PROJECT REPORT

PROJECT NAME: SMART FARMER –IoT ENABLED SMART FARMING APPLICATION

PROJECT TEAM ID: PNT2022TMID22894

PROJECT MEMBERS:

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SMART FARMING

1.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.

2. LITERATURE SURVEY:

2.1 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.

2.2 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.

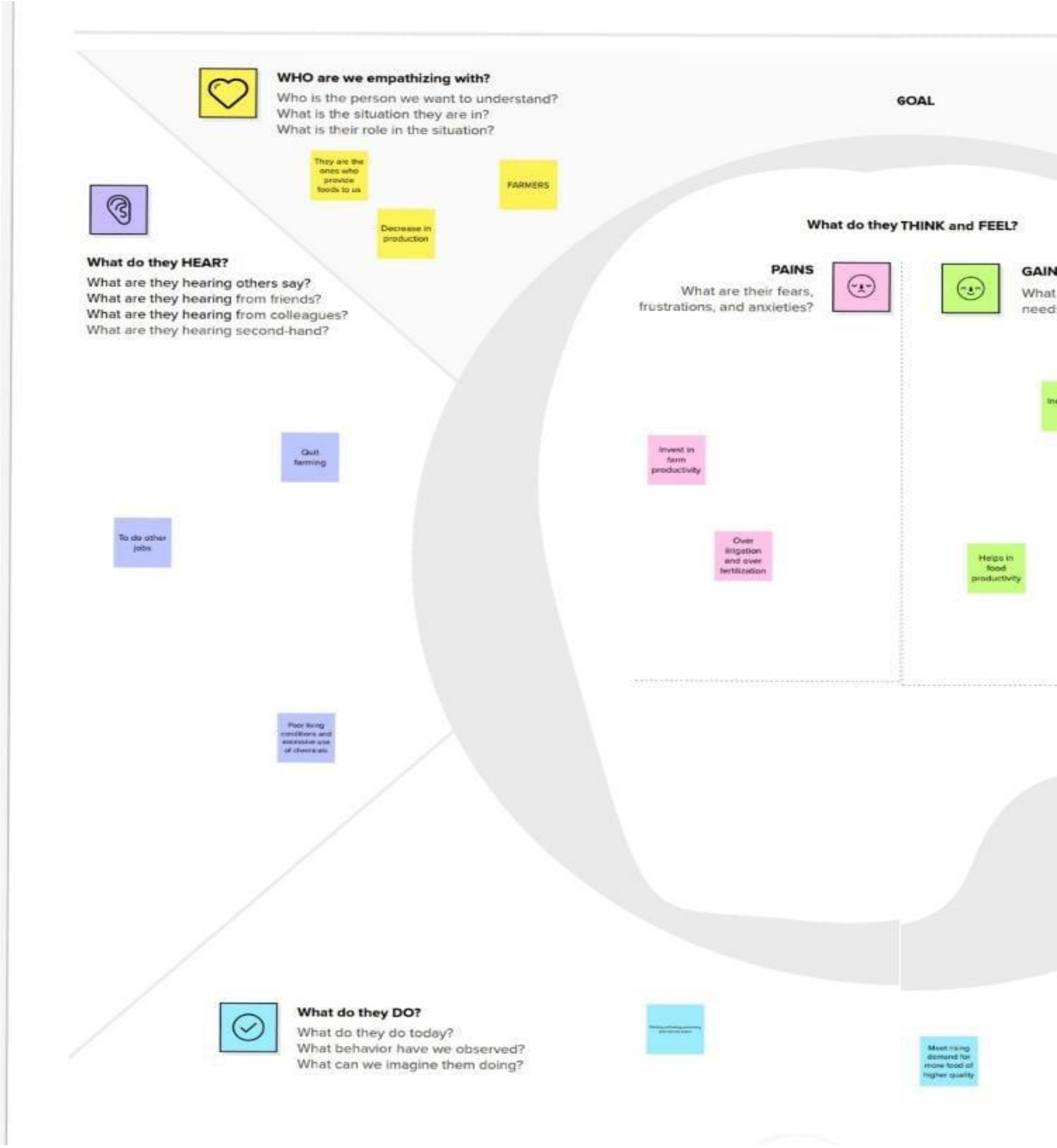
2.3 PROBLEM STATEMENT DEFINITION:

Overuse of pesticides and fertilizer in agricultural fields leads to destruction ofthe 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.

3. IDEATION & PROPOSED SOLUTION:

3.1 EMPATHY MAP CANVAS:



WHO are we empathizing with?

Who is the person we want to understand?
What is the situation they are in?
What is their role in the situation?

GOAL

What do they HEAR?

What are they hearing others say?
What are they hearing from friends?
What are they hearing from colleagues?
What are they hearing second-hand?

What do they THINK and FEEL?

PAINS

What are their fears,
frustrations, and anxieties?

GAIN

What
need

What do they DO?

What do they do today?
What behavior have we observed?
What can we imagine them doing?

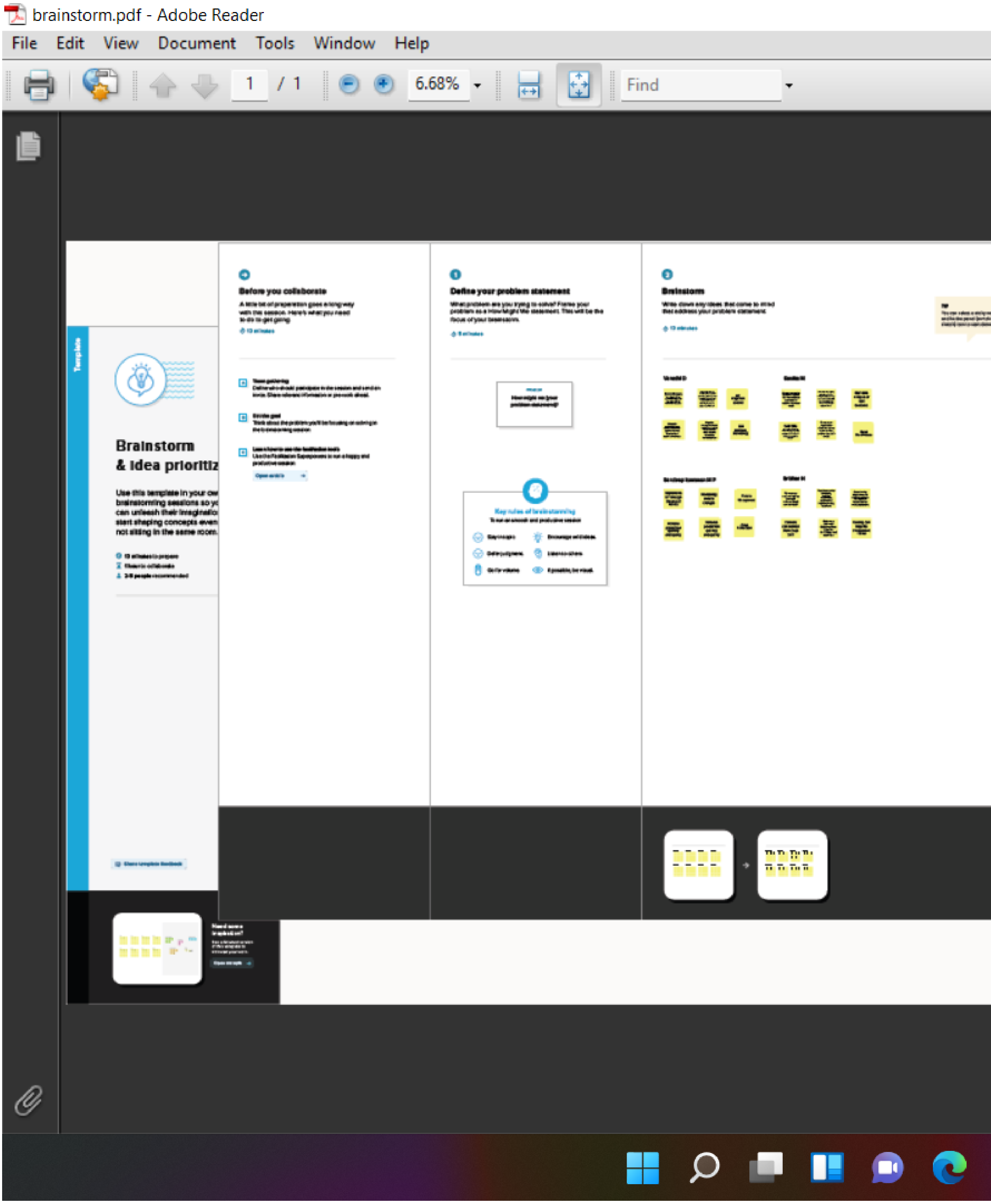
They are the ones who provide foods to us
FARMERS
Decrease in production
Quit farming
To do other jobs
Poor living conditions and excessive use of chemicals
Invest in farm productivity
Over irrigation and over fertilization
Helps in food productivity
In
Meet rising demand for more food of higher quality

3.2 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 be either visual, concrete, or abstract.

Brainstorming is a group creative technique by which efforts are made to find a conclusion for a specific problem by gathering alist of ideas spontaneously contributed by its members.

IDEATION PROCESS



Brainstorm
& idea prioritiz

Use this template in your ow
brainstorming sessions so yo
can unleash their imaginatio
start shaping concepts even
not sitting in the same room.

Before you collaborate

A little bit of preparation goes a long way with this session. Here's what you need to do to get going.

Define your problem statement

What problem are you trying to solve? Frame your problem as a How Might We statement. This will be the focus of your brainstorm.

Brainstorm

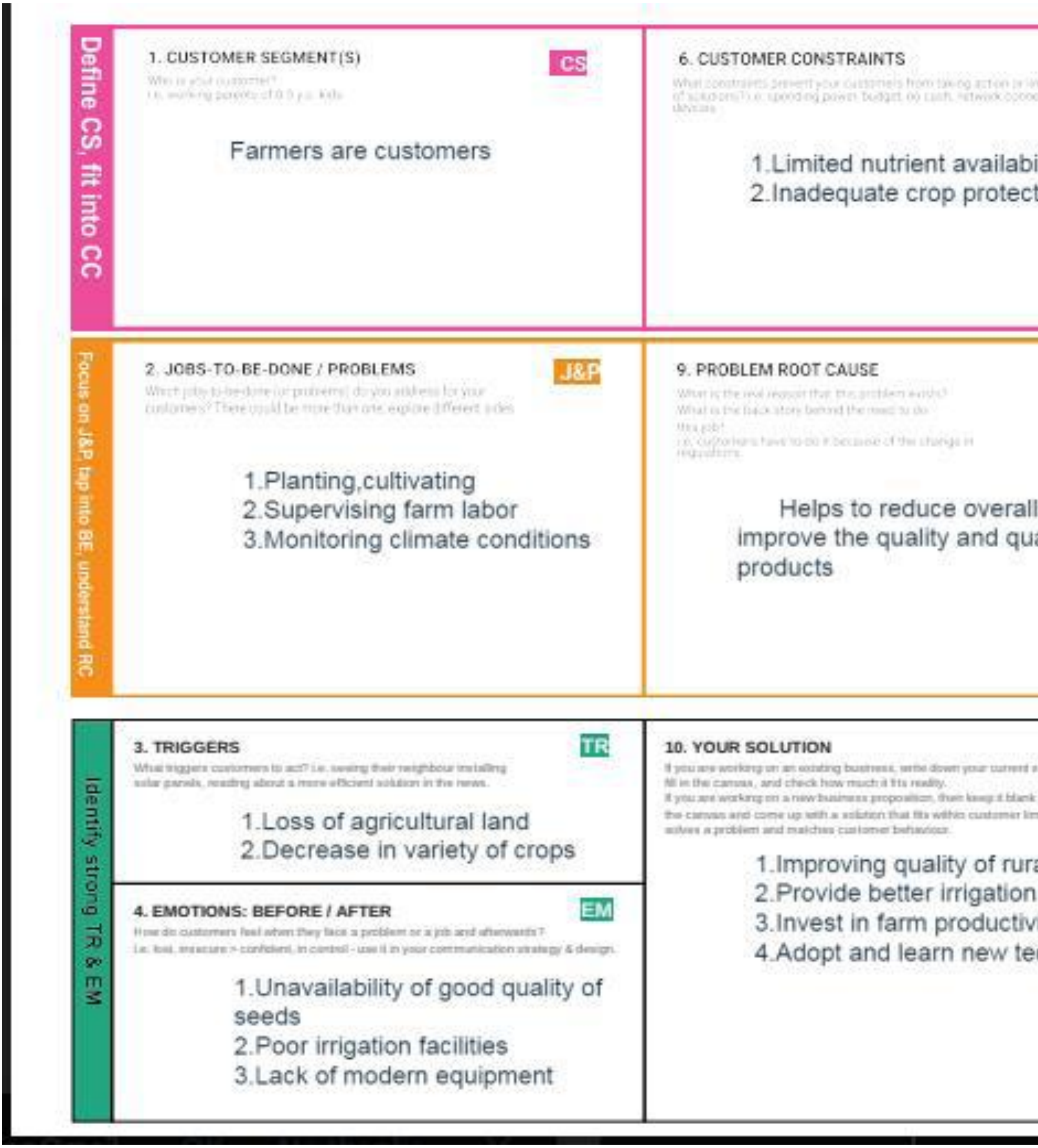
Write down any ideas that come to mind that address your problem statement.

Key rules of brainstorming

To run an smooth and productive session

3.3 Proposed Solution Template:

3.4 Problem 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

Farmers are customers

6. CUSTOMER CONSTRAINTS

What constraints prevent your customers from taking action or lim
of solutions? i.e. spending power, budget, no cash, network connec
devices

1.Limited nutrient availabi
2.Inadequate crop protect

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.

1.Planting,cultivating
2.Supervising farm labor
3.Monitoring climate conditions

9. PROBLEM ROOT CAUSE

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.

Helps to reduce overall
improve the quality and qua
products

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.

1.Loss of agricultural land
2.Decrease in variety of crops

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.

1.Unavailability of good quality of seeds
2.Poor irrigation facilities
3.Lack of modern equipment

10. YOUR SOLUTION

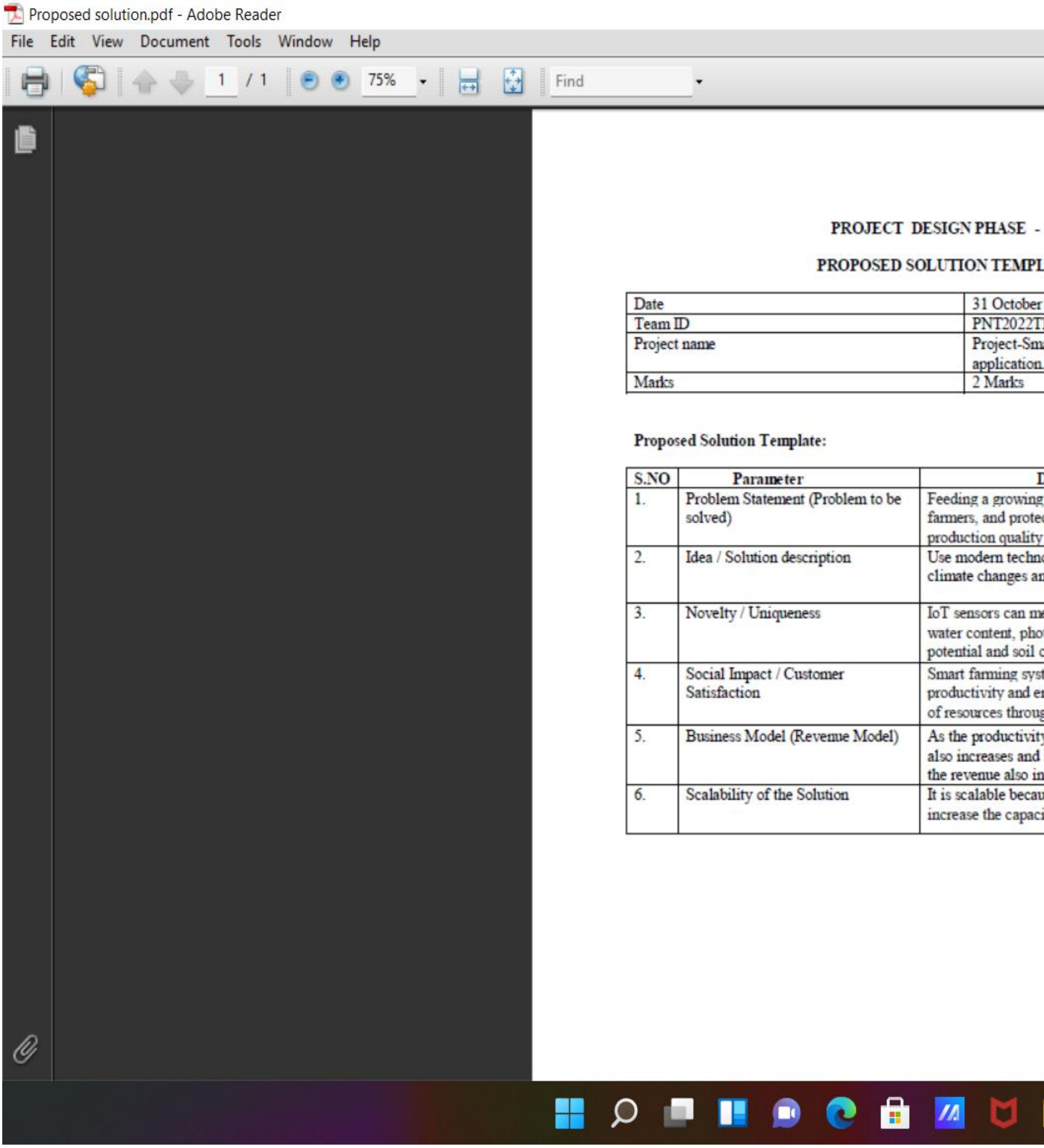
If you are working on an existing business, write down your current s
fill in the canvas, and check how much it fits reality.
If you are working on a new business proposition, then keep it blank
the canvas and come up with a solution that fits within customer lim
solves a problem and matches customer behaviour.

1.Improving quality of rura
2.Provide better irrigation
3.Invest in farm productiv
4.Adopt and learn new te

4.REQUIREMENT ANALYSIS:

4.1 FUNCTIONAL ANALYSIS:

4.2 NON-FUNCTIONAL REQUIREMENTS:



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PROJECT DESIGN PHASE -

PROPOSED SOLUTION TEMPL

Date	31 October
Team ID	PNT2022T
Project name	Project-Sm application.
Marks	2 Marks

Proposed Solution Template:

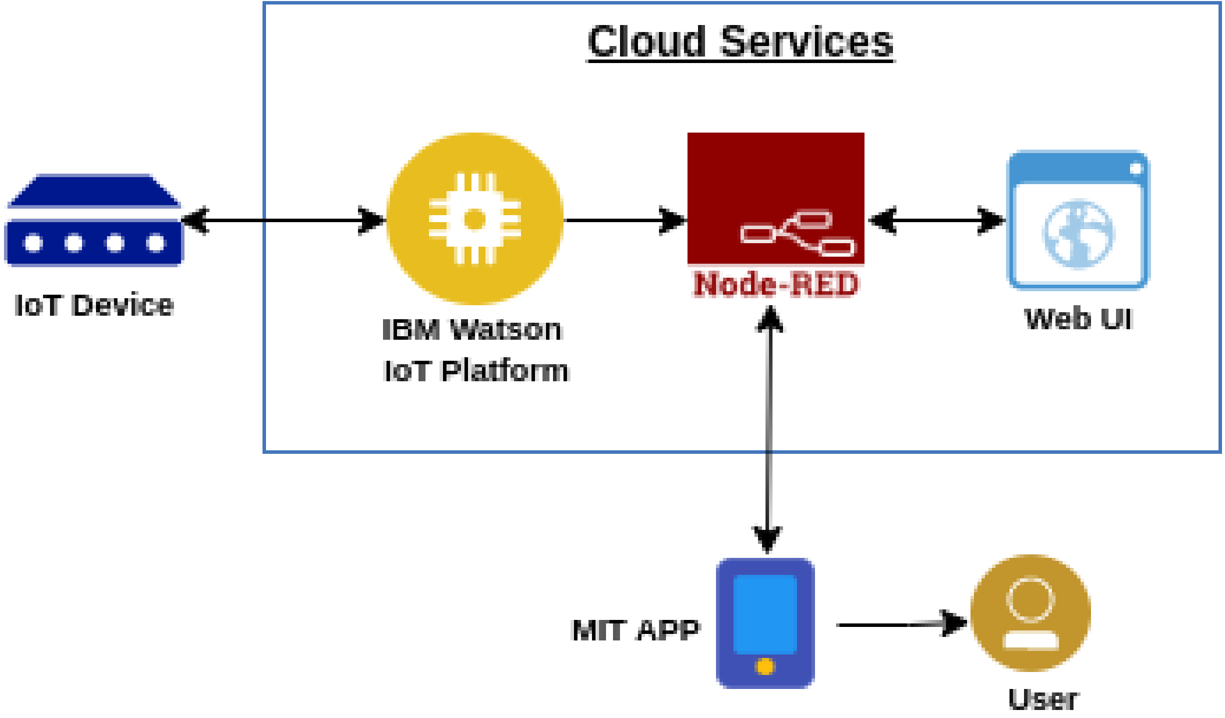
S.NO	Parameter	D
1.	Problem Statement (Problem to be solved)	Feeding a growing farmers, and protec production quality
2.	Idea / Solution description	Use modern techno climate changes an
3.	Novelty / Uniqueness	IoT sensors can me water content, pho potential and soil c
4.	Social Impact / Customer Satisfaction	Smart farming syst productivity and en of resources throug
5.	Business Model (Revenue Model)	As the productivity also increases and the revenue also in
6.	Scalability of the Solution	It is scalable becau increase the capaci

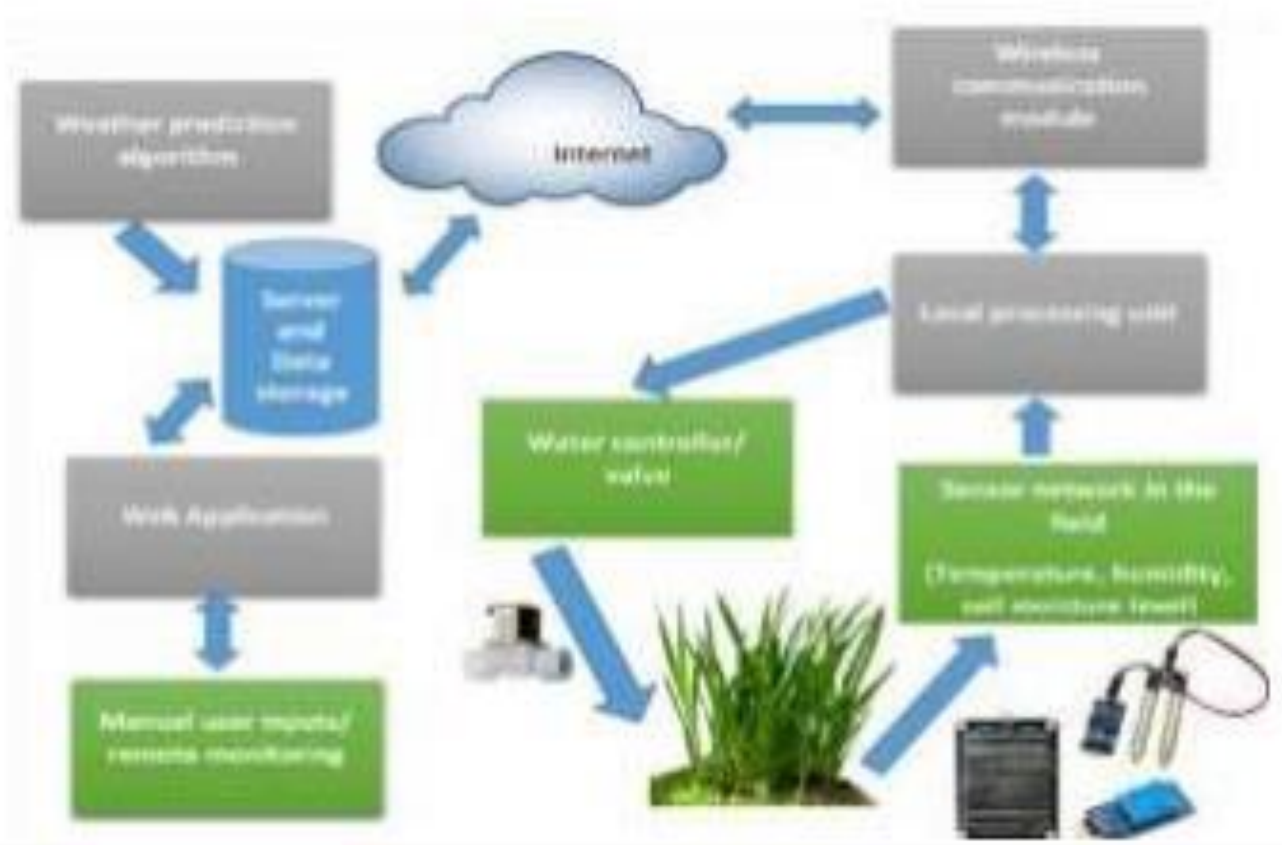
5. PROJECT DESIGN:

5.1 DATA FLOW DAIGRAMS AND USER STORIES:

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.




Weather prediction algorithm
Internet
Wireless communication module
Server and Data storage
Local processing unit
Water controller/ valve
Web Application
Sensor network in the field
(Temperature, humidity, soil moisture level)
Manual user inputs/ remote monitoring

5.2 SOLUTIONS AND TECHNICAL ARCHITECTURAL:

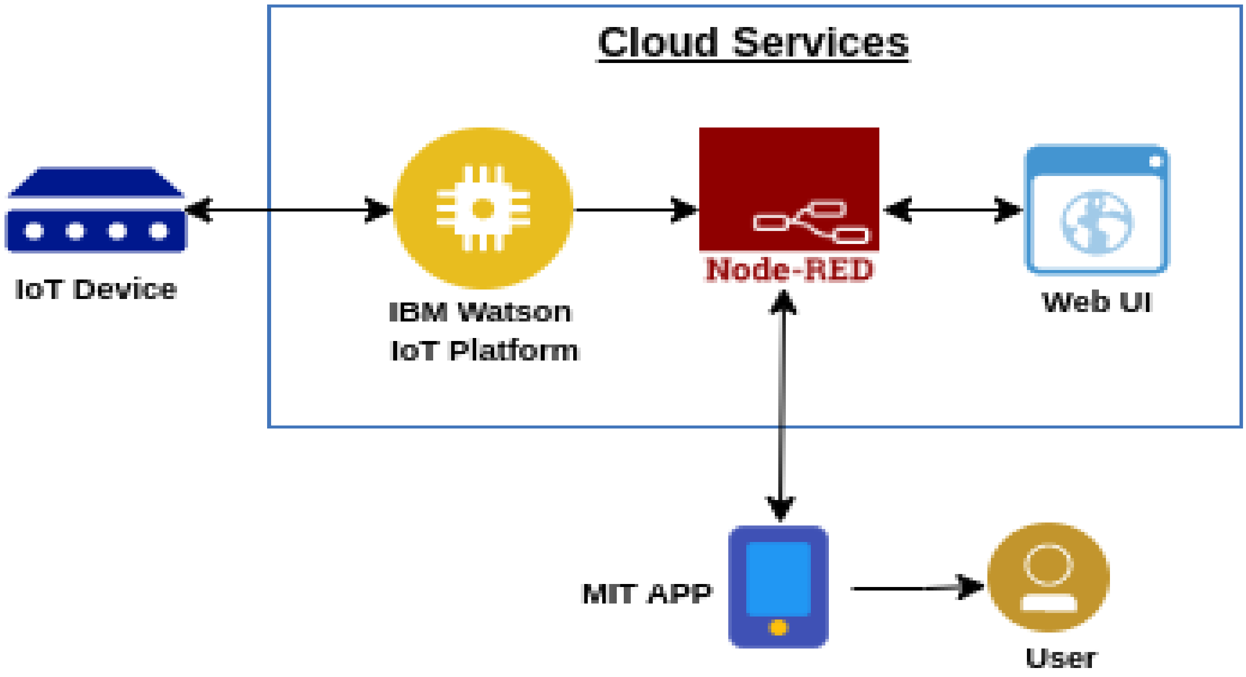
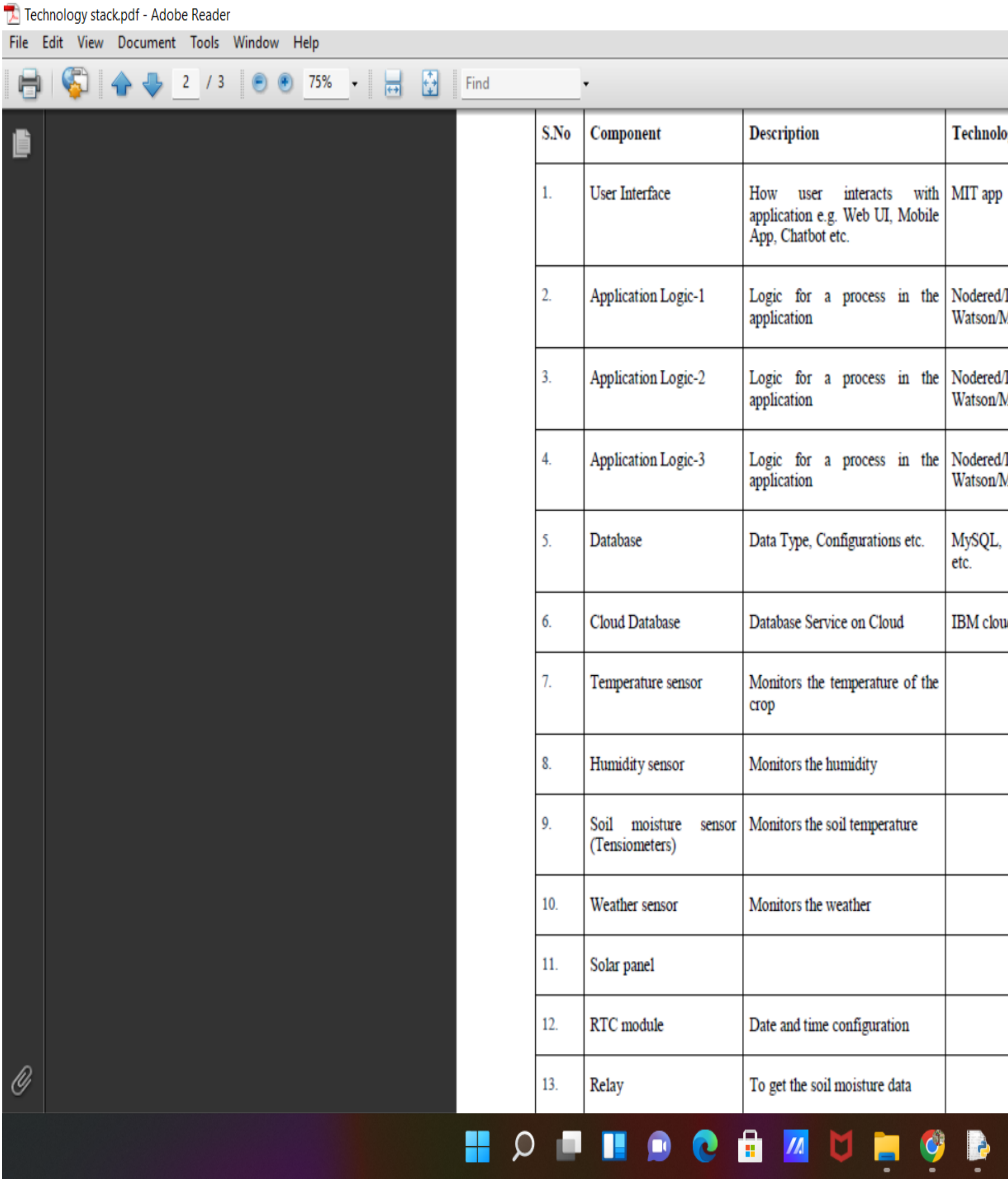


Table-1 : Components & Technologies:



Technology stack.pdf - Adobe Reader
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S.No	Component	Description	Technolo
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	Nodered/I Watson/M
3.	Application Logic-2	Logic for a process in the application	Nodered/I Watson/M
4.	Application Logic-3	Logic for a process in the application	Nodered/I Watson/M
5.	Database	Data Type, Configurations etc.	MySQL, etc.
6.	Cloud Database	Database Service on Cloud	IBM clou
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	

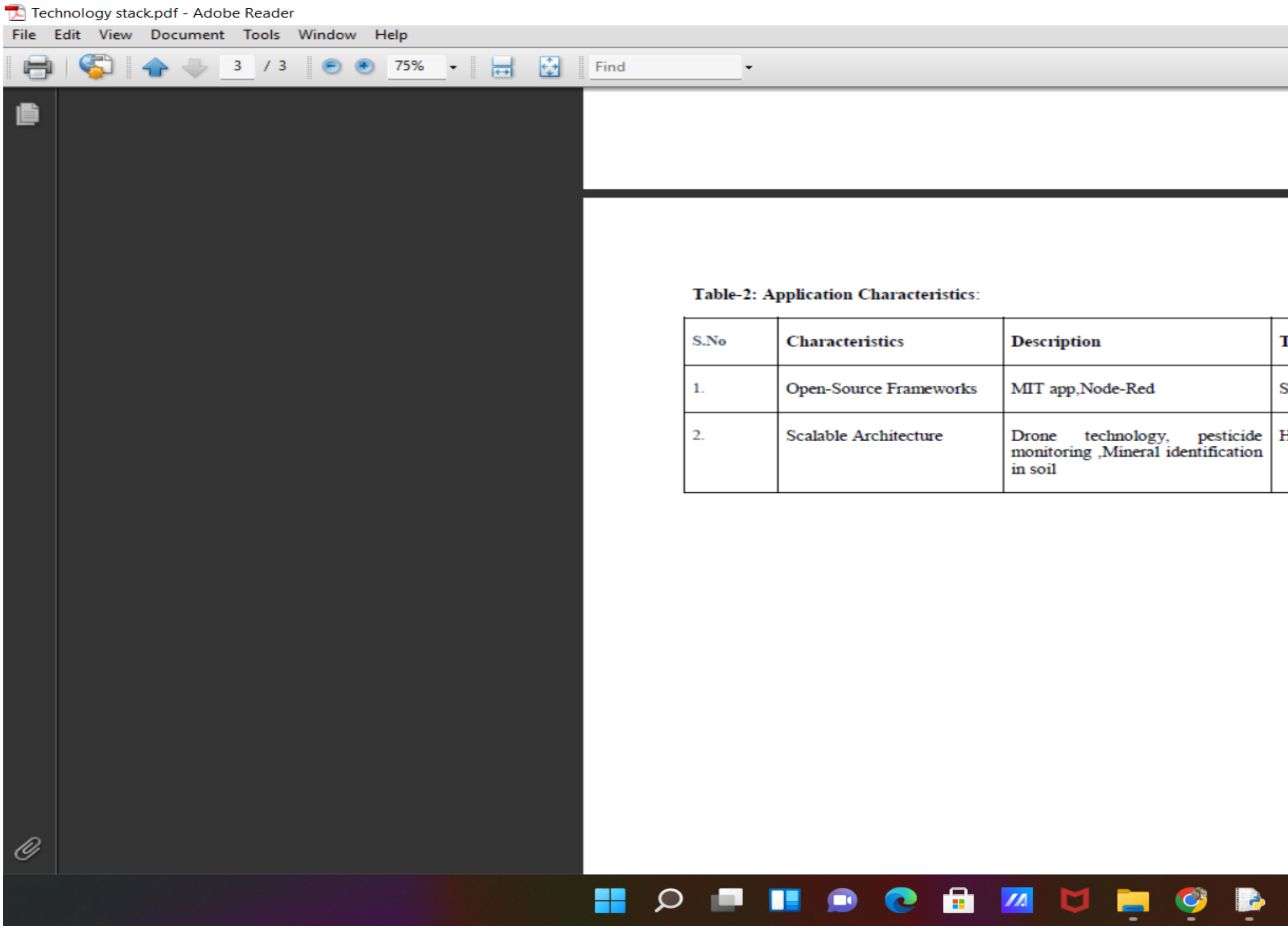
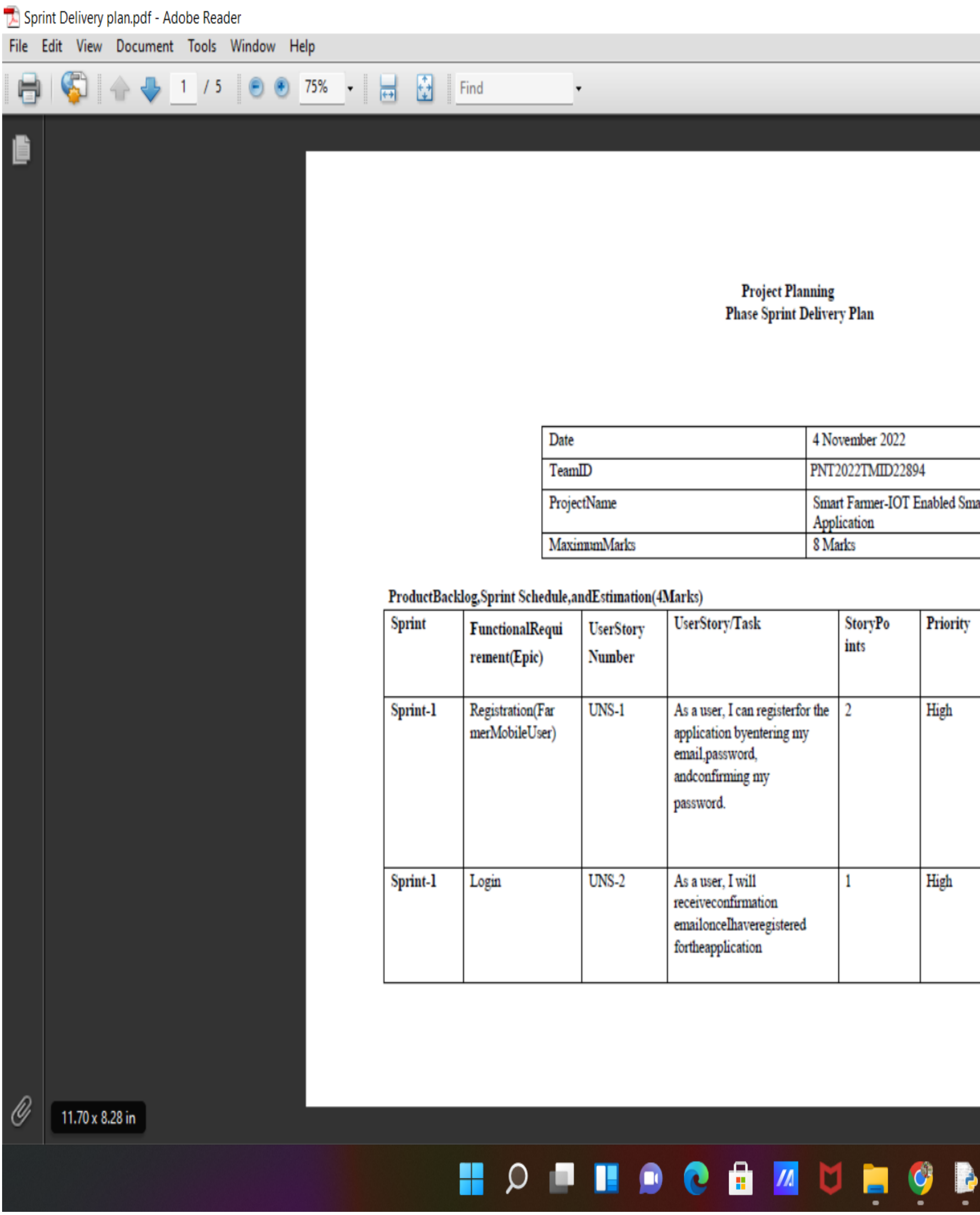


Table-2: Application Characteristics:

S.No	Characteristics	Description	T
1.	Open-Source Frameworks	MIT app,Node-Red	S
2.	Scalable Architecture	Drone technology, pesticide monitoring ,Mineral identification in soil	H

6. PROJECT PLANNING AND SCHEDULING:

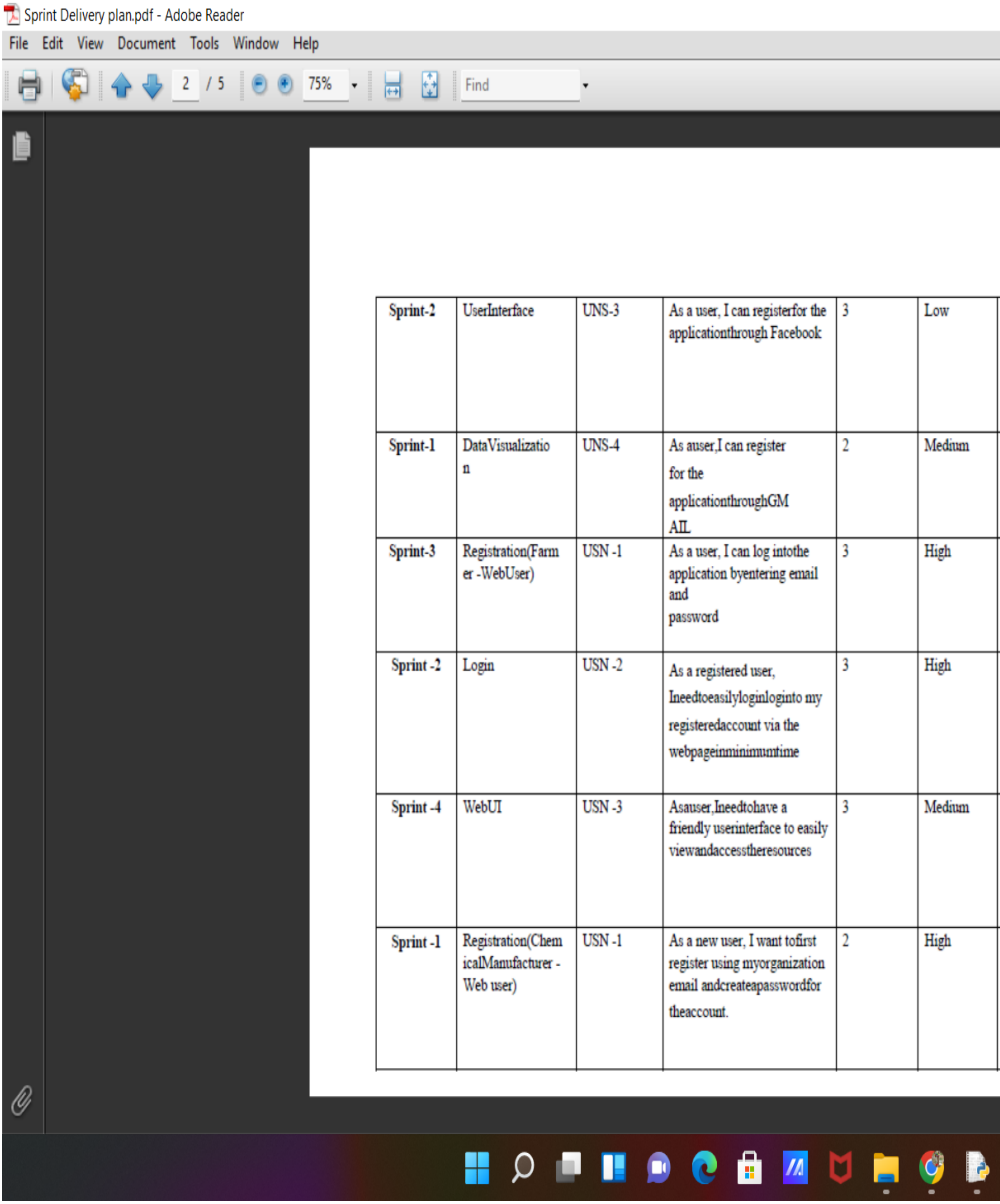


Project Planning
Phase Sprint Delivery Plan

Date	4 November 2022
TeamID	PNT2022TMID22894
ProjectName	Smart Farmer-IOT Enabled Sma Application
MaximumMarks	8 Marks

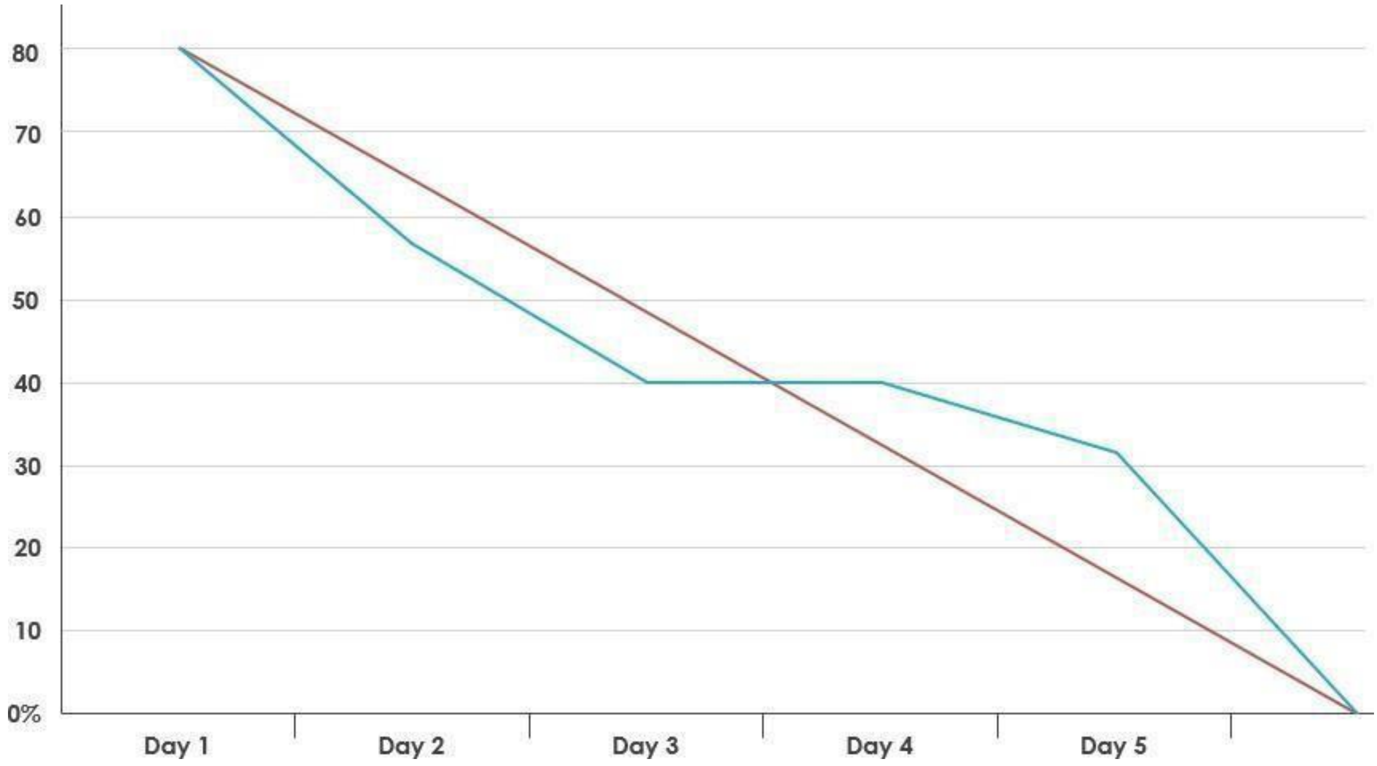
ProductBacklog,Sprint Schedule,andEstimation(4Marks)

Sprint	FunctionalRequirement(Epic)	UserStory Number	UserStory/Task	StoryPoints	Priority
Sprint-1	Registration(FarmerMobileUser)	UNS-1	As a user, I can registerfor the application byentering my email,password, andconfirming my password.	2	High
Sprint-1	Login	UNS-2	As a user, I will receiveconfirmation emailonceIhaveregistered fortheapplication	1	High

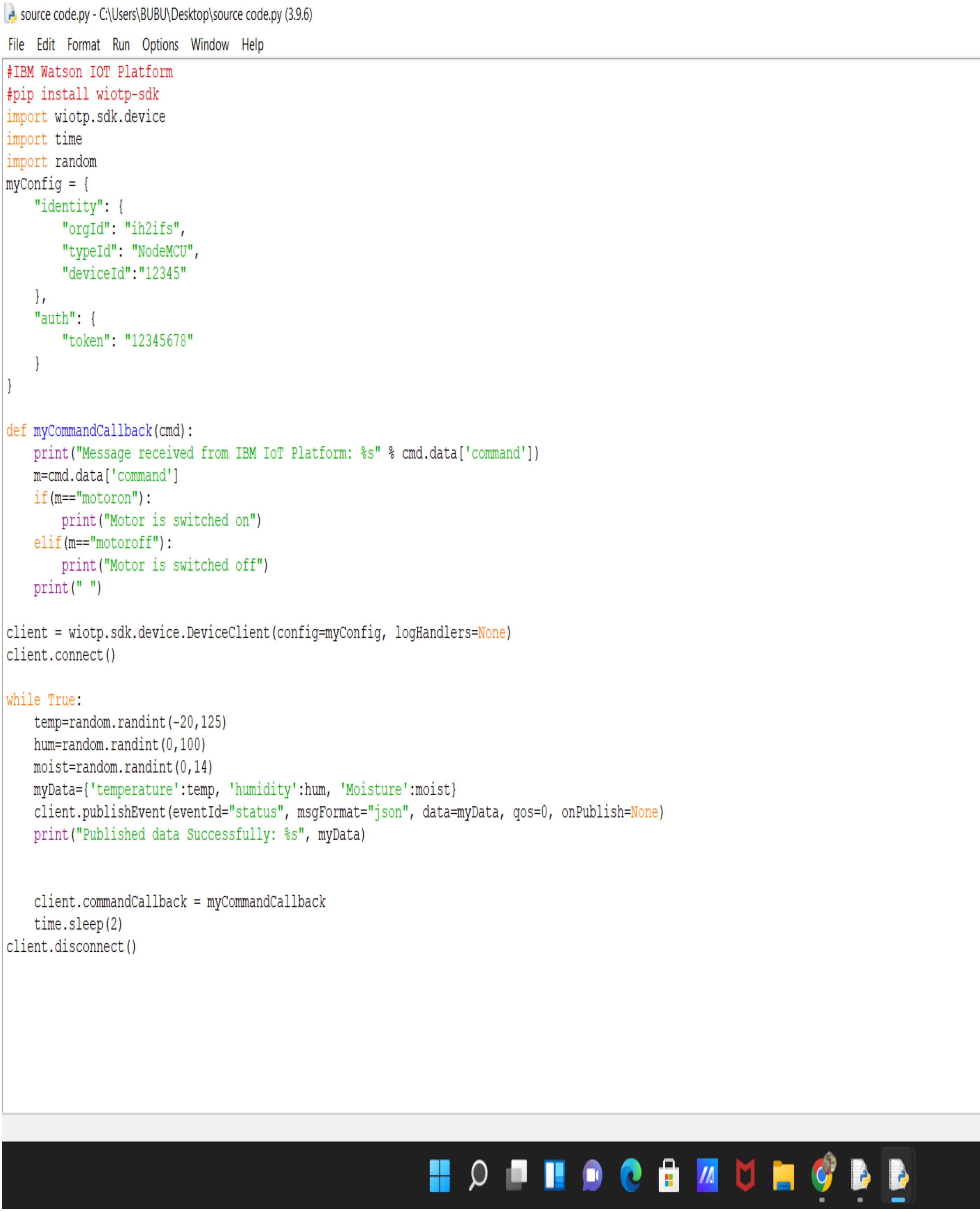


Sprint-2	UserInterface	UNS-3	As a user, I can registerfor the applicationthrough Facebook	3	Low
Sprint-1	DataVisualizatio n	UNS-4	As auser,I can register for the applicationthroughGM AIL	2	Medium
Sprint-3	Registration(Farm er -WebUser)	USN -1	As a user, I can log intothe application byentering email and password	3	High
Sprint -2	Login	USN -2	As a registered user, Ineedtoeasilyloginloginto my registeredaccount via the webpageinminimumtime	3	High
Sprint -4	WebUI	USN -3	Asauser,Ineedtohave a friendly userinterface to easily viewandaccesstheresources	3	Medium
Sprint -1	Registration(Chem icalManufacturer - Web user)	USN -1	As a new user, I want tofirst register using myorganization email andcreateapasswordfor theaccount.	2	High

BURNDOWN CHART:



7.CODING & SOLUTIONS:
FEATURE :



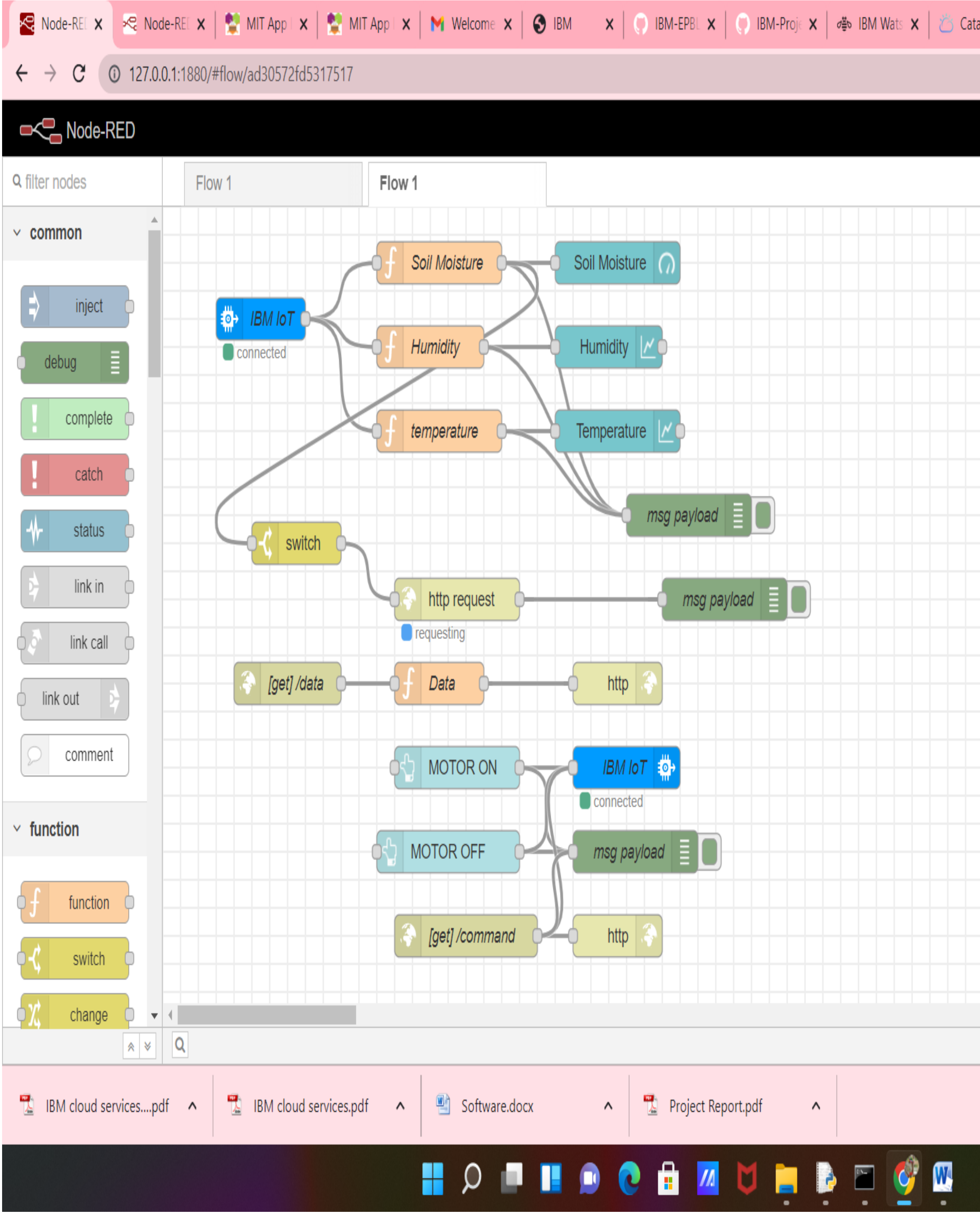
source code.py - C:\Users\BUBU\Desktop\source code.py (3.9.6)
File Edit Format Run Options Window Help

```
#IBM Watson IOT Platform
#pip install wiotp-sdk
import wiotp.sdk.device
import time
import random
myConfig = {
    "identity": {
        "orgId": "ih2ifs",
        "typeId": "NodeMCU",
        "deviceId":"12345"
    },
    "auth": {
        "token": "12345678"
    }
}

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(" ")

client = wiotp.sdk.device.DeviceClient(config=myConfig, logHandlers=None)
client.connect()

while True:
    temp=random.randint(-20,125)
    hum=random.randint(0,100)
    moist=random.randint(0,14)
    myData={'temperature':temp, 'humidity':hum, 'Moisture':moist}
    client.publishEvent(eventId="status", msgFormat="json", data=myData, qos=0, onPublish=None)
    print("Published data Successfully: %s", myData)


    client.commandCallback = myCommandCallback
    time.sleep(2)
client.disconnect()
```

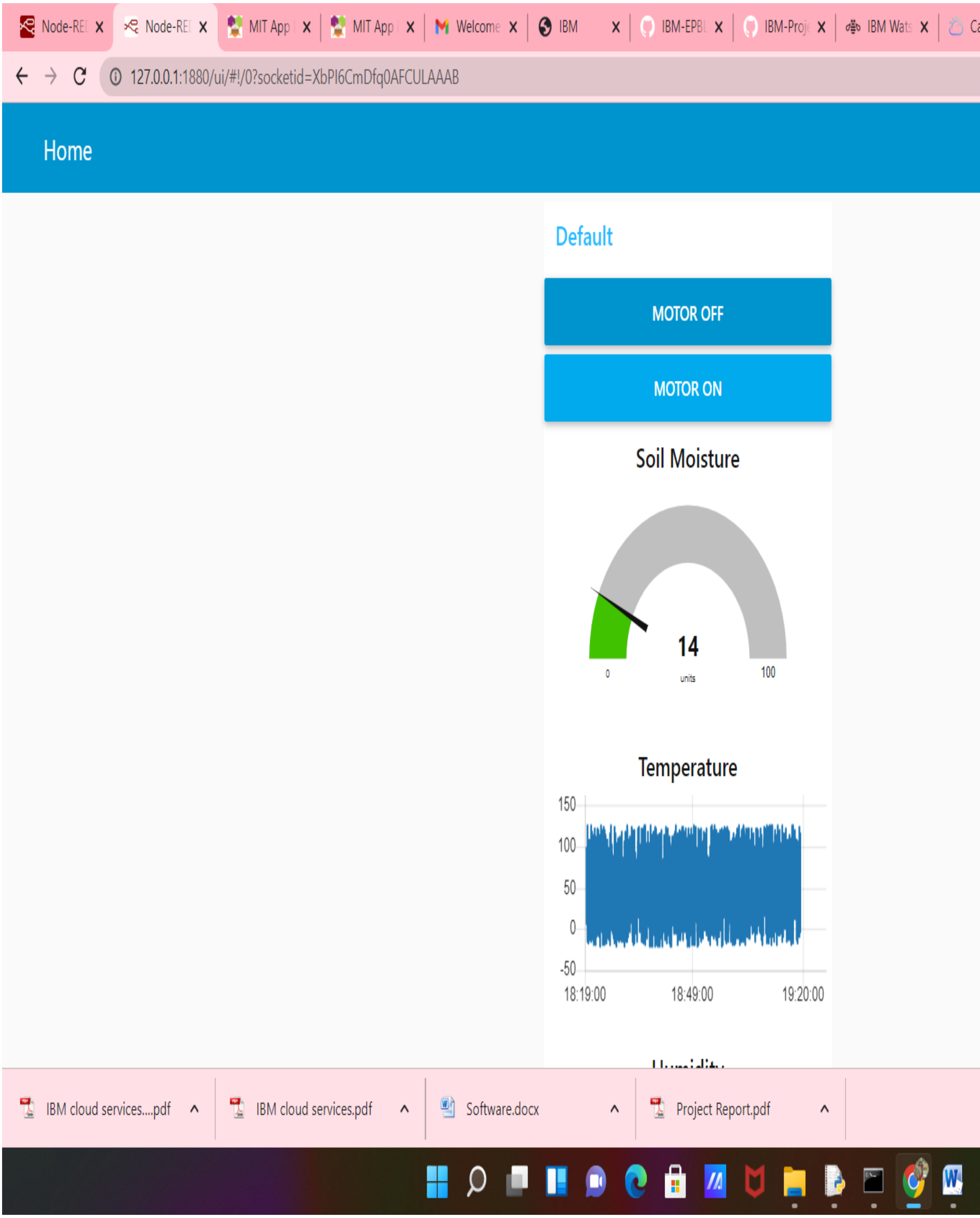
8.TESTING:

8.1 TEST CASE:

Web application using Node-RED.

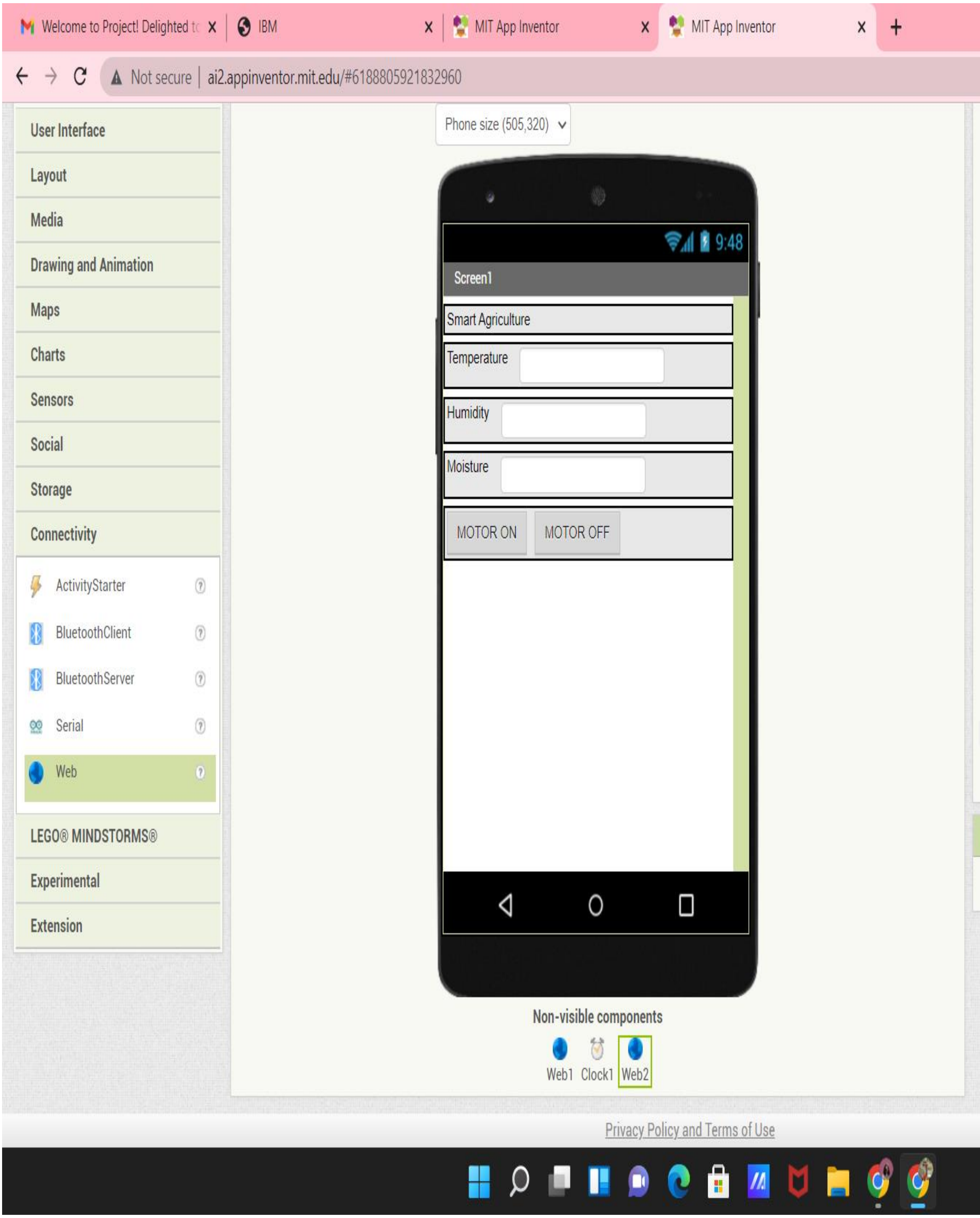


8.2 USER ACCEPTANCE TESTING:



9. RESULT:

9.1 Performance Metrics



10.ADVANTAGES AND 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 Agriculture requires internet connectivity continuously, but rural parts cannot fulfil 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.

11.CONCLUSION:

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

12.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 IOTcan be implemented in most of the places.

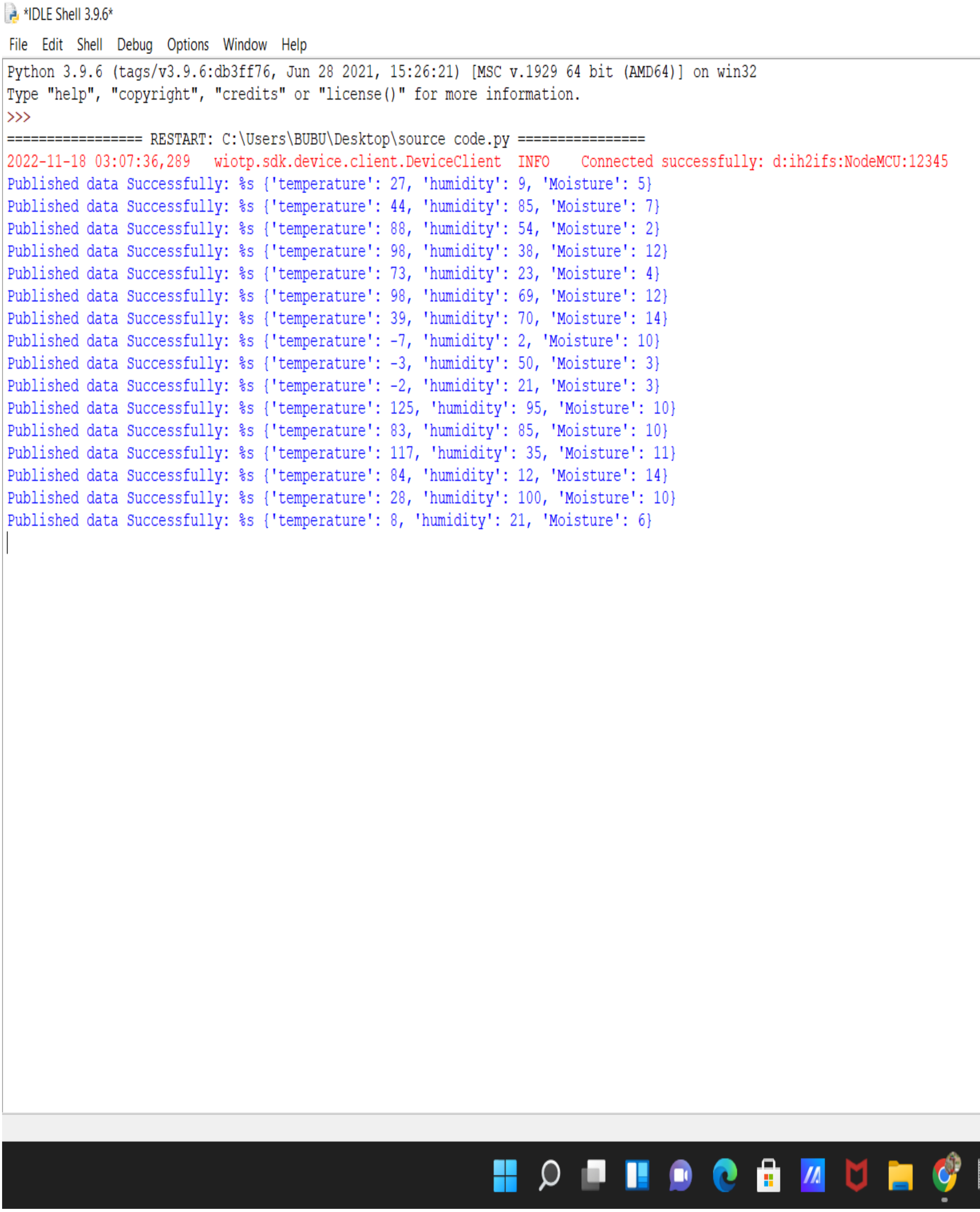
13.APPENDIX

SOURCE CODE:

```
#IBM Watson IOT Platform
#pip installwiotp-sdk
importwiotp.sdk.device
import time
import random
myConfig = {
"identity": {
"orgId": "ih2ifs",
"typeId": "NodeMCU",
"deviceId":"12345"
},
"auth": {
"token": "12345678"
}
}

defmyCommandCallback(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(" ")
```

```
client =
wiotp.sdk.device.DeviceClient(config=myConfig,
logHandlers=None)
client.connect()

while True:
temp=random.randint(-20,125)
hum=random.randint(0,100)
moist=random.randint(0,14)
myData={'temperature':temp, 'humidity':hum,
'Moisture':moist}
client.publishEvent(eventId="status",
msgFormat="json", data=myData, qos=0,
onPublish=None)
print("Published data Successfully: %s", myData)


client.commandCallback = myCommandCallback
time.sleep(2)
client.disconnect()
```

OUTPUT:



```
Python 3.9.6 (tags/v3.9.6:db3ff76, Jun 28 2021, 15:26:21) [MSC v.1929 64 bit (AMD64)] on win32
Type "help", "copyright", "credits" or "license()" for more information.
>>>
================= RESTART: C:\Users\BUBU\Desktop\source code.py ================
2022-11-18 03:07:36,289  wiotp.sdk.device.client.DeviceClient  INFO    Connected successfully: d:ih2ifs:NodeMCU:12345
Published data Successfully: %s {'temperature': 27, 'humidity': 9, 'Moisture': 5}
Published data Successfully: %s {'temperature': 44, 'humidity': 85, 'Moisture': 7}
Published data Successfully: %s {'temperature': 88, 'humidity': 54, 'Moisture': 2}
Published data Successfully: %s {'temperature': 98, 'humidity': 38, 'Moisture': 12}
Published data Successfully: %s {'temperature': 73, 'humidity': 23, 'Moisture': 4}
Published data Successfully: %s {'temperature': 98, 'humidity': 69, 'Moisture': 12}
Published data Successfully: %s {'temperature': 39, 'humidity': 70, 'Moisture': 14}
Published data Successfully: %s {'temperature': -7, 'humidity': 2, 'Moisture': 10}
Published data Successfully: %s {'temperature': -3, 'humidity': 50, 'Moisture': 3}
Published data Successfully: %s {'temperature': -2, 'humidity': 21, 'Moisture': 3}
Published data Successfully: %s {'temperature': 125, 'humidity': 95, 'Moisture': 10}
Published data Successfully: %s {'temperature': 83, 'humidity': 85, 'Moisture': 10}
Published data Successfully: %s {'temperature': 117, 'humidity': 35, 'Moisture': 11}
Published data Successfully: %s {'temperature': 84, 'humidity': 12, 'Moisture': 14}
Published data Successfully: %s {'temperature': 28, 'humidity': 100, 'Moisture': 10}
Published data Successfully: %s {'temperature': 8, 'humidity': 21, 'Moisture': 6}
```

GITHUB LINK: https://github.com/IBM-EBPL/IBM-Project-35259-1660283054