# SMART AGRICULTURE SYSTEM BASED ON IOT

# REPORT

# BY


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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

➤ Confifigure The Nodered To Get The Data From IBM IOT Platform And Open Weather API

➤ Building A Web App

➤ Confifigure 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 I0T simulator for getting the Temperature, Humidity and Soil Moisture values**

## 4. EXPERIMENTAL INVESTIGATIONS

**When correctly configured and connected appropriately, all the elemen**

## 3. THEORATICAL ANALYSIS

### 3.1 Hardware / Software designing

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

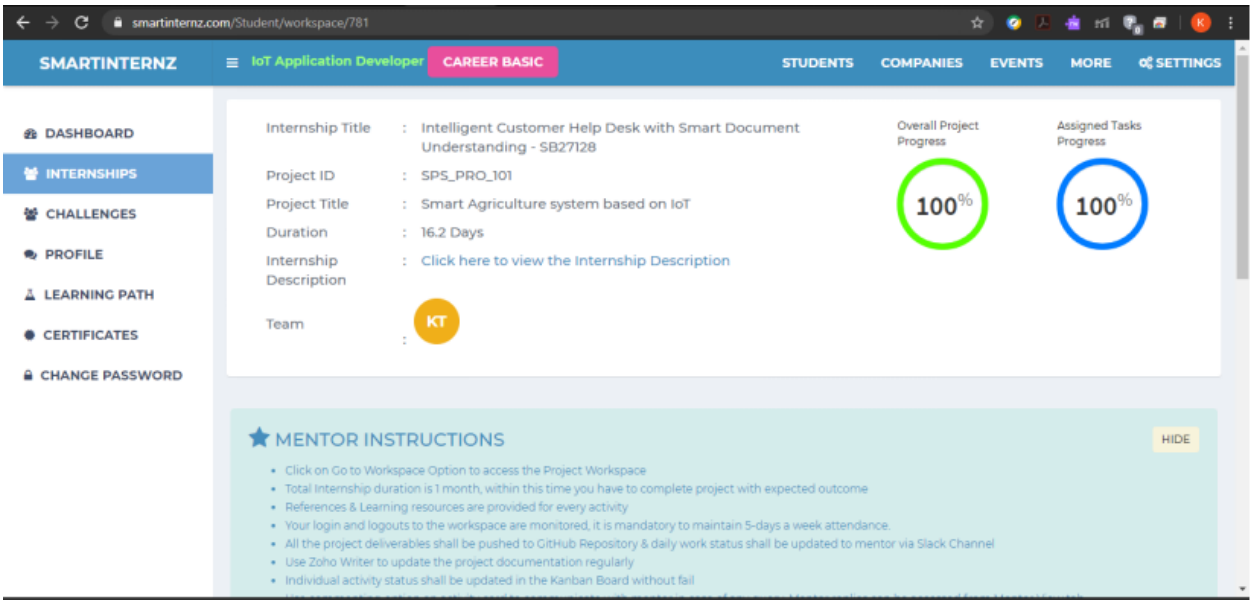
**IBM Watson IOT Platform To create an IOT device and to use IBM Watson Sensor Simulator**

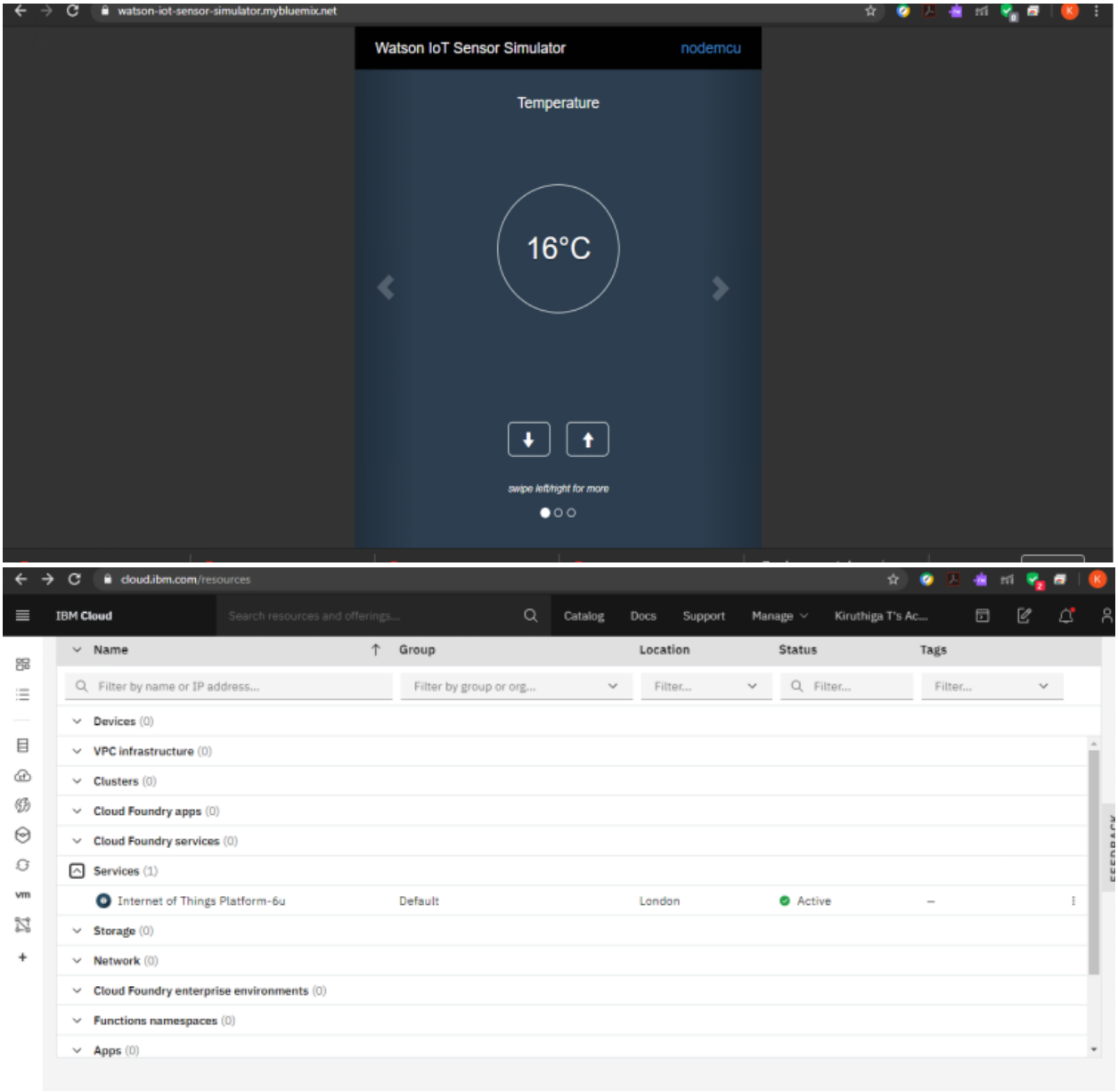
**IBM Watson Sensor Simulator To receive data as it act as a virtual**

**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**

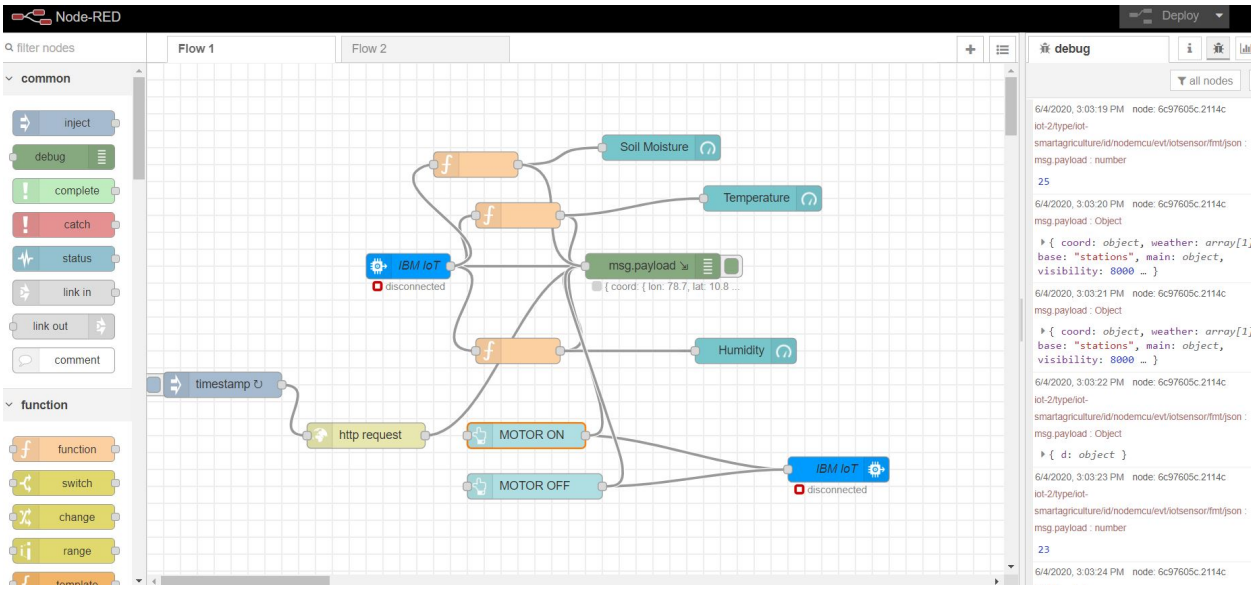




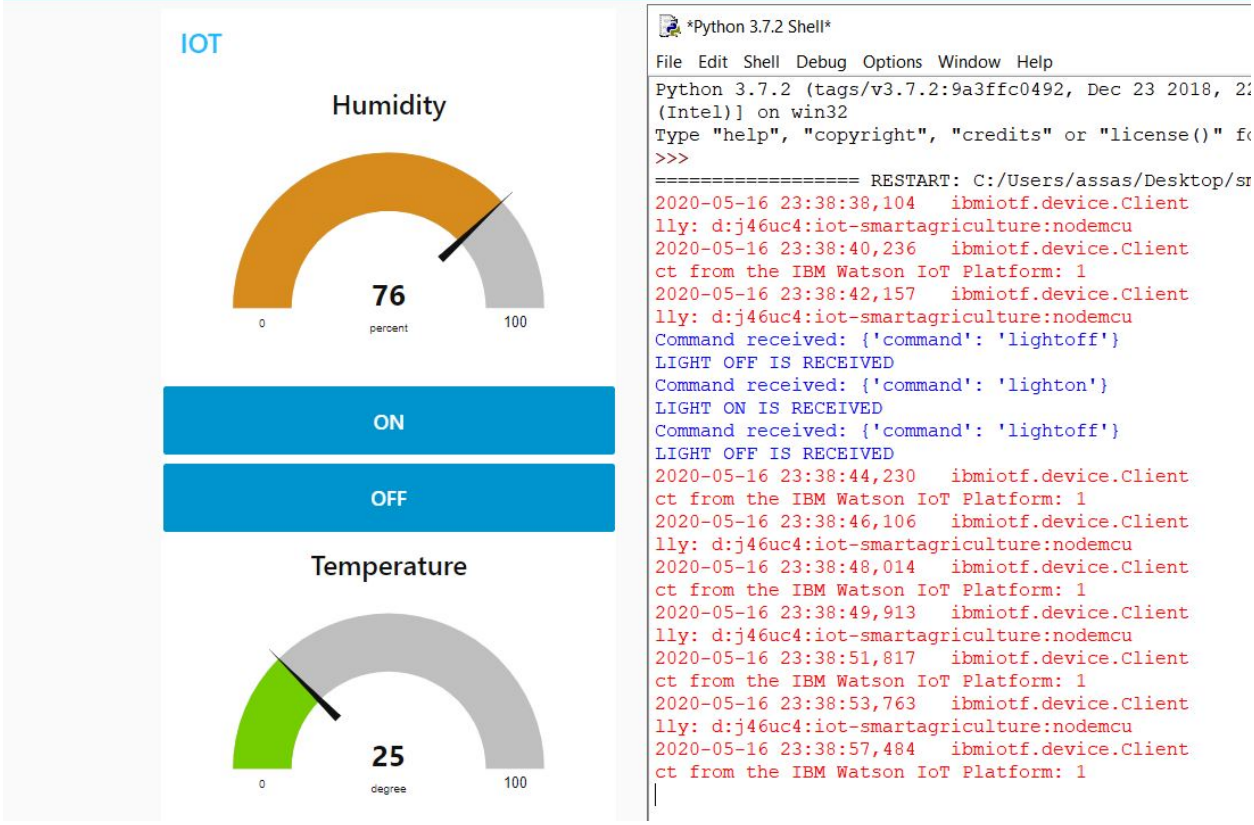

**1. Data received from Watson IOT Sensor Simulator ( using IBM IOT Input node),**

**2. Data received from Open Weather API ( using http request node),**

**3. Buttons to send command to the motor ( using IBM OUT Output node)**


Node-RED
Deploy
filter nodes
Flow 1
Flow 2
common
inject
debug
complete
catch
status
link in
link out
comment
function
function
switch
change
range
Soil Moisture
Temperature
IBM IoT
disconnected
msg.payload
Humidity
timestamp
http request
MOTOR ON
MOTOR OFF
IBM IoT
disconnected
debug
all nodes

# 6. RESULT


IOT
Humidity
76
percent
0
100
ON
OFF
Temperature
25
degree
0
100
*Python 3.7.2 Shell*
File Edit Shell Debug Options Window Help
Python 3.7.2 (tags/v3.7.2:9a3ffc0492, Dec 23 2018,
(Intel)] on win32
Type "help", "copyright", "credits" or "license()"
>>>
========== RESTART: C:/Users/assas/Desktop/
2020-05-16 23:38:38,104 ibmiotf.device.Client
lly: d:j46uc4:iot-smartagriculture:nodemcu
2020-05-16 23:38:40,236 ibmiotf.device.Client
ct from the IBM Watson IoT Platform: 1
2020-05-16 23:38:42,157 ibmiotf.device.Client
lly: d:j46uc4:iot-smartagriculture:nodemcu
Command received: {'command': 'lightoff'}
LIGHT OFF IS RECEIVED
Command received: {'command': 'lighton'}
LIGHT ON IS RECEIVED
Command received: {'command': 'lightoff'}
LIGHT OFF IS RECEIVED
2020-05-16 23:38:44,230 ibmiotf.device.Client
ct from the IBM Watson IoT Platform: 1
2020-05-16 23:38:46,106 ibmiotf.device.Client
lly: d:j46uc4:iot-smartagriculture:nodemcu
2020-05-16 23:38:48,014 ibmiotf.device.Client
ct from the IBM Watson IoT Platform: 1
2020-05-16 23:38:49,913 ibmiotf.device.Client
lly: d:j46uc4:iot-smartagriculture:nodemcu
2020-05-16 23:38:51,817 ibmiotf.device.Client
ct from the IBM Watson IoT Platform: 1
2020-05-16 23:38:53,763 ibmiotf.device.Client
lly: d:j46uc4:iot-smartagriculture:nodemcu
2020-05-16 23:38:57,484 ibmiotf.device.Client
ct from the IBM Watson IoT Platform: 1

**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: qir187**
**Device Type: smart**
**Device ID: nodemcu**
**Authentication Method: use-token-auth**
**Authentication Token: 123456789**

**Web Application:**

**API Key: a-qir187-tc94a69zzl**
**Authentication token: o8yO0b?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 = "qir187" #replace the ORG ID
deviceType = "smart"#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()
```