NALAIYA THIRAN - IBM PROJECT REPORT

(19IT410T Professional Readiness for Innovation, Employability and Entrepreneurship)

ON

SMART FRAMER-IOT ENABLED SMARTFRAMING APPLICATION

Submitted by

TEAM ID: PNT2022TMID23394

KAAVYA E (113219031065)

NIKITHA K (113219031100)

SANGEETHA V P (113219031129)

SINDHUJA B (113219031141)

SIVAPRIYA P (113219031143)

in partial fulfillment for the award of the degree of

BACHELOR OF ENGINEERING

IN

COMPUTER SCIENCE AND ENGINEERING

VELAMMAL ENGINEERING COLLEGE, CHENNAI-66.

(An Autonomous Institution, Affiliated to Anna University, Chennai)

2022-2023

VELAMMAL ENGINEERING COLLEGE
CHENNAI -66

(An Autonomous Institution, Affiliated to Anna University, Chennai)

BONAFIDE CERTIFICATE

Certified that this NALAIYA THIRAN – IBM PROJECT REPORT **“SMART FRAMER-IOT ENABLEDSMARTFRAMING APPLICATION”** is the Bonafide work of “KAAVYA E (113219031065), NIKITHA K (113219031100), SANGEETHA V P (113219031129), SINDHUJA B (113219031141) and SIVAPRIYA P (113219031143)” carried out in “PROFESSIONAL READINESS FOR INNOVATION, EMPLOYABILITY AND ENTREPRENEURSHIP (NALAIYA THIRAN-IBM PROJECT)**”** during the Academic Year 2022-2023.

FACULTY EVALUATOR	**HEAD OF THE DEPARTMENT**
Dr.S.GUNASUNDARI	**DR. B.MURUGESHWARI**
Associate Professor	**Professor and Head**
Dept. of Computer Science Engineering	Dept. of Computer Science and Engineering
Velammal Engineering College	Velammal Engineering College
Chennai-600 066	Chennai-600 066

PROJECT REPORT

CHAPTER 1

INTRODUCTION

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. The farmers do not have that much knowledge on the internet of things and good internet connection is required. So, farmers don't know how to use the web application and to make a connection if any component get failed.

IOT is network that connects physical objects or things embedded with electronics, software and sensors through network connectivity that collects and transfers data using cloud for communication. IOT- Enabled Smart Farming agriculture system helps the farmer in monitoring different parameters of his field like soil moisture, temperature, humidity using some sensors. Farmer 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 task for the farmers. They can make the decision whether to water the crop or postpone it by monitoring the sensor parameters and control the motor pumps from the mobile application itself. Data is transferred through internet without human to human or human to computer interaction. All the sensor parameters are stored in the IBM Cloudant DB.

IoT based farming improves the entire agriculture system by monitoring the field in real-time. With the help of IoT in agriculture not only saves the time but also reduces the extravagant use of resources such as water and electricity. Sometimes due to over or less supply of water in the agricultural field crops may not grow proper. Using IoT supply of water and growth of plants can be satisfied to a greater extent. The flow of water can be controlled from the application. Smart agriculture is a farming system which uses IoT technology. This emerging system increases the quantity and quality of agricultural products. IoT devices provide information about nature of farming fields and then take action depending on the farmer input.

The main goal of my project is to use IoT in the agriculture field in order to collect data instantly (soil Moister, temperature, humidity…), which will help one to monitor some environment conditions remotely, effectively and enhance tremendously the production and therefore the income of farmers. The present prototype is developed using Arduino technology, which comprise specific sensors, and a WIFI module that helps to collect instant data online. Worth mentioning the testing of this prototype generated, highly accurate data because while we were collecting them remotely any environmental changes were detected instantly and taking in consideration to make decisions.

In this project we have not used any hardware. Instead of real soil and temperature conditions, sensors IBM IoT Simulator is used which can transmit soil moisture temperature as required.

1.1 PROJCT REQUIREMENTS:

Node-RED, IBM Cloud, IBM Watson IoT, Node.js, IBM Device, IBM IoT Simulator, Python 3.7, Open Weather API platform.

Project Deliverables:

Application for IoT based Smart Agriculture System

CHAPTER 2

LITERATURE SURVEY

Sensor Based Smart Agriculture with IoT Technologies by M. Pyingkodi, K.Thenmozhi, K.Nanthini, M. Karthikeyan, Suresh Palarimath, V. Erajavign (2022) stated that IoT is a new technology trend used in almost every area thing, when connected to the internet and to each other, when you connect to the internet or interconnect, your entire system will be smarter. We have used IoT in all areas of our lives, including smart cities, smart homes, and smart retail. Much more. From 9.6 billion by 2050, agriculture needs to deliver even faster to meet this type of demand. This is possible with the latest technology, especially the IoT. The IoT enables labour free farms. The most significant tool for the IoT is the sensor. The important objective of sensors are used to determine the soil's physical qualities and the environment. The main applications of sensors are control and supervise, safety, alarm, diagnostics, and analytics. Sensors make innovative agriculture more effective and trouble-free. In agriculture, the sensor is mainly used for measuring, measuring NPK (Nitrogen, Phosphorus, Potassium) levels, and detecting disease and soil moisture content. The main solution to this problem is smart farming, which modernizes traditional farming practices. This paper narrates the role of IoT application in smart agriculture. Smart farming is also known as precision farming hence it uses accurate information to draw outcomes. It demonstrates the different sensors, applications, challenges, strengths and weaknesses that support the IoT and agriculture.

Smart Farm Monitoring Using LoRa Enabled IoT published by Ravi Kishore Kodali, Subbachari Yerroju, Shubhi Sahu (2019). Agricultural practices need to be transformed in order to overcome future food scarcity due to overpopulation across the globe. By employing emerging, disruptive technologies like IoT in the agricultural sector, it is possible to monitor farm fields using low-cost and low-power consuming devices, to automate irrigation systems for efficient usage of water resources. Weather forecast using IoT can help to plan farm filed activities like sowing, harrowing, harvesting, etc. This reduces negative impacts like yield losses due to uncertain weather changes. LPWAN technologies serve IoT applications in a better possible way so that these applications can overcome bandwidth, power and coverage constraints which are main drawbacks in other wireless communication technologies. In agricultural fields, LoRaWAN protocol or LoRa in LPWAN space gives additional advantages like scalability, security and robustness in designing IoT applications. In this paper, a smart farm monitoring model is proposed. This model utilizes LoRa communication mechanism to send sensor data like temperature (°C), humidity (%) and soil moisture (%) from the transmitter node to receiver node. The receiving node which is Wi-Fi enabled uses MQTT services to monitor the data in IBM Watson IoT platform and to store the same data in IBM cloud DB service.

Towards Smart Agriculture Monitoring Using Fuzzy Systems published by Noramalina Abdullah, Noor Aerina Binti Durani, King Soon Siong, Mohamad Farid Bin Shari, Vicky Kong Wei Hau, Wong Ngei Siong Ir Khairul Azman Ahmad (2020). Conventional farming is labor-consuming and the need to continuously monitor crops can be a burden for farmers. By realizing the concept of smart farming based on Internet of Things (IoT) technology, farmers can use a mobile application to observe and monitor air humidity, air temperature, and soil moisture-factors that can affect plant growth. Furthermore, the use of timers to control the pumps in conventional watering systems is not always practical in real-life cases. This paper proposes a framework that enables advanced fuzzy logic to control a pump's switching time according to user-defined variables, whereby sensors are the main aspect of and contributor to the system. Our proposed idea offers great potential for excellent performance as an interface between the sensors as the input and the IoT as the output medium. A comparison is made between the proposed system and manual handling. The results prove that the water consumption and watering time has been reduced significantly.

The world population growth is increasing the demand for food production stated in the paper named “A Systematic Review of IoT Solutions for Smart Farming” by Emerson Navarro,Nuno Cost,António Pereira(2020). Furthermore, the reduction of the workforce in rural areas and the increase in production costs are challenges for food production nowadays. Smart farming is a farm management concept that may use Internet of Things (IoT) to overcome the current challenges of food production. This work uses the preferred reporting items for systematic reviews (PRISMA) methodology to systematically review the existing literature on smart farming with IoT. The review aims to identify the main devices, platforms, network protocols, processing data technologies and the applicability of smart farming with IoT to agriculture. The review shows an evolution in the way data is processed in recent years. Traditional approaches mostly used data in a reactive manner. In more recent approaches, however, new technological developments allowed the use of data to prevent crop problems and to improve the accuracy of crop diagnosis.

2.1 REFERNCE:

[1] Divya J., Divya M.,Janani V.”IoT based Smart Soil Monitoring System for Agricultural Production” 2017.

[2] H.G.C.R.Laksiri, H.A.C.Dharmagunawardhana, J.V.Wijayakulasooriya ”Design and Optimization of loT Based Smart Irrigation System in Sri Lanka”2019 .

[3] Anushree Math, Layak Ali, Pruthviraj U” Development of Smart Drip Irriga- tion System Using IoT”2018.

[4] Dweepayan Mishra1, Arzeena Khan2 Rajeev Tiwari3, Shuchi Upadhay,” Automated Irrigation System-IoT Based Approach”,2018.

[5] R. Nageswara Rao, B.Sridhar,”IOT BASED SMART CROP-FIELD MONI- TORING AND AUTOMATION IRRIGATION SYSTEM”. 2018

[6] Shweta B. Saraf, Dhanashri H. Gawal,” IoT Based Smart Irrigation Monitoring and Controlling System”.2017

[7] Shrihari M”, A Smart Wireless System to Automate Production of Crops and Stop Intrusion Using Deep Learning” 2020.

[8] G. Sushanth1, and S. Sujatha”, IOT Based Smart Agriculture System”2018.

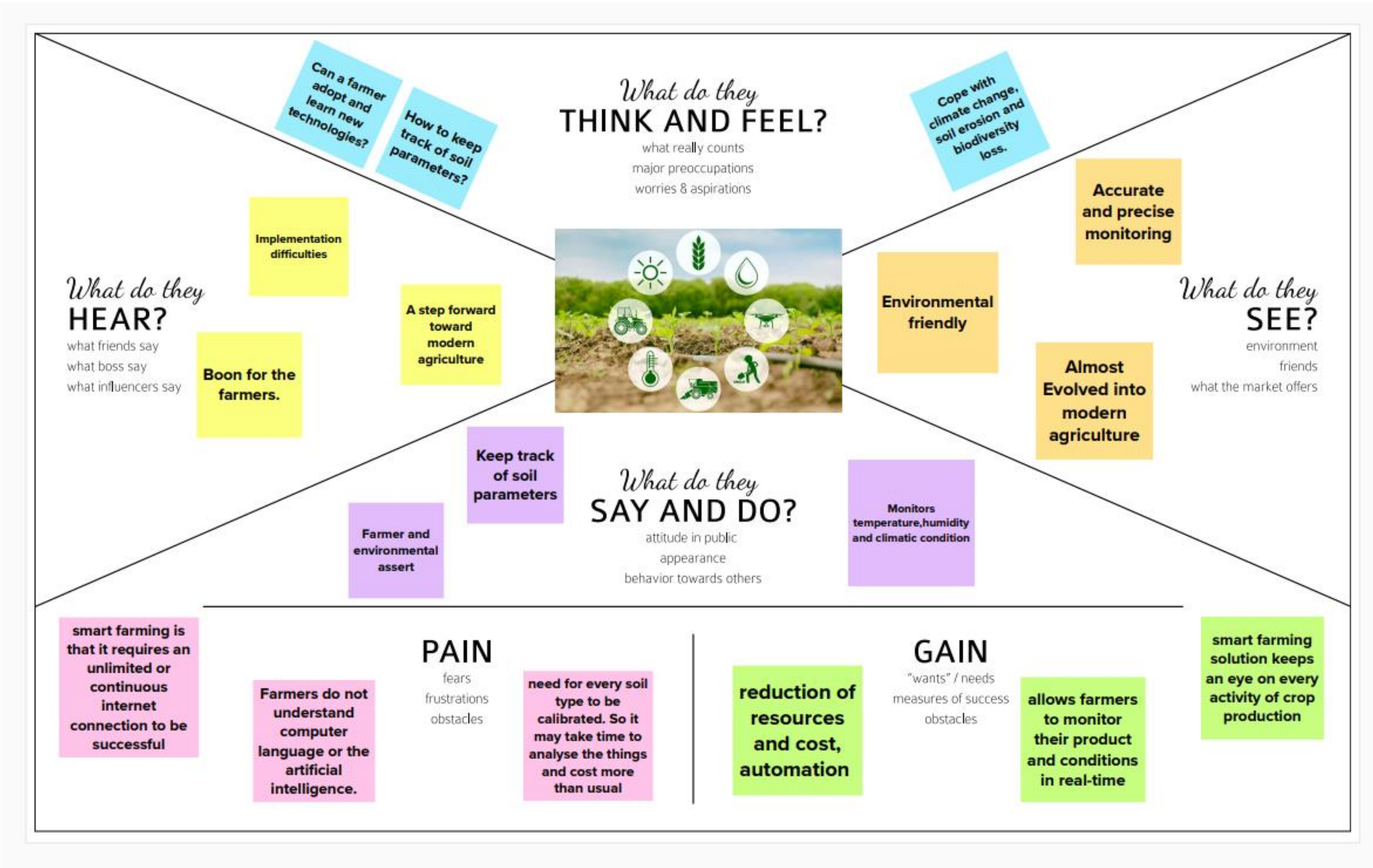
[9] Vaishali S, Suraj S, Vignesh G, Dhivya S and Udhayakumar S,” Mobile Integrated Smart Irrigation Management and Monitoring System Using IOT”,2017

CHAPTER 3
PROPOSED METHOD

3.1 EMPATHY MAP CANVAS:

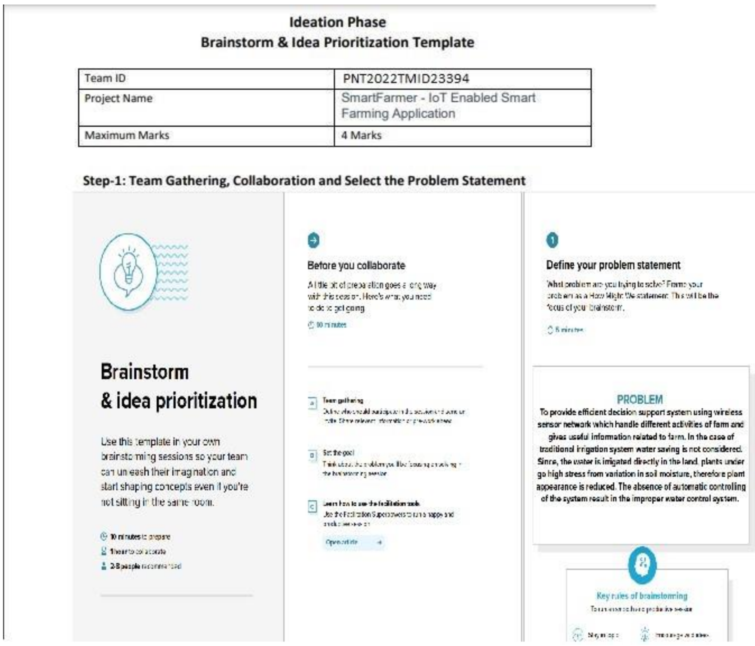
An empathy map is a simple, easy-to-digest visual that captures knowledge about a user's behaviours and attitudes. It is a useful tool to helps teams better understand their users. Creating an effective solution requires understanding the true problem and the person who is experiencing it. The exercise of creating the map helps participants consider things from the user's perspective along with his or her goals and challenges

Empathy Map

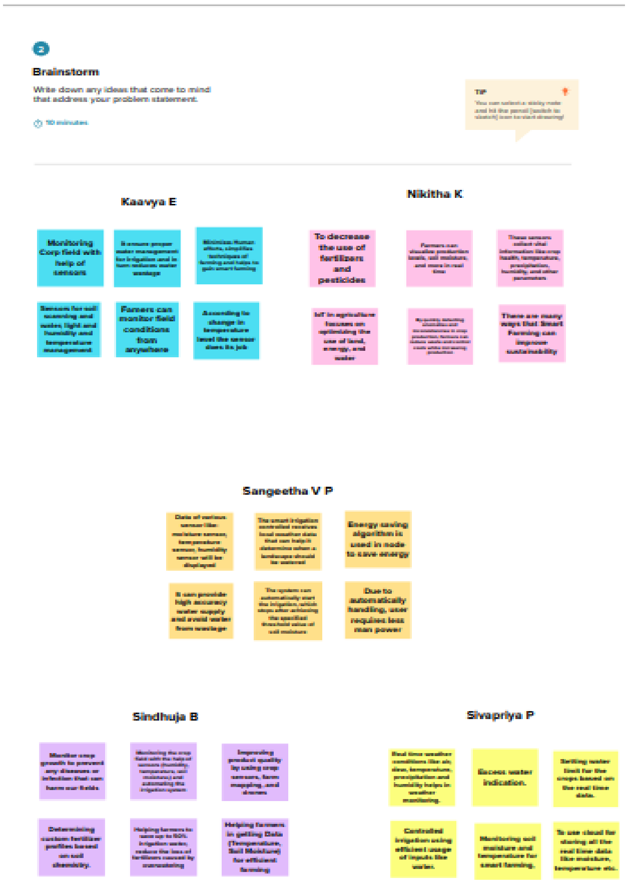


3.2 IDEATION AND BRAINSTROMING:

Step-1: Team Gathering, Collaboration and Select the Problem Statements:



Step-2: Brainstorm, Idea Listing and Grouping



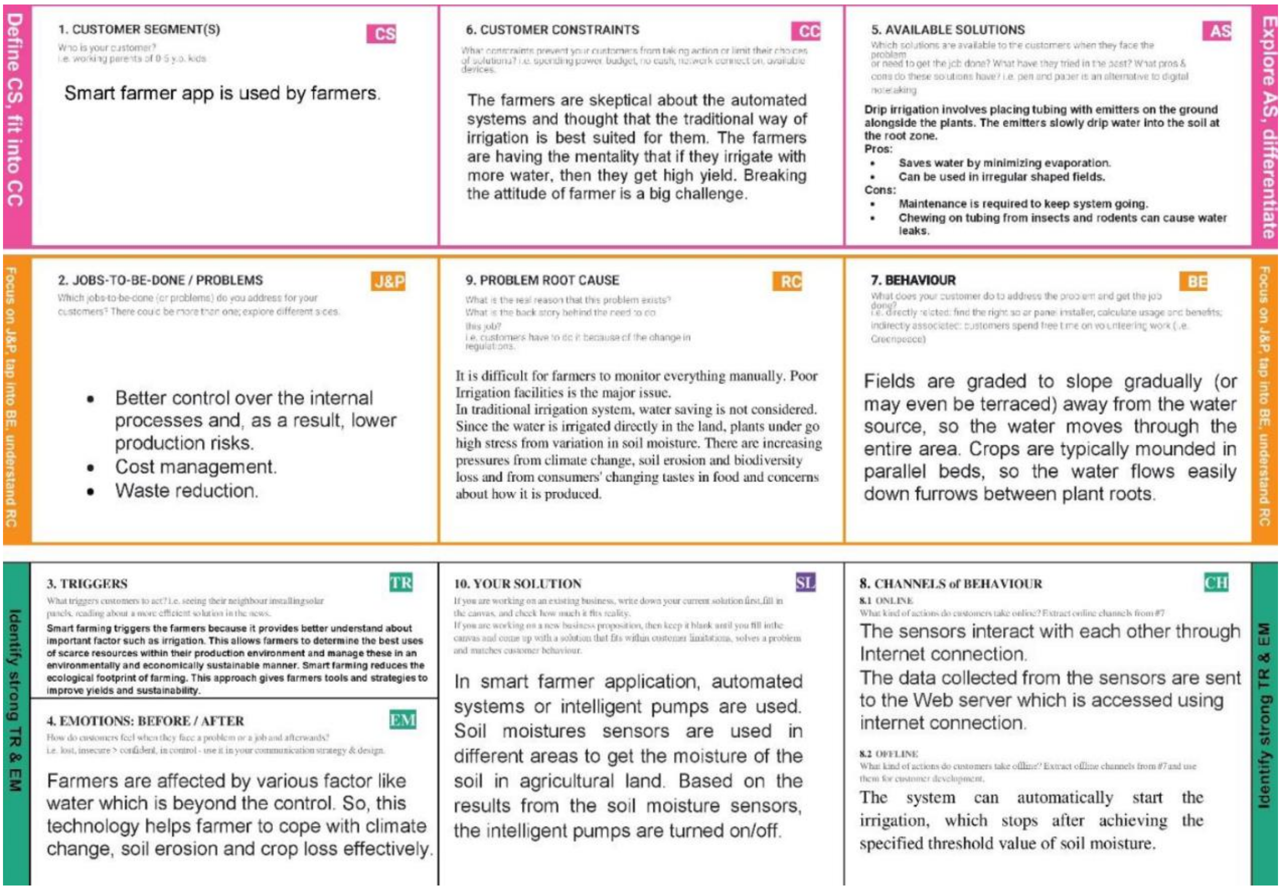
Step-3: Idea Prioritization

3.3 PROPOSED SOLUTION:

S.No	Parameter	Description
1.	Problem Statement (Problem to besolved)	To provide efficient decision support system using wireless sensor network which handle different activities of farm and gives useful information related to farm. In the case of traditional irrigation system water saving is not considered. Since, the water is irrigated directly in the land, plants under go high stress from variation in soil moisture, therefore plant appearance is reduced. The absence of automatic controlling of the system result in the improper water control system.
2.	Idea / Solution description	In smart farmer application, automated systems or intelligent pumps are used. Soil moistures sensors are used in different areas to get the moisture of the soil in agricultural land. Based on the results from the soil moisture sensors, the intelligent pumps are turned On/Off.
3.	Novelty / Uniqueness	IoT in agriculture focuses on optimizing the use of land, energy, and water. It is possible to quickly collect real-time data for varied sensors in the field. Farmers use the data to make accurate decisions and accurately allocate enough resources for farming efficiency. 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.

4.	Social Impact / Customer Satisfaction	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.
5.	Business Model (Revenue Model)	A popular IoT business model is the data-driven model powered by the data generated by your devices. You build a product that provides value to customers and collects data that you can use for other products or sell to a third party.
6.	Scalability of the Solution	Scaling IoT projects challenges organizations' approach to such setups and existing architecture. It requires much more than additional sensors attached to more machines. IoT leaders must ensure their team and architecture can handle the increased connected devices and influx of data.

3.4 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

Smart farmer app is used by farmers.

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.

The farmers are skeptical about the automated systems and thought that the traditional way of irrigation is best suited for them. The farmers are having the mentality that if they irrigate with more water, then they get high yield. Breaking the attitude of farmer is a big challenge.

5. AVAILABLE SOLUTIONS AS

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

Drip irrigation involves placing tubing with emitters on the ground alongside the plants. The emitters slowly drip water into the soil at the root zone.

Pros:

- **Saves water by minimizing evaporation.**
- **Can be used in irregular shaped fields.**

Cons:

- **Maintenance is required to keep system going.**
- **Chewing on tubing from insects and rodents can cause water leaks.**

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.

- Better control over the internal processes and, as a result, lower production risks.
- Cost management.
- Waste reduction.

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.

It is difficult for farmers to monitor everything manually. Poor Irrigation facilities is the major issue.
In traditional irrigation system, water saving is not considered. Since the water is irrigated directly in the land, plants under go high stress from variation in soil moisture. There are increasing pressures from climate change, soil erosion and biodiversity loss and from consumers' changing tastes in food and concerns about how it is produced.

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)

Fields are graded to slope gradually (or may even be terraced) away from the water source, so the water moves through the entire area. Crops are typically mounded in parallel beds, so the water flows easily down furrows between plant roots.

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

Identify strong TR & EM

3. TRIGGERS TR

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

Smart farming triggers the farmers because it provides better understand about important factor such as irrigation. This allows farmers to determine the best uses of scarce resources within their production environment and manage these in an environmentally and economically sustainable manner. Smart farming reduces the ecological footprint of farming. This approach gives farmers tools and strategies to improve yields and sustainability.

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.

Farmers are affected by various factor like water which is beyond the control. So, this technology helps farmer to cope with climate change, soil erosion and crop loss effectively.

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.

In smart farmer application, automated systems or intelligent pumps are used. Soil moistures sensors are used in different areas to get the moisture of the soil in agricultural land. Based on the results from the soil moisture sensors, the intelligent pumps are turned on/off.

8. CHANNELS of BEHAVIOUR CH

8.1 ONLINE

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

The sensors interact with each other through Internet connection.
The data collected from the sensors are sent to the Web server which is accessed using internet connection.

8.2 OFFLINE

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

The system can automatically start the irrigation, which stops after achieving the specified threshold value of soil moisture.

Identify strong TR & EM

CHAPTER 4
REQUIREMENT ANALYSIS

4.1 FUNCTIONAL REQUIREMENTS:

FR No.	Functional Requirement (Epic)	Sub Requirement (Story / Sub-Task)
FR-1	User Registration	Registration through Phone number
FR-2	User Confirmation	Confirmation via Phone Number Confirmation via OTP
FR-3	Observation	Sensors record observational data from the, soil, temperature, humidity and atmosphere.
FR-4	Diagnosis	The sensor values are fed to a cloud-hosted IoT platform that ascertain the condition of the examined object and identify the needs.
FR-5	Action	Shows the real time data and when the soil moisture content is reduced the water pump irrigate the field until the required moisture is achieved.
FR-6	Monitor	User can monitor the data online from anywhere

Above are the functional requirements of the proposed solution.

4.2 NON-FUNCTIONAL REQUIREMENTS:

Following are the non-functional requirements of the proposed solution.

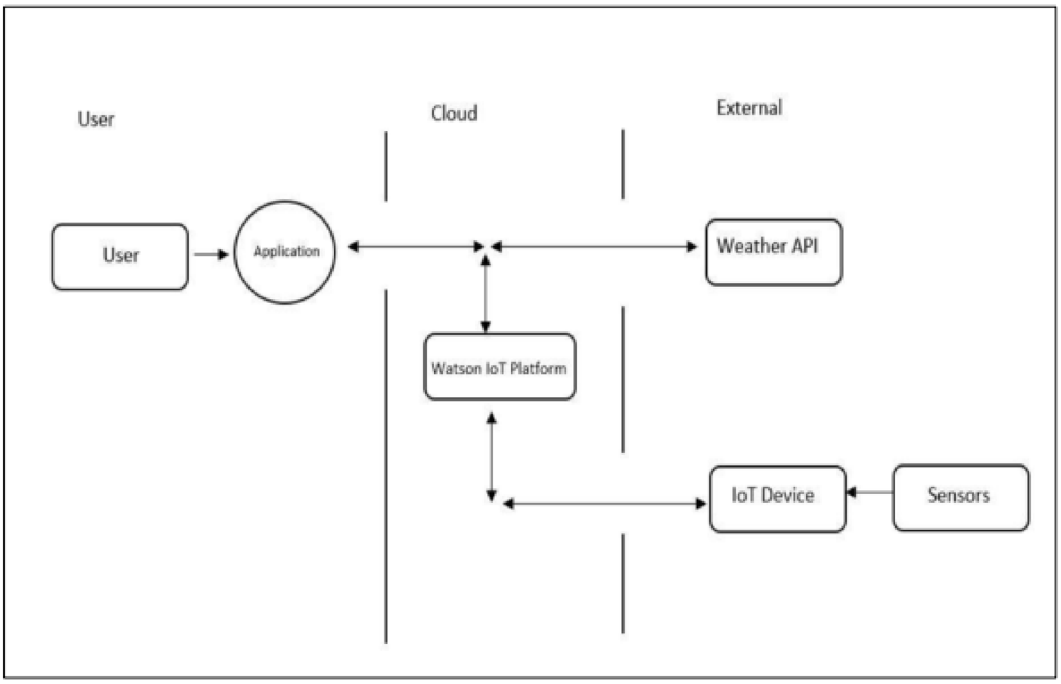
FR No.	Non-Functional Requirement	Description
NFR-1	**Usability**	Usability includes easy understanding and efficiency in use. With real-time monitoring and analytics systems, data collected by smart sensors allows farmers to better control processes.
NFR-2	**Security**	Device and data security includes authentication of devices and confidentiality.
NFR-3	**Reliability**	Smart farming platforms require reliable and robust technologies such as the physical safety of IOT devices for precision agricultural systems should be ensured in different environmental conditions to avoid communication failures.

NFR-4	**Performance**	High performance which includes the recurrent tasks on the field can be replaced by automatized modes of monitoring.
NFR-5	**Availability**	Automatic adjustment of farming equipment made possible by linking information like weather
NFR-6	**Scalability**	Automatic real time decision -making system is feasible in an environment composed of sensors continuously transmitting the real time data efficiently.

CHAPTER 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.



1. The different soil parameters like temperature, soil moisture and humidity are sensed using different sensors and obtained values are stored in the IBM cloud.
2. Arduino UNO is used as a processing Unit that process the data obtained from the sensors and data from the weather API.
3. NODE-RED is used as a programming tool to write the hardware, software and APIs.
4. The MQTT protocol is followed for communication process. Communicating between cloud and the user (Farmer).
5. All the collected data are provided to the user through a mobile application that was developed using the MIT app inventor

5.2 SOLUTION AND TECHNICAL ARCHITECTURE:

• The various factors like temperature, soil moisture level, humidity are measured using various sensor and are stored in IBM cloud.

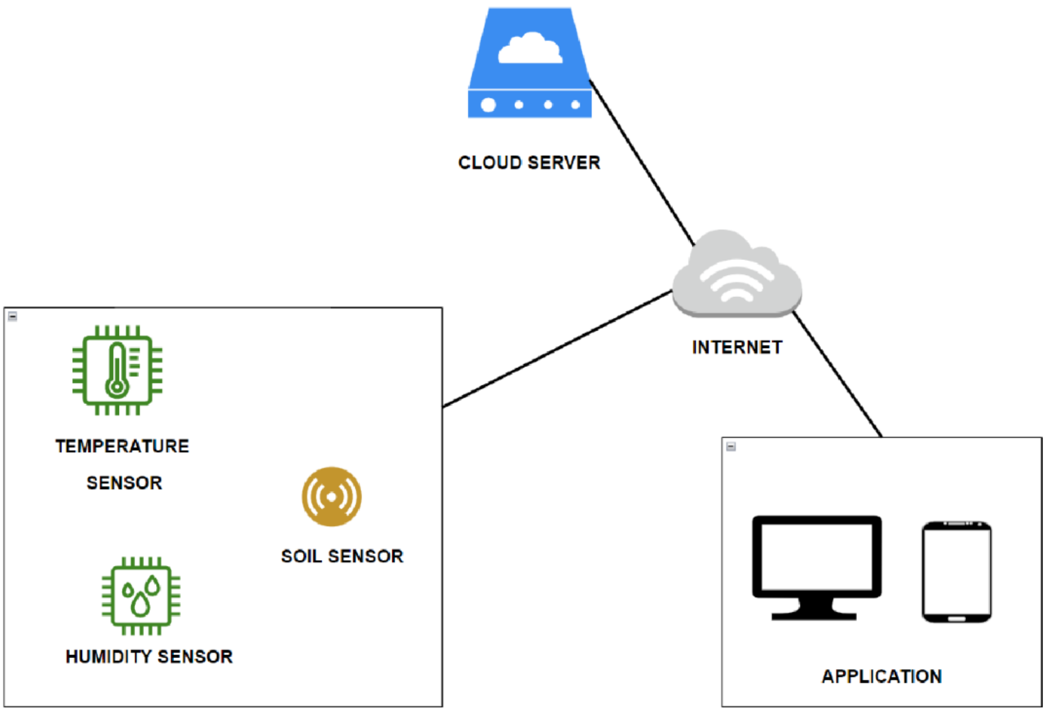
• The Arduino UNO is to process the data received from the sensor and weather from weather API.

• Node-RED is a programming tool for wiring the hardware devices, API and online services.

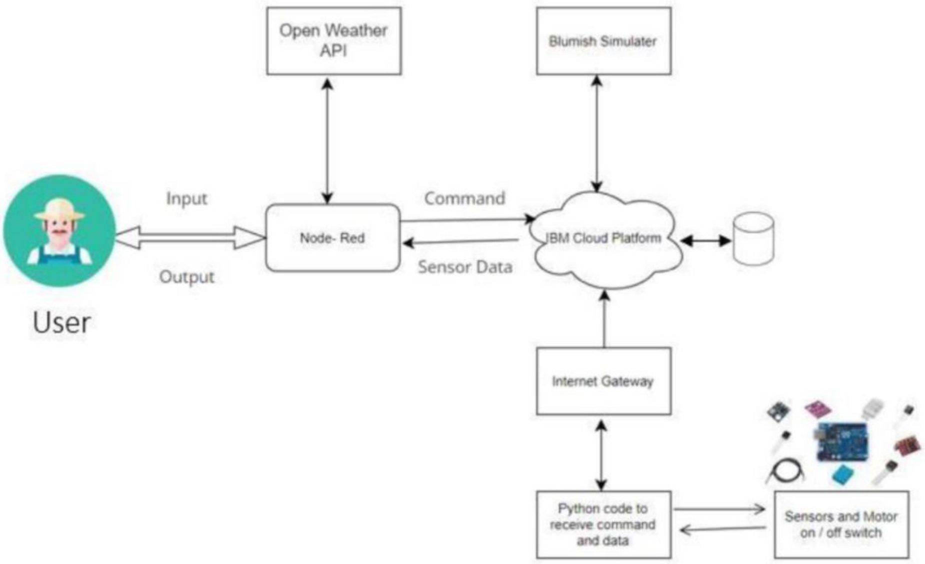
• MIT app Invertor is a visual programming environment that allows everyone to build fully functional apps.

• Extra care for plants to improve growth and save water for dry conditions.

Solution Architecture Diagram:



Technical Architecture
The Deliverable shall include the architectural diagram as below and the information as per the table1 & table 2



Components & Technologies:

S.No	Component	Description	Technology
1	User Interface	The communication protocol being used might act as an interface	MIT app inventor
2	Arduino UNO	It is used as a processing Unit	Python
3	MQTT protocol	The data to be collected and sent to the farmer via MQTT protocol providing the data to easily monitor the crops	IBM Watson IOT service, IBM Watson Assistant
4	Database	Data Type, Configurations	Firebase
5	Cloud Database	Database Service on Cloud	IBM Cloud
6	External API	To monitor the weather	Open Weather API

Application Characteristics:

S.No	Characteristics	Description	Technology
1	Open-Source Frameworks	MQTT protocol	Python
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.	Node-Red service
4	Availability	Available feasible	Open weather API
5	Performance	Design consideration for the performance of the application.	MIT app inventor

5.3 USER STORIES:

User Type	Functional Requirement (Epic)	User Story Number	User Story / Task	Acceptance criteria	Priority	Release
Customer (Mobile and web user)	User Registration	USN-1	As a user, I can register for the application by entering my username, password or by entering my phone number.	I can access my account / dashboard	High	Sprint-1
		USN-2	As a user, I can register for the application through Gmail		Low	Sprint-1
	Login	USN-3	As a user, I can log into the application by entering username and password or by entering my phone number.	I can access my account / dashboard	High	Sprint-1
	Dashboard	USN-4	As a user, I can check the soil temperature.	I can monitor the soil temperature	High	Sprint-2
		USN-5	As a user, I can check the humidity of the soil.	I can monitor the humidity	High	Sprint-2
		USN-6	As a user, I can check the temperature of the soil.	I can monitor the temperature	Medium	Sprint-2

CHAPTER 6

PROJECT PLANNING & SCHEDULING

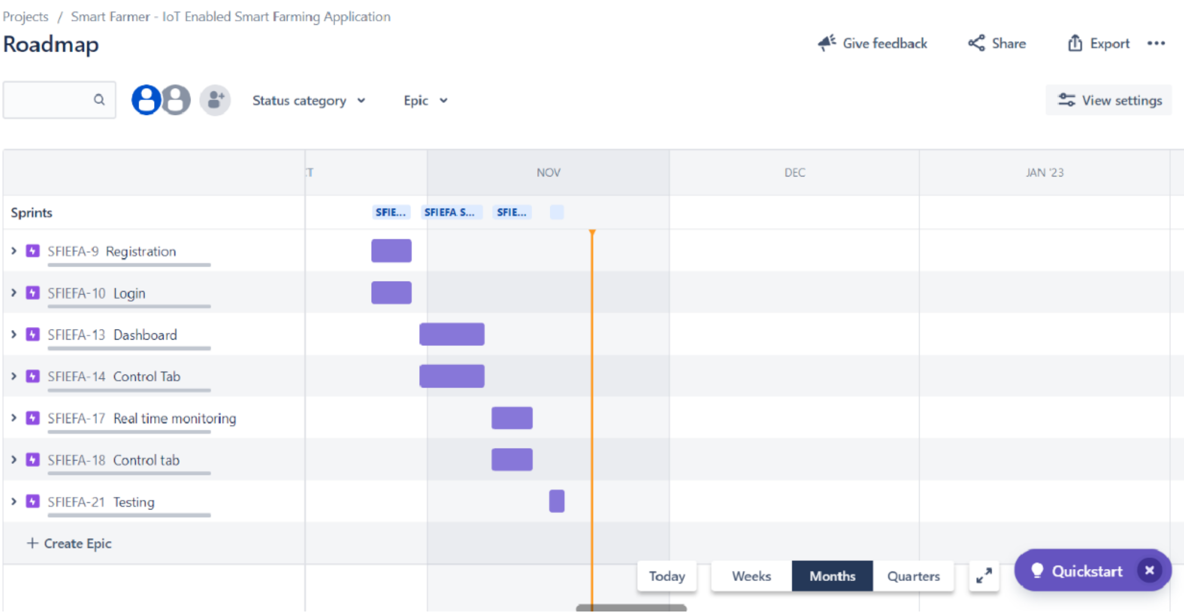
6.1 SPRINT PLANNING & ESTIMATING:

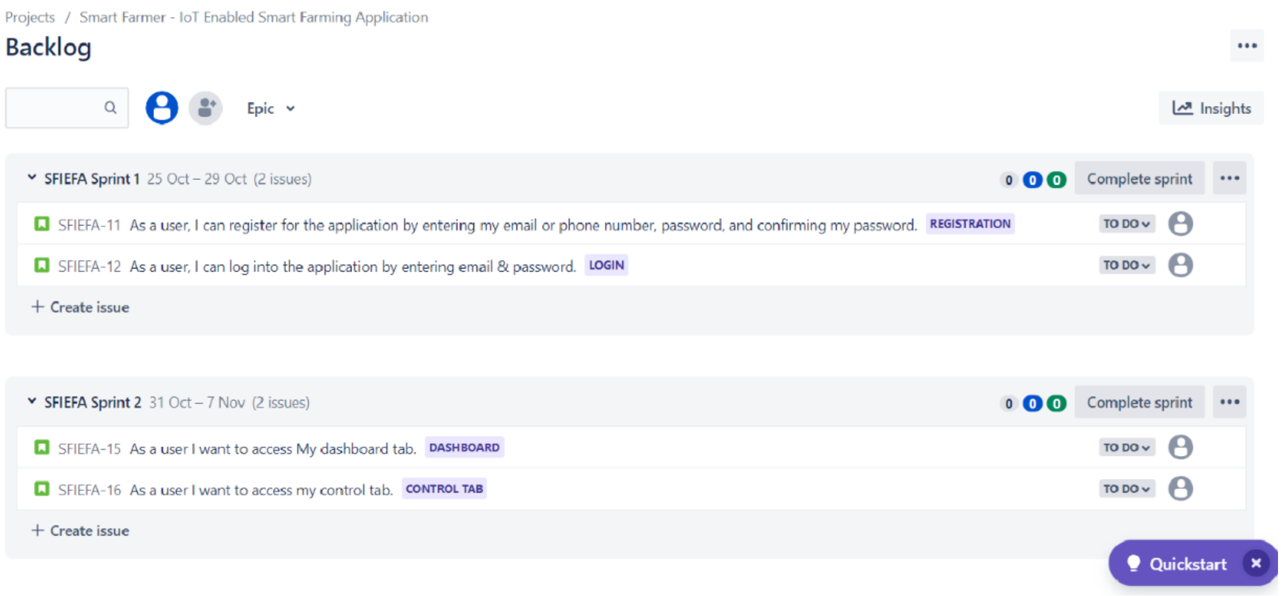
Sprint	Functional requirement	User Story Number	User Story / Task	Story Points	Priority	Team Members
Sprint-1	Registration	USN-1	As a user, I can register for the application by entering my email or phone number, password, and confirming my password.	1	Medium	Sangeetha, Nikitha
Sprint-1	Login	USN-2	As a user, I can log into the application by entering email & password.	2	High	Kaavya, Sivapriya
Sprint-2	Dashboard	USN-3	As a user I want to access My dashboard tab.	2	High	Sindhuja, Sangeetha, Sivapriya
Sprint-2	Control tab	USN-4	As a user I want to access my control tab.	2	High	Nikitha, Kaavya, Sindhuja
Sprint -3	Real time monitoring	USN-5	As a user I want to monitor the temperature, humidity and soil moisture	2	High	Sangeetha, Sindhuja, Sivapriya
Sprint-3	Control tab	USN-6	As a user I want to control the motors.	2	High	Sindhuja, Sangeetha
Sprint-4	Testing	USN-7	Testing developed application and working model of the hardware.	2	High	Sangeetha Sindhuja, Sivapriya, Nikitha, Kaavya

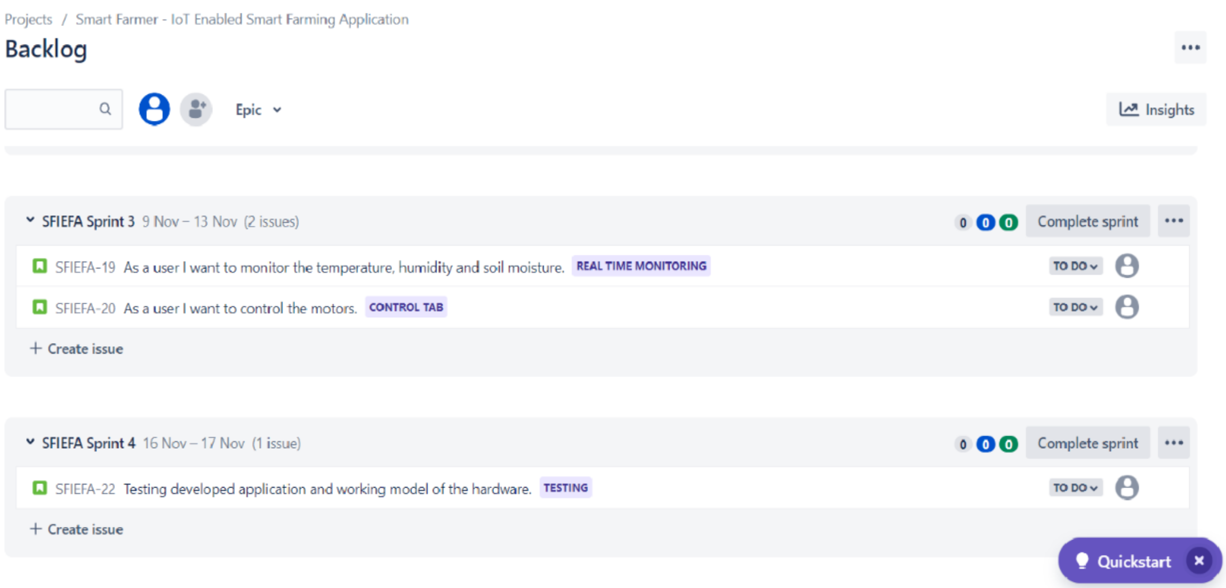
6.2 SPRINT DELIVERY SCHEDULE:

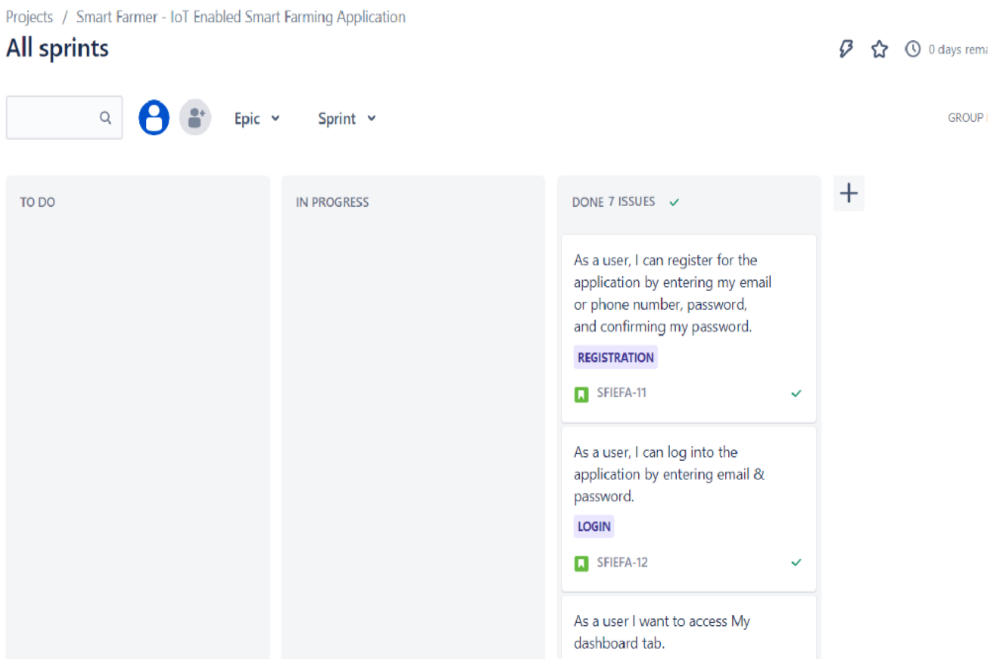
Sprint	Total Story Point	Duration	Sprint Start Date	Sprint End Date (Planned)	Story Points Completed (as on Planned End Date)
Sprint-1	20	5 Days	25 Oct 2022	29 Oct 2022	20
Sprint-2	20	8 Days	31 Oct 2022	07 Nov 2022	20
Sprint-3	20	7 Days	09 Nov 2022	13 Nov 2022	20
Sprint-4	20	8 Days	16 Nov 2022	17 Nov 2022	20

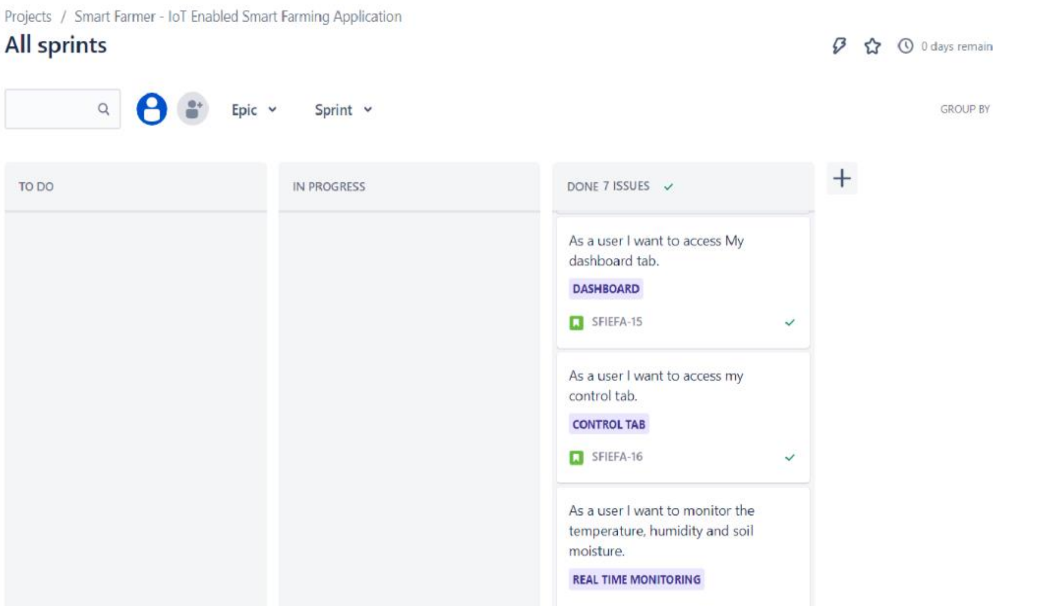
6.3 REPORT FROM JIRA:



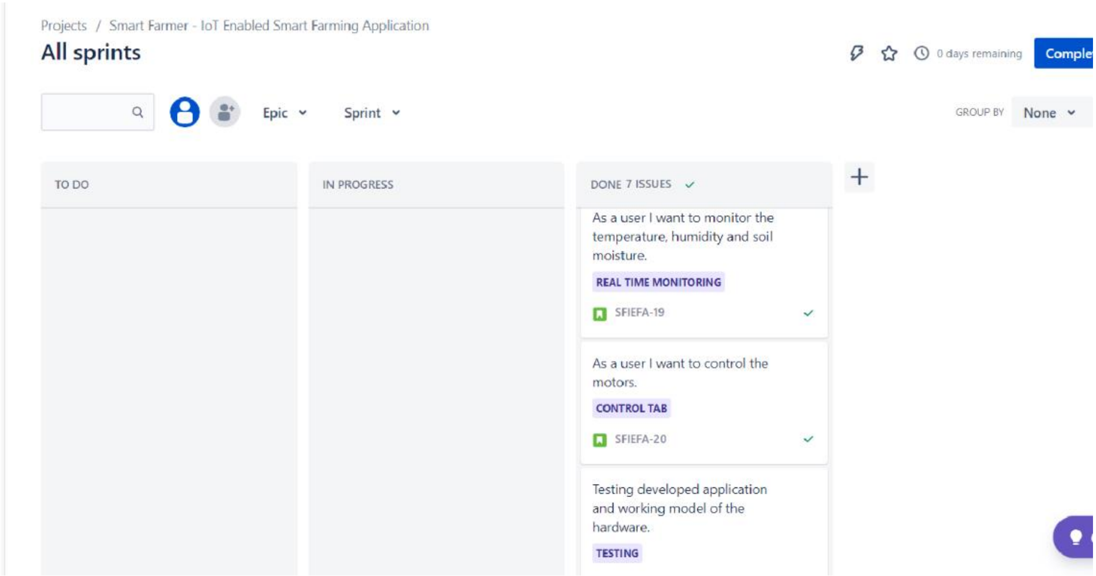

Projects / Smart Farmer - IoT Enabled Smart Farming Application
Backlog
Epic
Insights
SFIEFA Sprint 1 25 Oct – 29 Oct (2 issues)
0 0 0
Complete sprint
SFIEFA-11 As a user, I can register for the application by entering my email or phone number, password, and confirming my password.
REGISTRATION
TO DO
SFIEFA-12 As a user, I can log into the application by entering email & password.
LOGIN
TO DO
+ Create issue
SFIEFA Sprint 2 31 Oct – 7 Nov (2 issues)
0 0 0
Complete sprint
SFIEFA-15 As a user I want to access My dashboard tab.
DASHBOARD
TO DO
SFIEFA-16 As a user I want to access my control tab.
CONTROL TAB
TO DO
+ Create issue
Quickstart


Projects / Smart Farmer - IoT Enabled Smart Farming Application
Backlog
Epic
Insights
SFIEFA Sprint 3 9 Nov – 13 Nov (2 issues)
0 0 0
Complete sprint
SFIEFA-19 As a user I want to monitor the temperature, humidity and soil moisture.
REAL TIME MONITORING
TO DO
SFIEFA-20 As a user I want to control the motors.
CONTROL TAB
TO DO
+ Create issue
SFIEFA Sprint 4 16 Nov – 17 Nov (1 issue)
0 0 0
Complete sprint
SFIEFA-22 Testing developed application and working model of the hardware.
TESTING
TO DO
+ Create issue
Quickstart

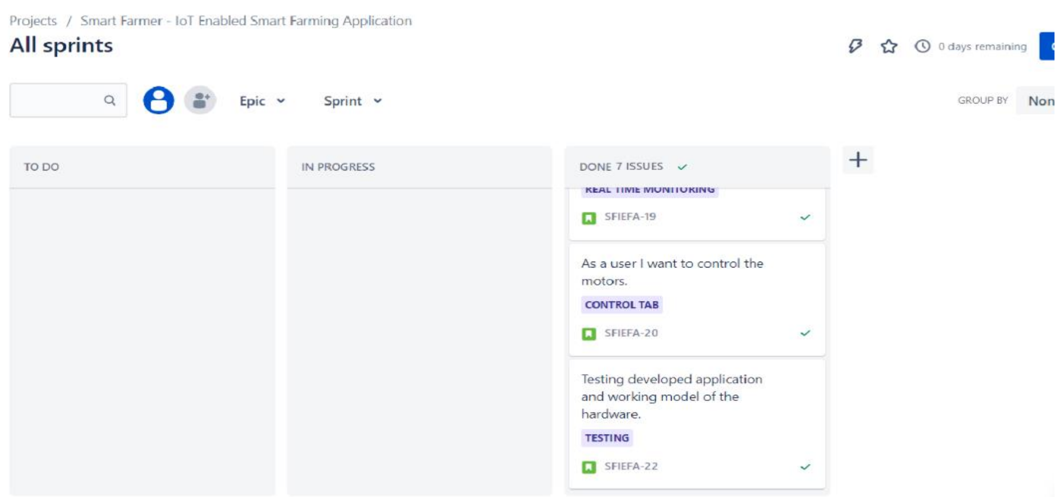

Projects / Smart Farmer - IoT Enabled Smart Farming Application
All sprints
0 days remai
Epic
Sprint
GROUP
TO DO
IN PROGRESS
DONE 7 ISSUES
As a user, I can register for the application by entering my email or phone number, password, and confirming my password.
REGISTRATION
SFIEFA-11
As a user, I can log into the application by entering email & password.
LOGIN
SFIEFA-12
As a user I want to access My dashboard tab.



Projects / Smart Farmer - IoT Enabled Smart Farming Application
All sprints
0 days remain
Epic
Sprint
GROUP BY
TO DO
IN PROGRESS
DONE 7 ISSUES
As a user I want to access My dashboard tab.
DASHBOARD
SFIEFA-15
As a user I want to access my control tab.
CONTROL TAB
SFIEFA-16
As a user I want to monitor the temperature, humidity and soil moisture.
REAL TIME MONITORING



Projects / Smart Farmer - IoT Enabled Smart Farming Application
All sprints
0 days remaining
Comple
Epic
Sprint
GROUP BY
None
TO DO
IN PROGRESS
DONE 7 ISSUES
As a user I want to monitor the temperature, humidity and soil moisture.
REAL TIME MONITORING
SFIEFA-19
As a user I want to control the motors.
CONTROL TAB
SFIEFA-20
Testing developed application and working model of the hardware.
TESTING



Projects / Smart Farmer - IoT Enabled Smart Farming Application
All sprints
0 days remaining
Epic
Sprint
GROUP BY
Non
TO DO
IN PROGRESS
DONE 7 ISSUES
SFIEFA-19
As a user I want to control the motors.
CONTROL TAB
SFIEFA-20
Testing developed application and working model of the hardware.
TESTING
SFIEFA-22

CHAPTER 7

CODING & SOLUTIONING

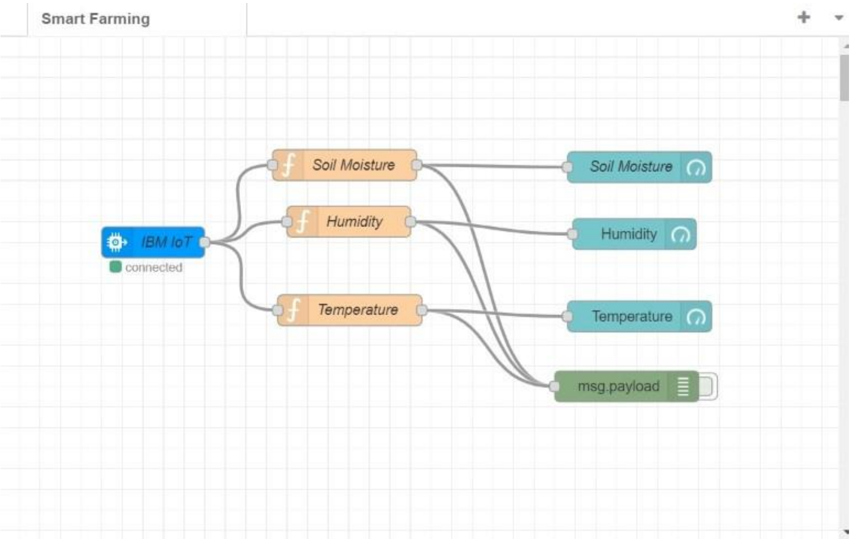
7.1 FEATURE 1:

SmartFram.py - C:/Users/IdeaPad/Documents/class_py_codes/SmartFram.py (3.7.4)

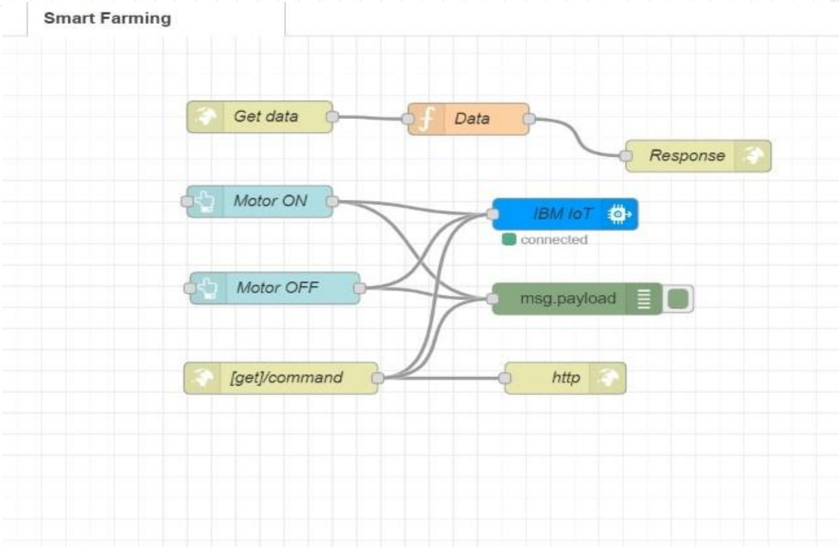
File Edit Format Run Options Window Help

```
import time
import os
import datetime
import random
import wiotp.sdk.application
#CallBack function to receive the commands from cloud
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(" ")
#Device credentials
myConfig = {
"identity": {
"orgId": "1v150i",
"typeId": "weather_device",
"deviceId": "weather_today"
},
"auth": {
"token": "J2qEAJhe2npnh-Nj1D"
}
#Making Connection to cloud
client = wiotp.sdk.device.DeviceClient(config=myConfig,
logHandlers=None)
client.connect()
#Sending data for every 2 seconds to cloud
while True:
 soil=random.randint(0, 100)
 temp=random.randint(0,125)
 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(5000)
 client.commandCallback = myCommandCallback
#Disconnected from cloud
client.disconnect()
```

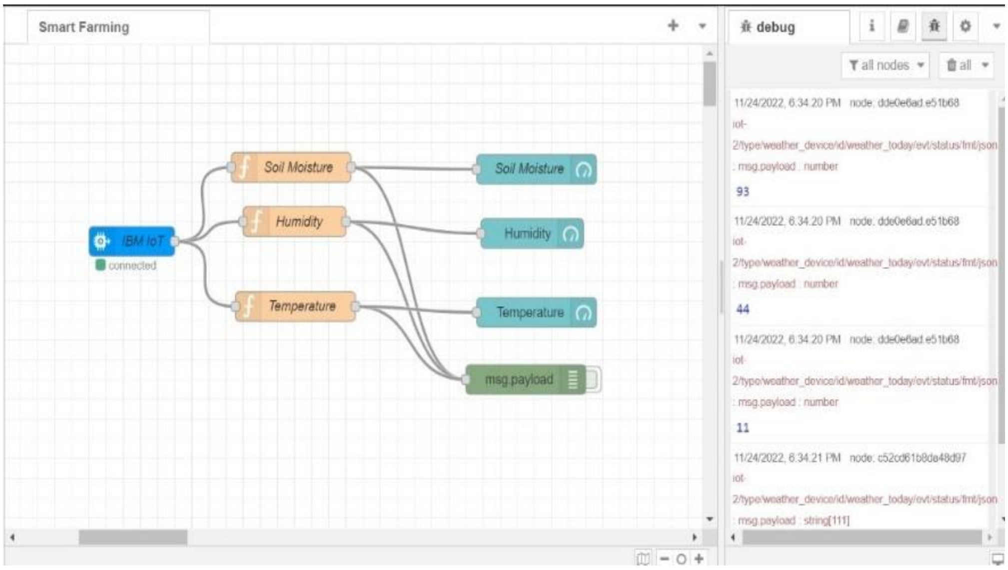
7.2 FEATURE 2:



Smart Farming
Soil Moisture
Humidity
Temperature
IBM IoT
connected
Soil Moisture
Humidity
Temperature
msg.payload



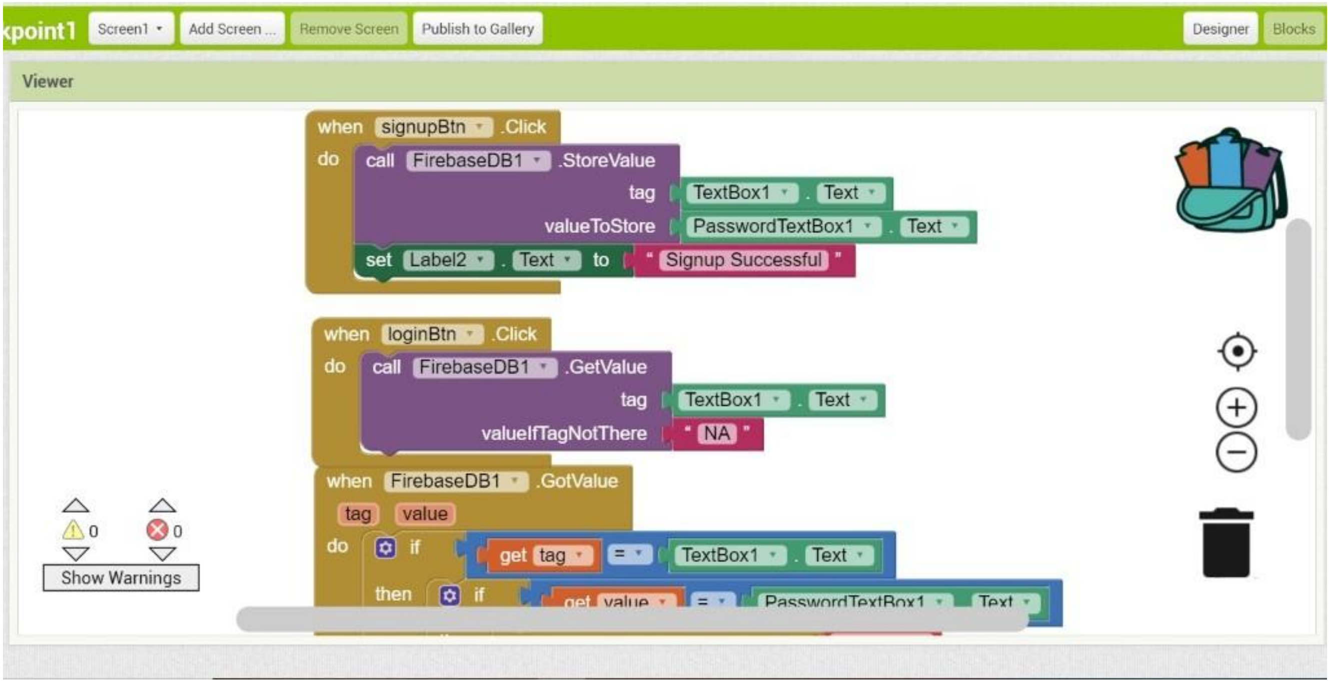
Smart Farming
Get data
Data
Response
Motor ON
Motor OFF
IBM IoT
connected
msg.payload
[get]/command
http

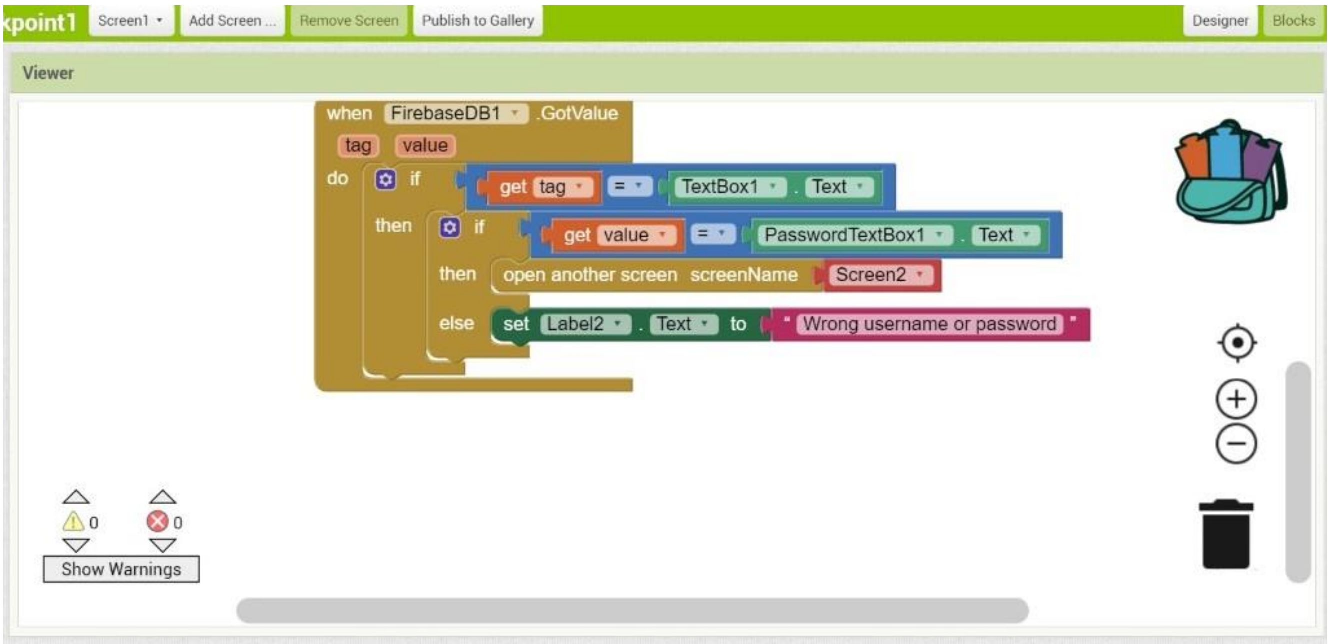


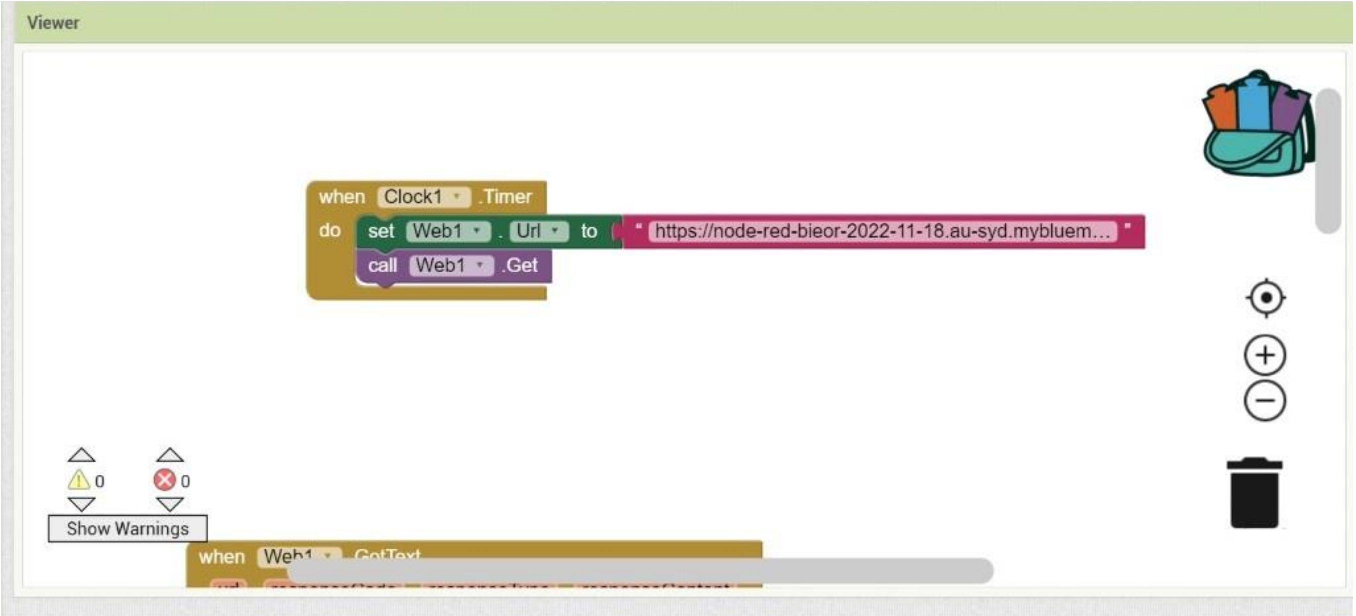
Smart Farming
Soil Moisture
Humidity
Temperature
IBM IoT
connected
Soil Moisture
Humidity
Temperature
msg.payload
debug
all nodes
all
11/24/2022, 6:34:20 PM node: dde0e6ad.e51b68
iot-2/type/weather_device/id/weather_today/evt/status/fmt/json
: msg.payload : number
93
11/24/2022, 6:34:20 PM node: dde0e6ad.e51b68
iot-2/type/weather_device/id/weather_today/evt/status/fmt/json
: msg.payload : number
44
11/24/2022, 6:34:20 PM node: dde0e6ad.e51b68
iot-2/type/weather_device/id/weather_today/evt/status/fmt/json
: msg.payload : number
11
11/24/2022, 6:34:21 PM node: c52cd61b8da48d97
iot-2/type/weather_device/id/weather_today/evt/status/fmt/json
: msg.payload : string[111]

7.2 FEATURE 3:

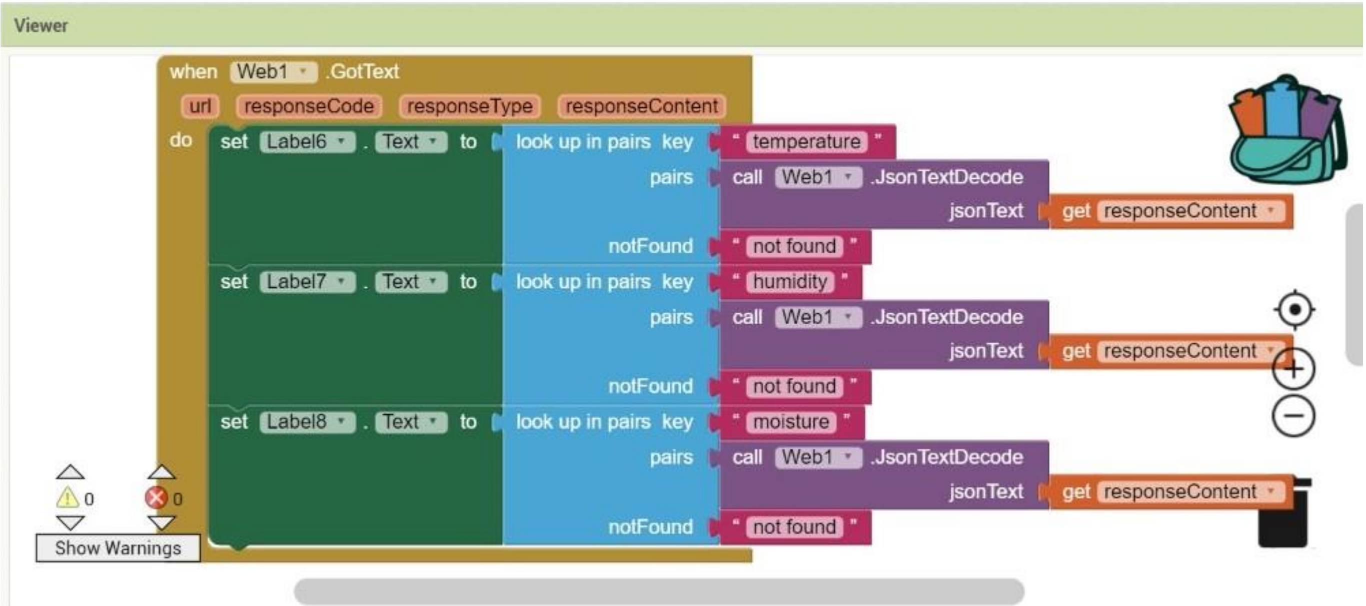
MIT APP INVENTOR







Viewer
when Clock1 .Timer
do set Web1 . Url to " https://node-red-bieor-2022-11-18.au-syd.mybluem... "
call Web1 .Get
0
0
Show Warnings



Viewer
when Web1 .GotText
url responseCode responseType responseContent
do set Label6 . Text to look up in pairs key " temperature "
pairs call Web1 .JsonTextDecode
jsonText get responseContent
notFound " not found "
set Label7 . Text to look up in pairs key " humidity "
pairs call Web1 .JsonTextDecode
jsonText get responseContent
notFound " not found "
set Label8 . Text to look up in pairs key " moisture "
pairs call Web1 .JsonTextDecode
jsonText get responseContent
notFound " not found "
0
0
Show Warnings

CHAPTER 8
TESTING

8.1 TEST CASES:

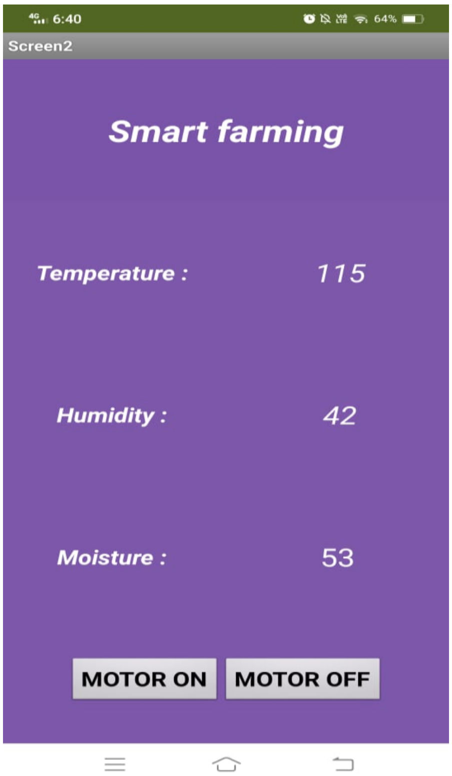
Step-1: First user need to download the android APK file from MIT app inventor where we developed our mobile application and install in their mobiles.

Step-2: After successful installation we can find app icon in our mobile.

Step-3: After clicking the app icon it ask the user need to create username and password.so give username and password and click the signup button. The user can see interface like these as shown below.

8.2 USER ACCEPTANCE TESTING:

After successful login. The next page will be open. In that page we can see the real time temperature, humidity and soil moisture reading and motor ON and motor OFF control button also as shown below.

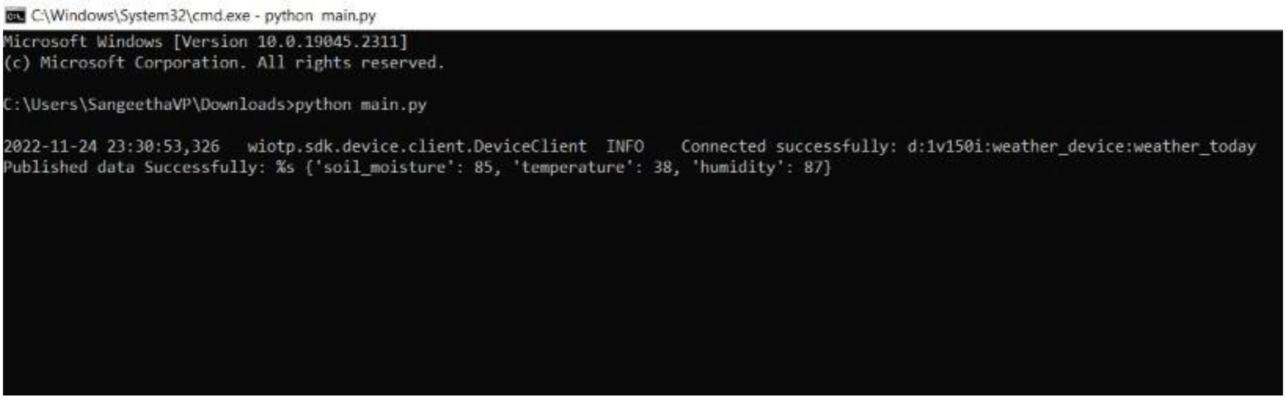


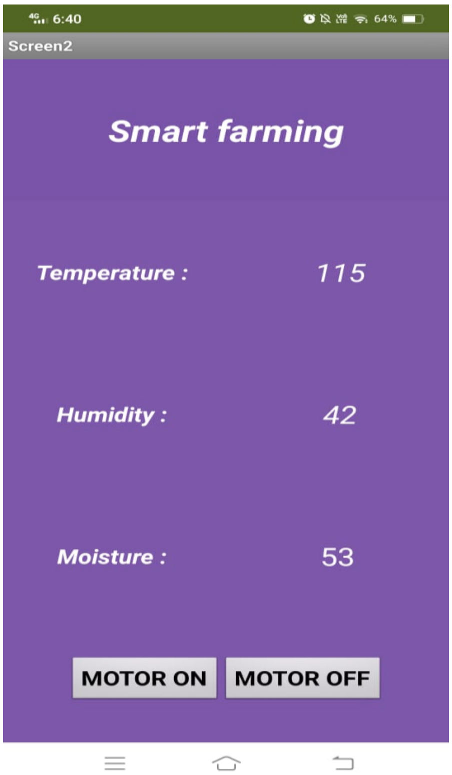
we are successfully created the IOT enabled smart farming application.

CHAPTER 9
RESULTS

9.1 PERFORMANCE METRICES:

So finally when we run the python code it is going to connect the IBM Watson platform and connecting to the node-red after that is going to connect the mobile application.so we can see output in the fourth window.





CHAPTER 10

ADVANTAGES & DISADVANTAGES

10.1 ADVANTAGES:

- All the data like climatic conditions and changes in them, soil or crop conditions everything can be easily monitored.
- Risk of crop damage can be lowered to a greater extent.
- Many difficult challenges can be avoided making the process automated and the quality of crops can be maintained.
- The process included in farming can be controlled using the web applications from anywhere, anytime.

10.2 DISADVANTAGES:

- Smart Framing requires internet connectivity continuously, but rural parts cannot fulfill this requirement.
- Any faults in the sensors can cause great loss in the agriculture, due to wrong records and the actions of automated processes.
- IoT devices need much money to implement.

CHAPTER 11

CONCLUSION

CONCLUSION:

So finally we build A IoT Web Application for smart framing system using WatsonIoT platform, Watson simulator, IBM cloud and Node-RED and MIT app Inventor

CHAPTER 12

FUTURE SCOPE

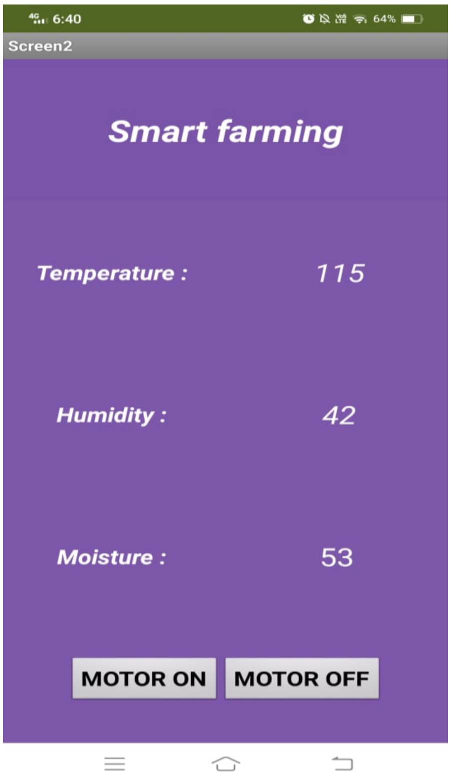
FUTURE SCOPE:

In future due to more demand of good and more farming in less time, for betterment of the crops and reducing the usage of extravagant resources like electricity and water IoT can be implemented in most of the places.

CHAPTER 13

APPENDIX

12.1 SOURCE CODE:



/*....................................retrieving to Cloud. .... */

```
import time
import os
import datetime
import random
import wiotp.sdk.application
#CallBack function to receive the commands from cloud
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(" ")
#Device credentials
myConfig = {
"identity": {
```

```
"orgId": "1v150i",
"typeId": "weather_device",
"deviceId": "weather_today"
},
"auth": {
"token": "J2qEAJhe2npnh-Nj1D"
}
}
#Making Connection to cloud
client = wiotp.sdk.device.DeviceClient(config=myConfig,
logHandlers=None)
client.connect()
#Sending data for every 2 seconds to cloud
while True:
 soil=random.randint(0, 100)
 temp=random.randint(0,125)
 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(5000)
 client.commandCallback = myCommandCallback
#Disconnected from cloud
client.disconnect()
```

GitHub:

Name	GitHub (User Name)
Team Leader(SANGEETHA V P)	**sangeethavp02**
Team Member(KAAVYA E)	**Kaavyaeswar**
Team Member(NIKITHA K)	**Nikithatheshine**
Team Member(SINDHUJA B)	**sindhujab26**
Team Member(SIVAPRIYA P)	**sivapriya09**

GitHub Link:

https://github.com/IBM-EPBL/IBM-Project-21830-1659792300