# PROJECT REPORT

## Project Name: SMART FARMER- IOT ENABLED SMART FARMING APPLICATION.

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1. **INTRODUCTION**

Project Overview Purpose



1. **LITERATURE SURVEY**
   1. Existing problem
   2. References
   3. Problem Statement Definition
2. **IDEATION & PROPOSED SOLUTION**
   1. Empathy Map Canvas
   2. Ideation & Brainstorming
   3. Proposed Solution
   4. Problem Solution fit
3. **REQUIREMENT ANALYSIS**
   1. Functional requirement
   2. Non-Functional requirements
4. **PROJECT DESIGN**
   1. Data Flow Diagrams & User Stories
   2. Solution & Technical Architecture
5. **PROJECT PLANNING & SCHEDULING**
   1. Sprint Planning & Estimation
   2. Sprint Delivery Schedule
6. **CODING & SOLUTIONING (Explain the features added in the project along with code)**
   1. Feature
   2. Database Schema (if Applicable)
7. **TESTING**
   1. Test Cases
   2. User Acceptance Testing
8. **RESULTS**
   1. Performance Metrics
9. **ADVANTAGES & DISADVANTAGES**
10. **CONCLUSION**
11. **FUTURE SCOPE**
12. **APPENDIX**

Source Code



GitHub & Project Demo Link

# SMART FARMING

#### INTRODUCTION:

**PROJECT OVERVIEW**:

This is system that enables framers to monitor and their forms with a webbased application build with Node-RED.

It uses the IBM IOT Watson cloud platform as its Backend.

**PURPOSE:**

Smart Farming reduce the ecological foodprint 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.

#### LITERATURE SURVEY:

* 1. **EXISTING PROBLEM:**

The biggest challenges faced by IoT in the agricultural sector are lack of information, high adoption costs , and security

concers , etc. Most of the farmers are not aware of the implementation of IoT in agriculture.

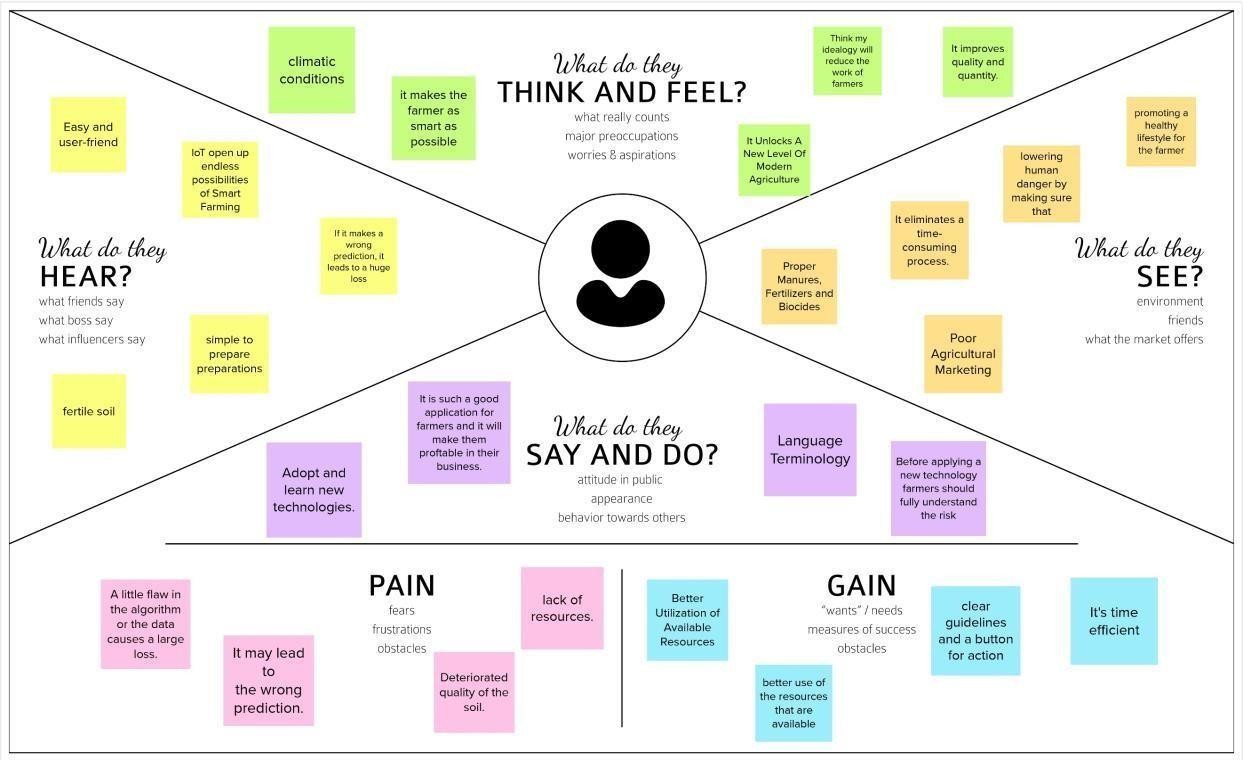
* 1. **REFERENCES:**

It is the application of modern ICT (Information and Communication Technologies) into agriculture. In IOT- based smart farming, a system is built for monitoring the crop field with the help of sensors (light, humidity, temperature, soil moisture, etc.). The farmers can monitor the field conditions from anywhere.

* 1. **PROBLEM STATEMENT DEFINITION:**

Overuse of pesticides and fertilizer in agricultural fields leads to destruction of the crop as well as reduces the efficiency of the field increasing the soil vulnerability toward pest. IoT applications may be used to update the farmer/ user about type & quantity of pesticide required by the crop.

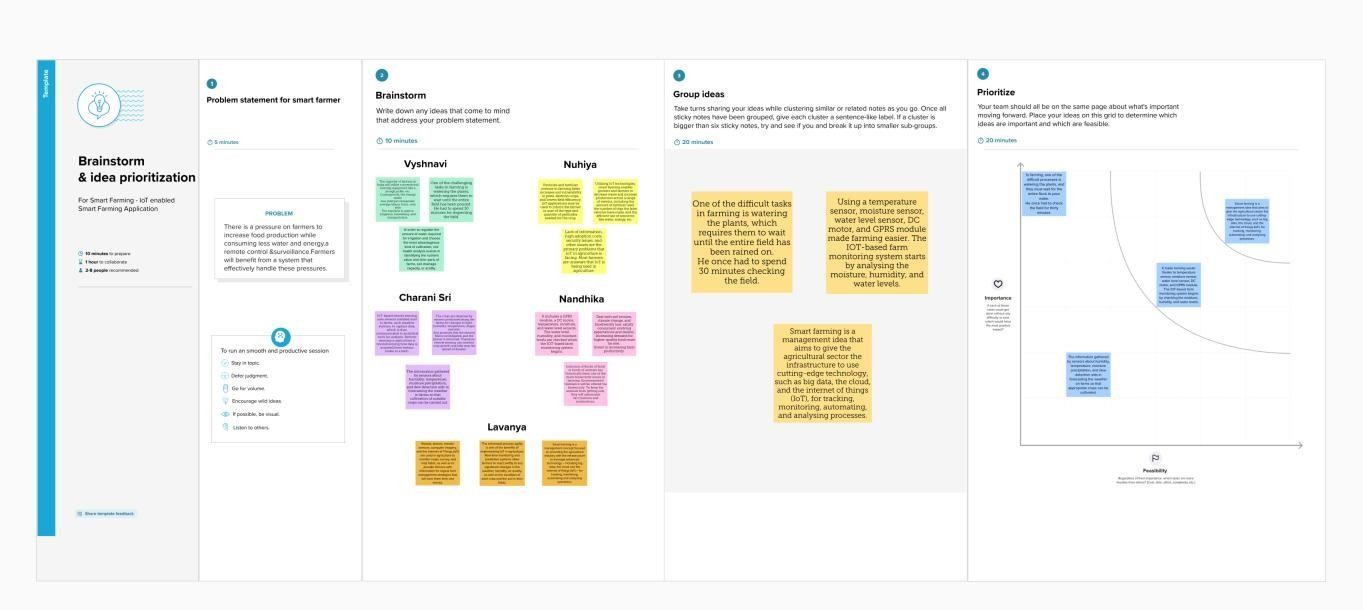
1. **IDEATION & PROPOSED SOLUTION**
   1. **EMPATHY MAP CANVAS:**



#### IDEATION & BRAINSTORMING:

**Ideation** is the create process of generating, developing, and communicating new ideas, where an

is idea understood as a basic element of thought that can beeither visual, concrete, or abstract

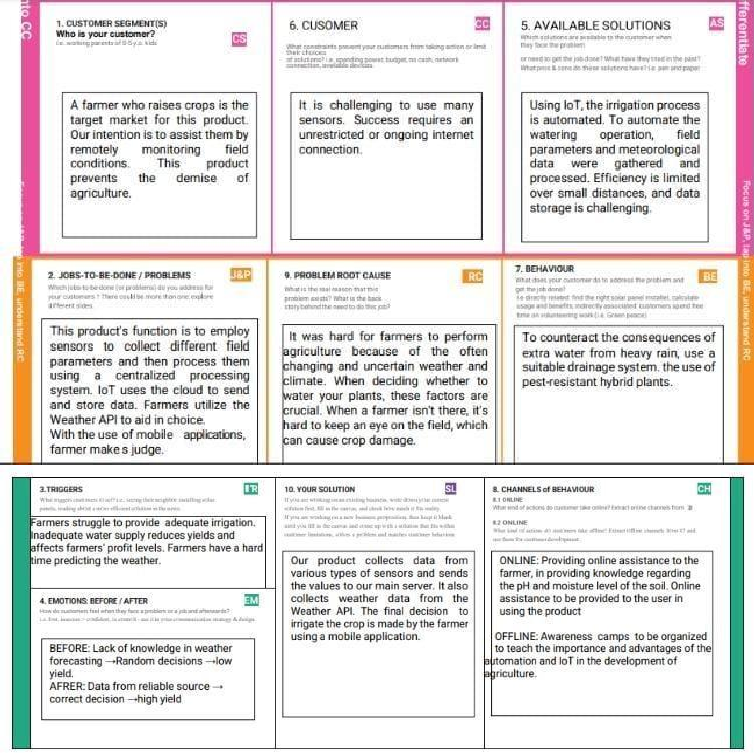


* 1. **Proposed Solution Template**:

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

|  |  |  |
| --- | --- | --- |
| **S.No.** | **Parameter** | **Description** |
| 1. | Problem Statement (Problem to be solved) | o Most of the farmers use large portions of farming land and it becomes very difficult to reachand track each corner of largelands. Sometime there is a possibility of uneven water  sprinkles. |
| 2. | Idea / Solution description | o Smart Farming has enabled farmers to reduce waste and enhance productivity with the help of sensors (light, humidity, temperature, soil moisture, etc..) |
| 3. | Novelty / Uniqueness | * Role of SENSORS : 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 easilymonitor the field conditions   from anywhere without any hassle |
| 4. | Social Impact / Customer Satisfaction | * Water conservation * Saves lot of time * Increased quality of production * insight |
| 5. | Business Model (Revenue Model) |  |
| 6. | Scalability of the Solution | o Scalability in smart farming refers to the adaptability of a system to increase the capacity, the number of technology devices such as sensors and actuators. |

#### PROBLEM SOLUTION FIT:



**Project Design Phase-II**

1. **Solution Requirements (Functional & Non-functional)**
   1. **Functional Requirements:**

Following are the functional requirements of the proposed solution.

|  |  |  |
| --- | --- | --- |
| **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 |

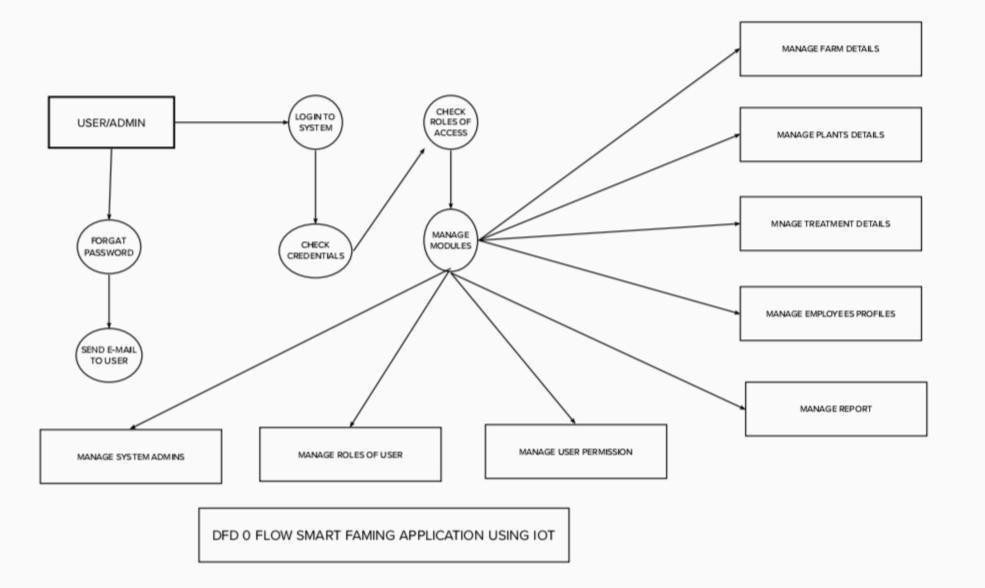
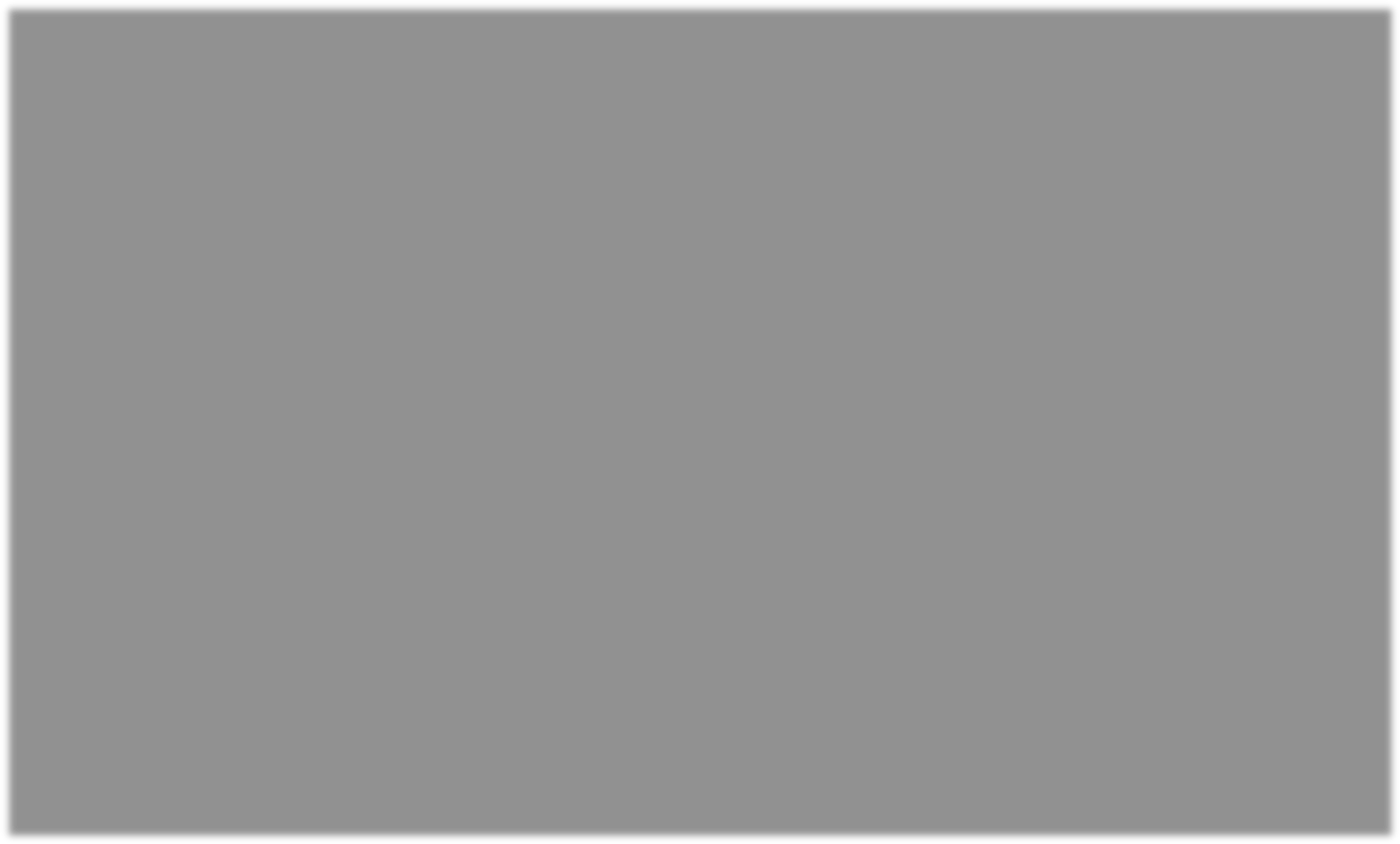
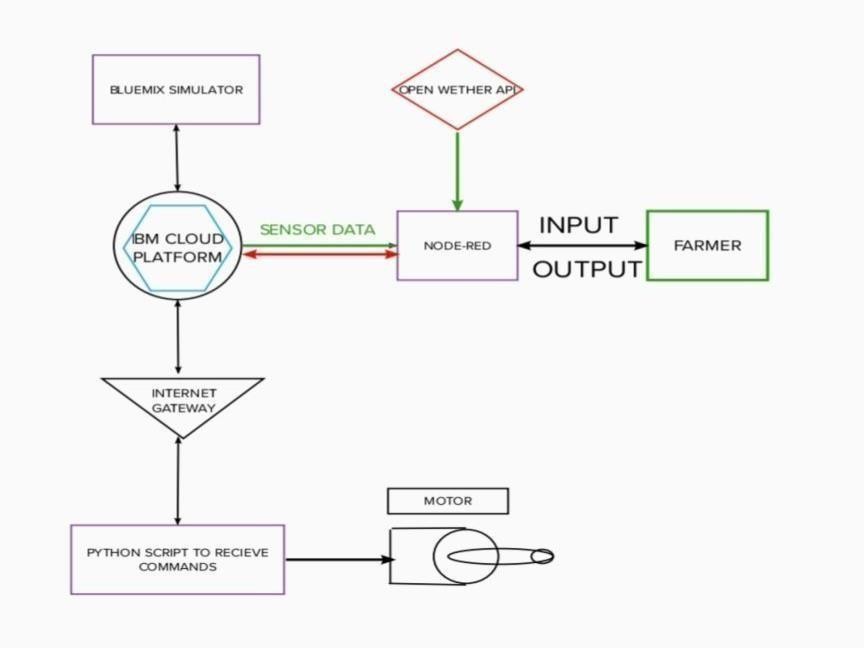
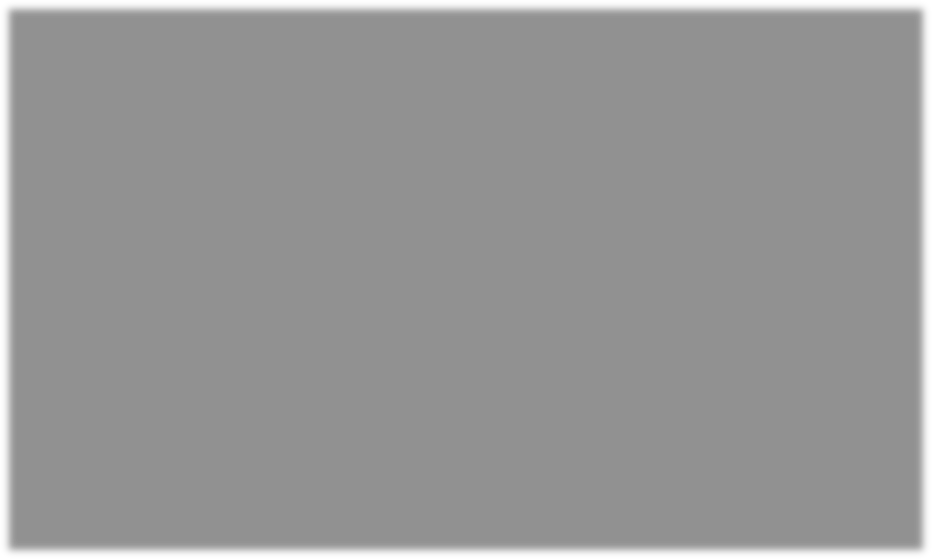
* 1. **Non-Functional Requirements**:

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

|  |  |  |
| --- | --- | --- |
| **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 protectionmethods. |
| 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. |

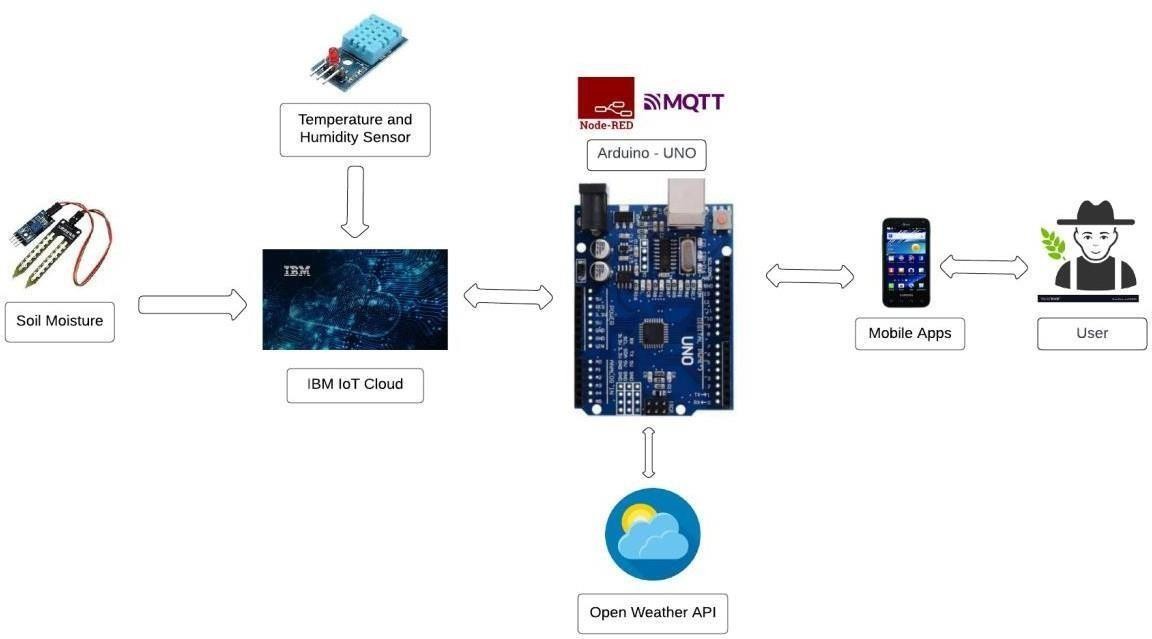
1. **PROJECT DESIGN**:
   1. **DATA**-**FLOW DAIGRAMS AND USER STORIES**:

A Data Flow Diagram (DFD) is a traditional visual representation of the informationflows 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. **SOLUTIONS AND TECHNICAL ARCHITECTURAL:**

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



### Table-1: Components & Technologies:

|  |  |  |  |
| --- | --- | --- | --- |
| **S.No** | **Component** | **Description** | **Technology** |
| 1. | User Interface | How user interacts with application e.g.  Web UI, Mobile App, Chatbot etc. | MIT app |
| 2. | Application Logic-1 | Logic for a process in the  application | Node red/IBM  Watson/MIT app |
| 3. | Application Logic-2 | Logic for a process in the application | Node red/IBM Watson/MIT app |
| 4. | Application Logic-3 | Logic for a process in the application | Node red/IBM Watson/MIT app |
| 5. | Database | Data Type, Configurations etc. | MySQL, NoSQL,  etc. |
| 6. | Cloud Database | Database Service on Cloud | IBM cloud. |
| 7. | Temperature sensor | Monitors the temperature of the crop |  |
| 8. | Humidity sensor | Monitors the humidity |  |
| 9. | Soil moisture sensor (Tensiometers) | Monitors the soil temperature |  |
| 10. | Weather sensor | Monitors the weather | . |
| 11. | Solar panel |  | . |
| 12. | RTC module | Date and time configuration |  |
| 13. | Relay | To get the soil moisture data |  |

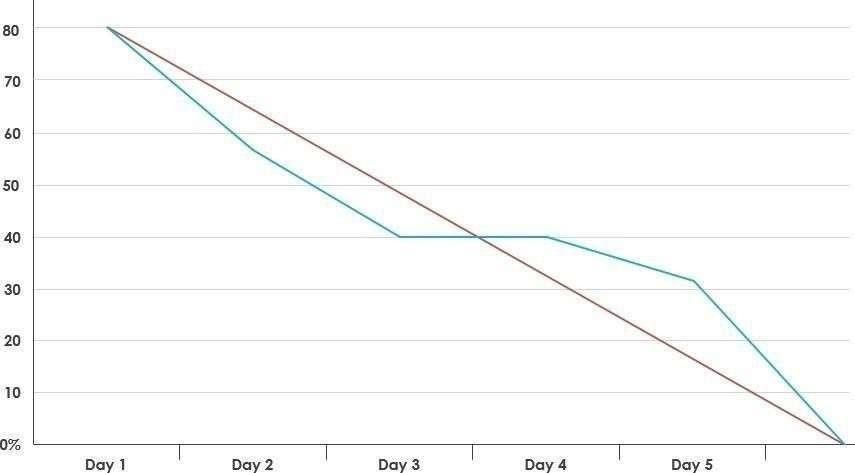
**Table-2: Application Characteristics:**

|  |  |  |  |
| --- | --- | --- | --- |
| **S.No** | **Characteristics** | **Description** | **Technology** |
| 1. | Open-Source  Frameworks | MIT app,Node-Red | Software |
| 2. | Scalable Architecture | Drone technology, pesticide monitoring  ,Mineral identification in  soil | Hardware |

1. **PROJECT PLANNING AND SCHEDULING:**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Sprint** | **Functional Requirement (Epic)** | **User Story Number** | **User Story / Task** | **Priority** | **Story Points** | **Team Members** |
| Sprint-1 | Hardware | USN-1 | Sensors and wi-fi module with python code. | High | 2 | Vyshnavi, Nuhiya, Charani sri, Lavanya, Nandhika |
| Sprint-2 | Software | USN-2 | IBM Watson IoT platform, Workflows for IoTscenarios using Node-red | High | 2 | Vyshnavi, Nuhiya, Charani sri, Lavanya, Nandhika |
| Sprint-3 | MIT app | USN-3 | To develop a mobile application using MIT | High | 2 | Vyshnavi, Nuhiya, Charani sri, Lavanya, Nandhika |
| Sprint-4 | Web UI | USN-4 | To make the user to interact with software. | High | 2 | Vyshnavi, Nuhiya, Charanisri,  Lavanya, Nandhika |

**Burndown Chart:**



1. **CODING & SOLUTIONS**:
   1. **FEATURE** :

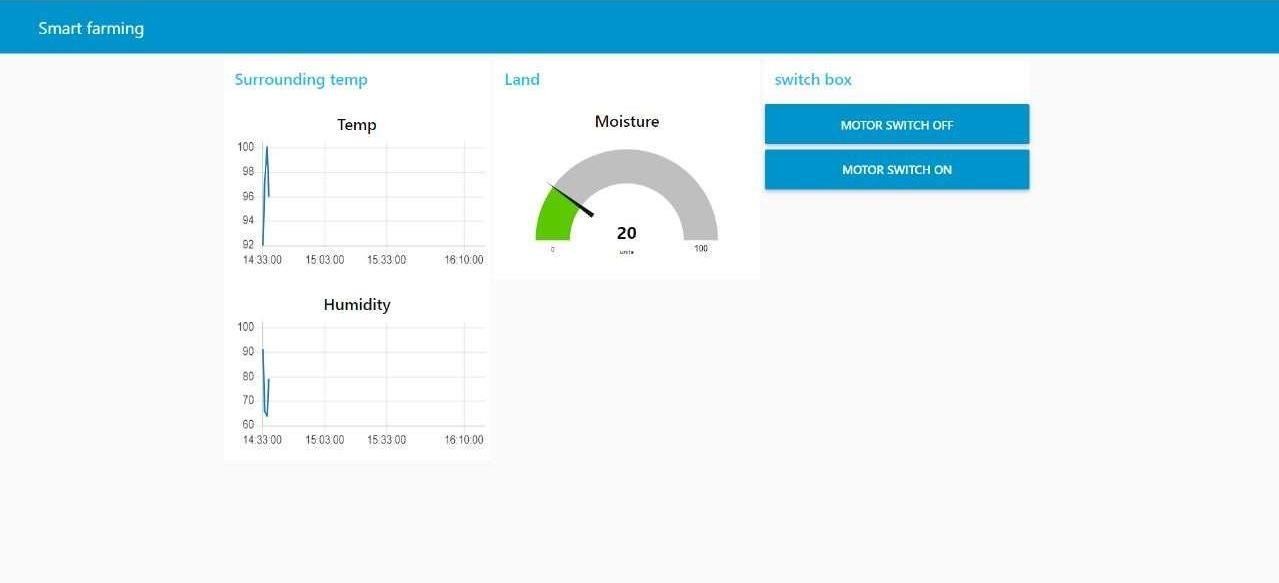


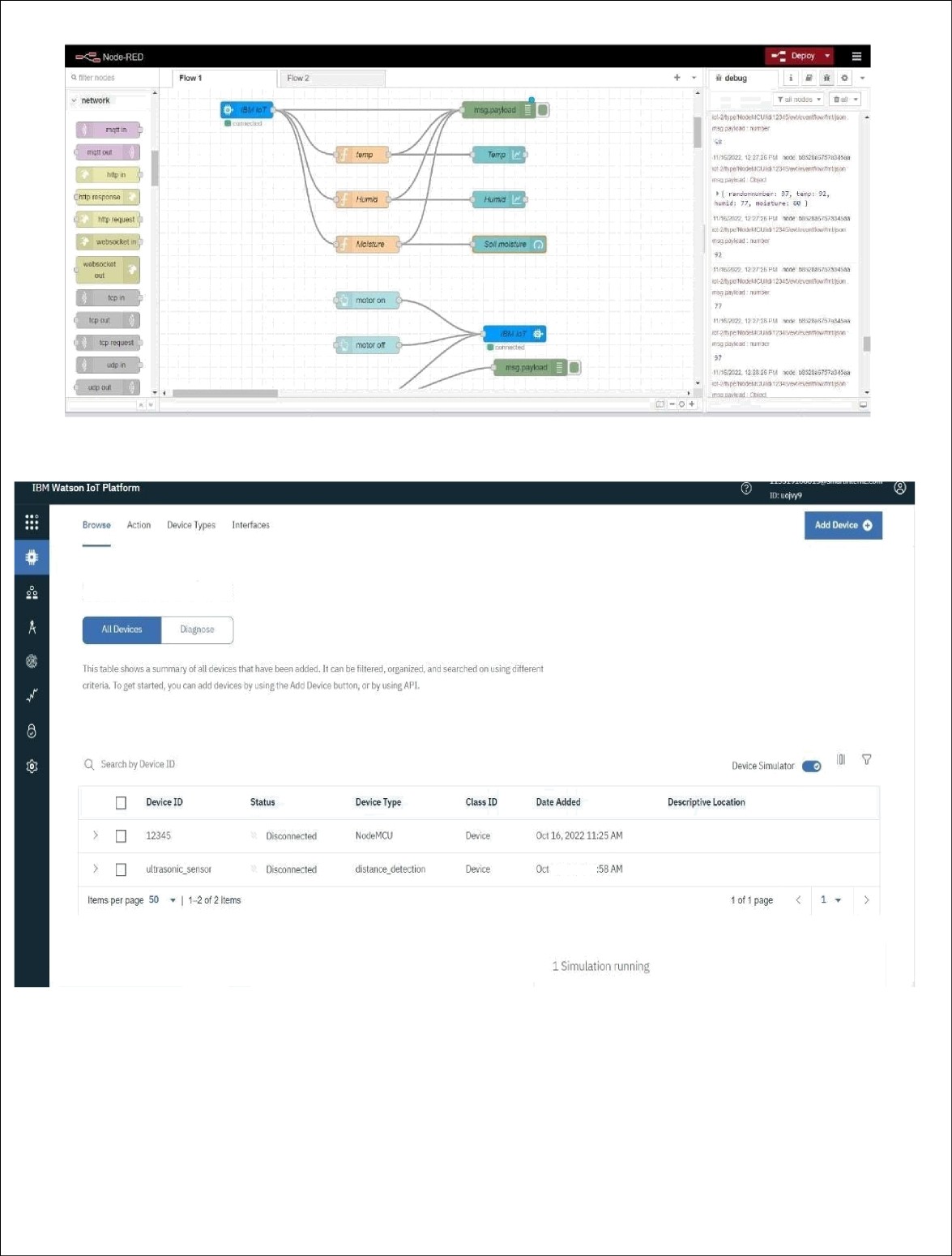
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### TESTING:

* 1. **TEST CASE:**

Web application using Node-RED.





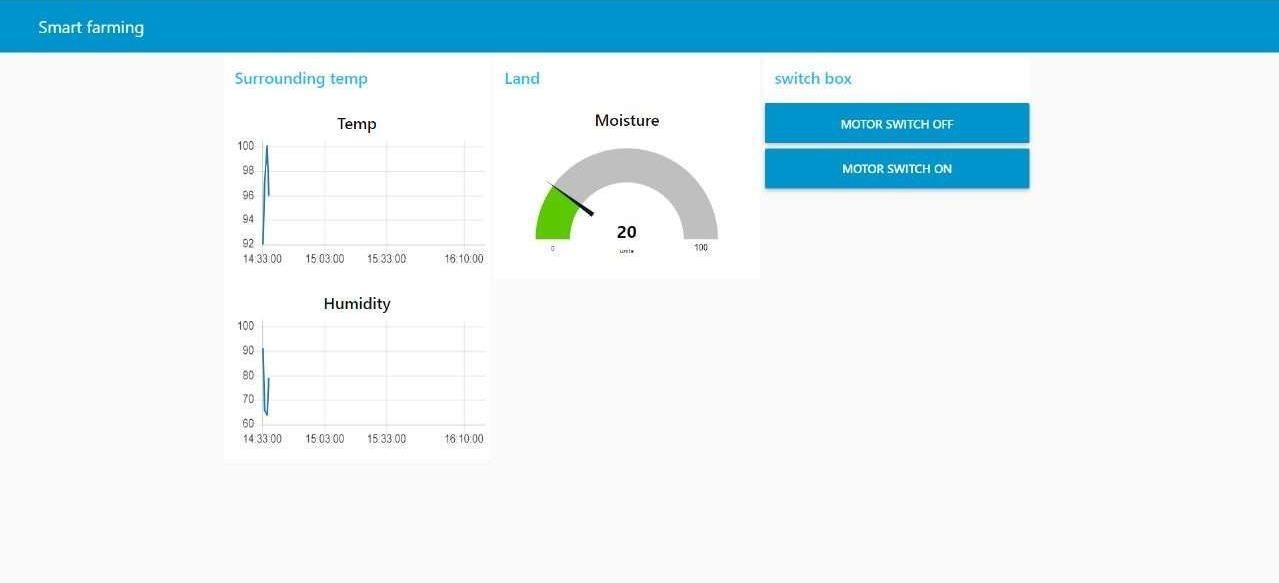
Browse Devices



### User Acceptance Testing



1. **RESULT:**
   1. **Performance Metrics**



1. **ADVANTAGES AND DISADVANTAGES:**
   1. **ADVANTAGES:**
      * All the data like climatic conditions and changes in them, soil orcrop 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.
   2. **DISADVANTAGES:**

* Smart Agriculture requires internet connectivity continuously, butrural parts cannot fulfl 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.

### CONCLUSION:

An IOT based smart agriculture system using Watson IOT platform, Watson simulator, IBM cloud and Node-RED.

### 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.

### APPENDIX:

SOURCE CODE:

import wiotp.sdk.device import time

import sys

import ibmiotf.application import ibmiotf.device import random

#Provide your IBM Watson Device organization = "uojvy9" deviceType = "NodeMCU" deviceId = "12345"

authMethod = "token" authToken ="12345678" # Initialize GPIO

def myCommandCallback(cmd): print("Commandreceived: %s" % cmd.data['command']) status=cmd.data['command']

if status=="motoron": print ("motor is on")

elif status == "motoroff":

print("motor is off") else :

print ("please send proper command")

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 aneventof type "greeting" 10 times

deviceCli.connect() while True:

#Get Sensor Data fromDHT11 temp=random.randint(90,110) Humid=random.randint(60,100) Mois=random. randint(20,120)

data = { 'temp' : temp, 'Humid': Humid ,'Mois': Mois} #print data

def myOnPublishCallback():

print ("Published Temperature = %s C" % temp, "Humidity = %s %%"

%Humid, "Moisture =%s deg c" % Mois, "to IBM Watson")

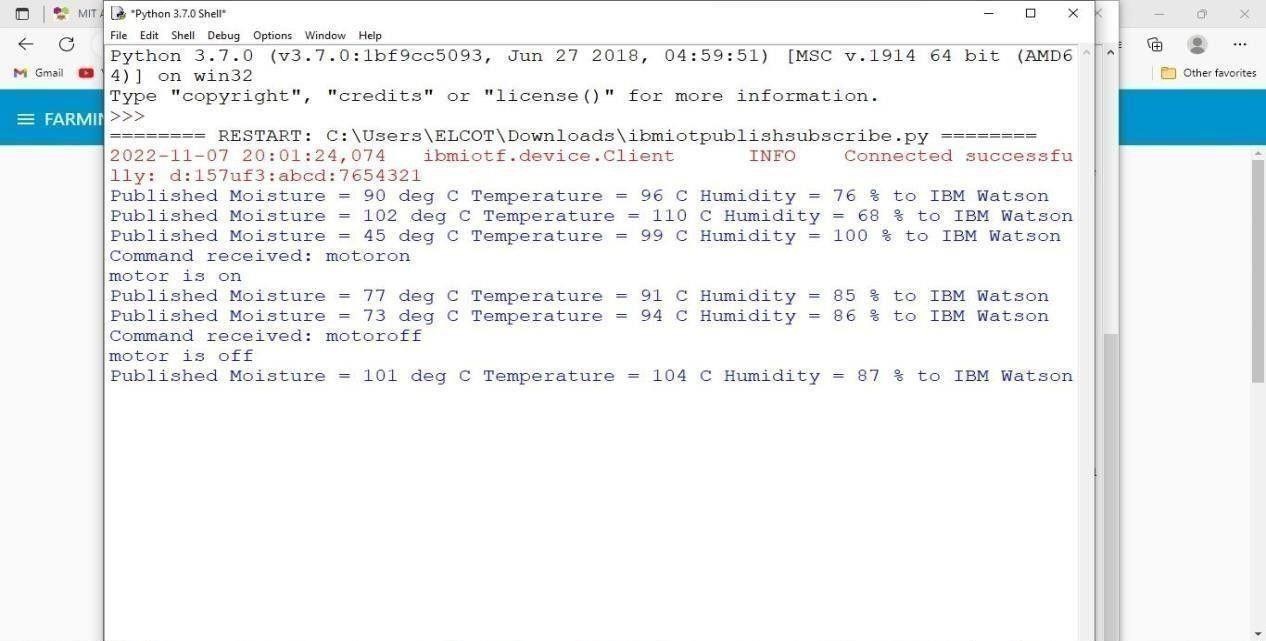
success = deviceCli.publishEvent("IoTSensor", "json", data,qos=0,on\_publish=myOnPublishCallback)

if not success:

print("Not connected to IoTF") time.sleep(10)

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

### OUTPUT:



**Github link:** **SI-GuidedProject-53078-1664338086**

` **THANK YOU**