# PROJECT REPORT

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

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# SMART FARMING

1. INTRODUCTION:

PROJECT OVERVIEW:

This is system that enables framers to monitor and their forms with a web based 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.

1. LITERATURESURVEY:
   1. EXISTINGPROBLEM:

ThebiggestchallengesfacedbyIoTintheagricultural sectorarelackofinformation,highadoptioncosts,andsecurity

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

* 1. REFERENCES:

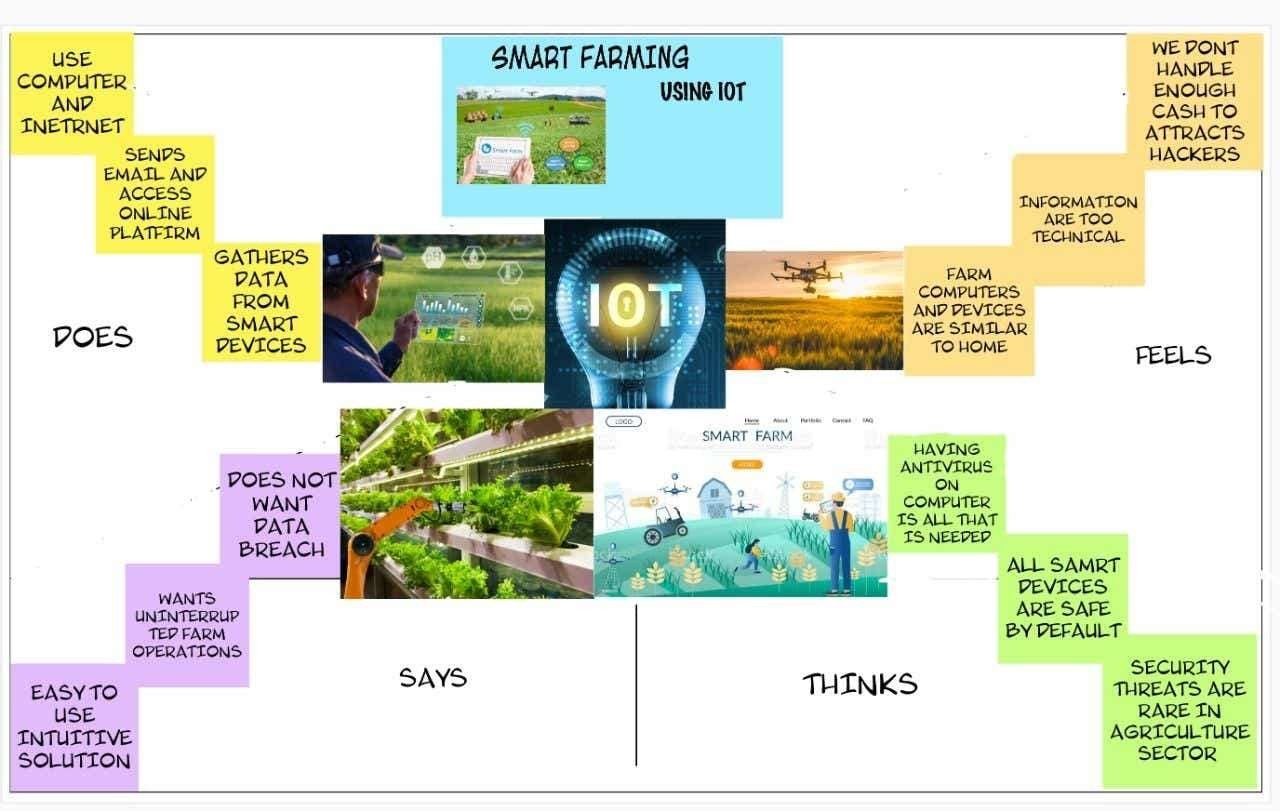
It is the application of modern ICT (Information and Communication Technologies) into agriculture. In IOT- based smart farming, a system is built for monitoring the crop field with the help of sensors (light, humidity, temperature, soil moisture, etc.). The farmers can monitor the field conditions from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

* 1. PROBLEM STATEMENTDEFINITION:

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 MAPCANVAS:



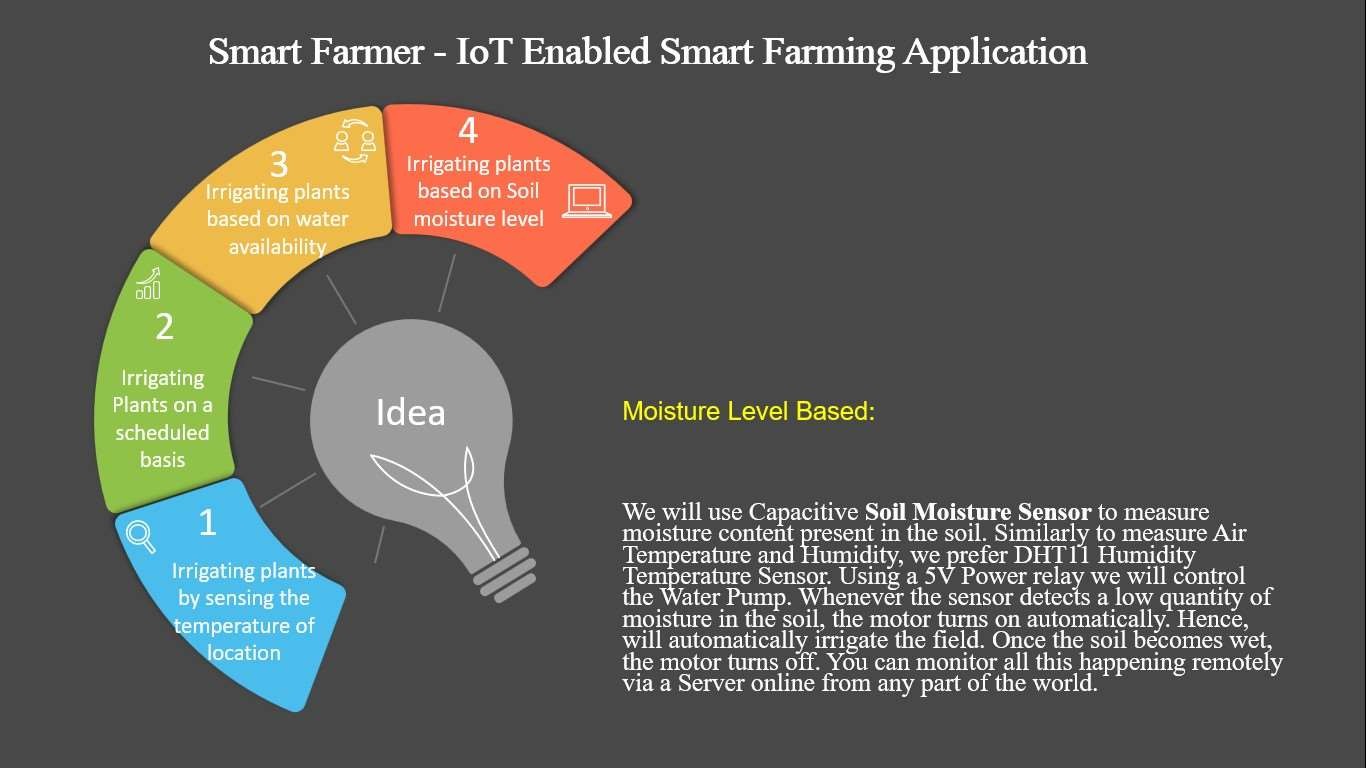
* 1. IDEATION &BRAINSTORMING:

**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**isagroupcreativetechniquebywhicheffortsare made to find a conclusion for a specific problem by gathering a list of ideas spontaneously contributed by itsmembers.

#### IDEATION PROCESS

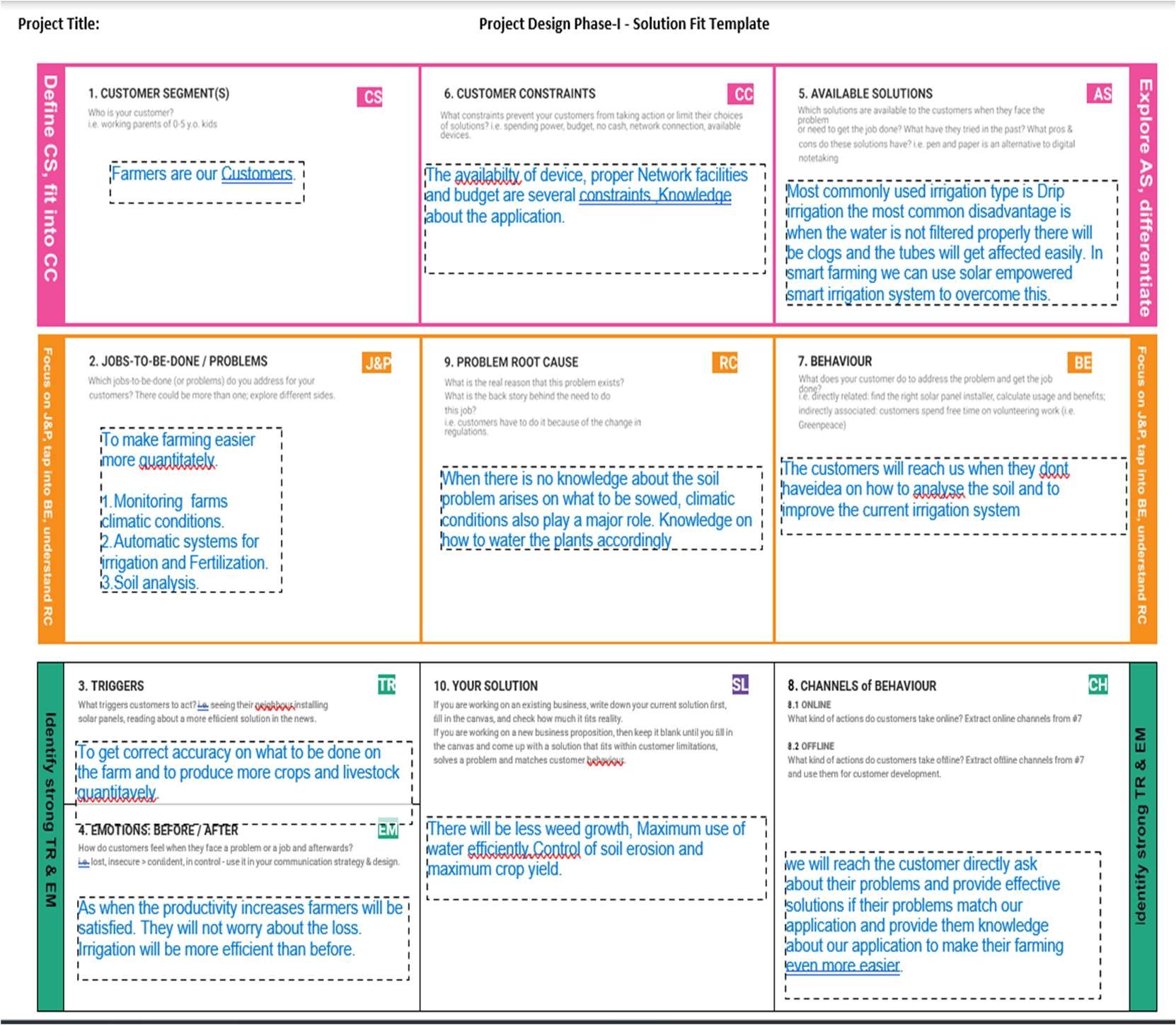


* 1. Proposed SolutionTemplate:

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

|  |  |  |
| --- | --- | --- |
| **S.No.** | **Parameter** | **Description** |
| 1. | Problem Statement (Problem to be solved) | To make farming easier by choosing several constraints in agriculture and to overcome those constraints, to increase production quality and  quantity using IOT. |
| 2. | Idea / Solution description | Using smart techniques like monitoring farms climate, smart  irrigation and soil analysis. |
| 3. | Novelty / Uniqueness | Solar power smart irrigation system which helps you to monitor temperature, moisture ,humidity  using smart sensors. |
| 4. | Social Impact / Customer Satisfaction | It is better than the present modern irrigation system by using this method we can control soil erosion.  There will be better production yield. |
| 5. | Business Model (Revenue Model) | As the productivity increases customer satisfaction also increases and hence need for the application also increases, which increases the  revenue of the business. |
| 6. | Scalability of the Solution | It is definetly scalable we ca increase  the constraints when the problem arises. |

* 1. PROBLEM SOLUTIONS FIT:



1. **REQUIREMENTANALYSIS:**

### FUNCTIONALANALYSIS:

Following are the functional requirements of the proposed solution.

|  |  |  |
| --- | --- | --- |
| **FR**  **No.** | **Functional Requirement**  **(Epic)** | **Sub Requirement (Story / Sub-Task)** |
| FR-1 | IoT devices | Sensors and Wifi module. |
| FR-2 | Software | Web UI, Node-red, IBM Watson, MIT app |
|  |  |  |

* 1. NON FUNCTIONALREQUIREMENTS:

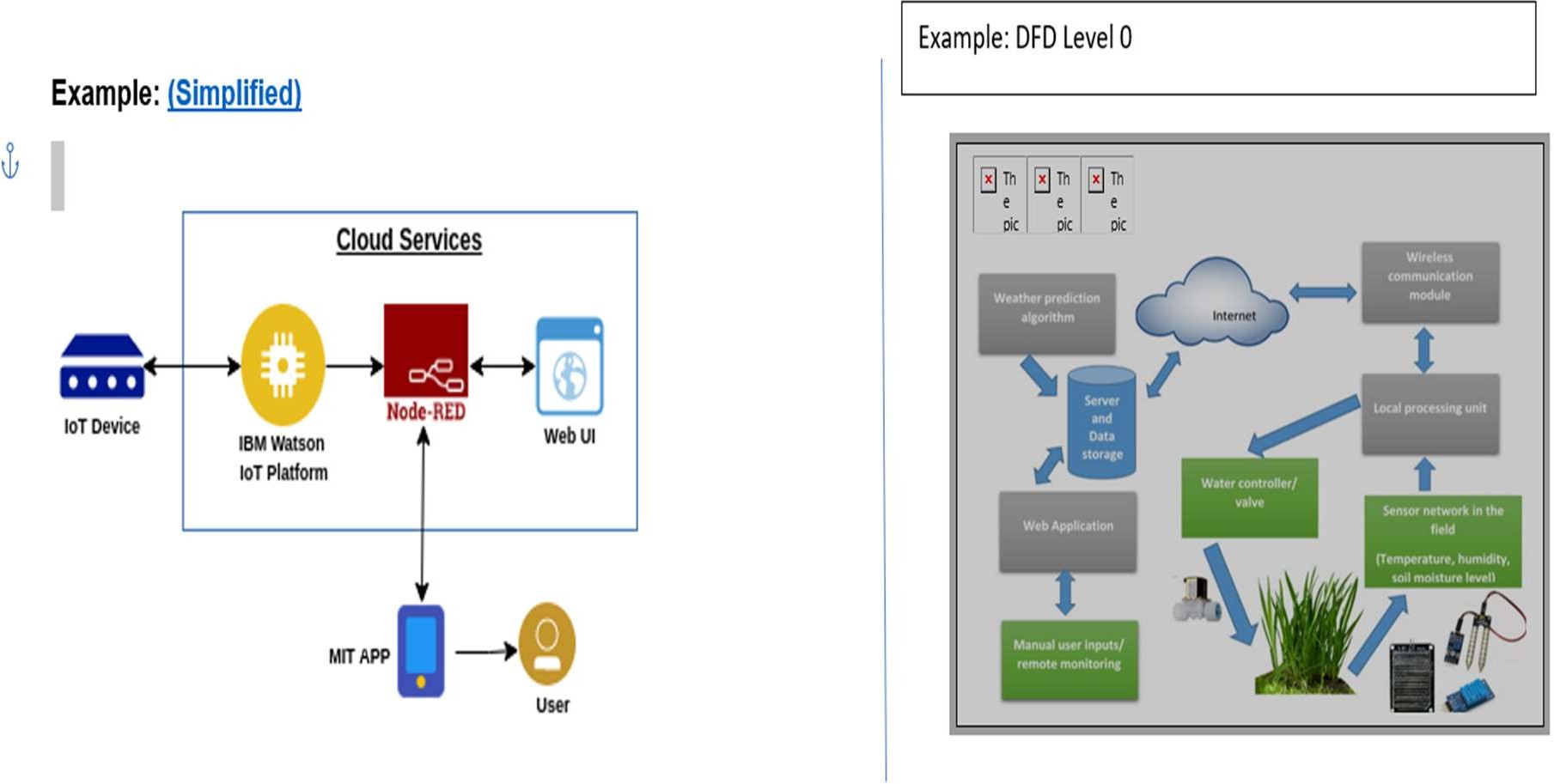
Following are the non-functional requirements of the proposed solution.

|  |  |  |
| --- | --- | --- |
| **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 of data and hence it is Reliable. |
| 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 |

### PROJECTDESIGN:

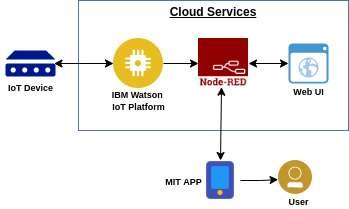
* 1. DATA FLOW DAIGRAMS AND USERSTORIES:

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.



### SOLUTIONS AND TECHNICALARCHITECTURAL:

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



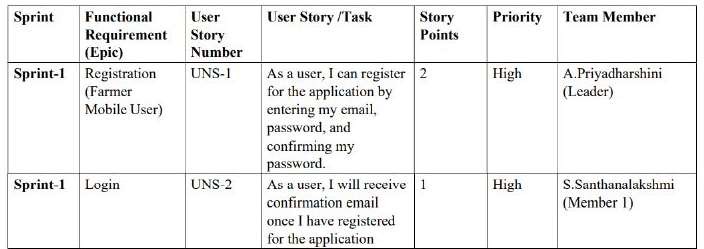
**Table-1 : Components & Technologies:**

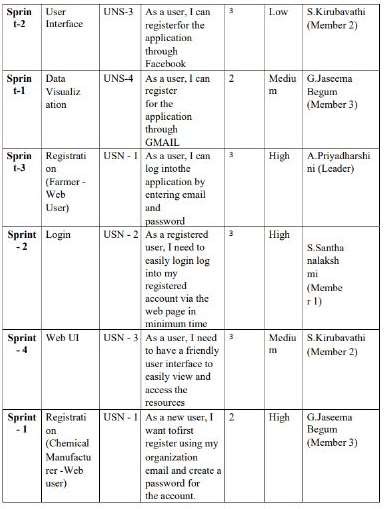
|  |  |  |  |
| --- | --- | --- | --- |
| **S.No** | **Component** | **Description** | **Technology** |
| 1. | User Interface | How user interacts with application e.g.  Web UI, Mobile App, Chatbot etc. | MIT app |
| 2. | Application Logic-1 | Logic for a process in the application | Node red/IBM Watson/MIT 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 |  |

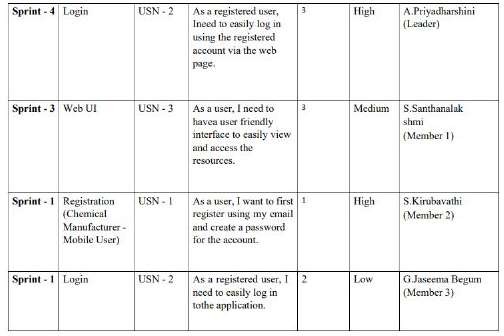
**Table-2: Application Characteristics:**

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

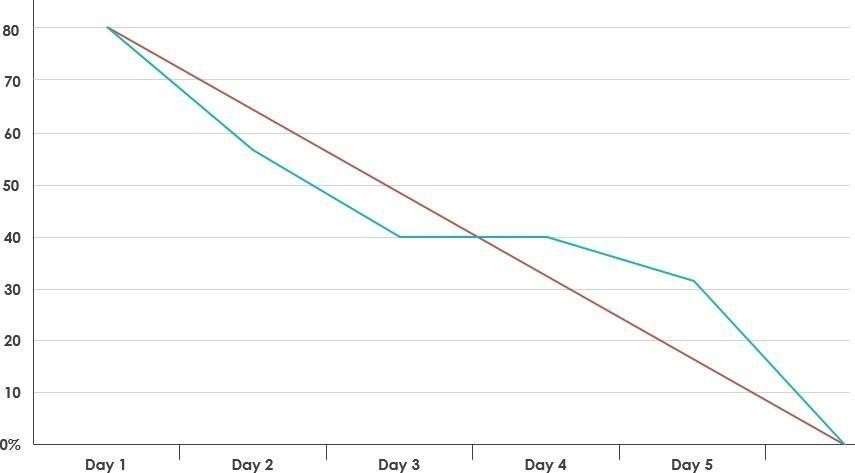
1. **PROJECT PLANNING AND SCHEDULING:**





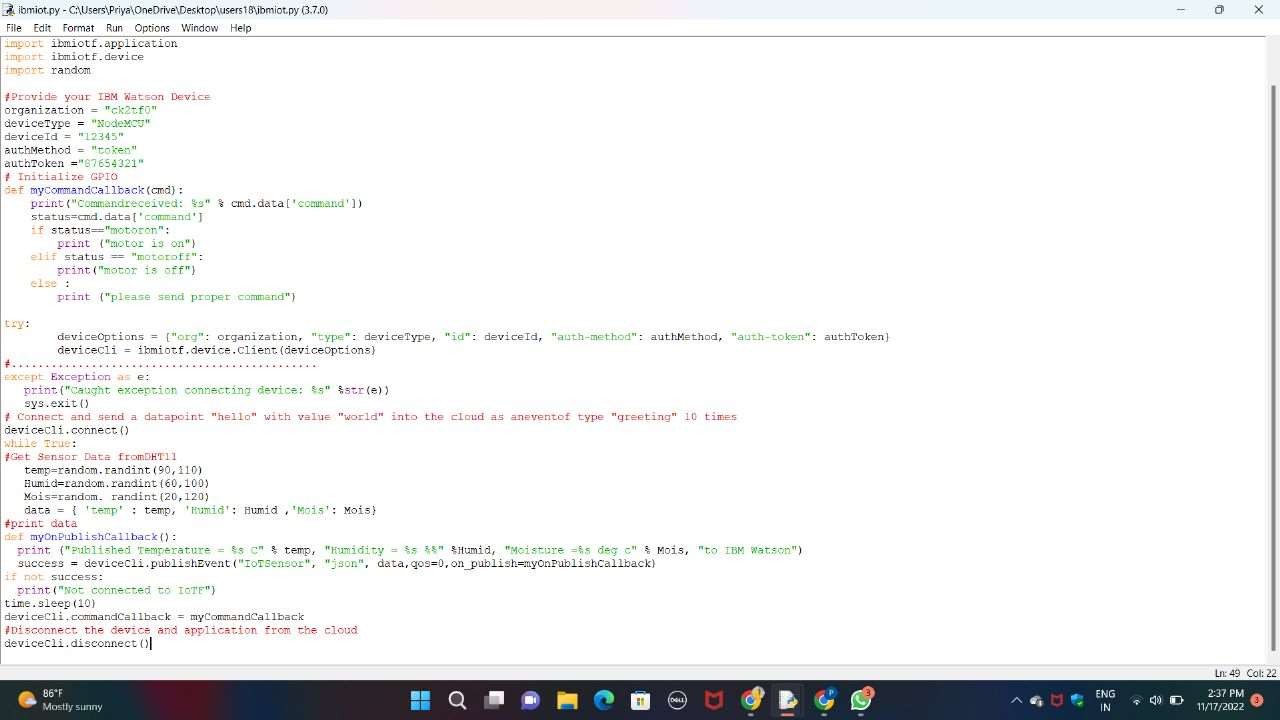


## Burndown Chart:



### CODING &SOLUTIONS:

FEATURE :

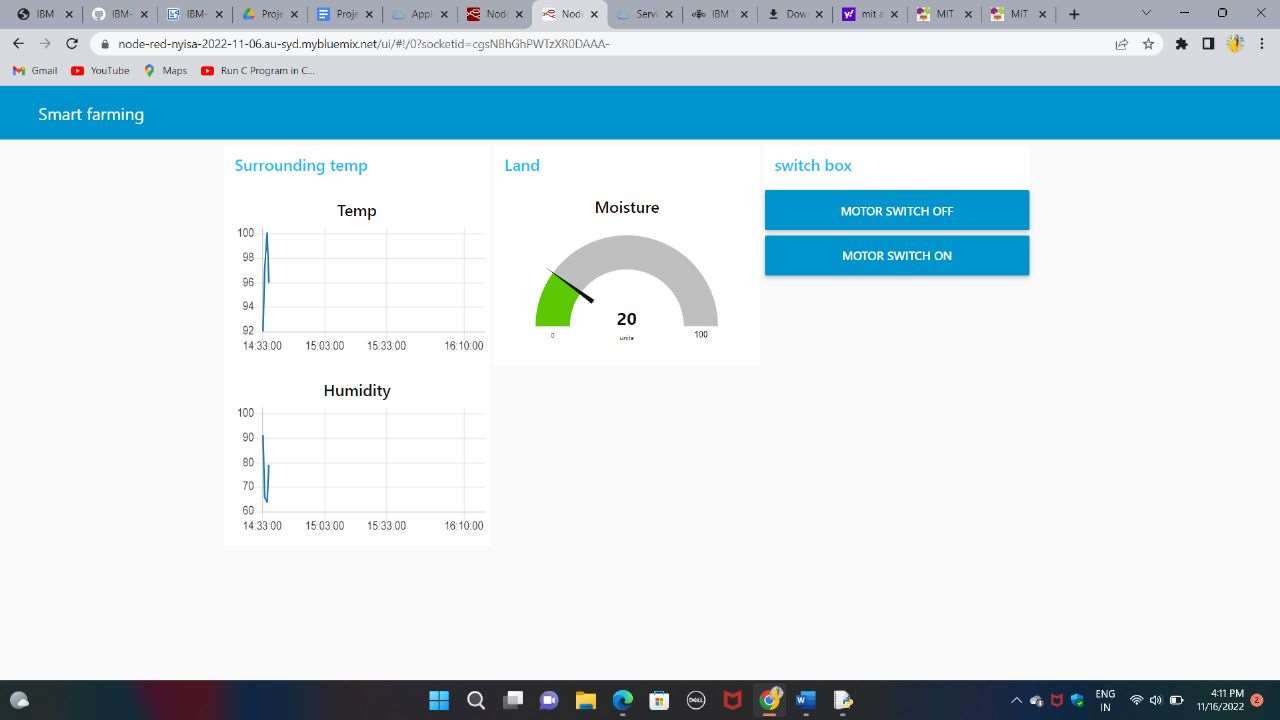


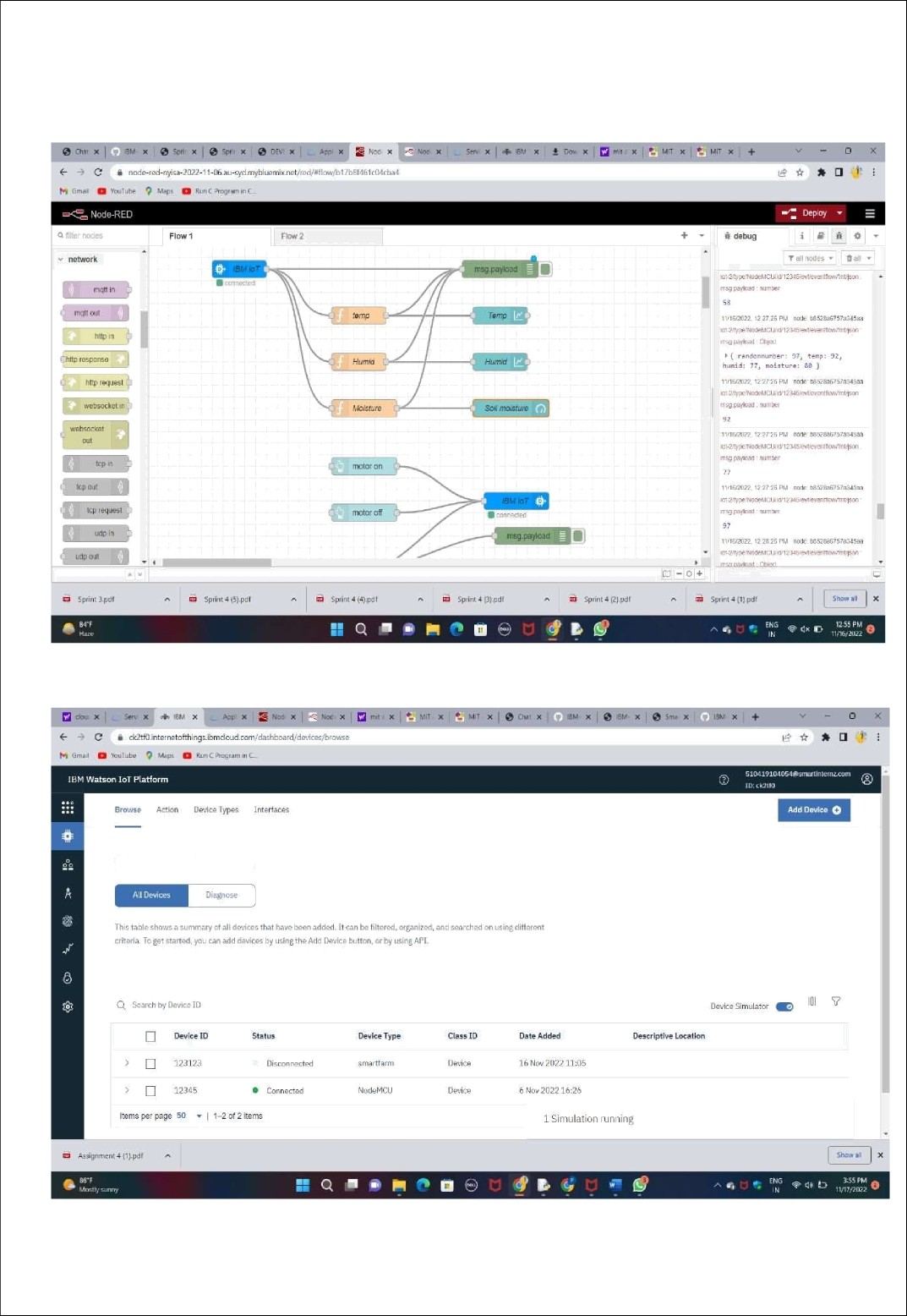
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1. **TESTING:**

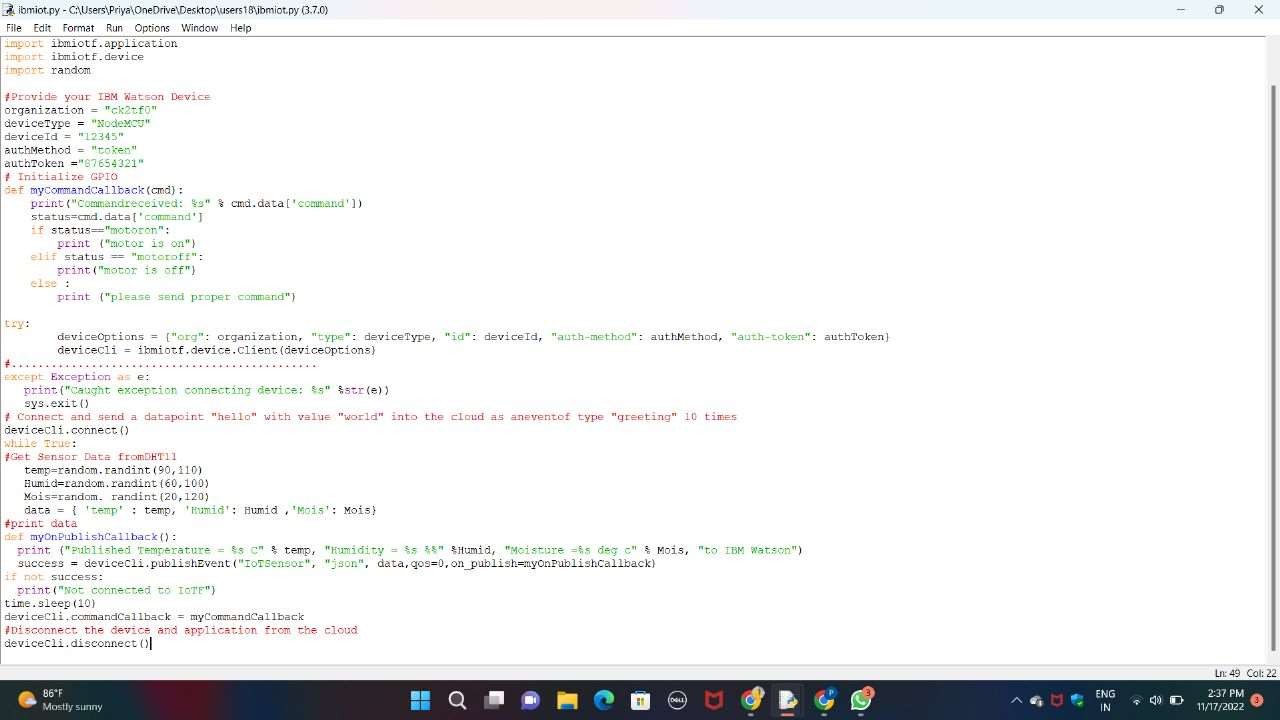
### TESTCASE:

Web application using Node-RED.

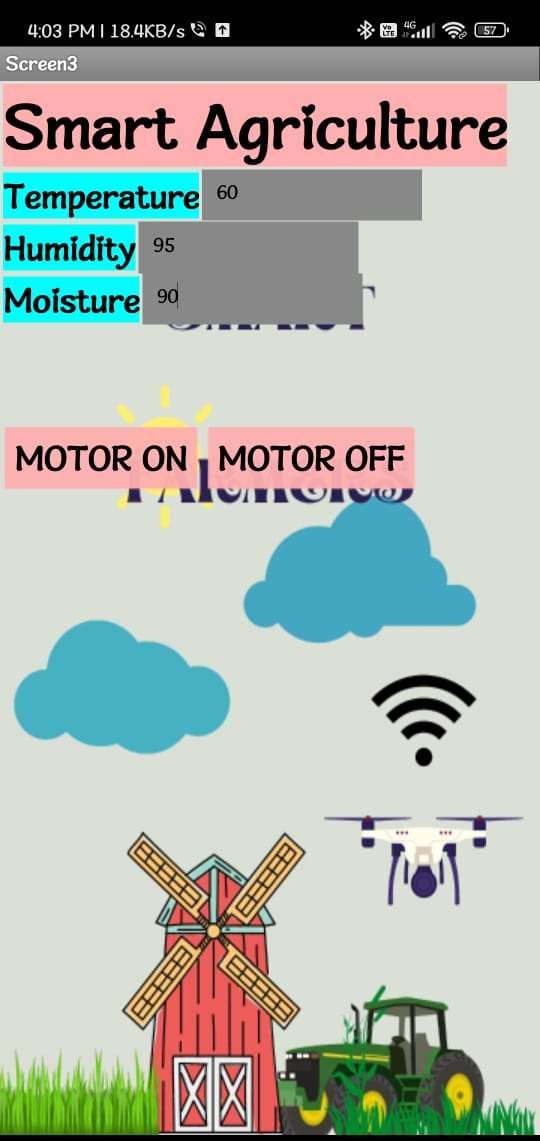




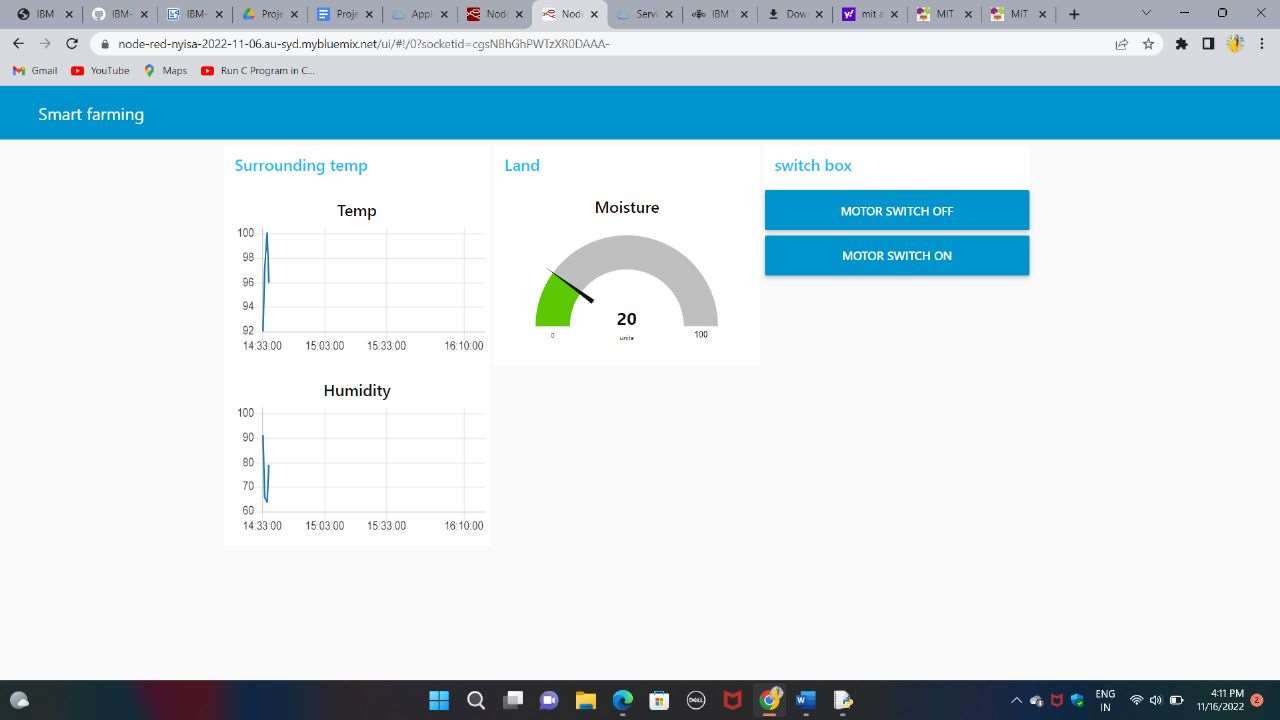
Browse Devices



#### 8.3 User AcceptanceTesting



1. RESULT:
   1. PerformanceMetrics



1. ADVANTAGES AND DISADVANTAGES:

#### ADVANTAGES:

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

#### DISADVANTAGES:

* Smart Agriculture requires internet connectivity continuously, but rural parts cannot fulfil thisrequirement.
* Any faults in the sensors can cause great loss in the agriculture, due to wrong records and the actions of automatedprocesses.
* IOT devices need much money toimplement.

1. CONCLUSION:

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

1. FUTURESCOPE:

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.

1. 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 = "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:

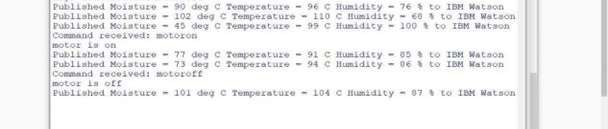
#Get Sensor Data fromDHT11 temp=random.randint(90,110) Humid=random.randint(60,100) Mois=random. randint(20,120)

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 notsuccess:

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

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

OUTPUT:

**Github link :https://github.com/IBM-EPBL/IBM-Project-51511-1660980188**

**Project Demo link :https://photos.app.goo.gl/AtvVJhyUrnQ1gEhSA**

**THANK YOU…..**