PROJECT REPORT

SMARTFARMER- IOT ENABLED SMART FARMING APPLICATION

Team ID:PNT2022TMID35124

ROHINI COLLEGE OF ENGINEERING AND TECHNOLOGY

SAFRIN BANU.S (963319106083)

PAVITHRA.R (963319106068)

SHAJINI.V (963319106091)

SHINY.D (963319106093)

Under the guidance of,

Dr. Benisha R.B (Mentor)

Mr. Bharadwaj (Industry Mentor)

ACKNOWLEDGEMENT

We students of Degree 4th year, Electronics and Communication Engineering, have successfully completed the project under the guidance of esteemed faculties of this very institute.

The constant guidance and encouragement received from prof. (Dr.) Benisha, Department of Electronics and Communication Engineering, has been of great help in carrying out present work and helped us in completing this project with success.

I would like to express a deep sense of gratitude to my Project Guide Dr. Benisha, ECE department for the guidance and support in defining the design problem and towards the completion for my project work. Without her wise counsel and able guidance, it would have been impossible to complete the thesis in this manner.

I am also thankful to all the faculty and staff members of Department of Electronics and Communication Engineering, Rohini College of Engineering and Technology, for their intellectual support throughout the course of this work.

ABSTRACT

Internet of Things (IOT) technology has brought revolution to each and every field of common man's life by making everything smart and intelligent. IOT refers to a network of things which make a self-configuring network.

The development of Intelligent Smart Farming IOT based devices is day by day turning the face of agriculture production by not only enhancing it but also making it cost-effective and reducing wastage. The aim / objective of this report is to propose IOT based Smart Farming System assisting farmers in getting Live Data (Temperature, Soil Moisture) for efficient environment monitoring which will enable them to increase their overall yield and quality of products.

The IOT based Smart Farming System being proposed via this report is integrated with Arduino Technology mixed with different Sensors and a Wi-Fi module producing live data feed that can be obtained online from Thingsspeak.com. The product being proposed is tested on Live Agriculture Fields giving high accuracy over 98% in data feeds.

The agriculture system proposed in this project is integrated with Node MCU technology consisting of various sensors which provide live on field data that can be obtained on android mobile phone.

1.INTRODUCTION

1.1 Project Overview

The objectives of this report is to proposed IOT based Smart Farming System which will enable farmers to have live data of soil moisture environment temperature at very low cost so that live monitoring can be done.

The structure of the report is as follows: chapter I will cover over of overview of IOT Technology and agriculture-concepts and definition, IOT enabling technologies, IOT application in agriculture, benefits of IOT in agriculture and IOT and agriculture current scenario and future forecasts. Chapter II will cover definition of IOT based smart farming system, the components and modules used in it and working principal of it. Chapter III will cover algorithm and flowchart of the overall process carried out in the system and its final graphical output, chapter IV consist of conclusion, future scope and references**.**

1.2 Purpose

The smart agriculture model main aim **to avoid water wastage in the irrigation process**. It is low cost and efficient system Is shown below. It includes Node MCU, Arduino Nano, sensors like soil moisture and Dht11, solenoid valves, relays

2. LITERATURE SURVEY

2.1 Existing Problem

The challenges of a smart agriculture system include the integration of these sensors and tying the sensor data to the analytics driving automation and response activities. When integrated, the use of data analytics can reduce the overall cost of agriculture and contribute to higher production from the same amount of area through precise control of water, fertilizer and light. Smart methods allow for farming on smaller and more distributed lands through remote monitoring, whether indoor or outdoor.
To successfully deploy a smart agriculture system, consider setting up a communication network that can integrate a limited number of sensors across a large area of farmland. This will require third-party network provisioning or setting up a private network consisting of access points and uplinks to a private backhaul network, which channels all the data traffic to centralized monitoring software or an analytics head-end system.

• It is not a secure system.
• There is no motion detection for protection of agriculture field.
• Automation is not available.

2.2 References

This paper talks about the different uses of IOT and distributed computing in the field of agribusiness and ranger service. As per the text, the utilization of IOT plays an important job in brilliant agribusiness. The fundamental advancements of IOT like laser scanner,428 K.Lakh Wanietal. RFID (Radio Frequency Identification), photo acoustic electromagnetic sensors, and so on these advances can be involved to make extraordinary developments in rural.

Essentially in rural data transmission, exact water system, clever development control, agrarian product safety, and some more.

AUTHOR:Zuraida Muhammad (2020)

DESCRIPTION**:** The task is about brilliant agriculture framework that is executed with IOT. The framework is joined with water system framework to adapt to the eccentric climate in Malaysia. Raspberry Pi 4 Model B is utilized as the micro controller of this framework. DHT22 and soil cream sensor whenever used to identify the temperature around and mugginess in encompassing and dampness level of the dirt separately where result will be shown on the advanced cell and the PC.

AUTHOR: Sujatha (2018)

DESCRIPTION:Writing survey depending to certain books of MDPI are drive organization perfectly positioned of open specialized beginning construct research on the water system utilization of web of things innovation for live controlling of soil dampness, more over examination of emotionally supportive networks. Smart in cultivating by Jayaraman with gathering of creator demonstrates the way that the web of things stage can assembled also, partner data, for example, the general climate, soil and horticulture and it is execution.

More significant, web of things stage can team up into camera, sensor and so forth. One more exploration report what can be utilized in Wi-Fi sensor engineering in water system and devotion of ranchers with enormous quantities of data. water system is a term that utilizes a savvy of calculations that preowned late data to work on quality, creation and productivity.

AUTHOR: Nurzaman Ahmed (2016)

DESCRIPTION:An Wireless Sensor Network for River Water Quality Monitoring in India. This paper introduces a river water quality monitoring system based on wireless sensor network which helps in continuous and remote monitoring of the water quality data in India. The wireless sensor node in the system is designed for monitoring the pH of water, which is one of the main parameters that affect the quality of water. Wireless sensor Network which aids in River Water Quality Monitoring. This paper also proposes a novel technique for the design of a water quality sensor node which can be used for monitoring the pH of water.

AUTHOR: Anushree Math (2018)

DESCRIPTION:The target of this try is to water the plants utilizing the savvy dribble water system framework. To accomplish this, open source stage is utilized as a focal regulator of the framework. Different sensor have been utilized which constantly give the current boundaries of variables overseeing fitness of plants. In light of the data got from the RTC module water is provided to plants at standard time frames by controlling a solenoid valve. The whole framework can observed and oversaw by the site page.

AUTHOR:Vaishali S & Suraj S (2017)

DESCRIPTION:Conventional techniques that are utilized for water system, for example, above sprinkler and flood type, isn't excessively much productive. They bring about a great deal of wastage water and can likewise advance sickness, for example, parasite development because of over dampness in the dirt. Robotized water system framework is fundamental for protection of the water and in a roundabout way practicality of the ranch since it is a significant product. Around 85% of all out accessible water assets across the world are exclusively utilized for the water system reason. In the robotization framework water accessibility to edit is observed through sensor and according to require watering is finished through controlled water system.

AUTHOR:Mega F. Yaligar & Shalini H Nagur (2019)

DESCRIPTION**:** To plan a savvy remote sensor for farming climate, the WSN (Wireless Sensor Network) is intended for directing and controlling for different element, for example, stickiness, soil, dampness, temperature, switches that engender the organization over bigger distance and facilitator that speaks with the PC, which in turns show the information and communicate it utilizing web of things, which can diminish the human work. Client can ready to develop more number of plants in their home by utilizing this data. Utilizing this application client can set aside cash and time in making application for own new application.

AUTHOR:Shrihari M (2020)

DESCRIPTION:Computerizing the development of harvests has existed since the mid 90's and one of the significant issues the two researchers and ranchers face is the subject of water system. A water system framework is dynamic framework that is prevalently reliant upon outer covariant. This paper gives a system by using an exceptionally fabricated numerical model which incorporates remote sensor as an information source that is handled on google cloud they are giving a shrewd IOT empowered design that can be scaled even on huge ranches. The framework is furnished with android application through a remote.

AUTHOR:Sivakumar N & Sandhiya R (2018)

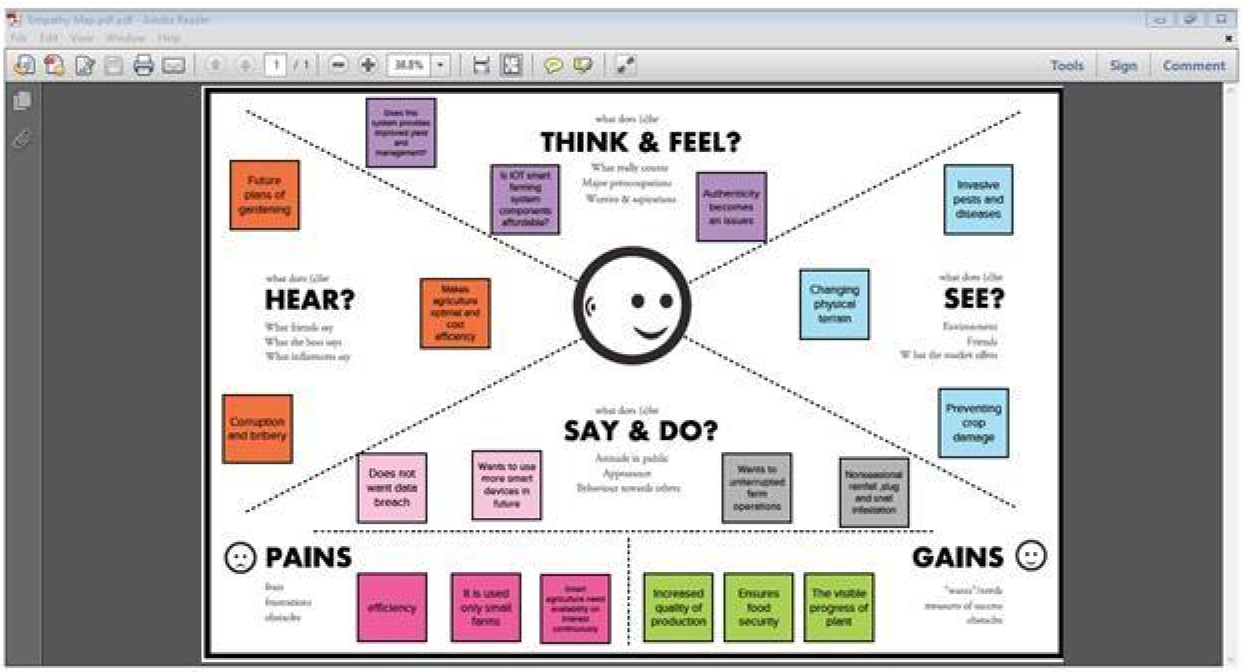
DESCRIPTION:To the extent that thoughts agricultural improvement is worried about, the agricultural intercolumniation is a significant power advancing the farming turn of events and change and a cornerstone for keeping up with sound and supporting monetary improvement. In a beyond couple of years, we have been center in around agricultural data administration and foundation improvement. After numerous long periods of hard endeavors, surprising results had seen in agricultural foundation improvement. Every object in IOT is addressable, recognizable, readable and locatable through the internet by using RFID (Radio Frequency Identification), Wireless Sensor Network (WSN) or other means. The idea of IOT is involving numerous in various areas, for example, accuracy horticulture, items supply chain the executives, Savvy Framework, natural observing, distributed computing and some more.

2.3 Problem Statement Definition

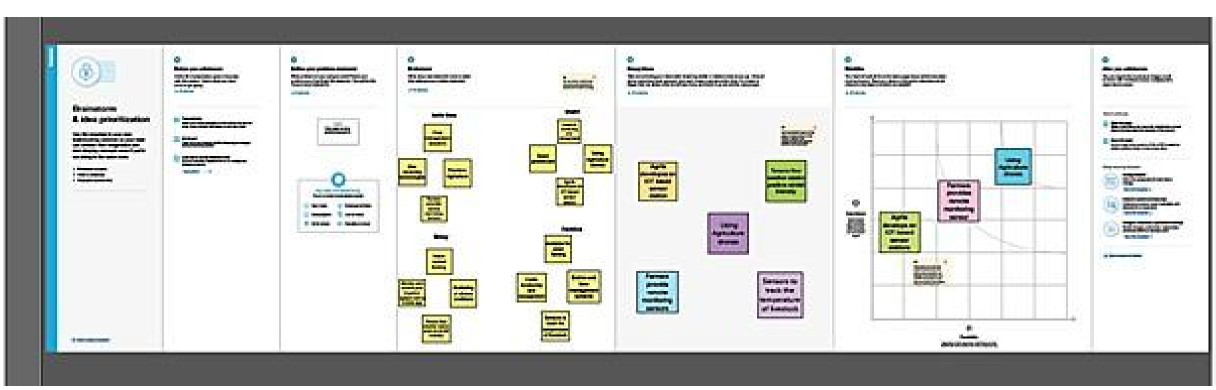
The soil moisture sensor measures wetness content in the soil. The Arduino UNO microcontroller used to receive input from a various sensors and it can be controlled automatically. When soil moisture sensor goes low the water pump will be on and it exceeds defined levels of the water motor will turn off automatically. We can constantly monitor the growth of a crop using ultrasonic sensor. PIR sensor detects the motion or unusual movement in the agricultural land. This device his very helpful to the former to monitor and control environmental parameters at their field. The farmers did not go to their field, they can remotely monitor and control using cloud.

3.IDEATION AND PROPOSED SOLUTION:

3.1 Empathy map canvas:



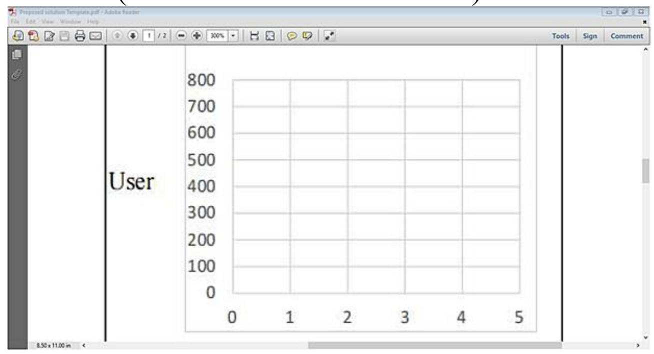
3.2 Ideation and Brainstorming:



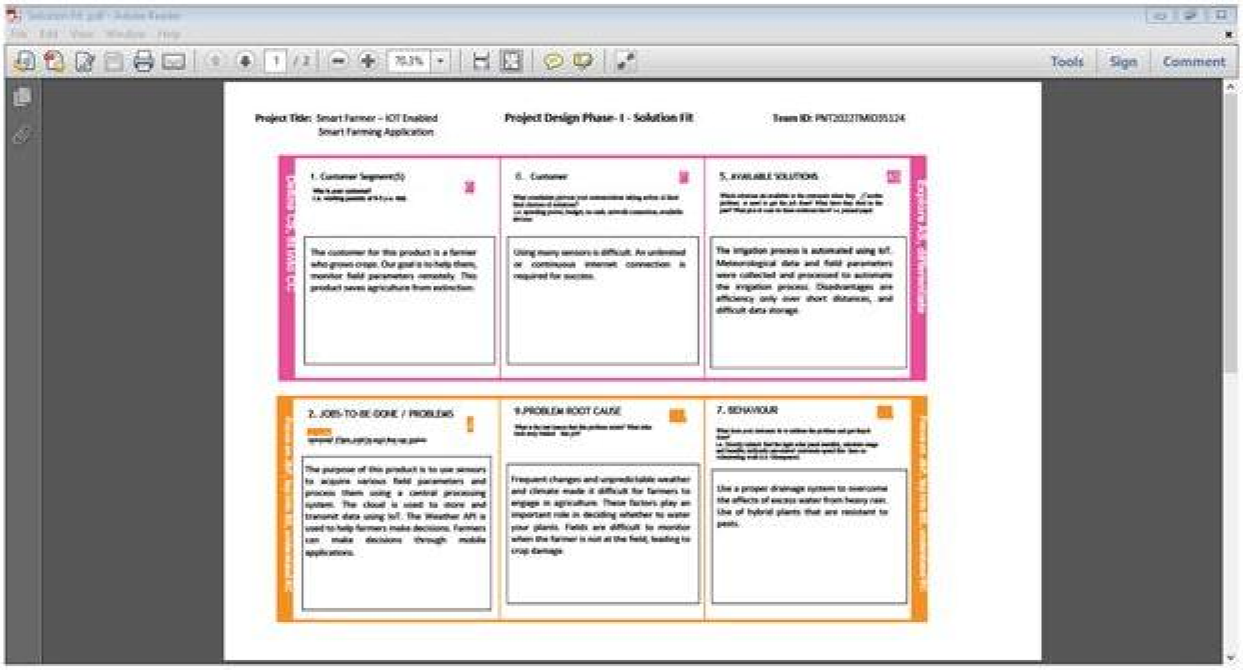
3.3 Proposed Solution

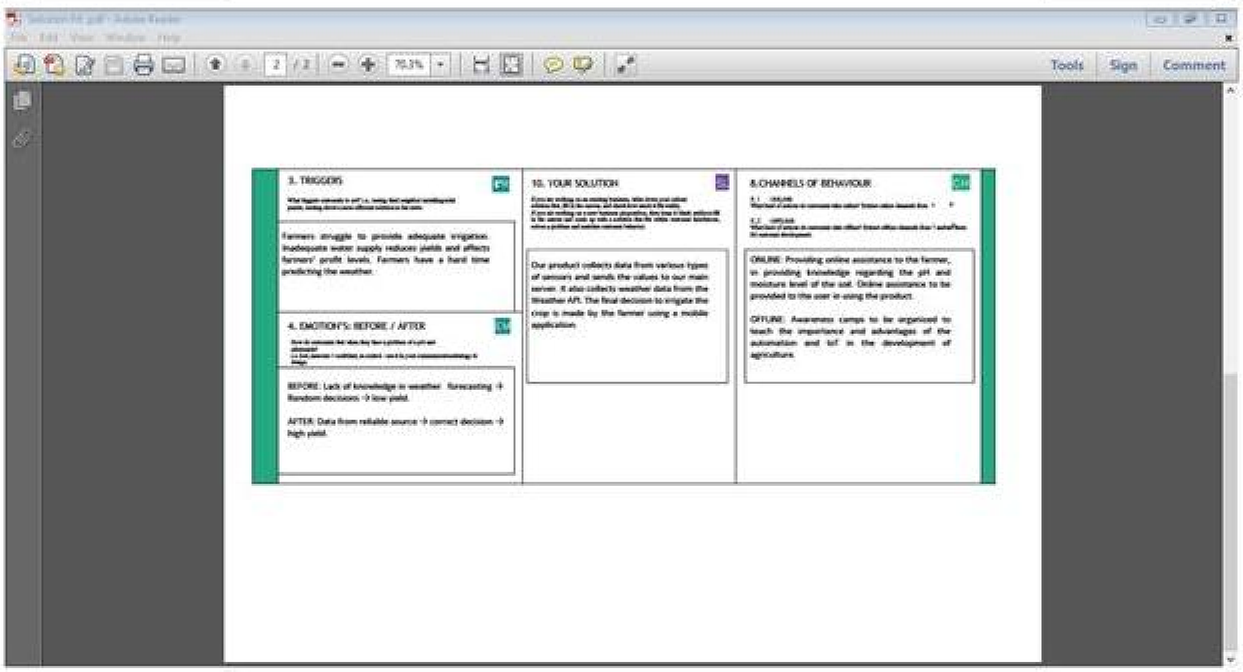
Project team shall fill the following information in proposed solution template.

Sl.no	Parameter	Description
1	Problem Statement(problem to be solved)	Our project will be give the problem statement in Smart farming application using IOT. History- based soil health parameters like soil moisture, pH level, temperature, etc.
2	Idea/Solution description	The most frequently used applicationsof IOT in agriculture are drones for monitoring fields and spraying crops, health assessment of livestock and irrigation.
3	Novelty/Uniqueness	REMOTE ACCESS: It helps the farmer to operate the motor from anywhere. 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 back haul devices.
4	Social Impact/Customer satisfaction	It saves a lot of time IOT can also help e-commerce business thrive and increases sales. Reduces the wages for labors who work in the agriculture field. It makes a wealthy society. IOT can help improve customer relationships by enhancing the customers overall experience.

5	Business Model(revenue model)	Revenue(number of users vs months) 
6	Scalability of the solution	Scalability in smart farming refers to the adaptability of a systems to increases the capacity. For example, the number of technology devices such as sensors and actuators ,while enabling timely analysis.

3.4 Problem solution fit:





4.REQUIREMENT ANALYSIS:

4.1 Functional requirement

Following are the functional requirement of the proposed solution.

FR No.	Functional requirement(epic)	Sub requirement(story/sub-task)
FR-1	User registration	As a user registration through G mail

FR-2	User confirmation	As a user confirmation via E mail then generate the confirmation via OTP
FR-3	Login to system	Once confirmation message received after login the system and check credentials.
FR-4	Check credential	Once check the credential after go to the manage modules.
FR-5	Manage modules	In this manage modules described the below functions like Manage System Admins Manage Roles of User Manage User permission and etc.
FR-6	Logout	Then check temperature, humidity and moisture after then logout or exist the application.

4.2 Non-Functional requirements:

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

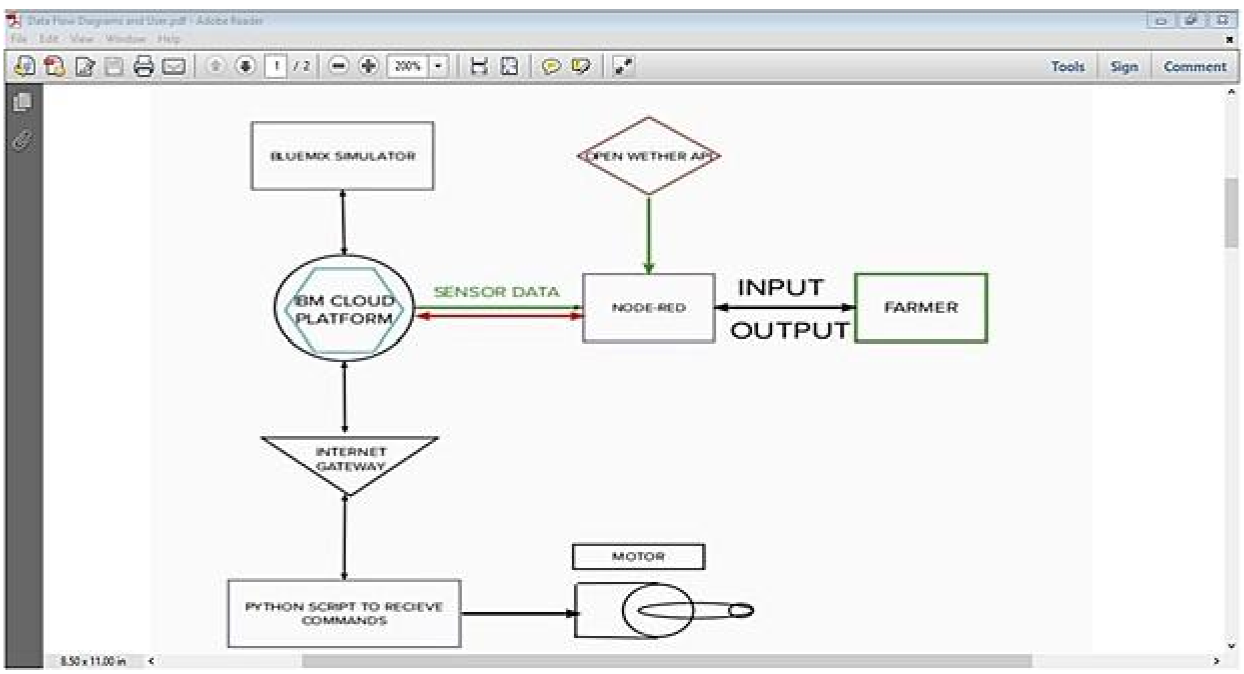
FR No	Non-functional requirement	Description
NFR-1	Usability	Usability includes easy learn ability, efficiency in use, remember ability, lack of errors in operation and subjective pleasure
NFR-2	Security	Sensitive and private data must be protected from their production until the decision-making and storage stages.
NFR-3	Reliability	The shared protection achieves a better trade-off between costs and reliability. The model uses dedicated and shared protection schemes to avoid farm service outages.
NFR-4	Performance	the idea of implementing integrated sensors with sensing soil and environmental or ambient parameters in farming will be more efficient for overall monitoring.
NFR-5	Availability	Automatic adjustment of farming equipment made possible by linking information like crops/weather and equipment to auto-adjust temperature, humidity, etc.

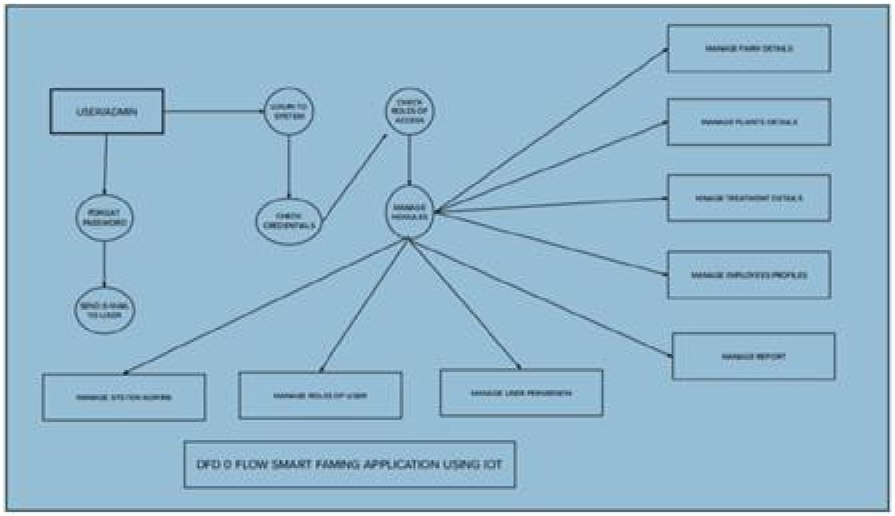
NFE-6	Scalability	scalability is a major concern for IOT platforms. It has been shown that different architectural choices of IOT platforms affect system scalability and that automatic real time decision-making is feasible in an environment composed of dozens of thousand

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 enter 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.
 Arduino UNO is used as 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 API s. 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 plan 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 and technical architecture:

Solution architecture is a complex process – with many sub-processes – that bridges the gap between business problems and technology solutions. Its goals are to:
 Find the best tech solution to solve existing business problems.
 Describe the structure, characteristics, behavior, and other aspects of the software to project stakeholders.
 Define features, development phases, and solution requirements.
 Provide specifications according to which the solution is defined, managed and delivered.
Example - Solution Architecture Diagram:

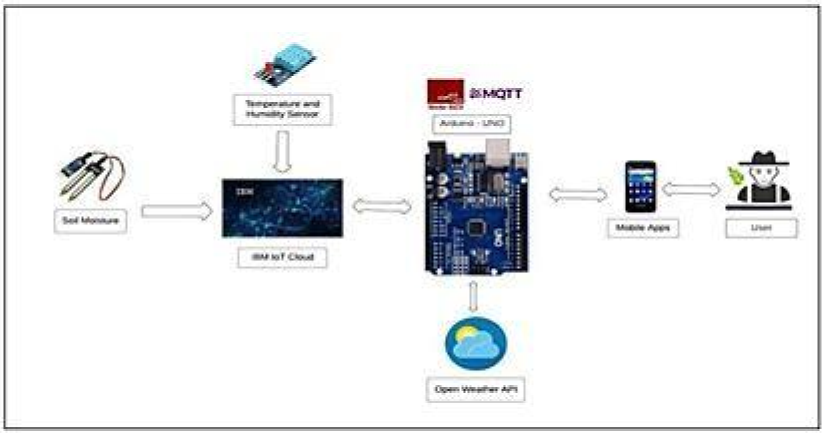
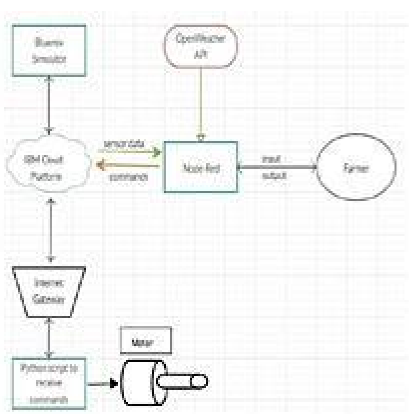


Fig :IOT ENABLED SMART FARMING APPLICATION

- The different soil parameters (temperature, soil moistures and then humidity) are sensed using different sensors and obtained value is stored in the IBM cloud.
- Arduino UNO is used as 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.

Technical Architecture:

The Deliverable shall include the architectural diagram as below and the information as per the tables.



Guidelines:

1. Include all the processes (As an application logic / Technology Block)
2. Provide infrastructural demarcation (Local / Cloud)
3. Indicate external interfaces (third party API' s etc.)
4. Indicate Data Storage components / services
5. Indicate interface to machine learning models (if applicable)

- The different soil parameters temperature, soil moistures and then humidity are sensed using different sensors and obtained value is stored in the IBM cloud.
- Arduino UNO is used as 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 API s. 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 decide through an app, weather to water the crop or not depending upon the sensor values. By using the app, they can remotely operate the motor switch.

Table - 1: Components & Technologies:

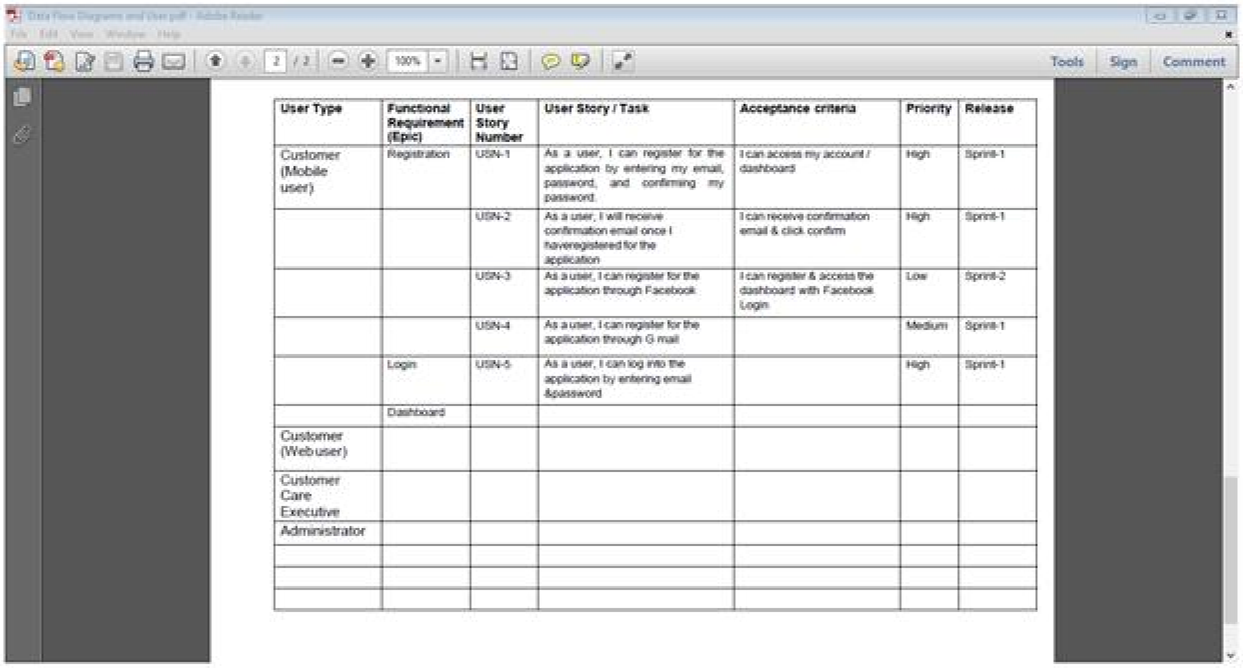
S. No	Component	Description	Technology
1.	User Interface	How user interacts with application e.g. Web UI, Mobile App.	HTML, CSS, JavaScript / Angular Js / React Js etc.
2.	Application Logic-1	Logic for a process in the application	Python
3.	Application Logic-2	Logic for a process in the application	IBM Watson IOT service
4.	Application Logic-3	Logic for a process in the application	IBM Watson Assistant
5.	Database	Data Type, Configurations etc.	MySQL, No SQL, etc.
6.	Cloud Database	Database Service on Cloud	IBM Cloud
7.	File Storage	File storage requirements	IBM Block Storage or Other Storage Service or Local File system
8.	External API-1	Purpose of External API used in the application	IBM Weather API, etc.
9.	Machine Learning Model	Purpose of Machine Learning Model	Object Recognition Model, etc.
10.	Infrastructure (Server / Cloud)	Application Deployment on Local System / Cloud Local Server Configuration: Cloud Server Configuration:	Local, Cloud Foundry, Kubernetes, etc.

Table-2: Application Characteristics:

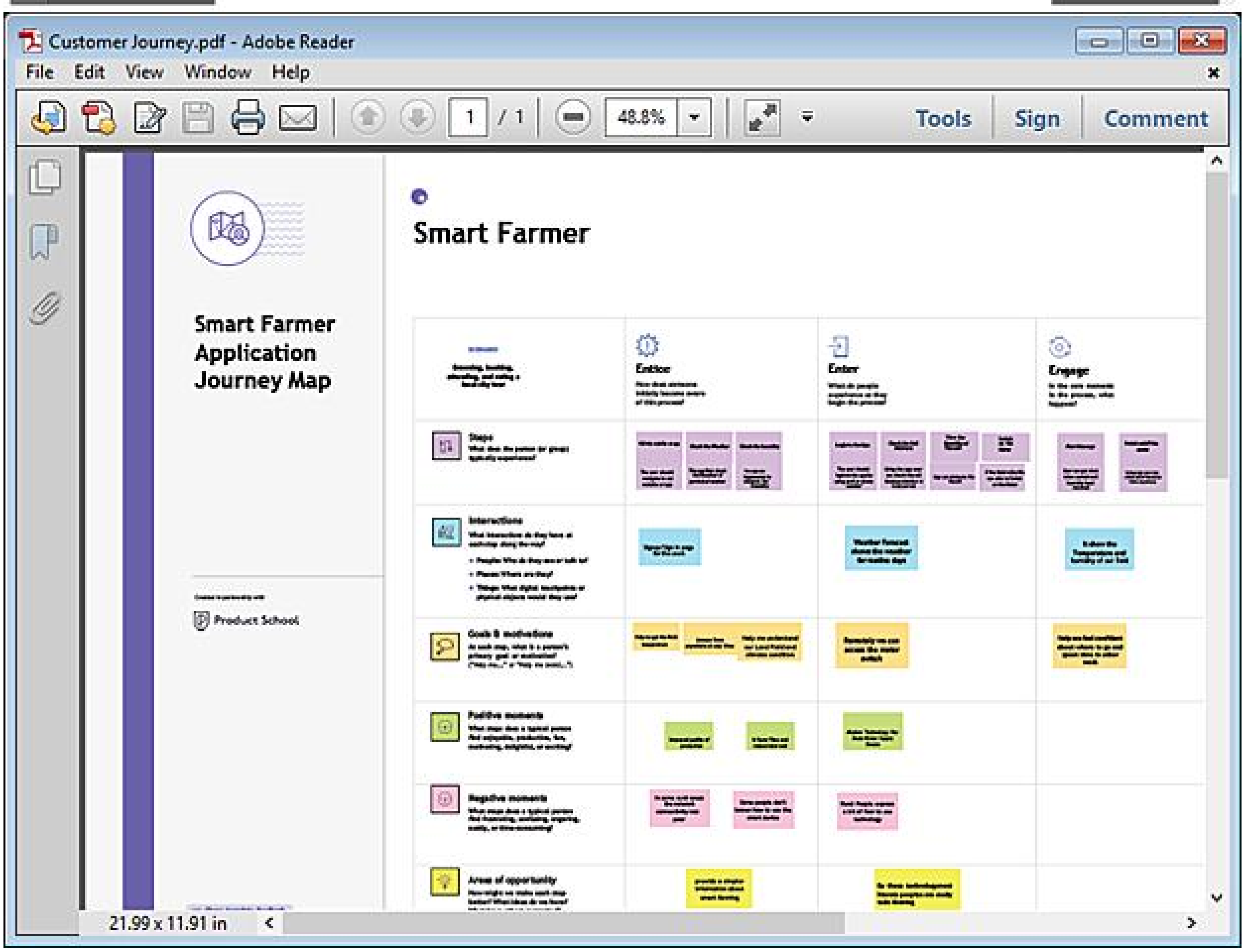
S. No	Characteristics	Description	Technology
1.	Open-Source Frameworks	List the open-source frameworks used	Technology of Open sourceframework
2.	Security Implementations	Sensitive and private data must be protected from their production until the decision-making and storage stages.	e.g. Node-Red, Open weather App API,MIT App Inventor, etc.
3.	Scalable Architecture	scalability is a major concern for IOT platforms. Ithas been shown that different architectural choices o f IOT platforms affect system scalability and that automatic real time decision-making is feasible in an environment composed of dozens of thousand.	Technology used
4.	Availability	Automatic adjustment of farming equipment made possible by linking information like crops/weather and equipment to auto-adjust temperature, humidity, etc.	Technology used
5.	Performance	The idea of implementing integrated sensors with sensing soil and environmental or ambient parameters in farming will be more efficient for overall monitoring.	Technology used

5.3 User stories:

Use the below template to list all the user stories for the product



User Type	Functional Requirement (Epic)	User Story Number	User Story / Task	Acceptance criteria	Priority	Release
Customer (Mobile user)	Registration	USN-1	As a user, I can register for the application by entering my email, password, and confirming my password.	I can access my account / dashboard	High	Sprint-1
		USN-2	As a user, I will receive confirmation email once I haveregistered for the application	I can receive confirmation email & click confirm	High	Sprint-1
		USN-3	As a user, I can register for the application through Facebook	I can register & access the dashboard with Facebook Login	Low	Sprint-2
		USN-4	As a user, I can register for the application through G mail		Medium	Sprint-1
	Login	USN-5	As a user, I can log into the application by entering email &password		High	Sprint-1
	Dashboard					
Customer (Web user)						
Customer Care Executive						
Administrator						



6.PROJECT PLANNING AND SCHEDULING:

6.1 Sprint planning and estimation:

1. Pre - Requisites
    - IBM Cloud Services
    - MIT App Inventor
    - Software
    - Create an Account in Fast2sms Dashboard
2. Project Objectives
    - Abstract
    - Brainstorming
3. Create and Configure IBM Cloud Services
    - Create IBM Watson IOT Platform and Device
    - Create Node- RED Service
4. Develop the Python Script and Subscribe to IBM IOT Platform
    - Develop A Python code
5. Develop a Web Application Using Node - RED Service
    - Develop The Web Application Using Node - RED
6. Develop a Mobile Application
    - Develop a Mobile Application
7. Ideation Phase
    - Literature Survey on The Selected Project & Information Gathering
    - Prepare Empathy Map
    - Ideation
8. Project Design Phase - 1
    - Proposed Solution
    - Prepare Solution Fit
    - Solution Architecture
9. Project Design Phase - 2
    - Customer Journey
    - Functional Requirement
    - Data Flow Diagram
    - Technology Architecture
10. Project Planning Phase
    - Prepare Milestones & Activity List
    - Sprint Delivery Plan
11. Project Development Phase
    - Project Development - Delivery of Sprint - 1
    - Project Development - Delivery of Sprint - 2
    - Project Development - Delivery of Sprint - 3
    - Project Development - Delivery of Sprint - 4

6.2 Sprint Delivery Schedule:

Product Backlog, Sprint Schedule, and Estimation (4 Marks)

Sprint	Functional Requirement (Epic)	User Story Number	User Story / Task	Story Points	Priority	Team Members
Sprint - 1	Creating Hardware Simulation	USN - 1	Connect Sensors and Wi - Fi modules by using Python code	2	High	Safrin Banu, Pavithra, Shajini,Shiny
Sprint - 2	Using Software	USN - 2	Creating device in the IBM Watson IOT platform, to making workflow of IOT scenarios using Node - RED service	2	High	SafrinBanu, Pavithra, Shajini,Shiny
Sprint - 3	MIT App Inventor	USN - 3	Develop a mobile application for the Smart Farmer project using MIT App Inventor	2	High	SafrinBanu, Pavithra, Shajini,Shiny
Sprint - 4	Web UI	USN - 4	To make the user to interact with software	2	High	SafrinBanu, Pavithra, Shajini,Shiny

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

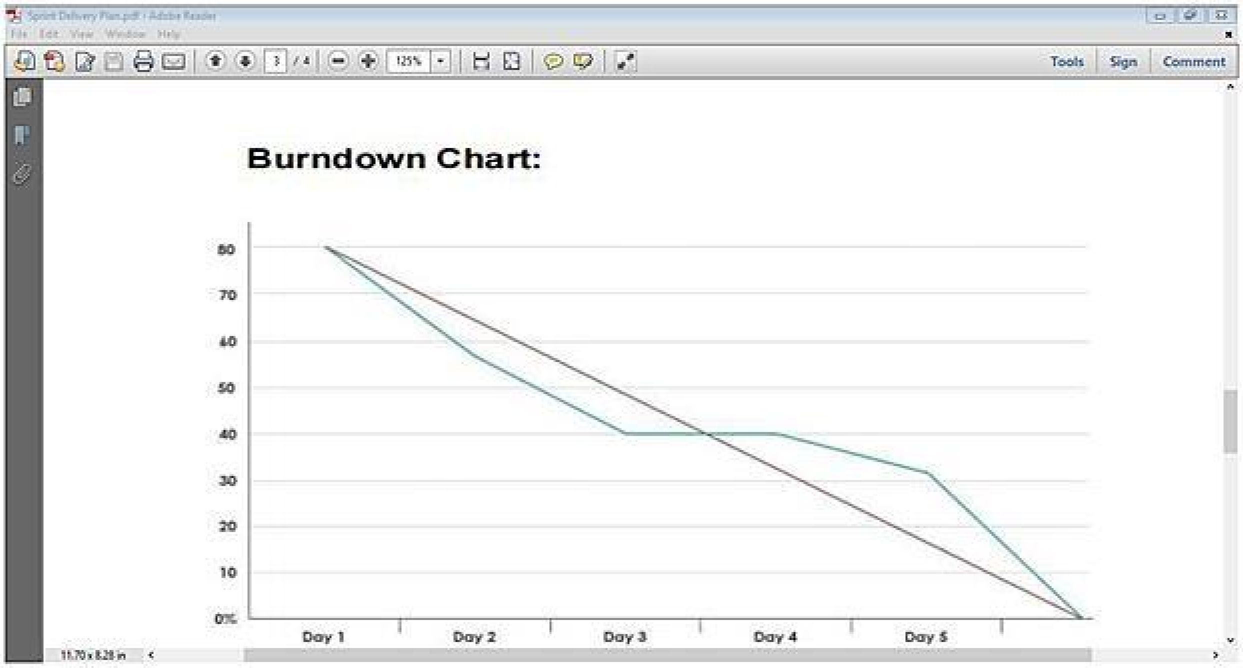
Velocity:

we have a 10 - day sprint duration, and the velocity of the team is 20 (points per sprint). Let’s calculate the team’s average velocity (AV) per iteration unit (story points per day).

AV=sprint duration/velocity
=20/10
=2

Burn down Chart:

A burn down chart is a graphical representation of work left to do versus time. It is often used in agile software development methodologies such as scrum. However, burn down charts can be applied to any project containing measurable
progress over time.



https://www.visual-paradigm.com/scrum/scrum-burndown-chart/
https://www.atlassian.com/agile/tutorials/burndown-charts

Reference:

https://www.atlassian.com/agile/project-management
https://www.atlassian.com/agile/tutorials/how-to-do-scrum-with-jira-software
https://www.atlassian.com/agile/tutorials/epics
https://www.atlassian.com/agile/tutorials/sprints
https://www.atlassian.com/agile/project-management/estimation
https://www.atlassian.com/agile/tutorials/burndown-charts

7.CODING AND SOLUTION

7.1 Feature 1

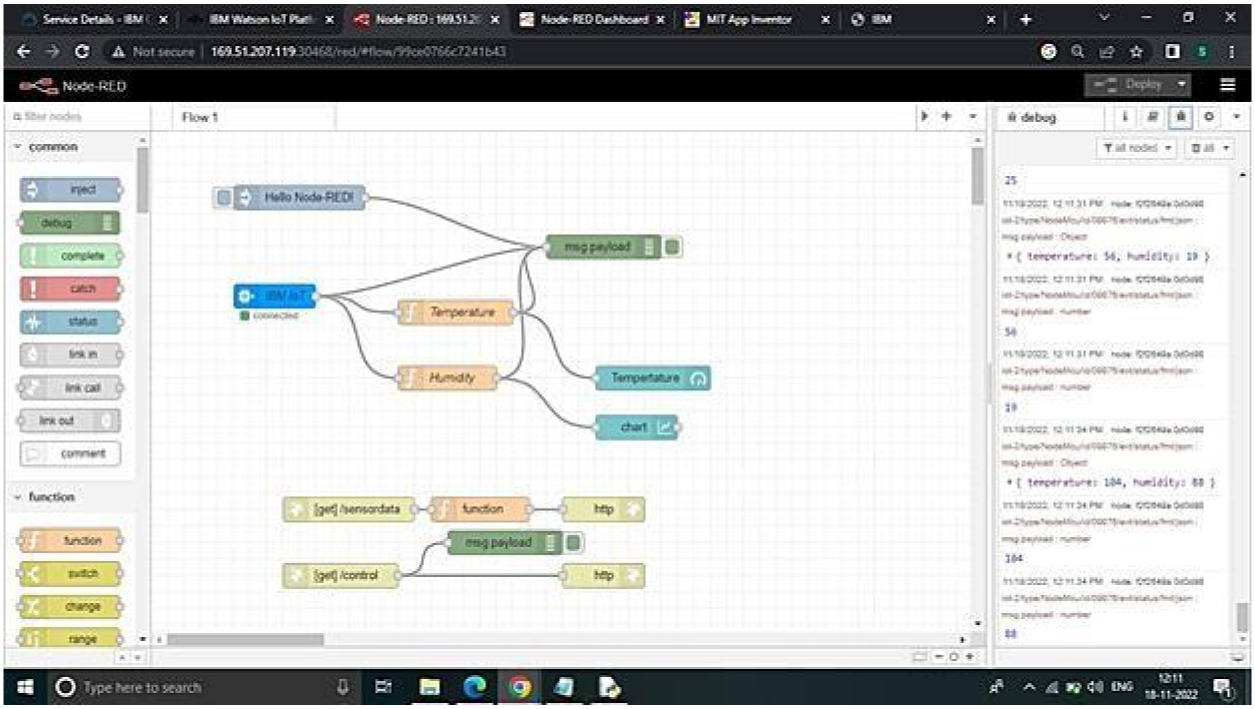
```
import wiotp.sdk.device
import time
import os
import datetime
import random
myConfig ={
   "identity": {
       "orgId": "iyrer2",
       "typeId": "abcdef",
       "deviceId": "786882"
    },
    "auth": {
      "token": "21122001"
    }
```

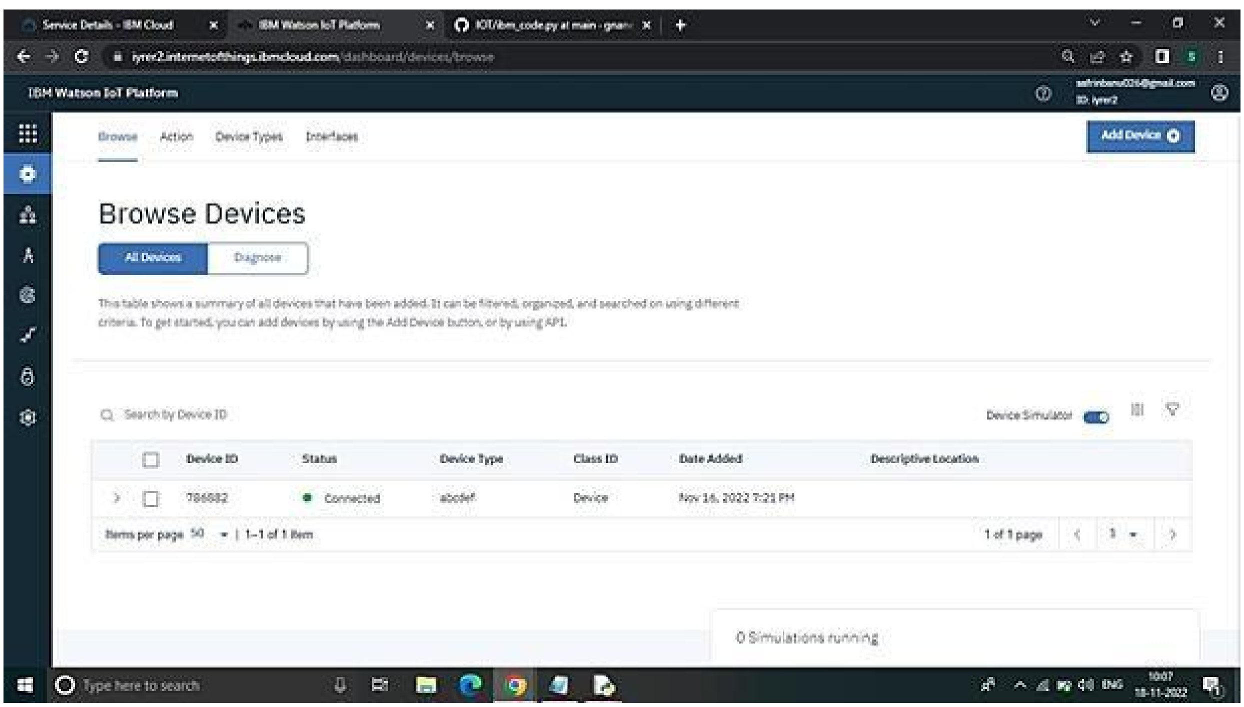
```
}
client = wiotp.sdk.device.DeviceClient(config=myConfig,logHandlers=None)
client.connect ()
def myCommandCallback (cmd) :
    print("Message received from IBM IoT Platform: %s" %cmd.data['command'])
    m=cmd.data['command']
    if (m=="motoron"):
        print("Motor is switchedon")
    elif (m=="motoroff"):
        print ("Motor is switchedOFF")
    print (" ")
while True:
    moist =random.randint (0,100)
    temp=random.randint (-20, 125)
    hum=random.randint (0, 100)
    myData={'moisture':moist,'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 ()
```

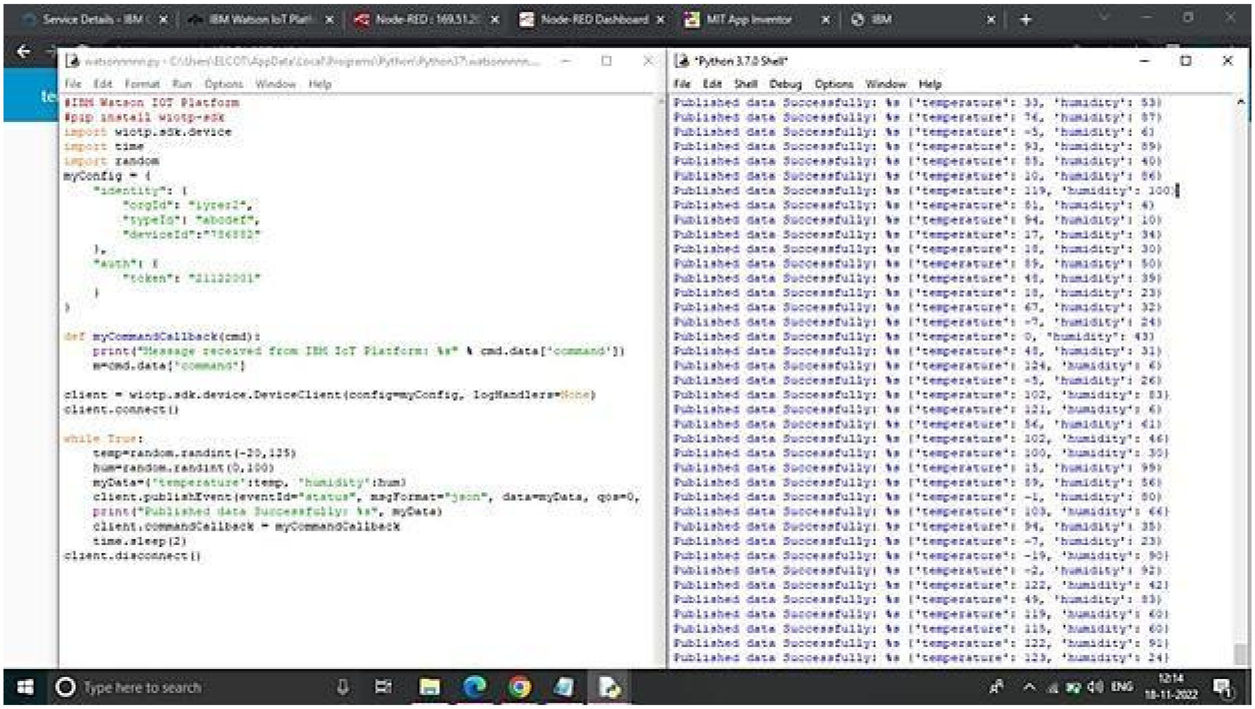
8.TESTING

8.1 Test case

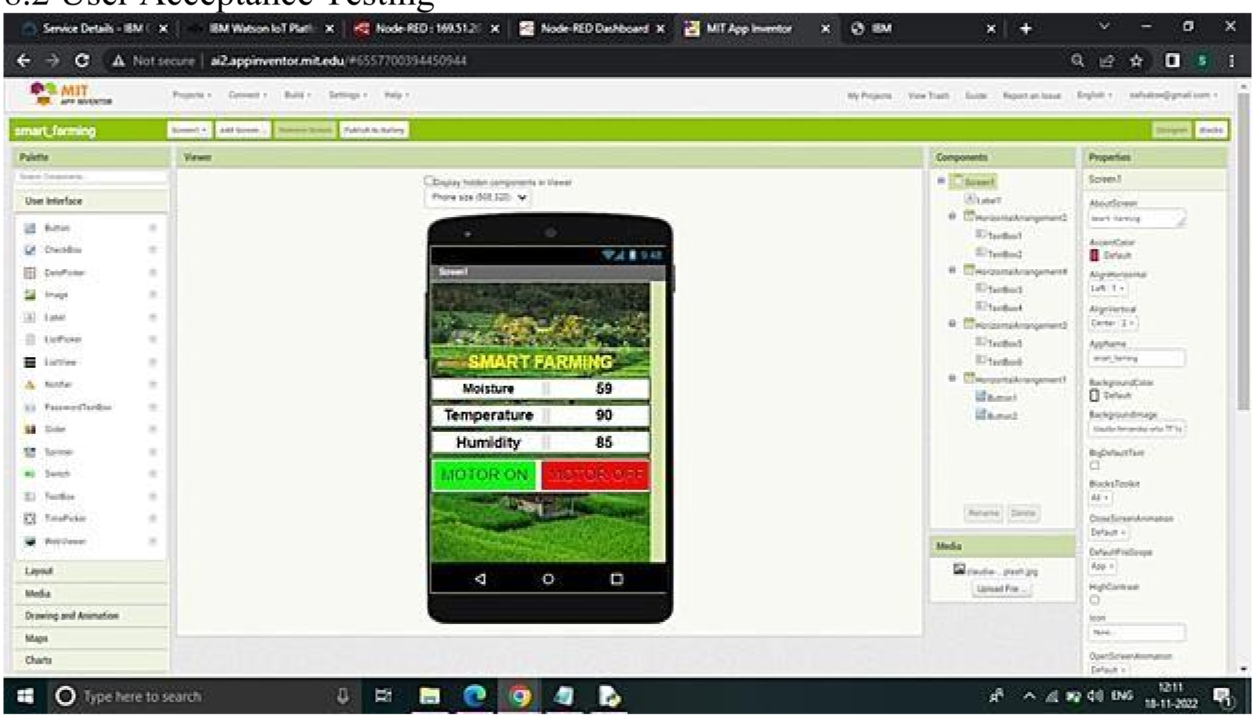
Web application using Node Red


Node-RED
Flow 1
debug
common
inject
debug
complete
catch
status
link in
link call
link out
comment
function
function
switch
change
range
Hello Node-RED!
msg.payload
IBM IoT
connected
Temperature
Humidity
Temperature
chart
[get] /sensordata
function
http
msg.payload
[get] /control
http
Type here to search


IBM Watson IoT Platform
Browse
Action
Device Types
Interfaces
Add Device
Browse Devices
All Devices
Diagnose
This table shows a summary of all devices that have been added. It can be filtered, organized, and searched on using different criteria. To get started, you can add devices by using the Add Device button, or by using API.
Search by Device ID
Device Simulator
Device ID
Status
Device Type
Class ID
Date Added
Descriptive Location
786882
Connected
abcdef
Device
Nov 16, 2022 7:21 PM
Items per page 50
1–1 of 1 item
1 of 1 page
0 Simulations running
Type here to search

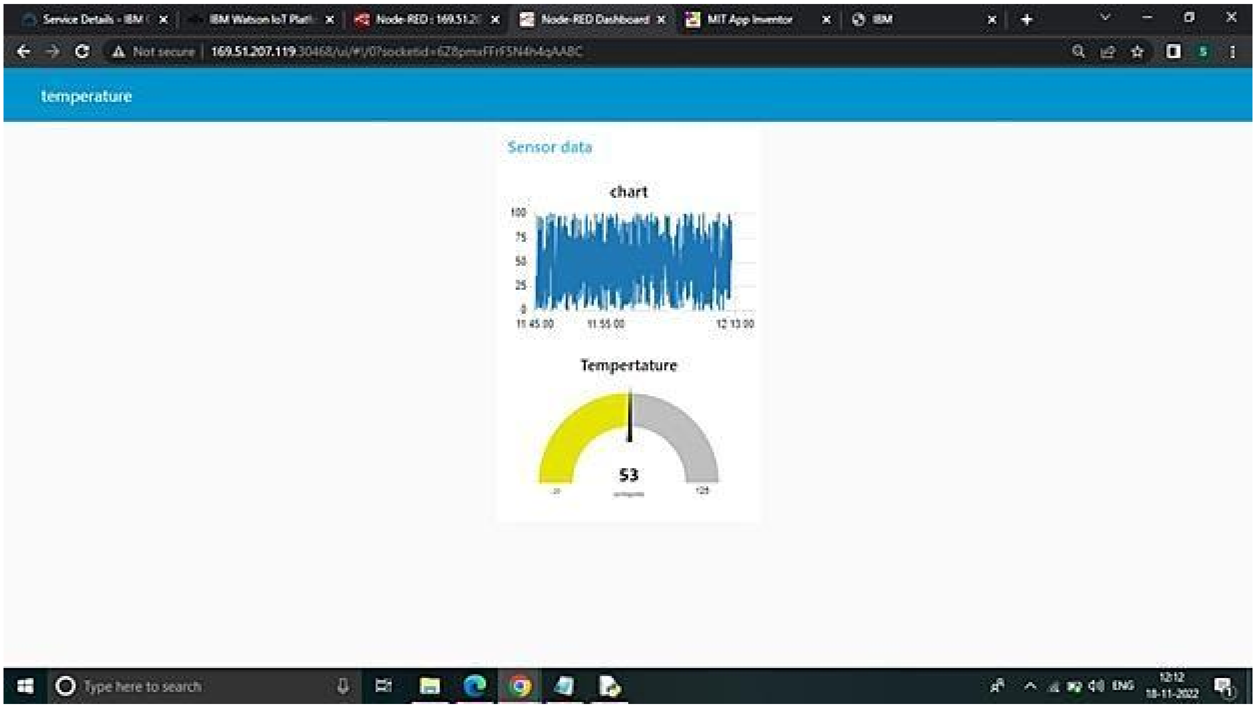


8.2 User Acceptance Testing



9.RESULTS:

9.1 Performance Metrics



10.ADVANTAGES AND DISADVANTAGES:

Advantages:

➢ Various solutions are available to monitor engine statistics and starting or stopping the engine. When the client chooses to begin or stop the motor, the program transmits a sign to the unit within seconds by means of a mobile phone system.

➢ Submersible weight sensors or ultrasonic sensors can screen the degree of tanks, lakes, wells and different kinds of fluid stockpiling like fuel and compost. The product figures volume dependent on the tank or lake geometry after some time. It conveys alarms dependent on various conditions.

➢ A remote control system can help in working irrigation system valves dependent on schedule. Irrigating remote farm properties can be exceptionally troublesome and labor intensive. It gets hard to comprehend when the valves were started and whether the ideal measure of water was distributed.

➢ For situations where a quick reaction is required, manual valve actuation may not be conceivable constantly. Thus, remote observing and control of irrigation systems, generators or wind machines or some other motor-driven hardware become the next logical step

Disadvantages:

➢ The smart agriculture needs availability of internet continuously. Rural part of most of the developing countries do not fulfil this requirement. More over internet connection is slower.

➢ The smart farming based equipment require farmers to understand and learn the use of technology. This is major challenge in adopting smart agriculture farming at large scale across the countries.

11.CONCLUSION:

Farmers can benefit greatly from an IOT-based smart agriculture system. As a result of the lack of irrigation, agriculture suffers. Climate factors such as humidity, temperature, and moisture can be adjusted dependent on the local environmental variables. This technology also detects animal invasions, which are a major cause of crop loss. This technology aids in the scheduling of irrigation based on present data from the field and records from a climate source. It helps in deciding the farmer to whether to do irrigation or not to do. Continuous internet connectivity is required for continuous monitoring of data from sensors. This also can be overcome by using GSM unit as an alternative of mobile app. By GSM, SMS can be sent to farmer's phone. 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:

In the current project we have implemented the project that can protect and maintain the the crop. In this project the farmer monitor and control the field remotely. In future we can add or update few more things to this project

. • We can create few more models of the same project, so that the farmer can have information of entire.

• We can update this project by using solar power mechanism. So that the power supply from electric poles can be replaced with solar panels. It reduces the power line cost. It will be a one- time investment. We can add solar fencing technology to this project.

• We can use GSM technology to this project so that the farmers can get the information directly to his home through SMS. This helps the farmer to get information if there is a internet issues.

• We can add camera feature so that the farmer can monitor his field in real time. This helps in avoiding thefts.

13.APPENDIX

Source Code

```
import wiotp.sdk.device
import time
import os
import datetime
import random
myConfig ={
   "identity": {
        "orgId": "iyrer2",
        "typeId": "abcdef",
        "deviceId": "786882"
    },
    "auth": {
       "token": "21122001"
    }
}
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 switchedon")
   elif (m=="motoroff"):
      print ("Motor is switchedOFF")
   print (" ")
while True:
   moist =random.randint (0,100)
   temp=random.randint (-20, 125)
   hum=random.randint (0, 100)
   myData={'moisture':moist,'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 ()
```

Demo link:

https://www.mediafire.com/file/bkr7kum6ub1gmuw/IBM+-+Google+Chrome+2022-11-18+11-54-29.mp4/file

Git Hub link :

https://github.com/IBM-EPBL/IBM-Project-44630-1660725674