

**SMART AGRICULTURE SYSTEM
BASED ON IOT
REPORT
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Project Scope

- Project Summary
 - Smart Agriculture System based on IoT can monitor soil moisture and climatic conditions to grow and yield a good crop.
 - A Farmer is provided a mobile app using which he can monitor the temperature, humidity and soil moisture parameters along with weather forecasting details.
 - Based on all the parameters he can water his crop by controlling the motors using the mobile application
- Project Requirements
 - IOT Application Development
 - IOT Cloud Platform
- Software Requirements
 - GIT tool and Nodered
 - Python IDE
- Project Deliverables
 - Explore IBM Cloud Platform
 - Connect The IOT Simulator To Watson IOT Platform
 - Configure The Nodered To Get The Data From IBM IOT Platform And Open Weather API
 - Building A Web App
 - Configure Device To Receive The Data From The Web Application And Control Motors

1. INTRODUCTION

1.1 OVERVIEW

The objectives of this report is to proposed IOT based Smart Farming System which will enable farmers to have live data of soil moisture, environment temperature and humidity at very low cost so that live monitoring can be done.

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

Internet of things IOT consists of two words Internet and Things .The term things in IOT refers to various IOT devices having unique identities and have capabilities to perform remote sensing, actuating and live monitoring of certain sort of data. IOT devices are also enable to have live exchange of data with other connected devices and application either directly or indirectly, or collected data from other devices and process the data and send the data to various servers. The other term internet is define as Global communication Network connecting Trillions of computers across the planets enabling sharing of information .

2.2 EXISTING PROBLEM

The farmers have stay at their farms to take care of their crops and they are unable to get information about the crops remotely. They do not have scientific values about the requirement of the crops like how much water is needed by the crop. Excess usage of water leads to wastage of water and less usage of water can affect the growth of the crops. They cannot control their equipment remotely and have to go to the farm to operate and monitor the equipment.

2.3 PROPOSED SOLUTION

Smart Agriculture System based on IOT can monitor soil moisture and climatic conditions like humidity and temperature to grow and yield a good crop. The farmer can also get the real time weather forecasting data by using external platforms like Open Weather API. Farmer is provided a mobile app using which he can monitor the temperature, humidity and soil moisture parameters along with weather forecasting details. 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. Here we are using the Online IOT simulator for getting the Temperature, Humidity and Soil Moisture values

3. THEORATICAL ANALYSIS

3.1 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 act as a virtual IOT device

Node-Red To create 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.

1. Data received from Watson IOT Sensor Simulator (using IBM IOT Input node),
2. Data received from Open Weather API (using http request node),
3. Buttons to send command to the motor (using IBM OUT Output node)

6. RESULT

We have successfully designed the Smart agricultural system based on iot as 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.

7. BENEFITS OF IOT IN AGRICULTURE

The following are the benefits of IoT in Agriculture:

IoT enables easy collection and management of tons of data collected from sensors and with integration of cloud computing services like Agriculture fields maps,

cloud storage

etc., data can be accessed live from anywhere and everywhere enabling live monitoring

and end to end connectivity among all the parties concerned.

IoT is regarded as key component for Smart Farming as with accurate sensors and smart

equipment's, farmers can increase the food production by 70% till year 2050 as depicted

by experts.

With IoT productions costs can be reduced to a remarkable level which will in turn

increase profitability and sustainability.

With IoT, efficiency level would be increased in terms of usage of Soil, Water, Fertilizers, Pesticides etc.

With IoT, various factors would also lead to the protection of environment.

8. IOT APPLICATIONS IN AGRICULTURE

With the adoption of IoT in various areas like Industry, Homes and even Cities, huge

potential is seen to make everything Intelligent and Smart. Even the Agricultural sector

is also adopting IoT technology these days and this in turn has led to the development of

"AGRICULTURAL Internet of Things (IoT)"

9. CONCLUSION

IoT based SMART FARMING SYSTEM for Live Monitoring of Temperature and Soil

Moisture has been proposed using IBM Cloud and Node-red . The System has high efficiency and accuracy in fetching the live data of temperature and soil moisture. The IoT based smart farming System being proposed via this report will assist farmers in increasing the agriculture yield and take efficient care of food production as the System will always provide helping hand to farmers for getting accurate live feed of environmental temperature and soil moisture with more than 99% accurate results.

10. FUTURE SCOPE

Future work would be focused more on increasing sensors on this system to fetch more data especially with regard to Pest Control and by also integrating GPS module in this system to enhance this Agriculture IoT Technology to full-fledged Agriculture Precision ready product.

11. BIBILOGRAPHY

1. <https://www.ibm.com>
2. <https://www.youtube.com>
3. <https://www.researchgate.net>

APPENDIX

API AND DEVICE CREDENTIALS

Device Credentials:

Organization ID: j46uc4

Device Type: iot-smartagriculture

Device ID: nodemcu

Authentication Method: use-token-auth

Authentication Token: 123456789

Web Application:

API Key: a-qir187-tc94a69zzl

Authentication token: o8y00b?g*fZuClWJpe

PYTHON CODE:

```
import time
```

```
import sys
```

```
import ibmiotf.application # to install pip install ibmiotf
```

```
import ibmiotf.device
```

```
#Provide your IBM Watson Device Credentials
```

```
organization = "j46uc4" #replace the ORG ID
```

```
deviceType = "iot-smartagriculture" #replace the Device type wi
```

```
deviceId = "nodemcu" #replace Device ID
```

```
authMethod = "token"
```

```
authToken = "123456789" #Replace the authtoken
```



```

def myCommandCallback(cmd): # function for Callback
    print("Command received: %s" % cmd.data)
    if cmd.data['command']=='motoron':
        print("LIGHT ON IS RECEIVED")

    elif cmd.data['command']=='motoroff':
        print("LIGHT 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

```

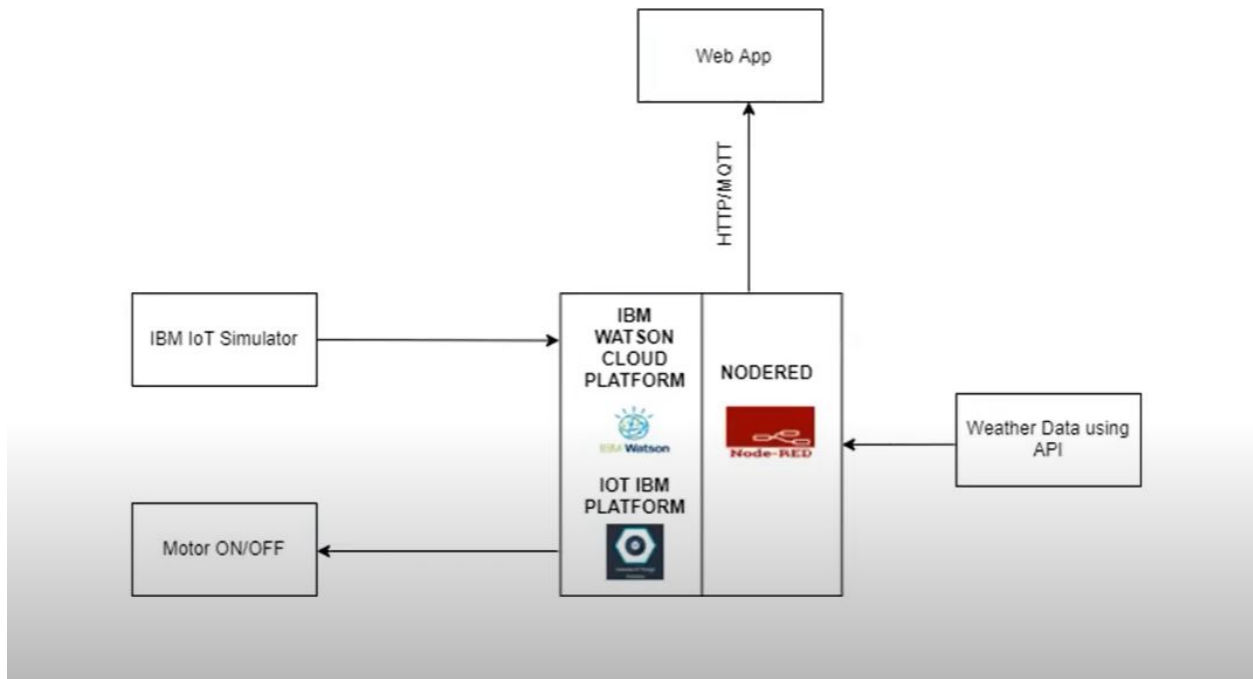
an event of type "greeting" 10 times
deviceCli.connect()

while True:

deviceCli.commandCallback = myCommandCallback

Disconnect the device and application from the cloud
deviceCli.disconnect()

Images for reference:



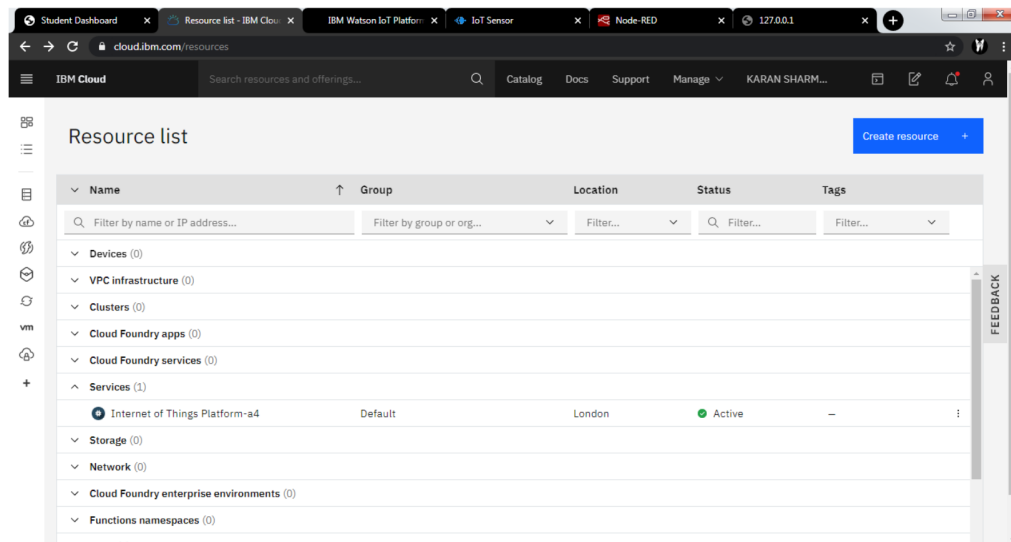


Figure 2: Internet of Things Platform service on IBM Cloud

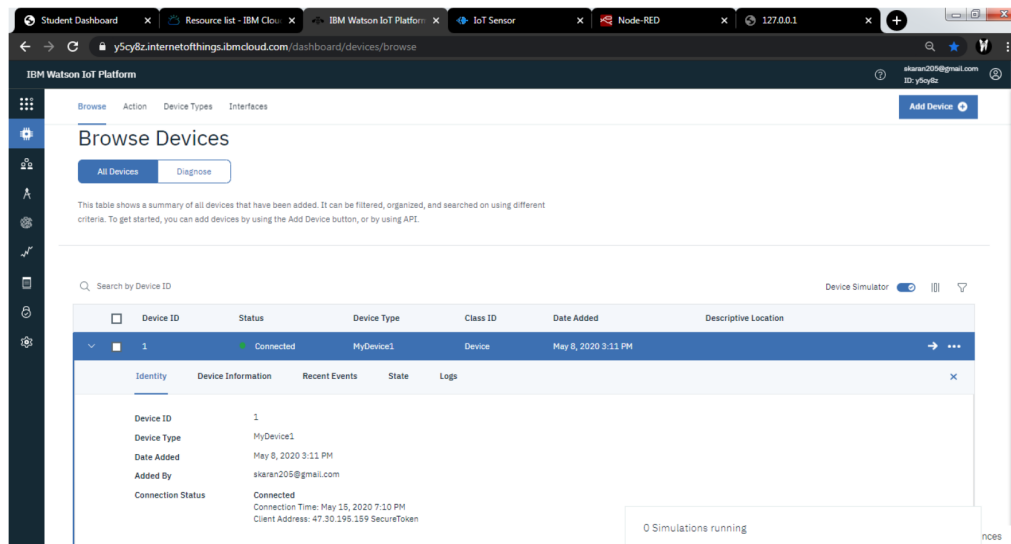
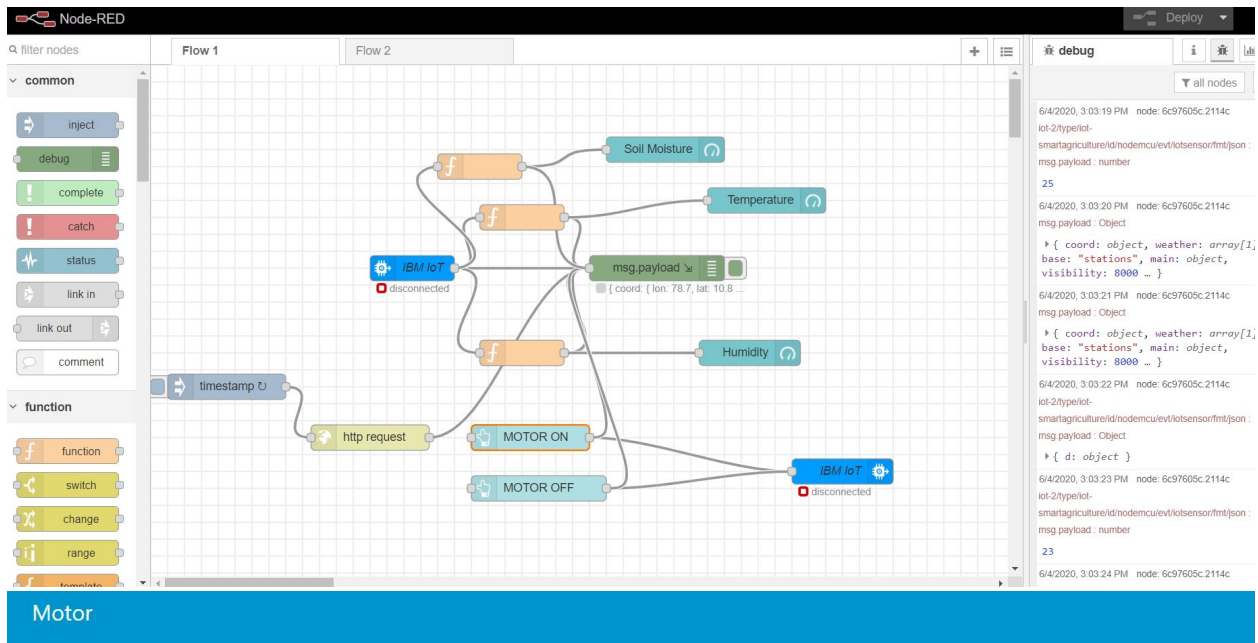
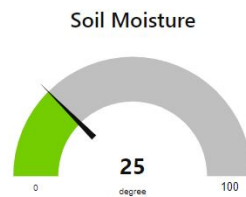
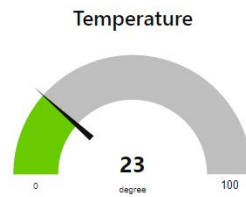
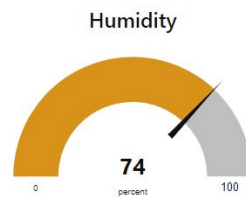


Figure 3: The device which we have created is showing status as "Connected" on IBM Watson IOT Platform



Motor



MOTOR ON

MOTOR OFF

