- 4) IoT based Agriculture (IoTA): Architecture, Cyber Attack, Cyber Crime and Digital Forensics Challenges. 2022, Research Square

2.3 Problem Statement Solution

The traditional agriculture and allied sector cannot meet the requirements of modern agriculture which requires high-yield, high quality and efficient output.

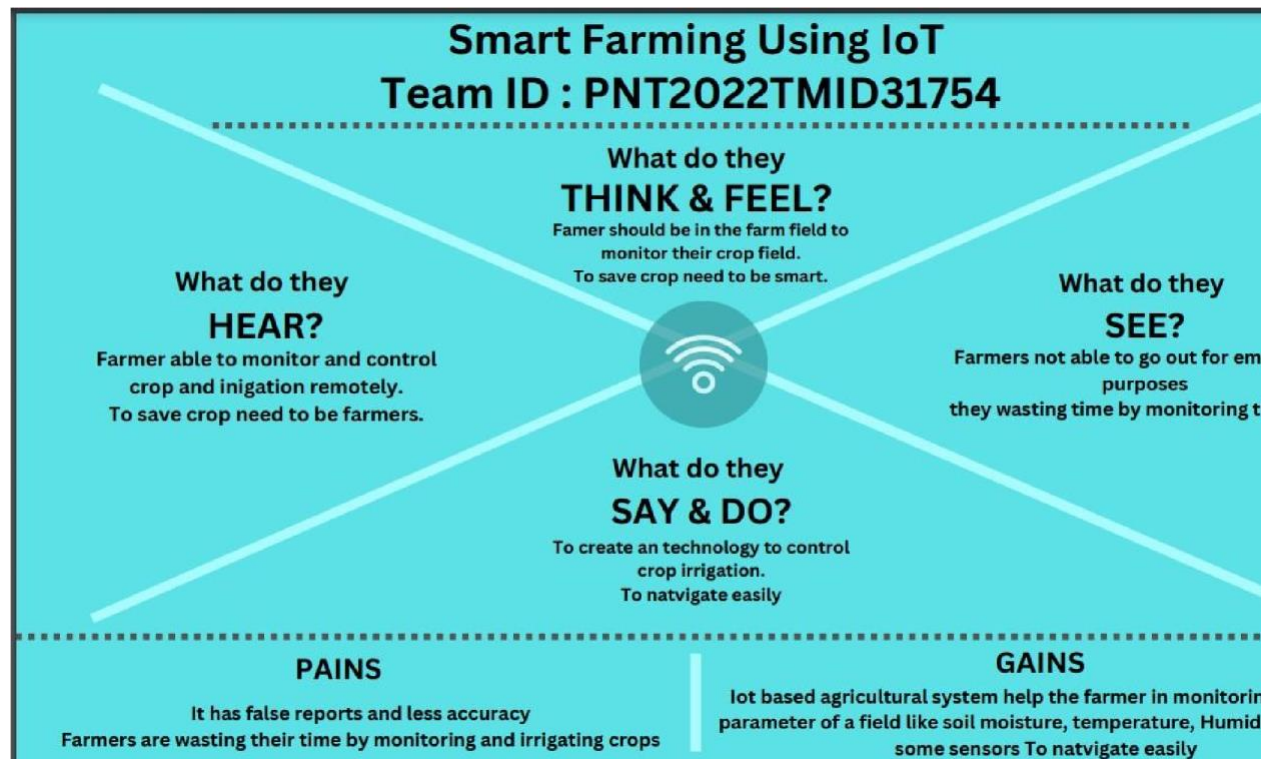
Thus, it is very important to turn towards modernization of existing methods and using the information technology and data over a certain period to predict the best possible productivity and crop suitability on the very particular land. The adoption of access to high-speed internet, mobile devices, and reliable, low-cost satellite (for imagery and positioning) are few key technologies characterizing the precision agriculture trend. Precision agriculture is one of the most famous applications of IoT in the agricultural sector and numerous organizations are leveraging this technique around the world. Some products and services in use are VRI optimization, soil moisture probes, virtual optimizer PRO, and so on. VRI (Variable Rate Irrigation) optimization maximizes profitability on irrigated crop fields with topography or soil variability, improve yields, and increases water use efficiency. IoT has been making deep inroads into sectors such as manufacturing, healthcare and automotive. When it comes to food production, transport and storage, it offers a breadth of options that can improve India's per capita food

availability. Sensors that offer information on soil nutrient status, pest infestation, moisture conditions etc. which can be used to improve crop yields over time. Some of the sample problem statements related to Agriculture & allied sectors where lot application will be beneficial are given below.



3. Ideation & Proposed Solution

3.1. Prepare Empathy Map

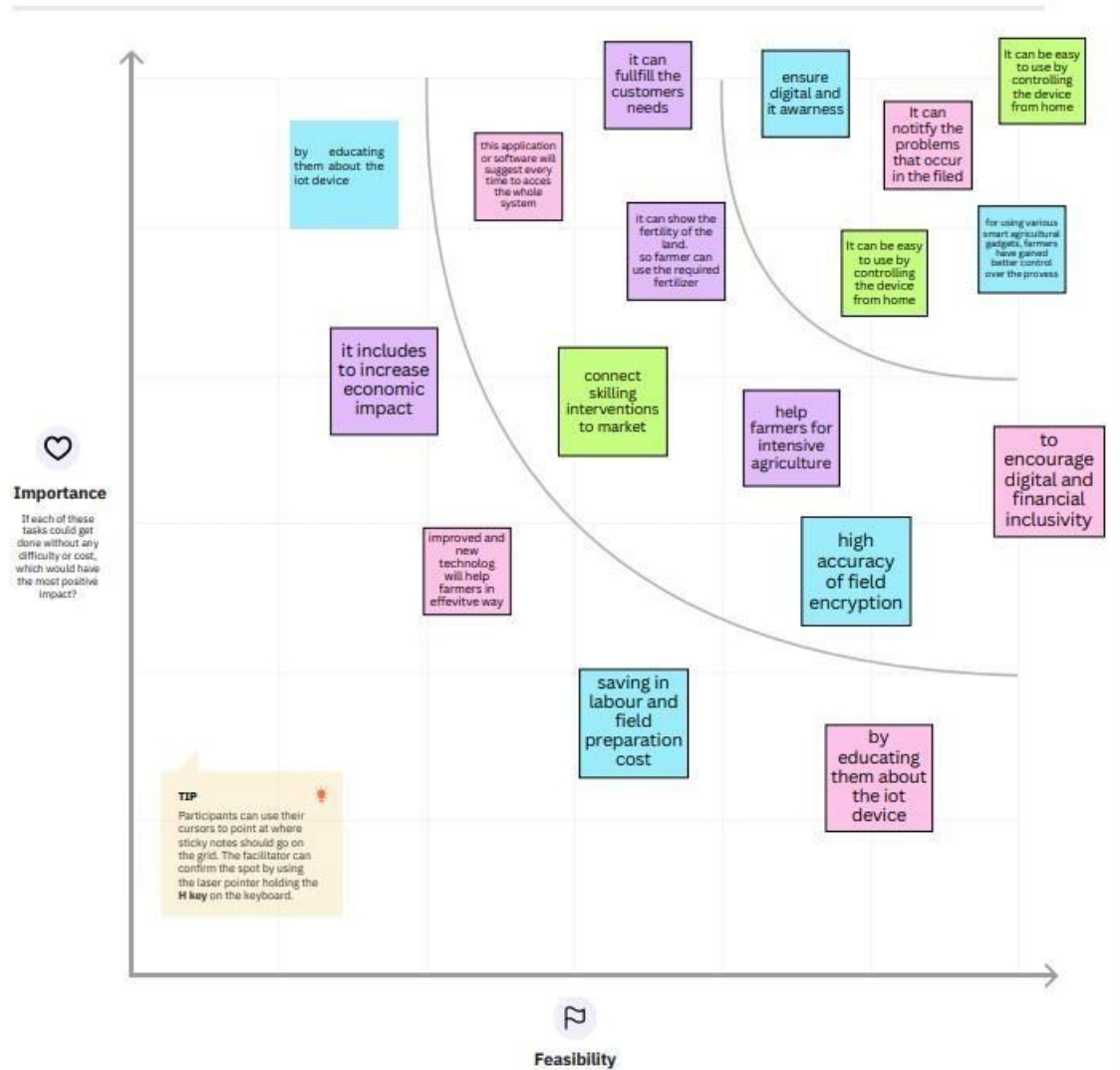


3.2 Ideation & Brainstorming

Prioritize

Your team should all be on the same page about what's important moving forward. Place your ideas on this grid to determine which ideas are important and which are feasible.

⌚ 20 minutes



3.3 Proposed Solution

S.No	Parameter	Description
	Problem Statement (Problem to be solved)	<ul style="list-style-type: none"> ● Watering the field is a difficult process, Farmers have to wait in the field until the water covers the whole farm field. ● Power Supply is also one of the problems. In Village Side, the power supply may vary. ● The Biggest Challenges Faced by IoT in the Agricultural Sector are Lack of Information, High Adoption, Cost and Security Concerns, etc
	Idea / Solution description	<ul style="list-style-type: none"> ● As is the case of precision Agriculture Smart Farming Technique Enables Farmers better to monitor the fields and maintain the humidity level accordingly. ● The Data collected by sensors, In terms of humidity, temperature, moisture, and dew detections help in determining the weather

		<p>pattern in Farms. So cultivation is done for suitable crops.</p>
	Novelty / Uniqueness	<p>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.</p> <p>REMOTE ACCESS – It helps the farmer to operate the motor from anywhere.</p>
	Social Impact / Customer Satisfaction	<ul style="list-style-type: none"> ● Reduces the wages for labors who work in the agricultural field. ● It saves a lot of time. ● IoT can help improve customer relationships by enhancing the customer's overall experience. ● Easily identify maintenance needs, build better products, send personalized communications, and more. ● IoT can also help e-

		<p>commerce businesses thrive and increase sales.</p> <ul style="list-style-type: none">● It make a wealthy society
	Business Model (Revenue Model)	<p>Revenue (No. of Users vs Months)</p> <p>User</p> <p>Months</p>

	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.
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3.4 Problem Solution fit

Project Title : SmartFarmer - IoT Enabled Smart Farming Application

Project Design - Solution Fit Phase- I

Team ID: PNT2022TMID31754

Define CS, fit into CC	1. Customer Segment(S) CS Who is your customer? i.e. working parents of 0-5 y.o. kids The customer for this product is a farmer who grows crops. Our goal is to help them, monitor field parameters remotely. This product saves agriculture from extinction.	6. Customer Constrains 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 Using many sensors is difficult. An unlimited or continuous internet connection is required for success.	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 The irrigation process is automated using IoT. Meteorological data and field parameters were collected and processed to automate the irrigation process.	Explore AS, differentiate
	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 cloud is used to store and transmit data using IoT. The Weather API is used to help farmers make decisions. Farmers can make decisions through mobile applications.	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? Frequent changes and unpredictable weather and climate made it difficult for farmers to engage in agriculture. These factors play an important role in deciding whether to water your plants. Fields are difficult to monitor when the farmer is not at the field, leading to crop damage.	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) 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				Focus on J&P, tap into BE, understand RC

4.REQUIREMENT ANALYSIS

4.1 Functional Requirement

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

4.2 Non-Functional Requirement

FR No.	Non-Functional Requirement	Description
NFR-1	Usability	Usability is defined as the ability to learn quickly, use something effectively, remember something,
		operate something without making a mistake, and enjoy something.
NFR-2	Security	Private and confidential information must be kept secure at all times, including during collection, processing, and storage.
NFR-3	Reliability	A superior cost-to-reliability trade-off is achieved with shared protection. To prevent agricultural service interruptions, the approach employs specialised and shared protection methods.

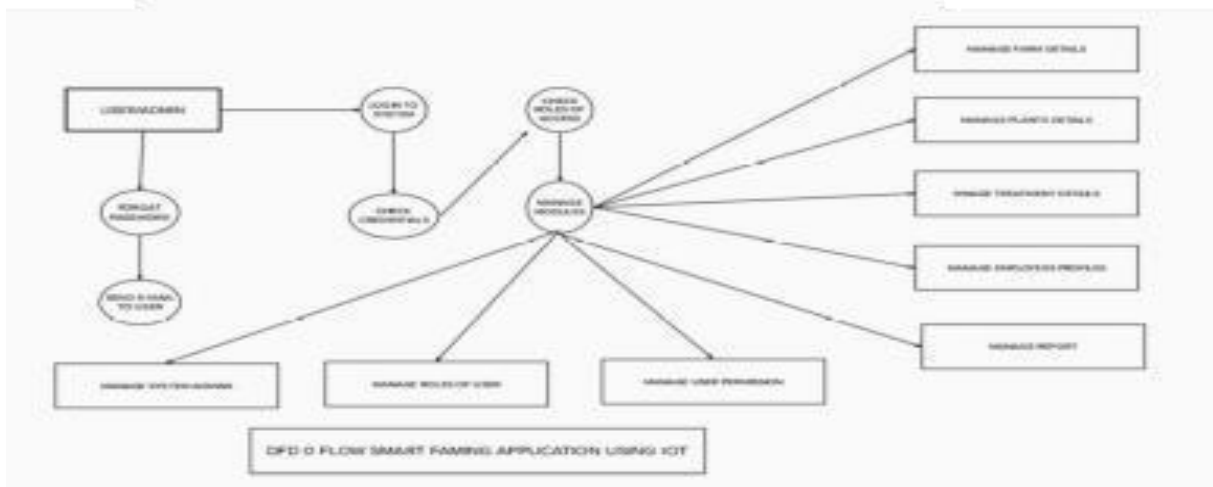
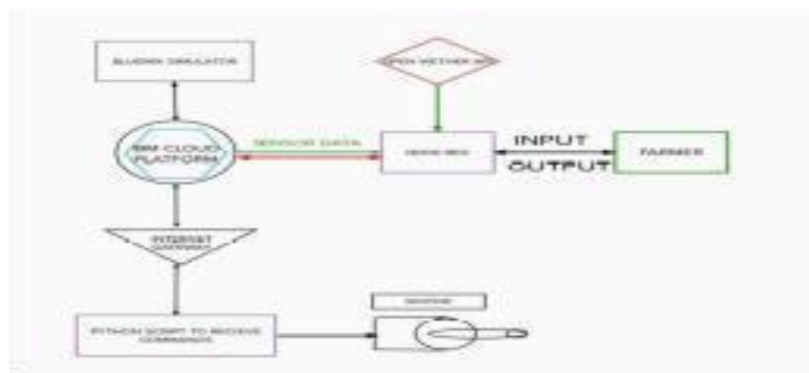
NFR-4	Performance	It will be more effective to monitor farming operations overall if integrated sensors are used to measure soil and ambient characteristics.
NFR-5	Availability	By tying information about crops, weather, and equipment together, it is feasible to automatically alter temperature, humidity, and other factors in farming equipment.

NFR-6	Scalability	For IoT platforms, scalability is a big challenge. It has been demonstrated that different IoT platform architectural decisions impact system scalability and that automatic real-time decision-making is possible in a setting with thousands of users.
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5.PROJECT DESIGN

5.1 Data Flow Diagrams

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



- The different soil parameters temperature, soil moistures and then humidity are

Sensed using different sensors and obtained value is stored in the ibm cloud.

- Aurdino UNO is used at a processing Unit that process the data obtained from the sensors and whether data from the weather API.
- NODE-RED is used as a programming tool to write the hardware ,software and APIs. The MQTT protocol is followed for the communication.
- All the collected data are provided to the user through a mobile application that was developed using the MIT app inventor. The user could make a decision through an app, weather to water the crop or not depending upon the sensor values. By using the app they can remotely operate to the motor switch.

5.2 Solution & Technical Architecture

The different soil parameters temperature, soil moistures and then humidity are sensed using different sensors and obtained value is stored in the IBM B2 cloud.

1. Arduino UNO is used as a processing Unit that process the data obtained from the sensors .The

different soil parameters temperature, soil moistures and then humidity are sensed using different sensors and obtained value is stored in the IBM B2 cloud.

2. Arduino UNO is used as a processing Unit that process the data obtained from the sensors and whether data from the weather API.
3. NODE-RED is used as a programming tool to write the hardware, software and APIs. The MQTT protocol is followed for the communication.
4. 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, weather to water the field or not depending upon the sensor values. By using the app they can remotely operate the motor switch.

Table-1 : Components & Technologies:

Component	Description	Technology
1. User Interface	How user interacts with application e.g. Web	MIT App Inventor
2. Application Logic-1	Logic for a process in the application	Python
3. Application Logic-2	Logic for a process in the application	IBM Watson IOT service

4. Application Logic-3	Logic for a process in the application	IBM Watson Assistant
5. Database	Data Type, Configurations etc.	MySQL, NoSQL, etc.
6. Cloud Database	Database Service on Cloud	IBM Cloud
7. File Storage	File storage requirements	IBM Block Storage or Other Storage
8. External API-1	Purpose of External API used in the application	Open Weather API
9. Infrastructure (Server / Cloud)	Application Deployment on Local System / Cloud Local Server Configuration: Cloud Server Configuration:	Local, Cloud Foundry.

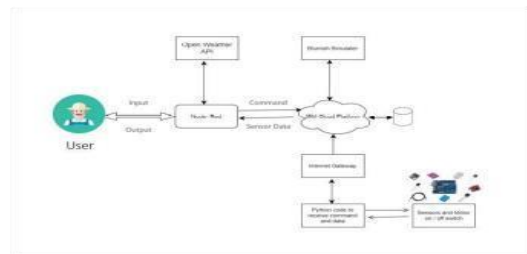
Table-2: Application Characteristics:

S.No	Characteristics	Description	Technology
1.	Open-Source Frameworks	List the open-source frameworks used	Technology of Opensource framework







2.	Security Implementations	Sensitive and private data must be protected from their production until the decision making and storage stages.	Node-Red, Open weather App API, MIT App Inventor
3.	Scalable Architecture	scalability is a major concern for IoT platforms. It has been shown that different architectural choices of IoT platforms affect system scalability and that automatic real time decision making is feasible in an environment composed of dozens of thousand.	Technology used

1. d whether data from the weather API.
2. NODE-RED is used as a programming tool to write the hardware, software and APIs. The MQTT protocol is followed for the communication.
3. 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, weather to water the field

or not depending upon the sensor values. By using the app they can remotely operate the motor switch.



5.3 User Stories

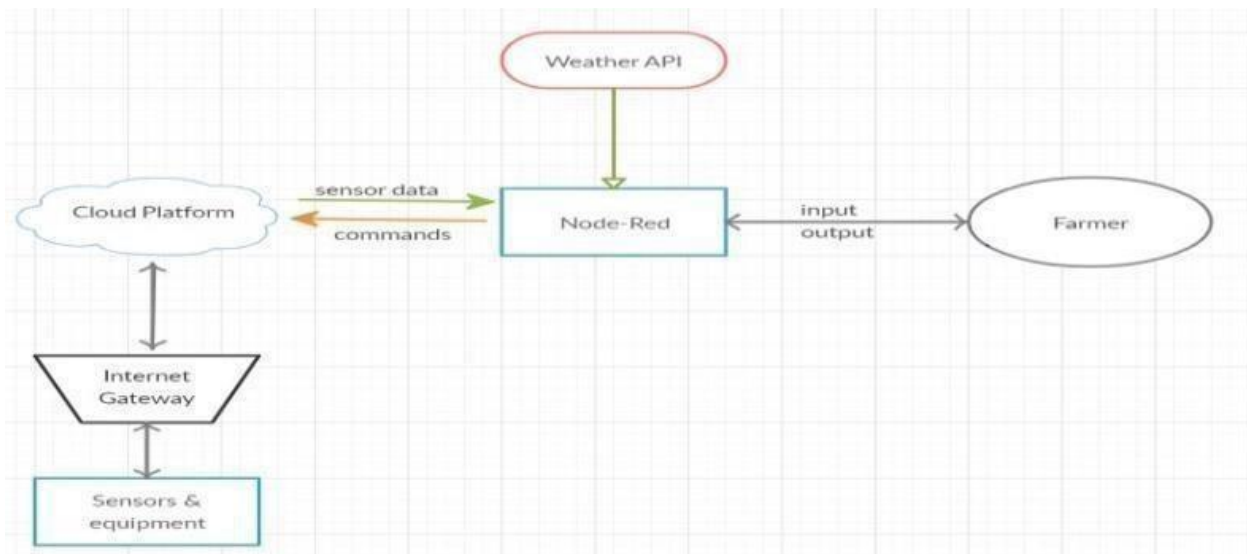
<p>SCENARIO</p> <p>Browsing, booking, attending, and rating a local city tour</p>	<p></p> <p>Entice</p> <p>How does someone initially become aware of this process?</p>	<p></p> <p>Enter</p> <p>What do people experience as they begin the process?</p>
<p></p> <p>Steps</p> <p>What does the person (or group) typically experience?</p>	<p>Opening App</p> <p>Visually treat will be there and widgets in arranged position for better experiences</p> <p>View details on sensor data</p> <p>Where data is represented in filling color in a bar or numeric value for better understanding</p> <p>Motor Control</p> <p>Providing switch style button to control the motor</p>	<p>Information about their land</p> <p>Get to know about their land</p> <p>More about sensor data</p> <p>When they click, they gets detailed info about it</p>
<p></p> <p>Interactions</p> <p>What interactions do they have at each step along the way?</p> <ul style="list-style-type: none"> ■ People: Who do they see or talk to? ■ Places: Where are they? ■ Things: What digital touchpoints or physical objects would they use? 	<p>Interaction with widgets for more info</p>	<p>Interaction with data</p>
<p></p> <p>Goals & motivations</p> <p>At each step, what is a person's primary goal or motivation? ("Help me..." or "Help me avoid...")</p>	<p>What's happening currently in my land</p>	<p>What we can do in the land</p> <p>Think about next step</p>
<p></p> <p>Positive moments</p> <p>What steps does a typical person find enjoyable, productive, fun, motivating, delightful, or exciting?</p>	<p>Users become productive</p> <p>Their work will be easy</p>	

6. Project Planning & Scheduling

6.1 Sprint Planning & Estimation

SPRINT OVERVIEW:

In order to implement the solution, the following approach as shown in the block diagram is used



IBM Watson IoT Platform

dineshshelvaraj80454@gmail.com

ID: 9lgg1

Browse

Action

Device Types

Interfaces

Add Device

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
event_1	{"Temperature":65,"Humidity":3,"Moisture":57}	json	a few seconds ago
event_1	{"Temperature":31,"Humidity":66,"Moisture":36}	json	a few seconds ago
event_1	{"Temperature":41,"Humidity":96,"Moisture":18}	json	a few seconds ago
event_1	{"Temperature":93,"Humidity":69,"Moisture":45}	json	a few seconds ago
event_1	{"Temperature":41,"Humidity":40,"Moisture":96}	json	a few seconds ago

>

637929

Disconnected

ESP32_Controller

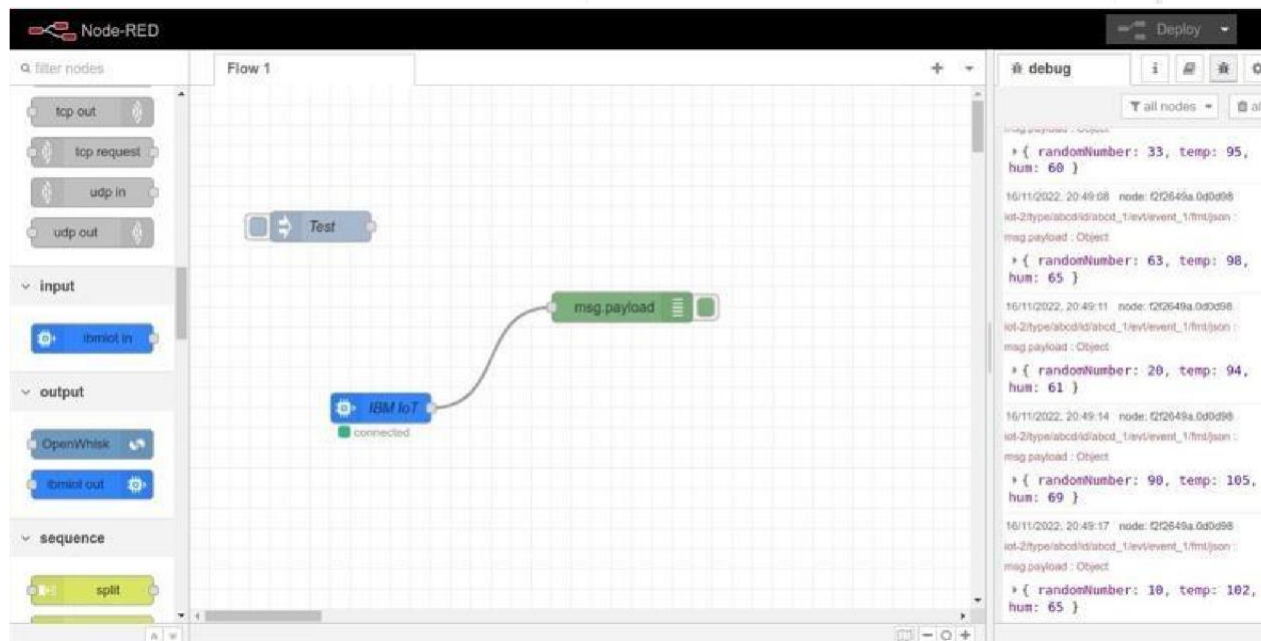
Device

16 Nov 2022 12:00

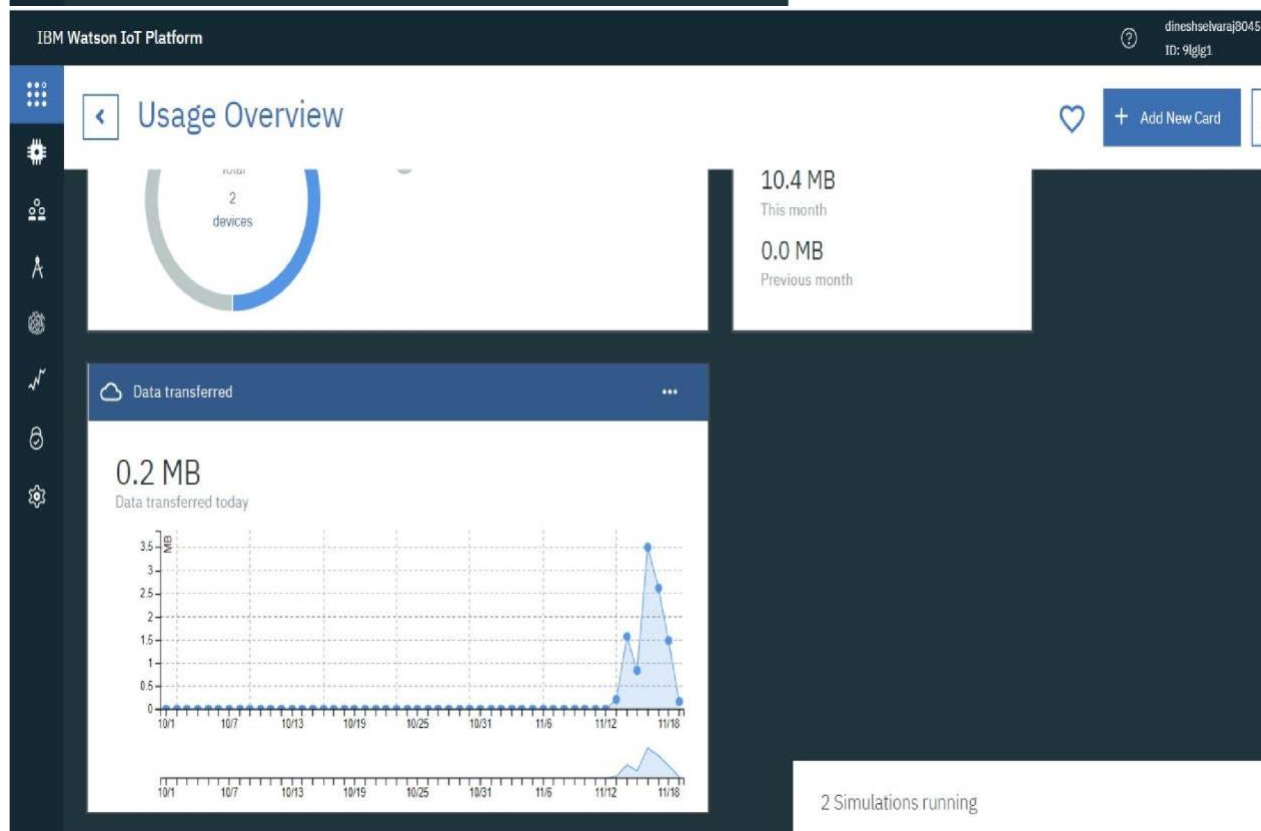
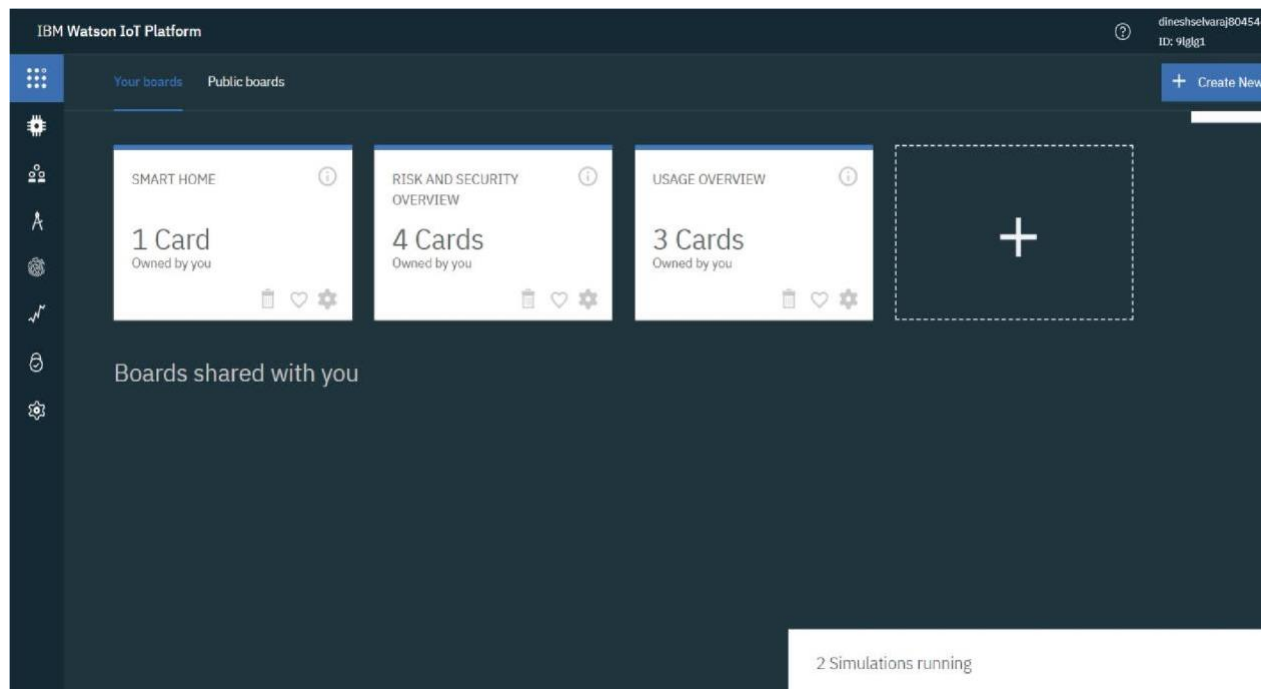
Items per page 50

1-2 of 2 items

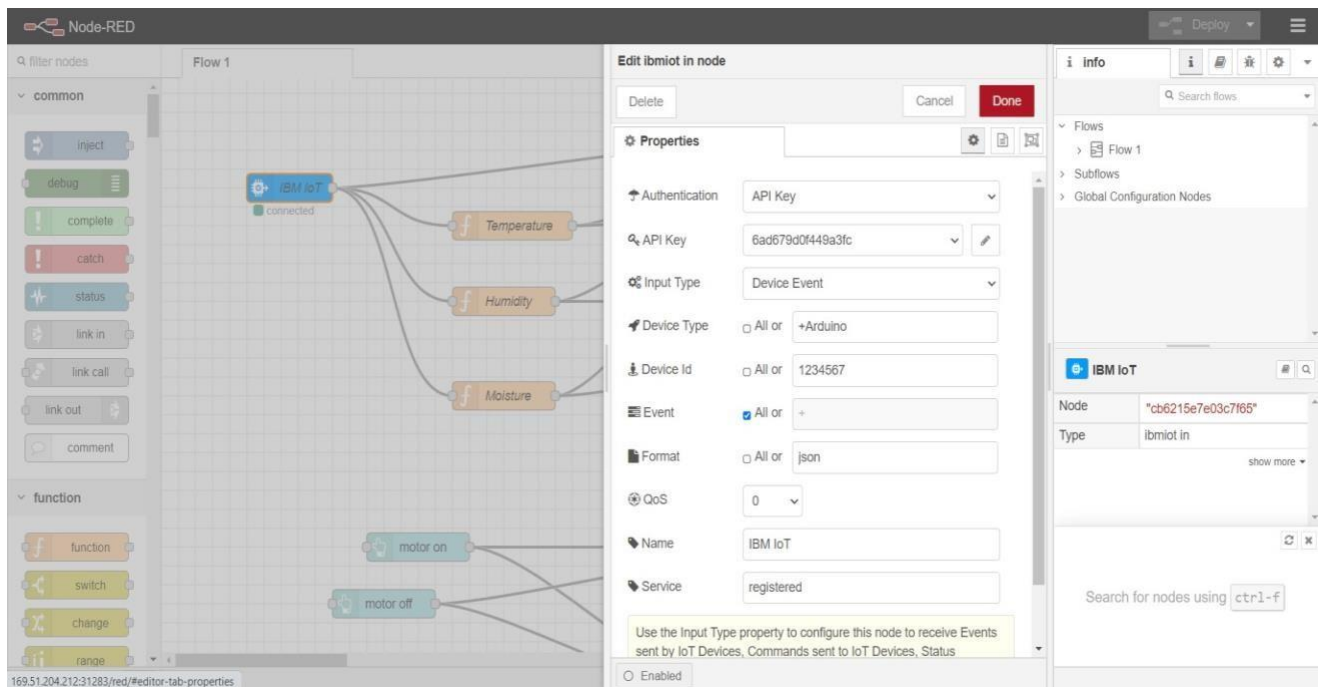
2 Simulations running



[illegible]



Configuration of Node-Red to send command to IBM cloud



Here we add two buttons in UI

1) for light on 2)for light off

We used a function node to analysis the data recevied and

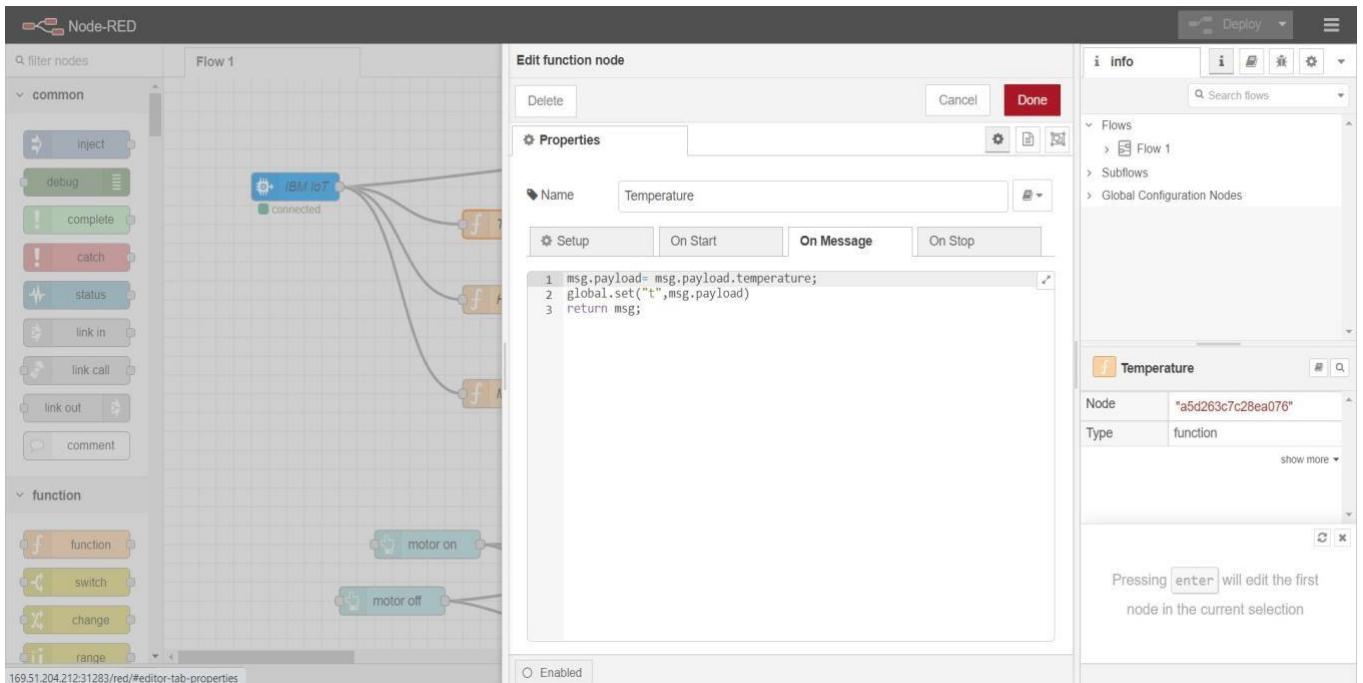
assign command to each number Java scrip code

for the analyses is:

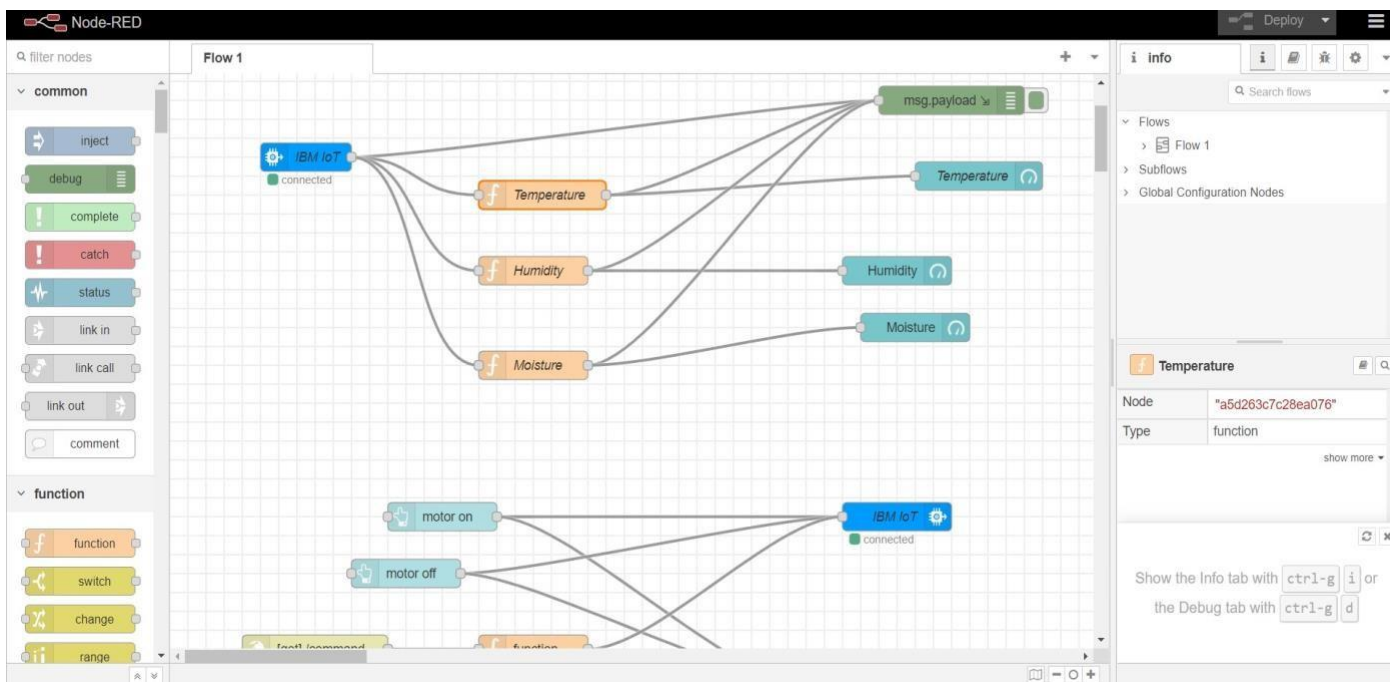
```

if(msg.payload==1)      msg.payload={"command":"ON"};
elseif(msg.payload==0)
    msg.payload={"command":"OFF"};

```

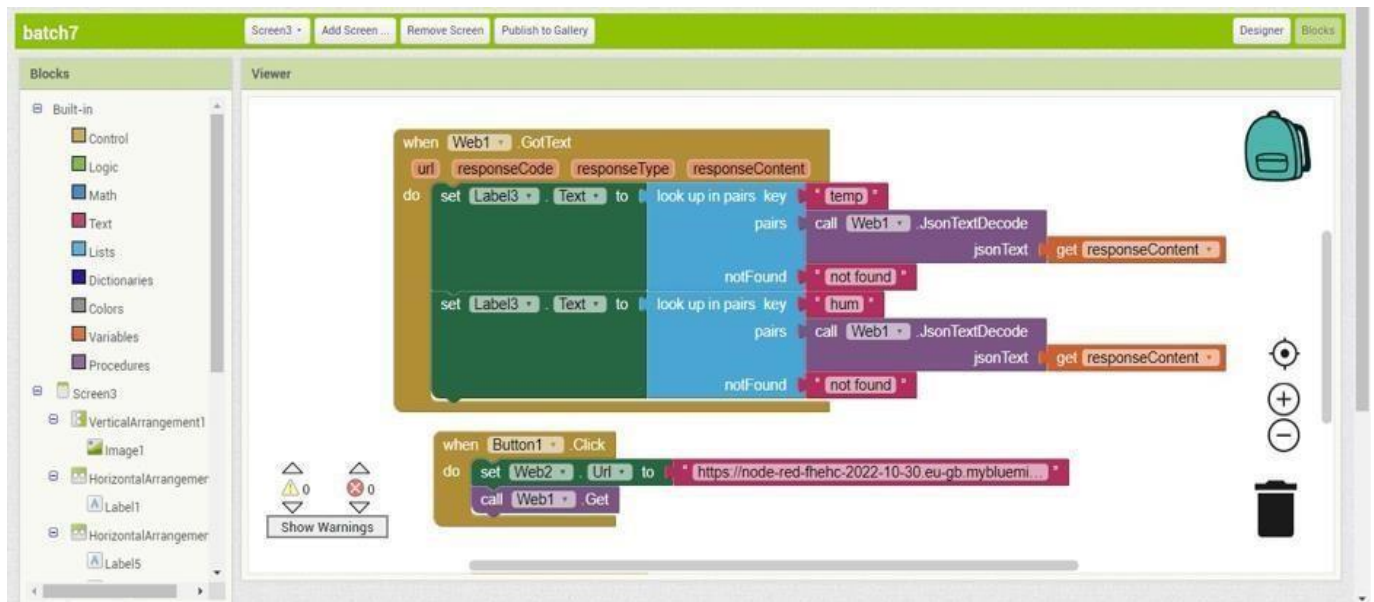


COMPLETE FLOW DIAGRAM:



MOBILE APP WEB:

BLOCK DIAGRAM



SCREEN 1



21:58

vol 0.24
LTE KB/s 4G



Humidity

41

Temperature

24

Moisture

34

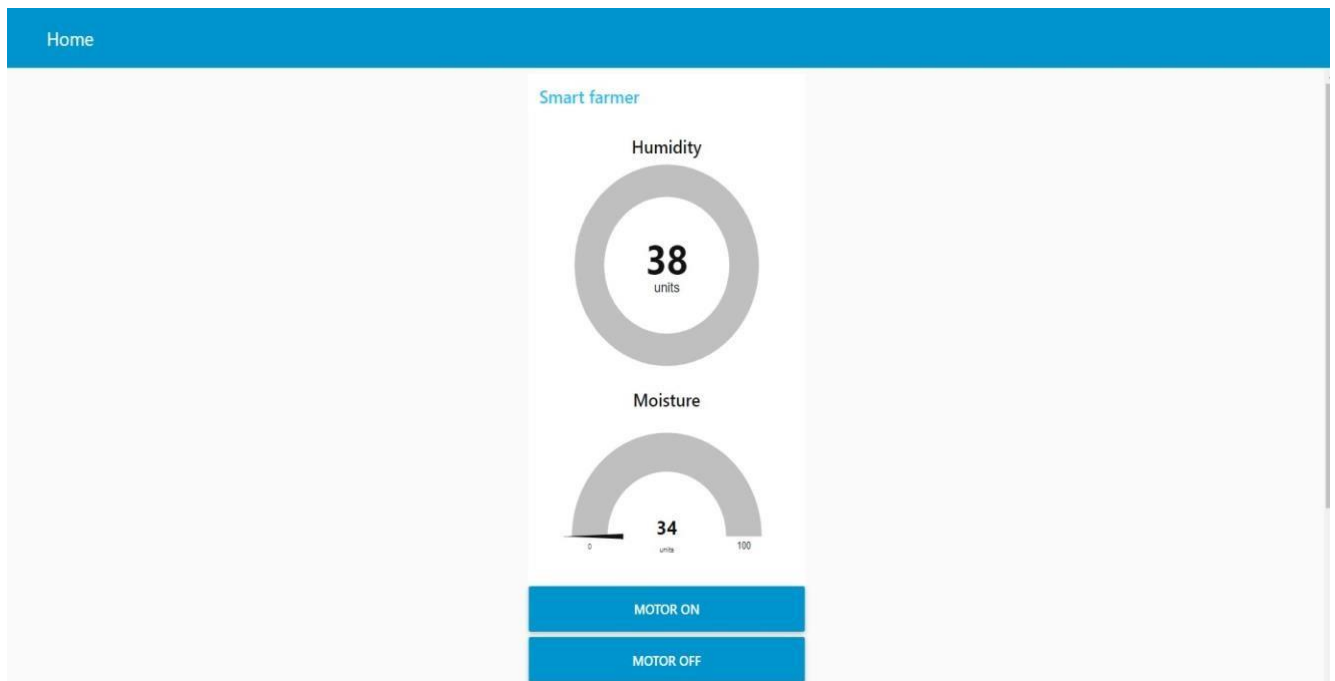
Motor Switch ON/OFF



Coimbatore, Tamilnadu

Sprint	Functional Requirement(Epic)	User Story Number	User Story/Task	Story Points	Priority	Team Member
Sprint-1	Registration(Farmer Mobile User)	UNS-1	As a user, I can register for the application by entering my email, password, and	2	High	Naren Krishna N A G (Leader)

Output



6.2 Sprint Delivery Schedule

1				confirming my password.			
	Sprint-1	Login	UNS-2	As a user, I will Receive confirmation email once I have registered for the application	1	High	Dinesh S (Member 1)

Sprint-2	User Interface	UNS-3	As a user, I can register for the application through Facebook	3	Low	Manoj N (Member 2)
Sprint-1	Data Visualization	UNS-4	As a user, I can register for the application through GMAIL	2	Medium	Manoj N (Member 2)

Sprint -2	Login	U SN - 2	As a registered user, I need to easily login log into my registered account via the webpage in minimum time	3	High	Naren Krishna N A (Leader)
Sprint -4	Web UI	U SN - 3	As a user, I need to have a friendly user interface to easily view and access the resources	3	Medium	Dinesh S (Member 1)

Sprint -1	Registration(Chemical Manufacturer - Web user)	U SN - 1	As a new user, I want to first register using my organization email and create a password for the account.	2	High	Anand Kumar S (Member 2)
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Sprint -4	Login	U SN - 2	As a registered user, I need to easily log in using the registered account via the web page.	3	High	V.K.Oviya (Member 3)
------------------	-------	----------------	--	---	------	-------------------------

Sprint	Total Story Points	Duration	Sprint Start Date	Sprint End Date(Planned)	Sprint Release Date(Actual)
Sprint1	12	6Days	24Oct2022	29Oct2022	29Oct2022
Sprint2	6	6Days	31Oct2022	05Nov2022	30OCT2022
Sprint3	6	6Days	07Nov2022	12Nov2022	6NOV 2022

Sprint4	6	6Days	14Nov2022	19Nov2022	7NOV 2022
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Velocity:

Sprint -1	Registration(Chemical Manufacturer- Mobile User)	USN -1	As a user, I want to first register using my email and create a password for the account.	1	High	Naren Krishna N A G (Leader)
Sprint -1	Login	USN -2	As a registered user,I need to easily log in to the application.	2	Low	Dinesh S (Member 1

AV for sprint 1= Sprint

Duration /velocity =12/6=2AV for sprint

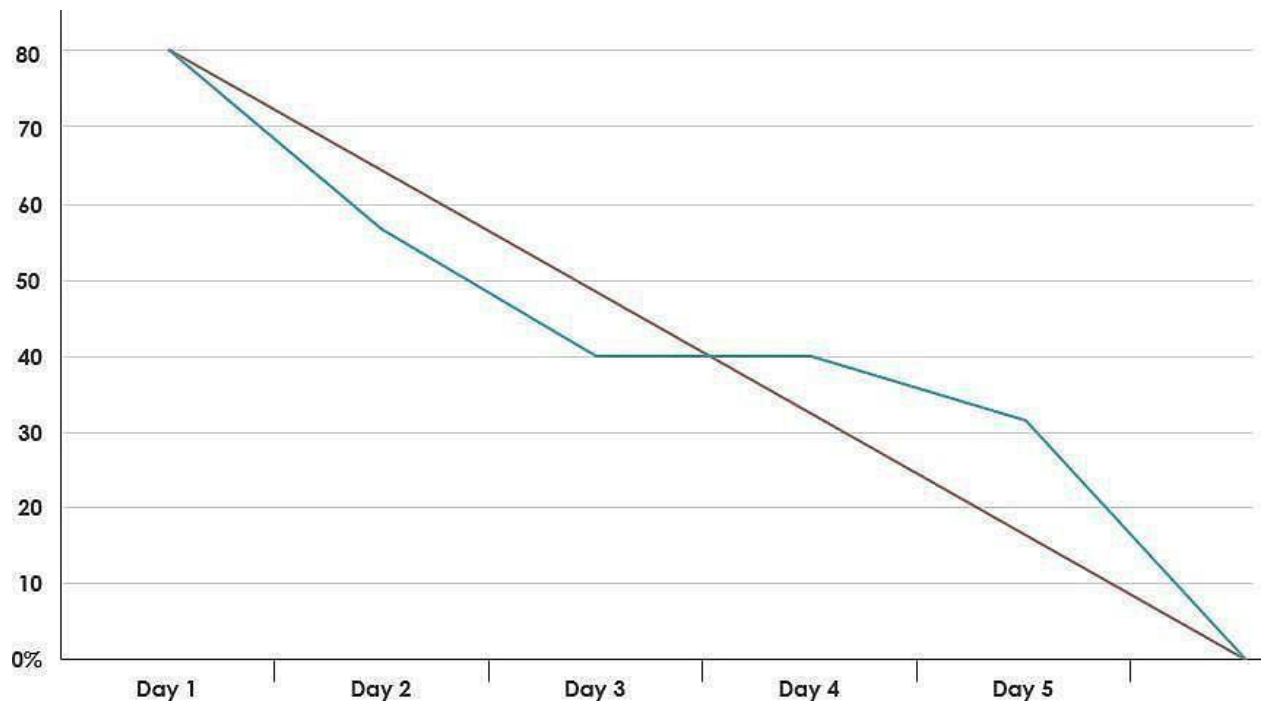
2= Sprint

Duration/Velocity=6/6=1AV for

Sprint 3=Sprint

Duration/Velocity=6/6=1AVfor

Sprint4=Sprint Duration/Velocity=6/6=1 **Burndown Chart:**



7 . CODING & SOLUTIONING

7.1 Feature 1

Receiving commands from IBM cloud using Python program

```
import time import sys
import ibmiotf.application
import ibmiotf.device
import random #Provide
your IBM Watson Device
Credentials organization
```



```
= " 9lg1" deviceType = " Arduino"
deviceId      =      "      1234567"
authMethod = " use-token- auth"
    authToken =
"123456789"
```

```
# Initialize GPIO
```

```
def myCommandCallback(cmd):    print("Command received:
%s" % cmd.data['command'])
status=cmd.data['command']    if status=="lighton":
print ("led is on")    else :
    print ("led is off")
```

```
#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)

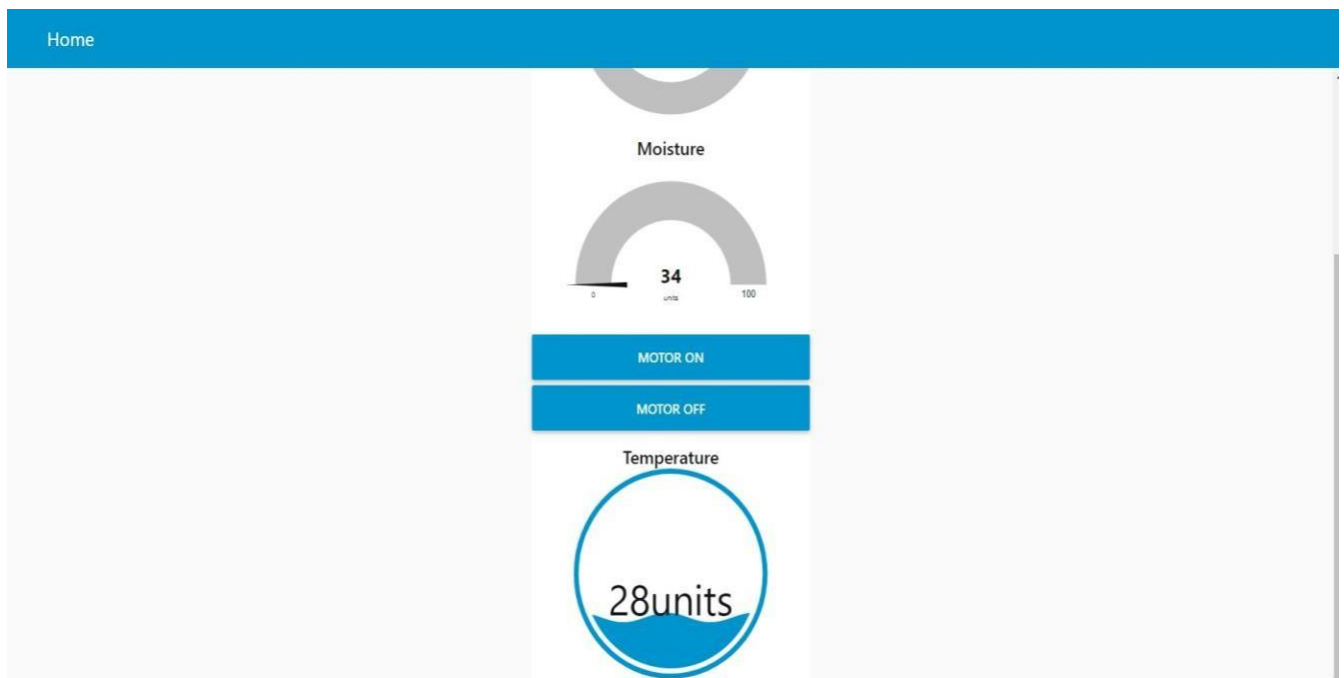
data = { 'temp' : temp, 'Humid': Humid }
#print data      def myOnPublishCallback():
    print ("Published Temperature = %s C" % temp, "Humidity = %s %" % Humid, "to
IBM Watson")

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

deviceCli.commandCallback = myCommandCallback

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

```



7.2 Feature 2

```
Python 3.7.0 Shell
File Edit Shell Debug Options Window Help
Python 3.7.0 (tags/v3.7.0:0000000, Jun 27 2019, 04:59:11) [AMD64] on win32
Type "copyright", "credits()" or "license()" for more information.
>>>
===== RESTART: C:\Users\Admin\Downloads\libm2tpublishsubscribe (1).py =====
2022-11-18 22:37:49,636 libm2tpublishsubscribe INFO Connected successfully: domain6123456789
Published Temperature = 2 C Humidity = 91 % to I2M Watson
Published Temperature = 12 C Humidity = 91 % to I2M Watson
Published Temperature = 57 C Humidity = 79 % to I2M Watson
Published Temperature = 89 C Humidity = 12 % to I2M Watson
Published Temperature = 71 C Humidity = 35 % to I2M Watson
Published Temperature = 73 C Humidity = 93 % to I2M Watson
Published Temperature = 100 C Humidity = 79 % to I2M Watson
Published Temperature = 23 C Humidity = 23 % to I2M Watson
```

8. Testing

8.1 Test Case

File Edit View Insert Format Styles Sheet Data Tools Window Help

Calibri 11 B I U A [Color Picker] [Bulleted List] [Numbered List] [Decrease Indent] [Increase Indent] [Align Left] [Align Center] [Align Right] [Justify] [Text Color] [Background Color] [Font Face] [Font Size] [Bold] [Italic] [Underline] [Link] [Unlink] [Image] [Table] [Chart] [Comment] [Review] [Help]

A12 fx Σ =

	A	B	C	D	E	F	G	H	I	J	K	L
					Name	Test ID						
					Description	Test Case ID						
					Pre-Requisite	Steps To Execute	Test Data	Expected Result	Actual Result	Status	Comments	TC Test Automation(Yes/No)
8	LoginPage_TC_003	Functional	Home page	Verify user is able to log into application with valid credentials		1.Enter URL(loginpage.jsp) and click on 2.Click on My Account dropdown button 3.Enter valid username(email id) as default test data 4.Enter valid password in password test box 5.Click on login button	username: shanzen@gmail.com password: Testing123	User should navigate to user account homepage				
9	LoginPage_TC_004	Functional	Login page	Verify user is able to log into app(home) with invalid credential.		1.Enter URL(loginpage.jsp) and click on 2.Click on My Account dropdown button 3.Enter Invalid email address(email id) as default test data 4.Enter valid password in password test box 5.Click on login button	username: shanzen@gmail.com password: Testing123	Validation should show "Invalid email or password" warning on message				
10	LoginPage_TC_004	Functional	Login page	Verify user is able to log into app(home) with invalid credential.		1.Enter URL(loginpage.jsp) and click on 2.Click on My Account dropdown button 3.Enter valid email address(email id) as default test data 4.Enter Invalid password in password test box 5.Click on login button	username: shanzen@gmail.com password: Testing123	Validation should show "Invalid email or password" warning on message				
11	LoginPage_TC_005	Functional	Login page	Verify user is able to log into app(home) with invalid credential.		1.Enter URL(loginpage.jsp) and click on 2.Click on My Account dropdown button 3.Enter Invalid email address(email id) as default test data 4.Enter Invalid password in password test box 5.Click on login button	username: shanzen@gmail.com password: Testing123	Validation should show "Invalid email or password" warning on message				

Sheet 1 of 2 PageStyle_Shopnizer Testcases English (India) Average: Sum: 0

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).

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	10	4	2	3	20
Duplicate	1	0	3	0	4
External	2	3	0	1	6
Fixed	11	2	4	20	37
Not Reproduced	0	0	1	0	1
Skipped	0	0	1	1	2
Won't Fix	0	5	2	1	8
Totals	24	14	13	26	77

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	7	0	0	7
Client Application	51	0	0	51
Security	2	0	0	2
Outsource Shipping	3	0	0	3

Exception Reporting	9	0	0	9
Final Report Output	4	0	0	4
Version Control	2	0	0	2

9.Result

9.1 Performance Metrics

21:58

Ver LTE 0.24 KB/s 4G : 



Humidity	41
Temperature	24
Moisture	34

Motor Switch ON/OFF



Coimbatore, Tamilnadu

```
Python 3.7.0 Shell
File Edit Shell Debug Options Window Help
Python 3.7.0 (tags/v3.7.0:0cc5041, Jun 27 2018, 04:09:51) [MSC v.1914 64 bit (AMD64)] on win32
Type "copyright", "credits" or "license()" for more information.
>>>
===== RESTART: C:\Users\Admin\Downloads\IHMiotPublishSubscribe II>.py =====
2022-11-17 22:17:40,636  IBMiot.Device.Client  INFO  Connected successfully: dsmurf@ibm123
Published Temperature = 2 C Humidity = 81 % to IBM Watson
Published Temperature = 12 C Humidity = 81 % to IBM Watson
Published Temperature = 17 C Humidity = 79 % to IBM Watson
Published Temperature = 33 C Humidity = 32 % to IBM Watson
Published Temperature = 71 C Humidity = 35 % to IBM Watson
Published Temperature = 73 C Humidity = 93 % to IBM Watson
Published Temperature = 100 C Humidity = 79 % to IBM Watson
Published Temperature = 23 C Humidity = 33 % to IBM Watson
```

10.Advantages & Disadvantages Advantages:

i)Farms can be monitored and controlled remotely.

ii) Increase in convenience to
farmers.

iii) Less labour cost.

iv) Better standards of living.

Disadvantages:

i) Lack of internet/connectivity issues.

ii) Added cost of internet and internet gateway infrastructure.

iii) Farmers wanted to adapt the use of Web App.

11. Conclusion

Thus the objective of the project to implement an IoT system in order to help farmers to control and monitor their farms has been implemented successfully.

12. Future Scope

Through collecting data from sensors using IoT devices, you will learn about the realtime state of your crops. The future of IoT in agriculture allows predictive analytics to help you make better harvesting decisions. InShot_20221118_112302897

Smart farming refers to managing farms using modern Information and communication technologies to increase the quantity and quality of products while optimizing the human labour required. Among the technologies available for present-day farmers are: Sensors: soil, water, light, humidity, temperature management.

IOT TECHNOLOGIES IN AGRICULTURE. IoT smart agriculture products are designed to help monitor crop fields using sensors and by automating irrigation systems.

As a result, farmers and associated brands can easily monitor the field conditions from anywhere without any hassle.

13. Appendix

Source code :

https://drive.google.com/drive/folders/1qEx536WIRNiwjeQ6K_3NX_Oyf1gyff9y **Links:**

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

Github link : <https://github.com/IBM-EPBL/IBM-Project-34289-1660233773>