PROJECT REPORT

SMART AGRICULTURAL SYSTEM BASED ON IOT

Jaladi Srivardhan

srivardhansrivardhan31@gmail.com

Category: Internet of Things

1. INTRODUCTION

1.1 OVERVIEW

The purpose of this report is to propose an intelligent agricultural system based on the Internet of Things so that farmers can obtain real-time data of soil moisture and the environment. The temperature and humidity are very low, so real-time monitoring is possible.

1.2 PURPOSE

- To provide a service using which farmers can monitor the temperature, humidity, and soil moisture parameters along with weather forecasting details so that they can grow and yield a good crop.
- Based on all the parameters he can water his crop by controlling the motors using the mobile application.
- Even if the farmer is not present near his crop he can water his crop by controlling the motors using the mobile application from anywhere.

2. LITERATURE SURVEY

2.1 IoT : CONCEPT AND DEFINITION

The Internet of Things is composed of the words Internet of Things and the Internet of Things. The term Internet of Things in the Internet of Things refers to a variety of Internet of Things devices with unique identities and the ability to perform remote sensing, startup, and real-time monitoring of certain types of data. IoT devices can also directly or indirectly exchange real-time data with other connected devices and applications, or collect data from other devices and process the data and send the data to various servers.

Another definition of the Internet is the global communication network, which connects thousands of computers on the earth, thus achieving information sharing. Therefore, the Internet of Things can be defined as: "Dynamic global network infrastructure, with standards-based interworking functions, and interoperable communication with protocols, physical and virtual things have an identity, physical attributes, and virtual personality, and use intelligent interfaces, And seamlessly integrated into the information network, often exchange data associated with users and their environment. "

IoT devices can take various forms, such as wearable sensors, smartwatches, IoT smart home monitoring, IoT smart transportation systems, IoT smart health devices, etc.

The Internet of Things has a strong backbone in various supporting technologies-wireless sensor networks, cloud computing, big data, embedded systems, security protocols and architectures, protocols that support communications, Web services, Internet, and search engines.

2.2 EXISTING PROBLEM

- Farmers stay on the farm to take care of the crops and cannot obtain information about the crops remotely.
- They have no scientific value about the needs of crops, such as how much water a crop needs. Excessive use of water will wastewater, while less use of water will affect the growth of crops.
- They cannot control their equipment remotely and have to go to the farm to operate and monitor the equipment.

2.3 PROPOSED SOLUTION

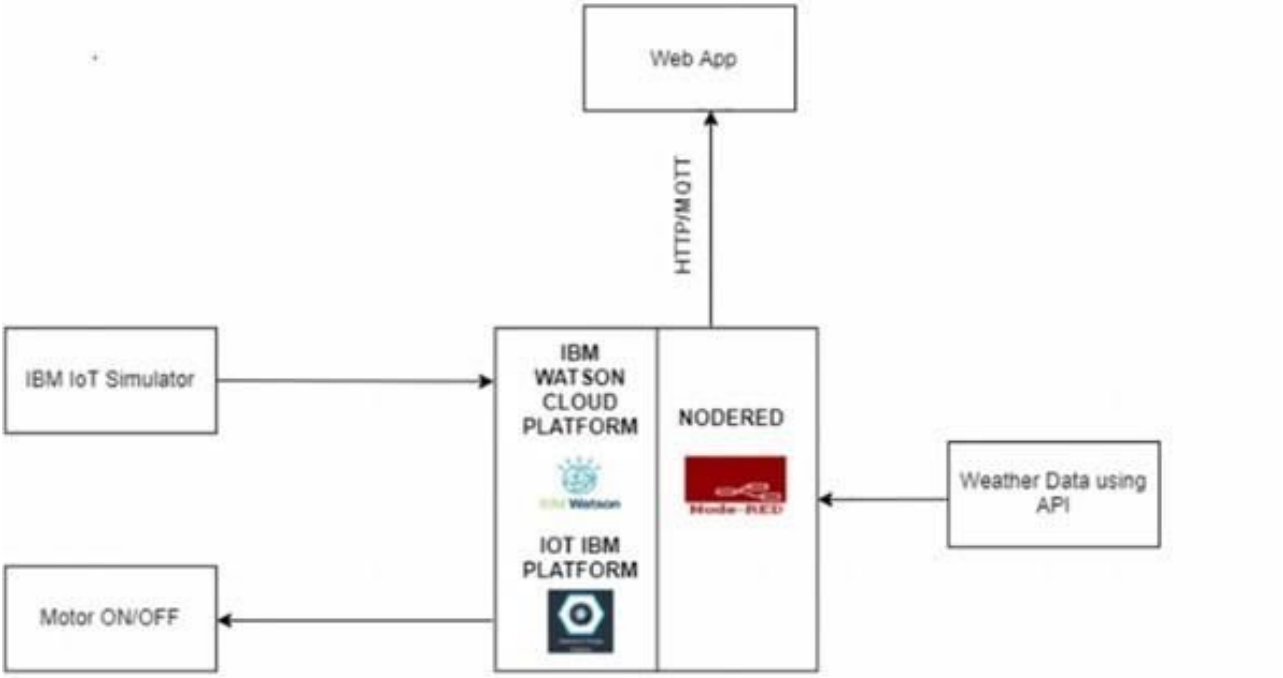
- The intelligent agricultural system based on the Internet of Things can monitor

climate conditions such as soil humidity and humidity and temperature, thereby growing and obtaining good crops.

- Farmers can also obtain real-time weather forecast data by using external platforms such as Open Weather API.
- Farmer is provided with a mobile application. Using this application, he can monitor temperature, humidity, and soil moisture parameters as well as detailed information on weather forecast.
- According to all the parameters, he can water the water by controlling the motor using the mobile application.
- Even if the farmer is not near his crops, he can water the water by controlling the electric motor using a mobile application anywhere.
- Here we are using the Online I0T simulator for getting the Temperature, Humidity, and Soil Moisture values.

3. THEORETICAL ANALYSIS

3.1 Block diagram



3.2 Hardware / Software designing

- **IBM Cloud Platform**
  To use services like IBM Watson IOT platform

- **IBM Watson IOT Platform**
  To create an IoT device and to use IBM Watson Sensor Simulator

- **IBM Watson Sensor Simulator**
  To receive data as it acts as a virtual IoT device

- **Node-Red**
  To create a node-red dashboard (web app / UI) and to receive data from Open Weather API

- **Open Weather API**
  To receive weather-related data of a particular location (say Delhi, IN

4. EXPERIMENTAL INVESTIGATIONS

When correctly configured and connected appropriately, all the elements of the project are working correctly according to the plan. That is, we are getting weather data from the Open Weather API and the Watson IoT Sensor Simulator data. Also we are able to send motor on/off commands to the device.

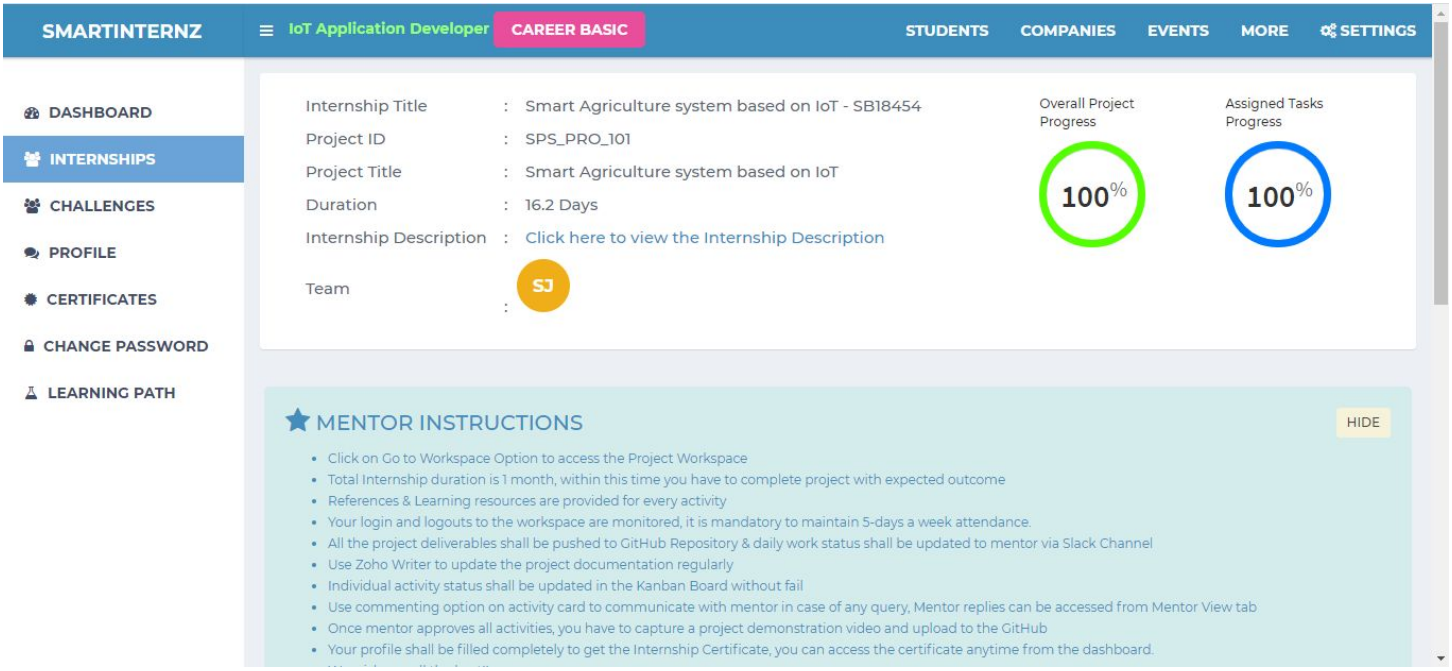


Figure 1: Internship Title

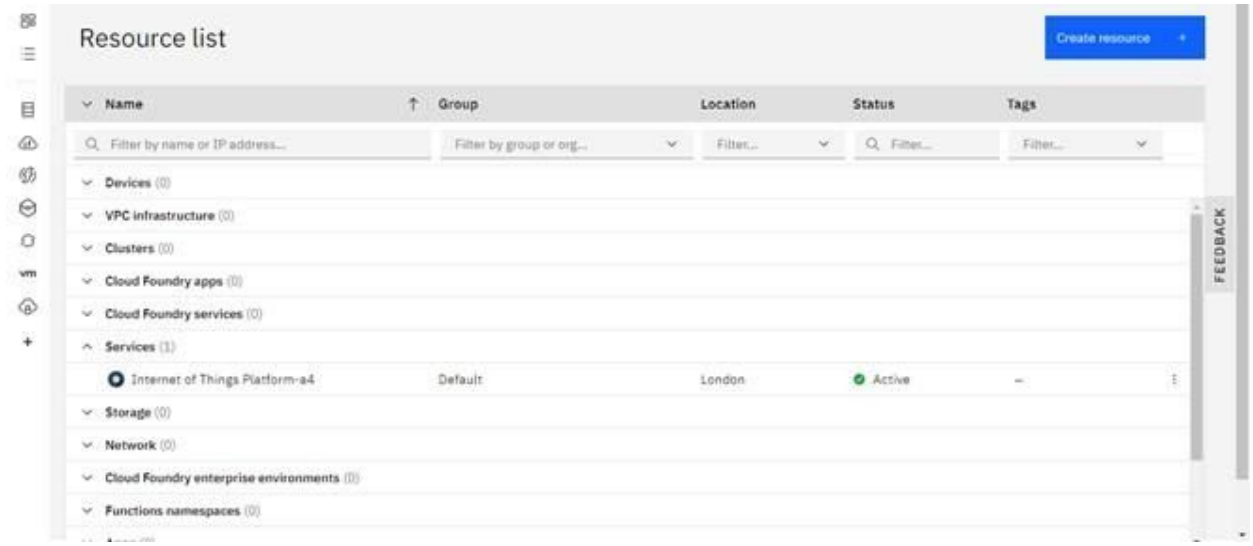
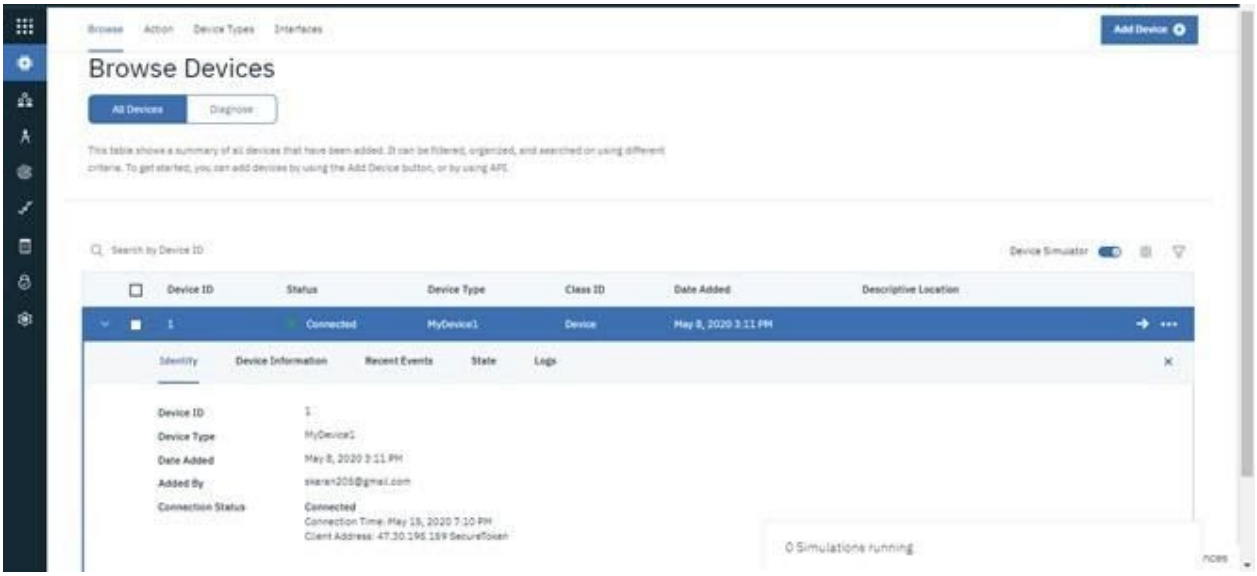


Figure 2: Internet of Things PlaVorm service on IBM Cloud

Figure 3: The device which we have created is showing status as “Connected” on IBM



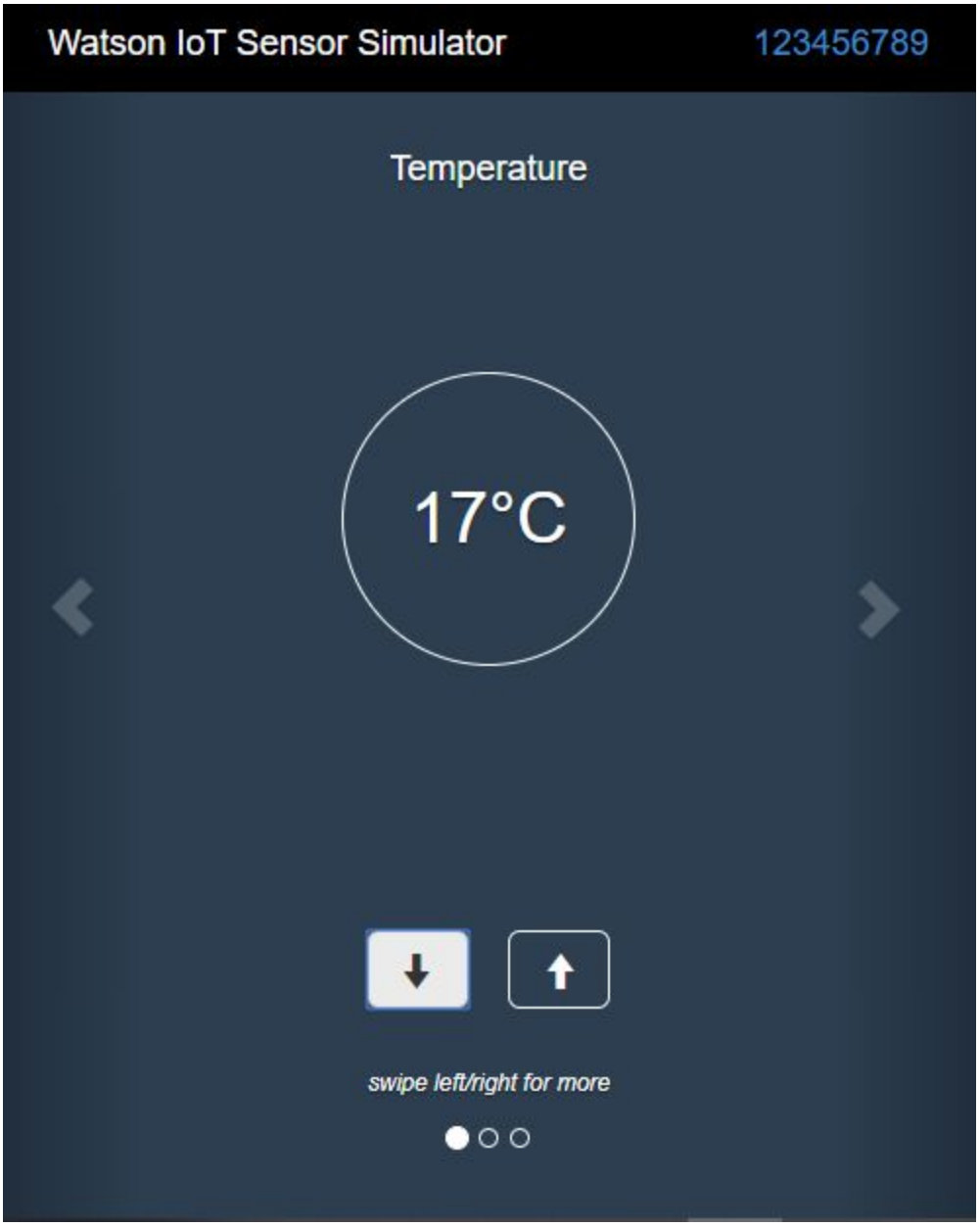


Figure 4: Watson IOT Sensor Simulator is connected and sending data to the Cloud

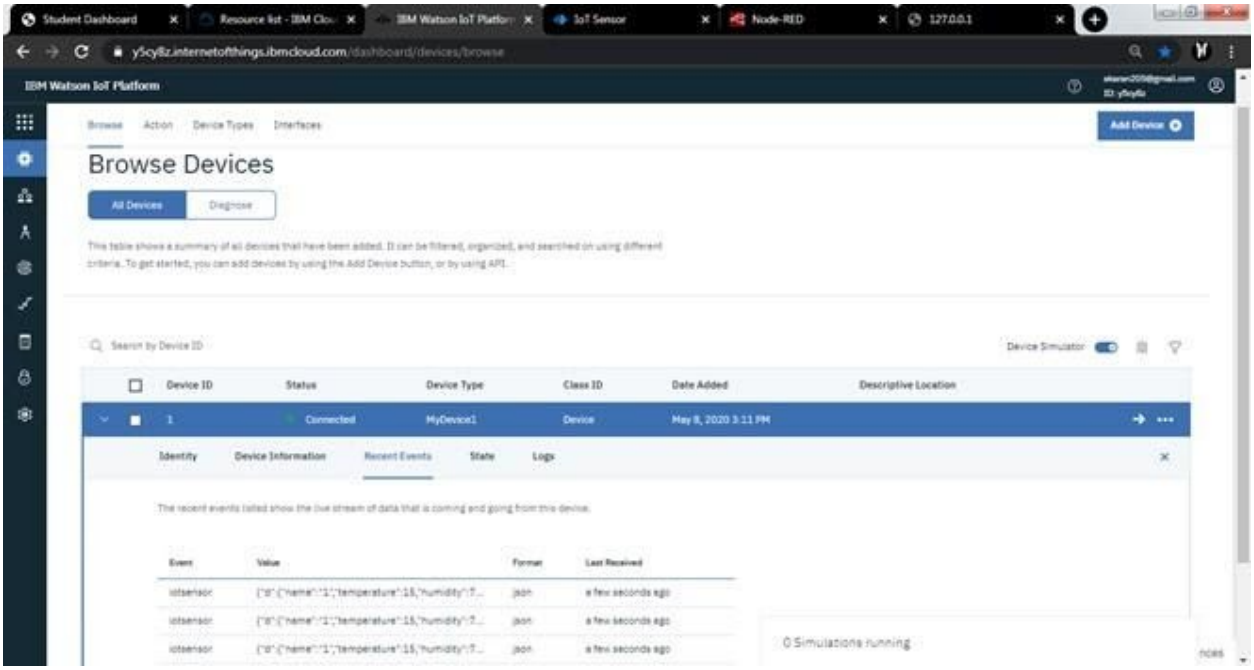


Figure 5: We are receiving data from the Watson IoT Sensor Simulator

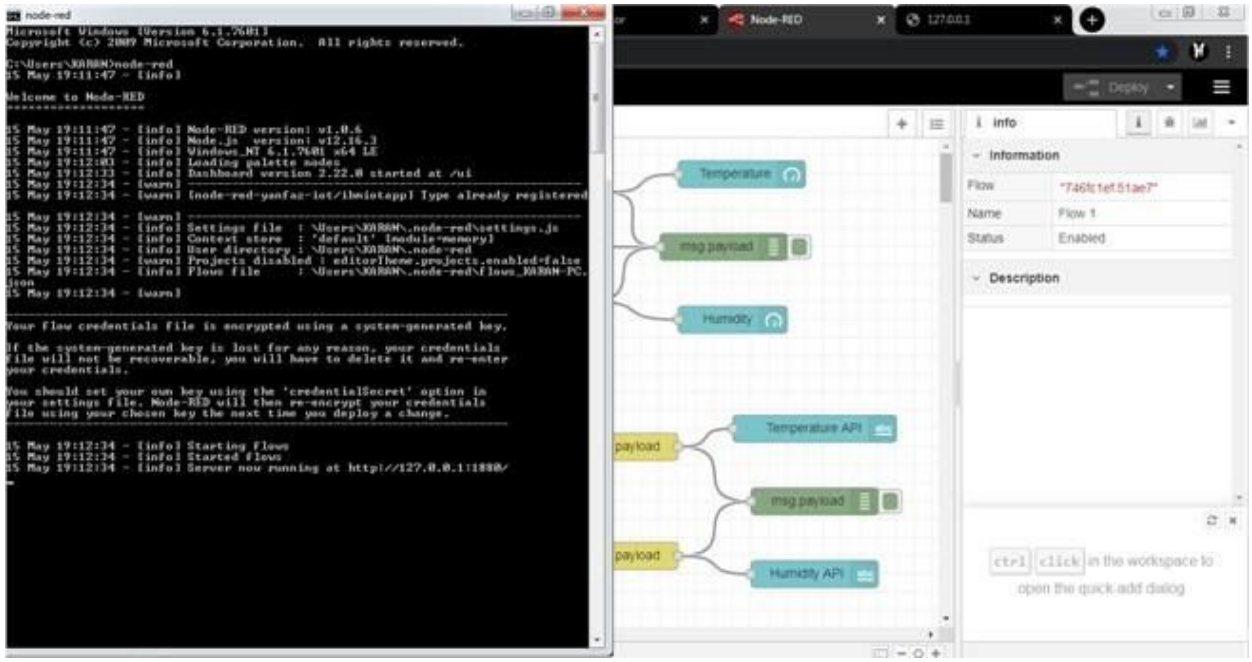


Figure 6: Running Node-RED locally

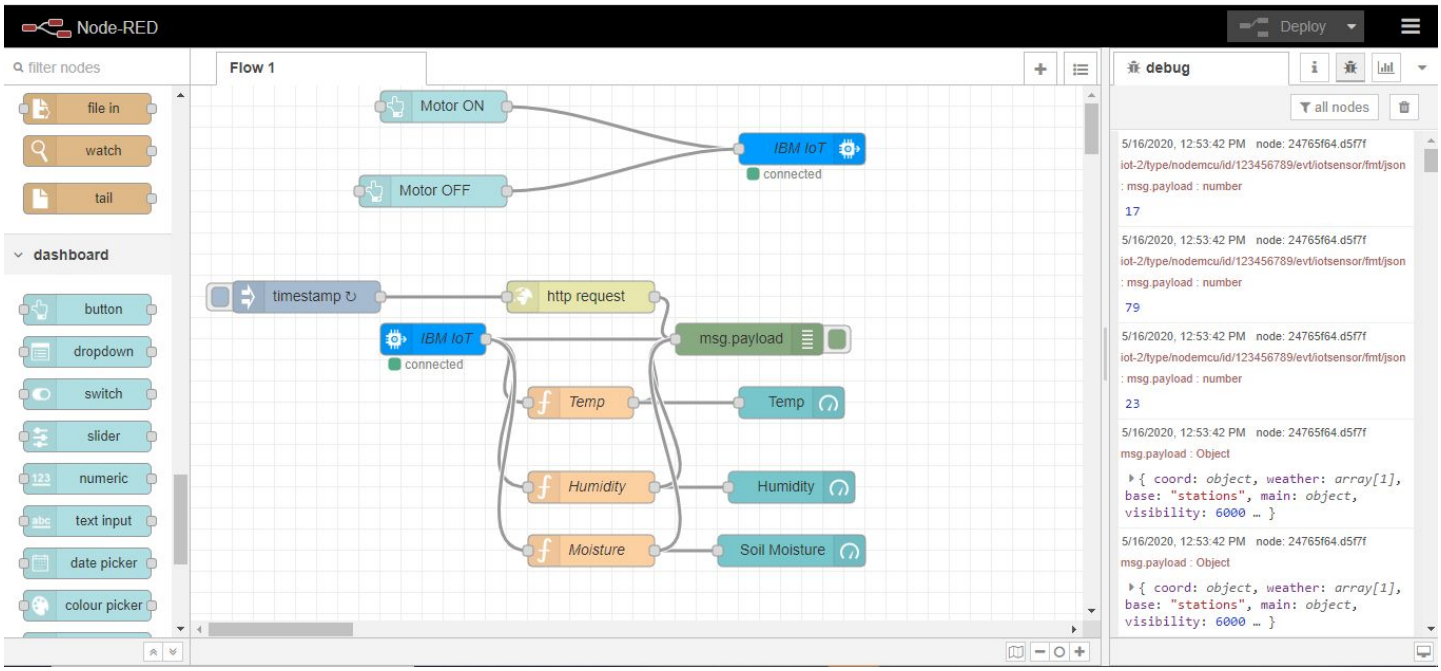


Figure 7: Watson IOT Sensor Simulator data is being received on Node-RED using IBM IOT Input node

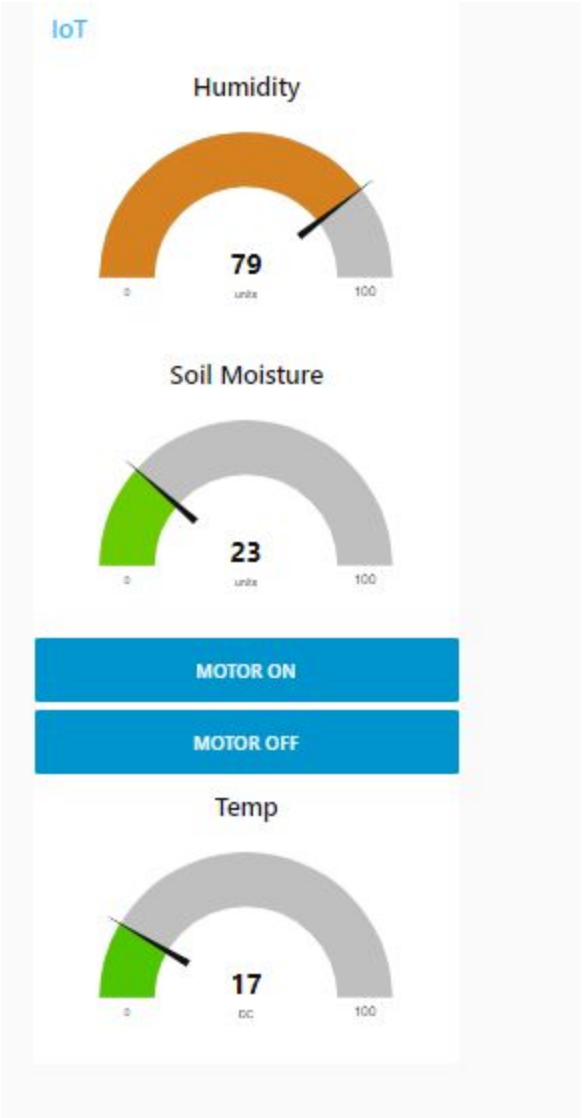


Figure 8: Node-RED Dashboard / UI / WEB APP showing

- Data received from Watson IOT Sensor Simulator (using IBM IoT Input node),
- Data received from Open Weather API (using HTTP request node),
- Buttons to send a command to the motor (using IBM OUT Output node)

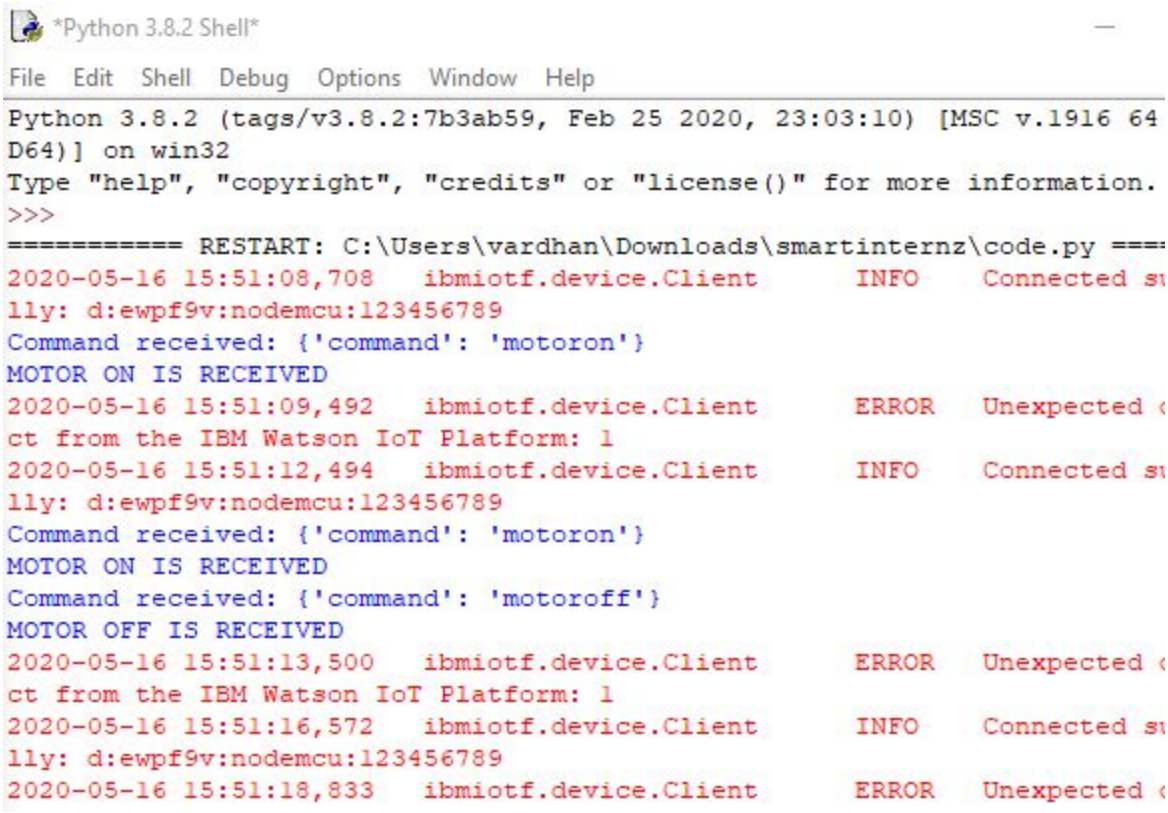
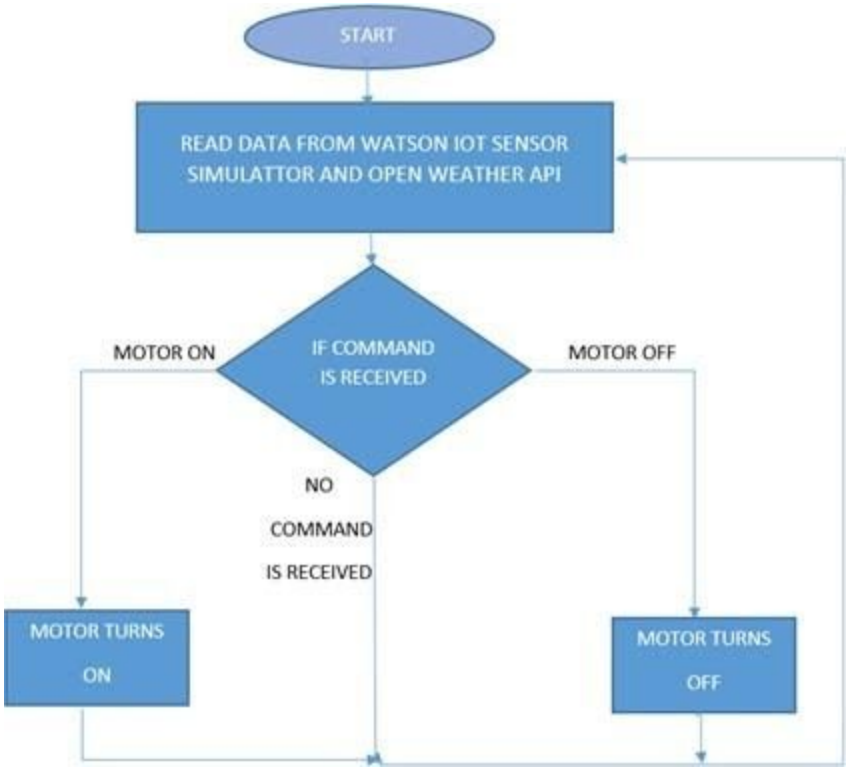


Figure 9: Device is receiving motor ON/OFF commands via IBM IOT Output node

5. FLOWCHART



6. RESULT

When we obtain weather data from the open weather API and Watson IoT Sensor Simulator data, we have successfully designed an intelligent agricultural system based on the Internet of Things. In addition, we can also send motor on/off commands to the device.

7. BENEFITS OF IOT IN AGRICULTURE

The following are the benefits of IoT in Agriculture:

- The Internet of Things can easily collect and manage the large amounts of data collected from sensors, and integrate with cloud computing services such as maps in the agricultural field, cloud storage, and real-time access to data from

anywhere. Real-time monitoring can be carried out everywhere and an end-to-end connection can be achieved between all relevant parties.

- The Internet of Things is considered to be a key component of smart agriculture, because with accurate sensors and smart devices, as described by experts, farmers can increase food production by 70% by 2050.
- The Internet of Things is considered to be a key component of smart agriculture, because with accurate sensors and smart devices, as described by experts, farmers can increase food production by 70% by 2050. Profitability and sustainability.
- Using the Internet of Things can improve the efficiency of the use of soil, water, fertilizers, and pesticides.
- Using the Internet of Things, various factors will also lead to environmental protection.

8. IOT APPLICATIONS IN AGRICULTURE

With the application of the Internet of Things in various fields such as industry, home, and even city, the huge potential is considered to make everything intelligent. Today, even the agricultural sector is adopting IoT technology, which in turn has led to the development of the "Internet of Agriculture (IoT)".

9. CONCLUSION

IBM Cloud and Node-red have been used to propose a SMART FARMING system for real-time monitoring of temperature and soil moisture based on IoT. The system has high efficiency and accuracy in obtaining real-time data of temperature and soil moisture. The intelligent agriculture system based on the Internet of Things proposed through this report will help farmers increase agricultural output and effectively take care of food production because the system will always provide help for farmers to

obtain an accurate real-time feed of ambient temperature and soil moisture, the result reaches more than 99%.

10. FUTURE SCOPE

Future work will focus more on adding sensors on the system to obtain more data (especially data on pest control), and integrating GPS modules into the system to enhance the agricultural IoT technology thereby

Complete agricultural precision products with complete functions.

11. BIBLIOGRAPHY

1. https//:www.ibm.com
2. https//:www.youtube.com
3. https//:www.researchgate.net
4. https://watson-iot-sensor-simulator.mybluemix.net
5. https://home.openweathermap.org

APPENDIX

API AND DEVICE CREDENTIALS

Device Credenfials:

Organizafion ID: y5cy8z
Device Type: MyDevice1
Device ID: 1
Authenficafion Method: use-token-auth
Authenficafion Token: 0123456789

Web Applicafion:

API Key: a-y5cy8z-r95mdkbjlu
Authenficafion token: -*0xJS2tRjzGXnDO?l

Open Weather API details:

API call: api.openweathermap.org/data/2.5/weather?q={city name}&&appid={your api key}

API Key on open weather:aa7b3612910baa639d1a90db0b3ee65 **City:**
Delhi, IN

URL:
api.openweathermap.org/data/2.5/weather?q=Delhi,IN&&appid=aa7b3612910baa639d1a90db 0b3ee65ddd

PYTHON CODE

```
import time
import sys
import ibmiotf.application # to install pip install ibmiotf
        import ibmiotf.device 5
#Provide your IBM Watson Device Credentials
organization = "y5cy8z" #replace the ORG ID
deviceType = "MyDevice1"#replace the Device type wi
deviceId = "1"#replace Device ID
authMethod = "token"
        authToken = "0123456789 "#Replace the authtoken 12
def myCommandCallback(cmd): # function for Callback
                print("Command received: %s" % cmd.data)
                if cmd.data['command']=='motoron':
        print("MOTOR ON IS RECEIVED") 17
                elif cmd.data['command']=='motoroff':
        print("MOTOR OFF IS RECEIVED") 20
                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 49
# Disconnect the device and application from the cloud
deviceCli.disconnect
```

N ODE-RED FILE

h ttps://github.com/SmartPracticeschool/llSPS-INT-823-Smart-Agriculture-system-based -on-IoT/blob/master/flows.json

P RESENTATION VIDEO LINK

https://drive.google.com/open?id=1taNP_kcYCBMSyeCPsZjaBT3MGGKpgAZY

P YTHON FILE

h ttps://github.com/SmartPracticeschool/llSPS-INT-823-Smart-Agriculture-system-based -on-IoT/blob/master/smart_bridge_project.py