PROJECT REPORT

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

Team ID: PNT2022TMID16094

TEAM:

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VIJAYALAKSHMI S

SHINEKA K S

SUBHIKHSHA B

1.INTRODUCTION

1.1 PROJECT OVERVIEW

In this project prototype is used to send message to farmers from the IOT. IOT plays a very important role in smart IOT based Agriculture monitoring system makes use of wireless sensor networks that collects data from different sensors deployed at various nodes and sends it through the wireless protocol. This smart agriculture using IOT system is powered by Arduino, it consists of Temperature sensor, Moisture sensor, water level sensor, DC motor and GPRS module. When the IOT based agriculture monitoring system starts it checks the water level, humidity and moisture level. It sends SMS alert on the phone about the levels. Sensors sense the level of water if it goes down, it automatically starts the water pump. If the temperature goes above the level, fan starts. This all is displayed on the LCD display module. This all is also seen in IOT where it shows information of Humidity, Moisture and water level with date and time, based on per minute. Temperature can be set on a particular level; it is based on the type crops cultivated. If we want to close the water forcefully on IOT there is button given from where water pump can be forcefully stopped.

1.2 PURPOSE

The Internet of Things is essentially a network of computers that are connected. However, as the world changes, its use is expanding beyond the world. The creation of smart homes, smart agriculture, and e-health are all products are accompanied with IOT.

The idea of IoT was introduced by care's etc. Without human-to-human or human-to-computer interaction, the Internet of Things refers to the connection or communication between two or more devices. With the use of sensors or actuators, connected devices may sense their environment. Sensing the device, gaining access to the device, processing the device's data, and offering applications and services make up the four main parts of IOT. Along with this, it also offers data security and privacy. All facets of our daily life have been impacted by automation. In order to save time and reduce human effort, more advancements are being made in practically every industry. The same is being considered while attempting to automate track testing. Smart farm is used along with IOT is used to intimate the farmer about the crop condition that they need to know the field situation.

2.LITERATURE SURVEY

2.1 EXISTING SYSTEM

The agriculture industry is developed a lot with the help of technology; it became data-centered and smarter. The rapid growth of the Internet of Things based technologies reshaped many industries, including agriculture. Such a radical change dismantles existing farming practices and creates new opportunities along with some challenges. The IoT systems contributed in many fields and proven. It is time for farmers need to introduce the Smart Agricultural systems for higher crop yield. With a compilation of data from sensors and modern electronic gadgets, the farmer can monitor agricultural fields. Smart Agriculture can forecast weather data, switching ON the pump motor and switch ON the bulb for artificial light due to less light intensity, for farms acknowledging the dampness of soil of moisture levels. The IR sensor detects the pest and humans by their temperature; the sensors are interfaced to process module Arduino-UNO. The Smart agriculture system can be operated from anywhere with the help of networking technology.

2.2 Reference:

[1] Pradyumna Gokhale, Omkar Bhat, Sagar Bhat, "Introduction to IOT", International Advanced Research Journal in Science, Engineering and Technology (IARJ SET), Vol. 5, Issue 1, January 2018.

[2] Brian Gilmore, "The Next Step in Internet Evolution: The Internet of Things", Internet of Things, cmswire, Jan 2014.

[3] A.Anusha, A.Guptha, G.Sivanageswar Rao, Ravi Kumar Tenali, "A Model for Smart Agriculture Using IOT", International Journal of Innovative Technology and Exploring Engineering (IJITEE),ISSN: 2278-3075, Volume-8 Issue-6, April 2019.

[4] Muthunoori Naresh, P Munaswamy," Smart Agriculture System using IoT Technology", International Journal of Recent Technology and Engineering (IJRTE), ISSN: 2277-3878, Volume-7 Issue-5, January 2019.

[5] Nikesh Gondchawar, Prof. Dr. R. S. Kawitkar, "IOT based smart agriculture", International Journal of Advanced Research in Computer and Communication Engineering, Vol. 5, Issue 6, June 2016.

[6] Anand Nayyar, Er. Vikram Puri," Smart Farming: IoT Based Smart Sensors Agriculture Stick for Live Temperature and Moisture Monitoring using Arduino, Cloud Computing & Solar Technology", November 2016.

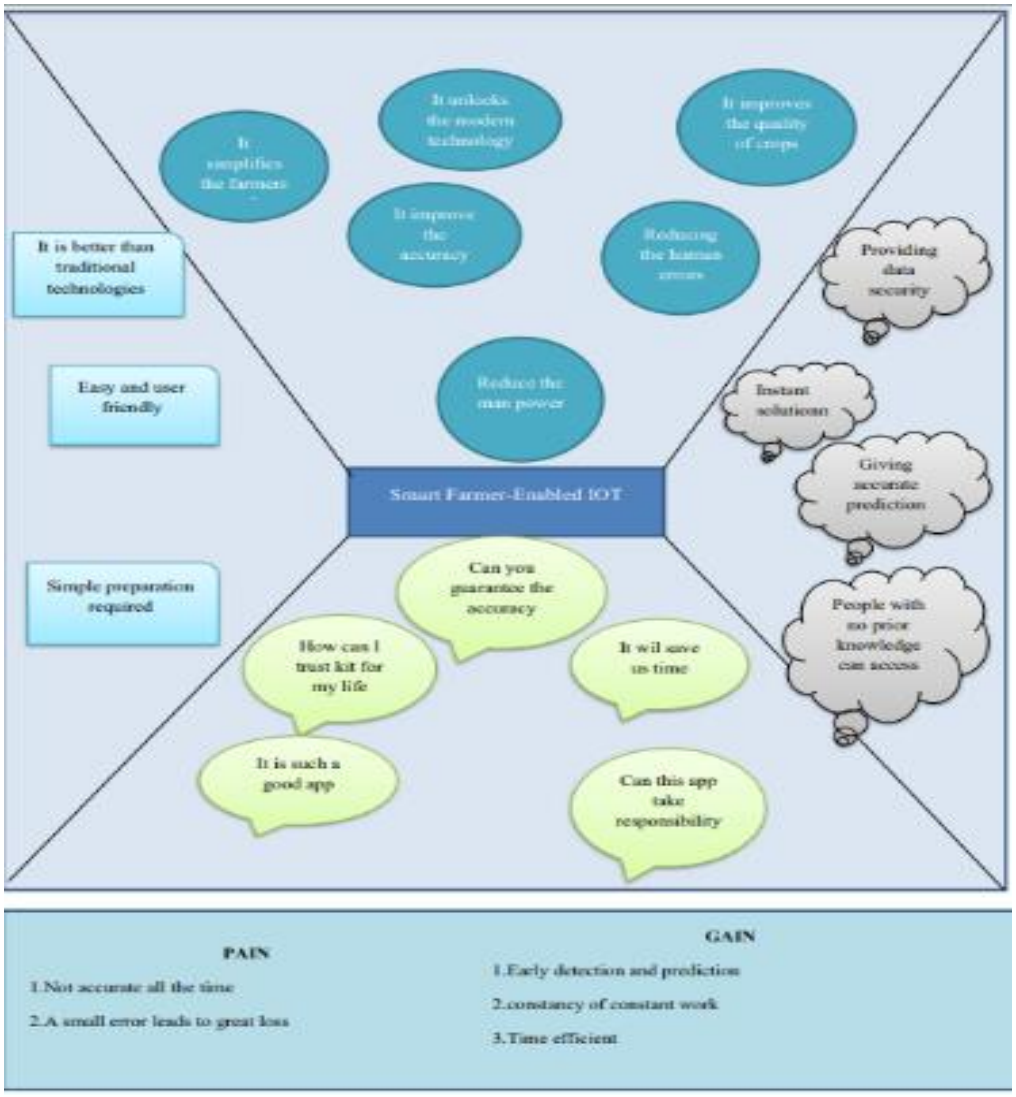
[7] www.wikipedia.org [8] Sweksha Goyal, Unnathi Mundra, Prof. Sahana Shetty," SMART AGRICULTURE USING IOT", International Journal of Computer Science and Mobile Computing, Vol.8 Issue.5, pg. 143-148, May 2019.

2.3 Problem Statement Definition

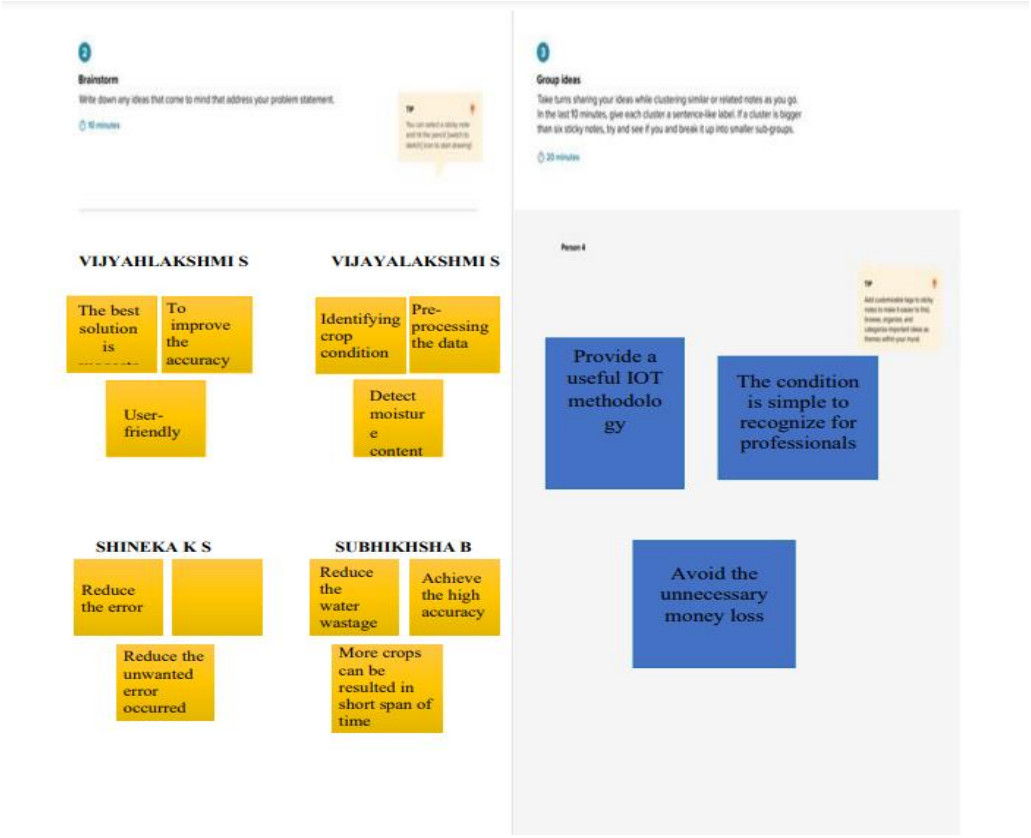
Smart farm should utilize minimum resources in terms of hardware and value. This overcomes the manual operations required to observe and maintain the agricultural farms in both automatic and manual modes. It should be able to measure the rise or decrease in level of water yet as moisture within the soil. Farmers are under pressure to produce more food and use less energy and water in the process. A remote monitoring and control system will help farmers deal effectively with these pressures. The major challenges of smart agriculture include continuous monitoring, energy harvesting, automatic irrigation, and disease prediction. An important issue that arises in farming is the loss of crops to various diseases.

3.IDEATION AND PROPOSED SOLUTION

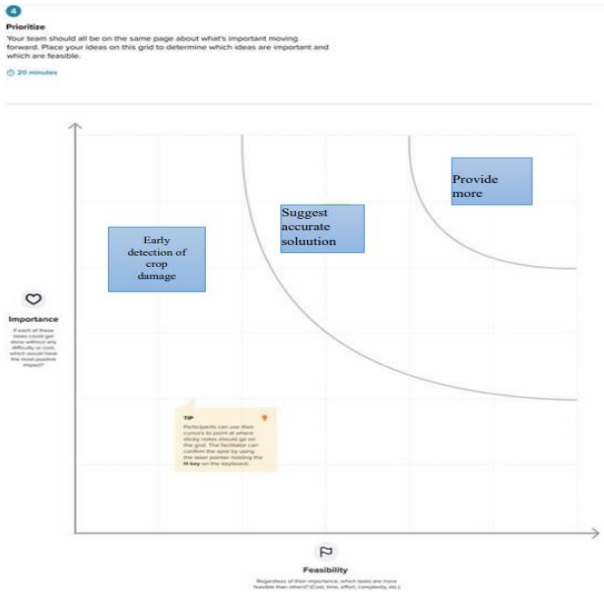
3.1 EMPATHY MAP CANVAS



3.2 IDEATION AND BRAINSTORMING



3.3 PROPOSED SOLUTION



S. No.	Parameter	Description
1.	Problem Statement (Problem to be solved)	Early Detection of Damaging Crop condition using IOT.
2.	Idea / Solution description	Early detection and cure of Crop Condition is extremely desirable as it can lead to the prevention of unwanted consequences. IOT methods are used to predict the various stages of diseases affecting the crops.
3.	Novelty / Uniqueness	Specifically, we have used the Soil Moisturizer sensor to detect the soil content in which the crop can grow efficiently.
4.	Social Impact / Customer Satisfaction	As the Crop diseases is a silent disease, as most sufferers have no symptoms until the total crops get damaged. Our project can be a huge game changer in a farming field by helping farmers to predict the Crops.
5.	Business Model (Revenue Model)	This application is recommended to farmers in low cost.
6.	Scalability of the Solution	IOT methods can be employed to better analyze soil moisturizer and prediction of crops and aid efforts to bring more new methodology.

3.4 PROBLEM SOLUTION FIT

Problem Solution Fit:

CS 1.CUSTOMER SEGMENT(s) About the crop monitoring system.	**CC** 6.CUSTOMER CONSTRAINTS Collection of database of the crop condition.	**AS** 5.AVAILABLE SOLUTION By using ,IoT and soil mosturizer sensor the soil and crop condition indentified.
J&P 2.JOB-TO-BE DONE/PROBLEMS The collection of data must be pre-processed and analyzed the data by the Internet of things and nodemcuesp8266	**RC** 9.PROBLEM ROOT CAUSE The major cause of this problem is lack of drinking water and doesn't follow the proper diet and doesn't have proper awareness is also being a root cause.	**BE** 7.BEHAVIOUR They must have to check the messages.
TR 3.TRIGGERS They may have trigger while hearing about the result of the plant crops through short message service. **EM** 4.EMOTIONS:BEFORE/AFTER Before: The crop may in need water or else there will be an excess of water under crop. After: But this helps to know the current condition of the crop in the field.	**SL** 10.YOUR SOLUTION Our project is about the crop condition in the field which are detected through the help of IoT and soil moisturizer sensor.	**CH** 8.CHANNEL OF BEHAVIOUR Online: The farmer can able to analyse the crop condition through the sms note provided to them. Offline: By visiting the field the farmer tends to know the condition of the crop.

4.REQUIREMENT ANALYSIS

4.1 FUNCTIONAL REQUIREMENTS

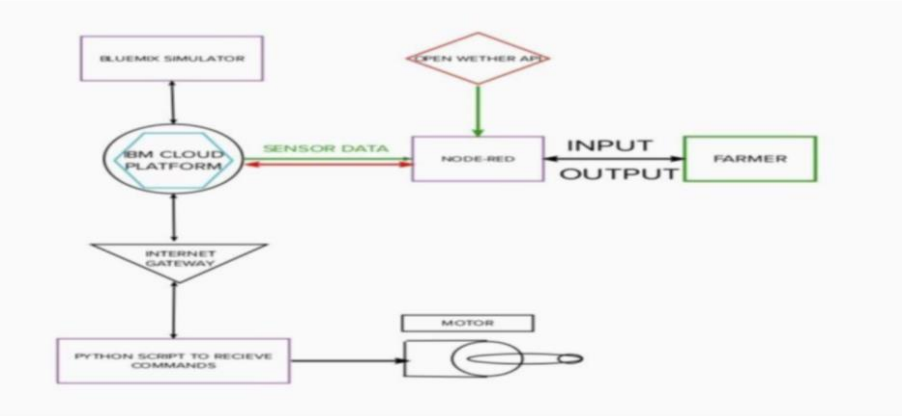
FR No.	Functional Requirement (Epic)	Sub Requirement (Story / Sub-Task)
FR-1	IOT devices	• Sensors and Wi-Fi module.
FR-2	Software	• Web UI, Node-Red,IBM,Watson,MIT app
FR-3	Mandatory fields	• System should only allow users tomove to payment only when mandatory fields such as date, time,location has been mentioned
FR-4	Synchronization	• System should consider timezonesynchronisation when accepting bookings from different timezones
FR-5	Authentication	• Booking confirmation should be sentto user to the specified contact details

4.2 NON – FUNCTIONAL REQUIREMENTS

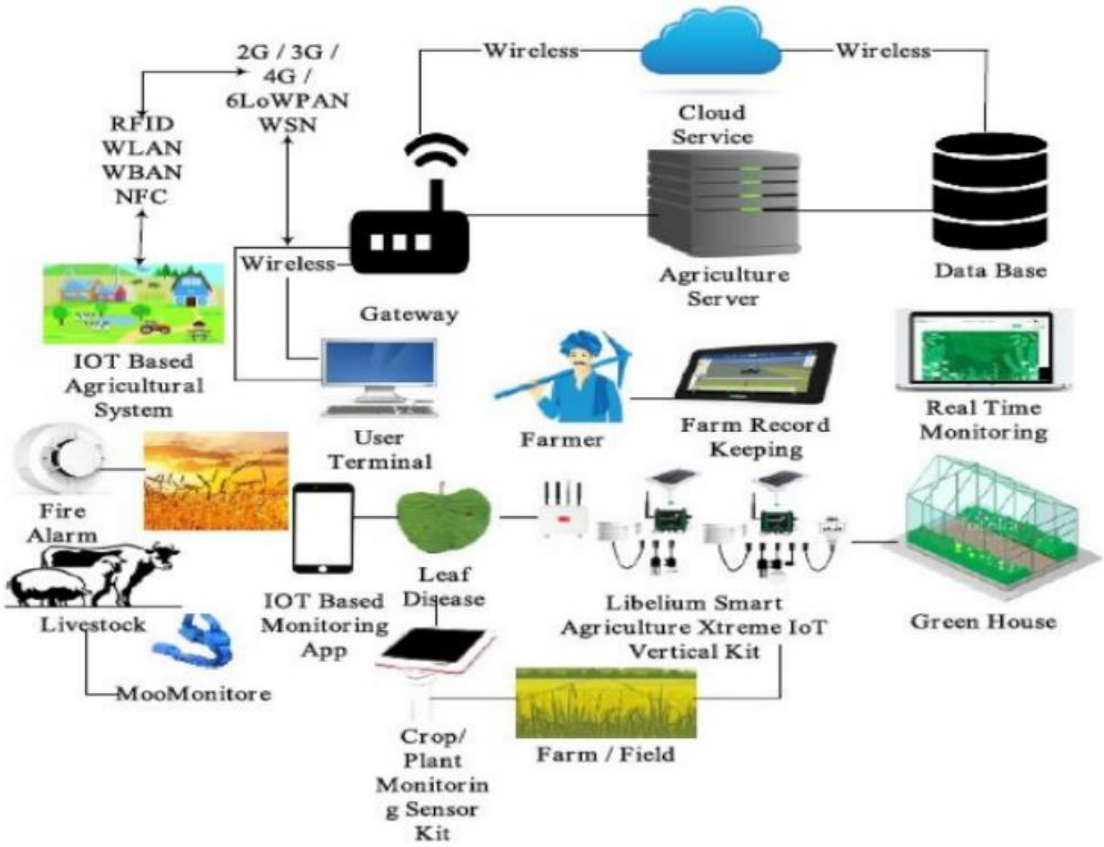
FR No.	Non-Functional Requirement	Description
NFR-1	**Usability**	• Time consumability is less,productivity is high
NFR-2	**Security**	• It has low level of security features due to integration of sensor data.
NFR-3	**Reliability**	• Accuracy data and hence it is relaible
NFR-4	**Performance**	• Performance is high and highly productive
NFR-5	**Availability**	• With permitted network connectivity the application is accessible.
NFR-6	**Scalability**	• It is perfectly scalable many new constraints can be added

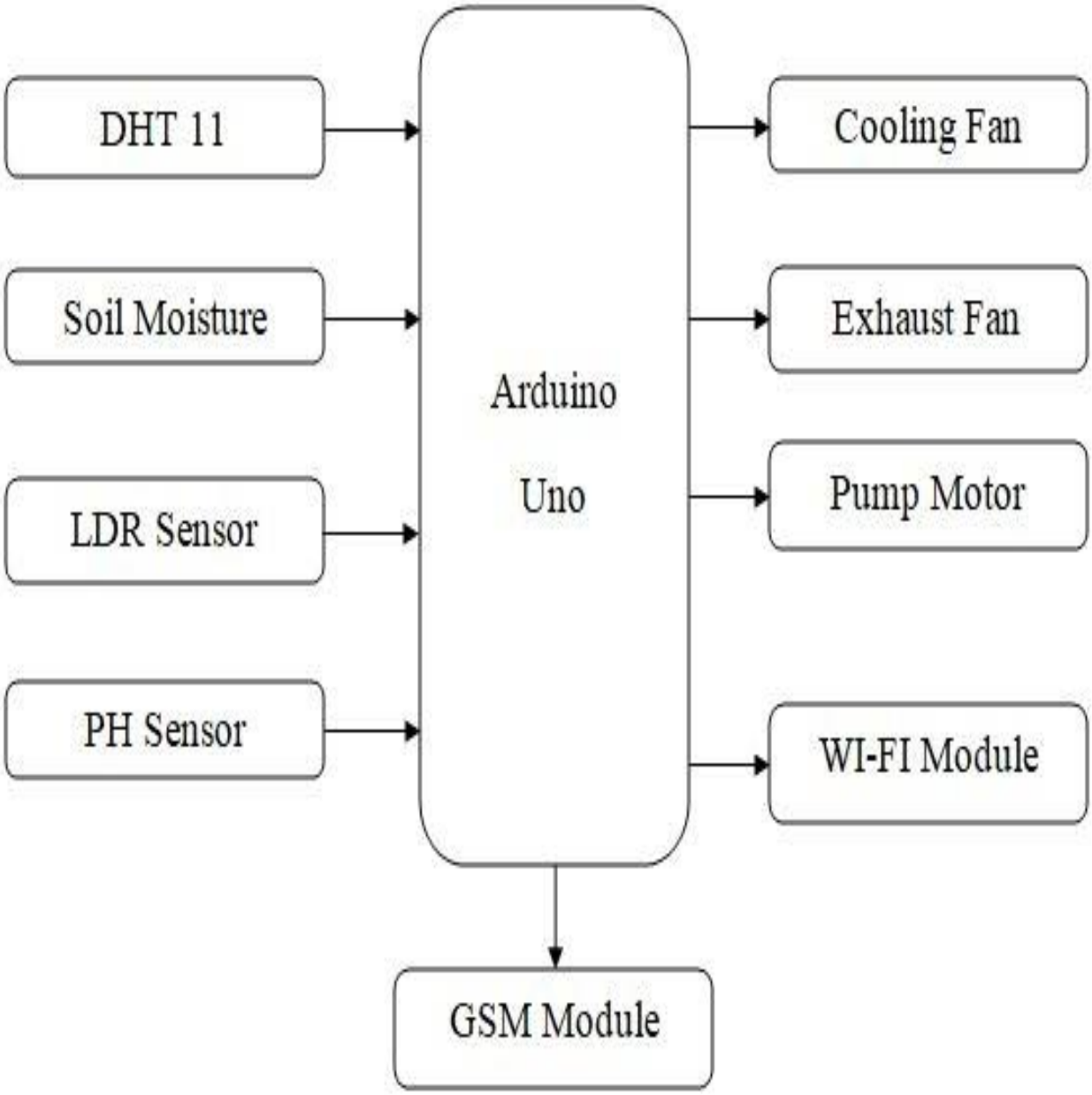
5.PROJECT DESIGN

5.1 DATA FLOW DIAGRAM



5.2 SOLUTION AND TECHNICAL ARCHITECTURE




DHT 11
Soil Moisture
LDR Sensor
PH Sensor
Arduino
Uno
Cooling Fan
Exhaust Fan
Pump Motor
WI-FI Module
GSM Module

6.PROJECT PLANNING AND SCHEDULING

Sprint	Functional Requirement(Epic)	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 email,password and conforming my password	2	High	Vijyahlakshmi S
Sprint-1	Log in	USN-2	As a user, I will received conformation email once I have registered the application.	1	High	Shineka K S
Sprint-1	User interface	USN-3	As a user, I will login into the application by entering email and password	2	Low	Subhikhsha B
Sprint-1	Data visulazation	USN-4	As a register user, I need to easily login in to my registered account via the web page in minimum time.	2	Medium	Vijayalakshmi S
Sprint-1	Registration on farmer	USN-5	As a user, I want to first register using my organization email and create a password for the account.	1	High	Vijyahlakshmi S
Sprint-2	Log in	USN-6	As a registered user I need to easily login using the registered account via the web page.	2	High	Shineka K S
Sprint-2	Web UI	USN-7	As a user, I know to have a user friendly interface to easily view and access the resources.	1	Low	Subhikhsha B
Sprint-2	Registration on(chemical manufacture on web browser)	USN-8	As a user, I want to first register using my email and create a password for an account.	1	High	Vijayalakshmi S
Sprint	Login	User Story Number	As a registered user I need to easily login to the application.	Story Points	Priority	Team Members
Sprint-2	Web UI	USN-9	As a user, I will be redirected to theselected	2	High	Subhikhsha B

Sprint-3	Login	USN-10	I need to easily login into the application which is releated to environmental changes and crops.	1	High	Vijayalakshmi S
Sprint-3	Registration on(Chemical manufacturer mobile user)	USN-11	As a user, I can see the status of application of the field condition.	2	High	Shineka K S

6.1 SPRINT PLANNING AND ESTIMATION

			Whether it's confirmed/waiting/RAC.			
Sprint-3	Remainders notification	USN-12	As a user, I need to easily login using the registered account via the web page.	1	High	Vijyahlakshmi S
Sprint-3	Field Application	USN-13	As a user, I need to easily login into the application which is releated to environmental changes and crops	2	High	Subhikhsha B
Sprint-4		USN-14	As a user, I can observe my crops in the field through mobile application.	1	High	Vijayalakshmi S
Sprint-4	Raise queries	USN-15	As a user, I can raise queries throughthe Mobile phones.	2	Medium	Vijyahlakshmi S
Sprint-4	Answer the queries	USN-16	As a user, I will answer thequestions/doubts Raised by the farmers.	2	High	Subhikhsha B
Sprint-4	Field details	USN-17	As a user, I will feed information about the humidity , temperature and soli moisturizer of the crops.	1	High	Shineka K S

6.2 SPRINT DELIVERY SCHEDULE

Sprint	**Total Story Points**	**Duration**	**Sprint StartDate**	**Sprint EndDate (Planned)**	**Story Points Completed (ason 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	5 Nov 2022
Sprint	Total Story Points	Duration	Sprint Start Date	Sprint End Date(Planned)	Story Points Completed (as onPlanned End Date)	Sprint Release Date(Actual)
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 Nov2022

7.CODING AND SOLUTIONING

7.1 FEATURE 1

- IBM IOT Simulator
- IBM Watson platform
- Node Red
- Web App
- Weather Data Using API
- Python Code
- HTTP/MQTT
- Motor ON/OFF

7.2 FEATURE 2

- Start
- Creating IBM Cloud and installing the IOT platform in the cloud
- Creating device and API key
- Setting IOT sensors simulator
- Creating the node red flow for reading and to display the simulated value
- Creating the flow to display the weather API data
- Creating a python code to read the data from cloud
- Stop

A.PYTHON CODE

```
import time
 import sys
import ibmiotf.application # to install pip install ibmiotf import
ibmiotf.device
#Provide your IBM Watson Device Credentials
 organization = "******" #replace the ORG ID
deviceType = "****"#replace the Device type wi
deviceId = "******"#replace Device ID
authMethod = "****"
authToken = "******" #Replace the authtoken
def myCommandCallback(cmd): # function for Callback print("Command
received: %s" % cmd.data) print(cmd.data['command'])
if cmd.data['command']=='Turned on Motor': print("MOTOR ON IS
RECEIVED")
elif cmd.data['command']=='Turned off Motor': print("MOTOR OFF IS
RECEIVED")
if cmd.command == "setInterval":
if 'interval' not in cmd.data:
 print("Error - command is missing required information: 'interval'")
else:
interval = cmd.data['interval']
elif cmd.command == "print":
if 'message' not in cmd.data:
print("Error - command is missing required information: 'message'")
 else:
output=cmd.data['message']
print(output)
 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:
```

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

B.NODE RED FLOW


```
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8.TESTING

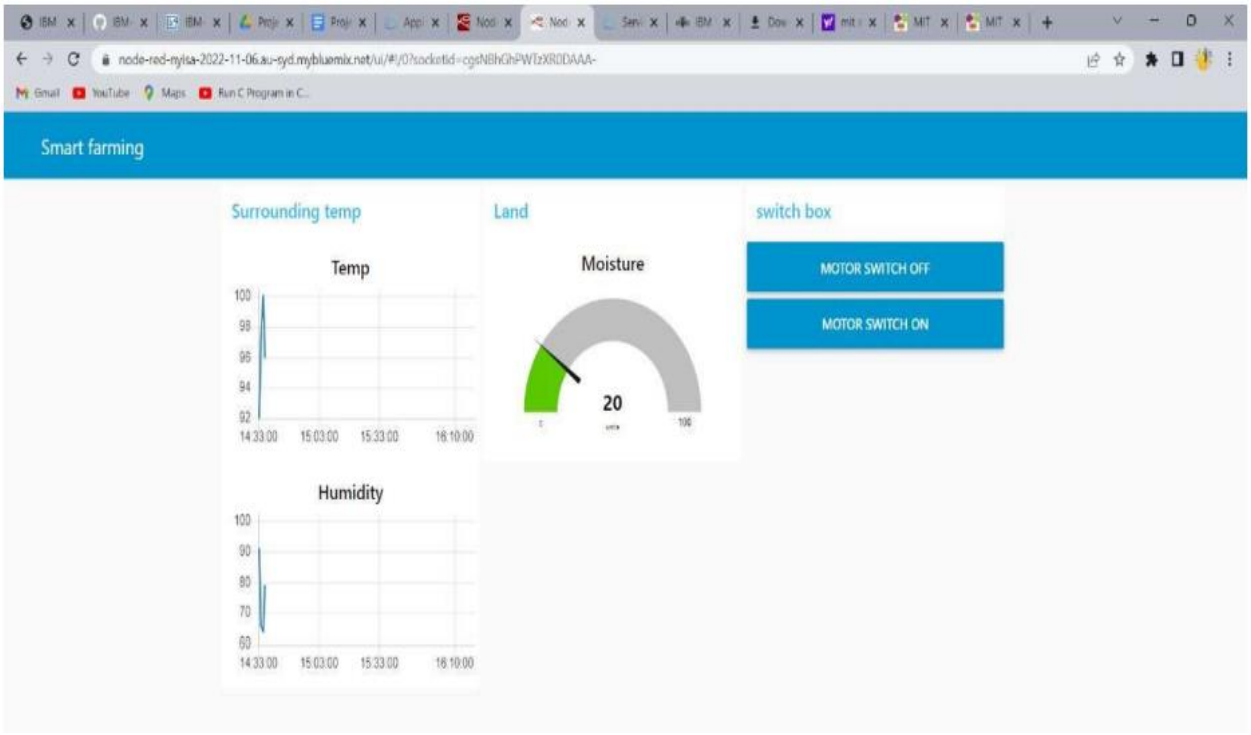
8.1 TEST CASES

Sprint	Functional Requirement (Epic)	User Story Number	User Story / Task	Story Points	Priority	Team Members
Sprint-1	Simulation creation	USN-1	Connect Sensors and Arduino with python code	2	High	VijyahlakshmiIS, Shineka K S
Sprint-2	Software	USN-2	Creating device in the IBM Watson IoT platform, workflow for IoT scenarios usingNode-Red	2	High	Vijyahlakshmi S, Shineka K S, Vijayalakshmi S
Sprint-3	MIT App Inventor	USN-3	Develop an application for the Smart farmerproject using MIT App Inventor	2	High	Subhikhsha B
Sprint-3	Dashboard	USN-3	Design the Modules and test the app	2	High	Vijayalakshmi S
Sprint-4	Web UI	USN-4	To make the user to interact with software.	2	High	Vijyahlakshmi S, Shineka K S, Vijayalakshmi S Subhikhsha B

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	7 Days	30 Oct 2022	06 Nov 2022	20	29 Oct 2022
Sprint-2	20	9 Days	31 Oct 2022	09 Nov 2022		05 Oct 2022
Sprint-3	20	6 Days	06 Nov 2022	13 Nov 2022		12 Oct 2022
Sprint-4	20	6 Days	11 Nov 2022	17 Nov 2022		15 Oct 2022

9.RESULTS

9.1 Performance Metrics



10.ADVANTAGES AND DISADVANTAGES

10.1 ADVANTAGES

- Communicating the device at larger distance through web application. It will play an important role in reducing the man power and travelling expenses of a farmer.
- Monitoring the parameter like temperature, humidity etc will play an important role in improving the growth of the plant.
- Integrating the weather station to the web browser will provide the details of status of the cloud, wind speed etc. It will allow the farmer to prevent their plants from natural calamities.

10.2 DISADVANTAGES

- Since the real time sensor will be connected to the controller, the controller requires continuous supply of internet to transfer the data.
- Non availability of weather prediction for long period of time. Since the long weather prediction require additional payment to open weather.
- The main disadvantage is the time it can take to process the information. Farmers are so busy with harvesting and caring for their crops that they may not have time to process data.
- There are also issues with the water supply, as well as issues with the cost of the technology, which can be quite expensive.

11.CONCLUSION

A system to monitor temperature, humidity, moisture levels in the soil was designed and the project provides an opportunity to study the existing systems, along with their features and drawbacks. Agriculture is one of the most water-consuming activities. The proposed system can be used to switch the motor (on/off) depending on condition of plants sensor values, thereby automating the process of irrigation. which is one of the most time efficient activities in farming, which helps to prevent over irrigation or under irrigation of soil thereby avoiding crop damage. The farm owner can monitor the process online through a android App. Though this project can be concluded that there can be considerable development in farming with the use of IOT and an automation.

12.FUTURE SCOPES

The various data's of soil nutrients is not added in the web browser, that can be added to the web application. Long range forecast is not available in the web application, it can also be added to provide accurate information about weather. Controlling the device through mobile application and voice will play important role in enhancing this project. Providing the GPS and GIS information will also improve productivity of the farmed.

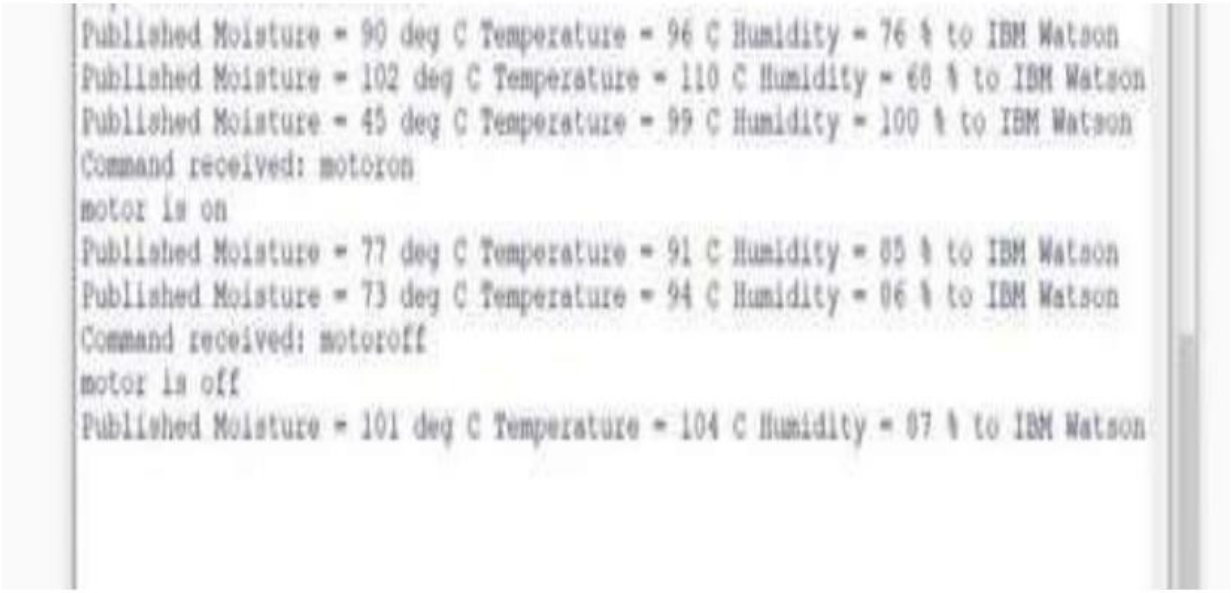
13.APPENDIX

13.1 SOURCE PROGRAM

```
import wiotp.sdk.device
 import time
 import sys
 import ibmiotf.application
 import ibmiotf.device
 import random
 #Provide your IBM Watson Device
 organization = "ck2tf0"
deviceType = "NodeMCU"
deviceId = "12345"
 authMethod = "token"
authToken ="87654321"
# 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


Published Moisture = 90 deg C Temperature = 96 C Humidity = 76 % to IBM Watson
Published Moisture = 102 deg C Temperature = 110 C Humidity = 60 % to IBM Watson
Published Moisture = 45 deg C Temperature = 99 C Humidity = 100 % to IBM Watson
Command received: motoron
motor is on
Published Moisture = 77 deg C Temperature = 91 C Humidity = 85 % to IBM Watson
Published Moisture = 73 deg C Temperature = 94 C Humidity = 06 % to IBM Watson
Command received: motoroff
motor is off
Published Moisture = 101 deg C Temperature = 104 C Humidity = 07 % to IBM Watson

Github link : IBM-EPBL/IBM-Project-15129-1659594332

Project Demo link : https://drive.google.com/file/d/1Xq9o461j7f-RBLNRLID18HmWsQq-IdGo/view?usp=drivesdk