A

INTERNSHIP PROJECT REPORT

On

SMART AGRICULTURE SYSTEM BASED ON IOT

Submitted

In partial fulfillment of the requirement for the award of the certification of Internship

IN

SMARTBRIDGE

By

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CONTENTS

1.INTRODUCTION

1.1 Overview:

Agriculture is the main backbone of Indian economical growth.The most important barrier that arises in farming is climate change.The effects of climate changes includes heavy rainfall most intense storm and heat waves, less rainfall etc.due to these the productivity decreases to the major extent.Climate change also raises the environmental consequences such as the seasonal change in the life cycle of the plant.To boost the productivity and minimize the barrier in agriculture field there is need to use innovative technology and technique i.e.Internet of things.

1.2 Purpose:

The main aim is to make agriculture smart using automation and IOT technologies.The highlighting features of this paper include smart irrigation with smart control based on real time field data.Secondly temperature maintenance,humidity maintenance and other environmental parameters. And finally the recommendation to farmer for smart agriculture.On the whole smart farming refers to data gathering, data processing, analyzing and automatic control system.

Overview of smart agriculture system as shown in figure

Overview of Smart Agriculture system

2.LITERATURE SURVEY

2.1 Existing Problem:

The existing method and one of the oldest ways in agriculture is the manual method of checking the parameters.In this method the farmers they themselves verify all the parameters and calculate the readings.The scenario of decreasing water tables,drying up of rivers and tanks,unpredictable environment present an urgent need of proper utilization of water.To cope up with this use of temperature,humidity and moisture sensors at suitable locations for monitoring of crops is essential.

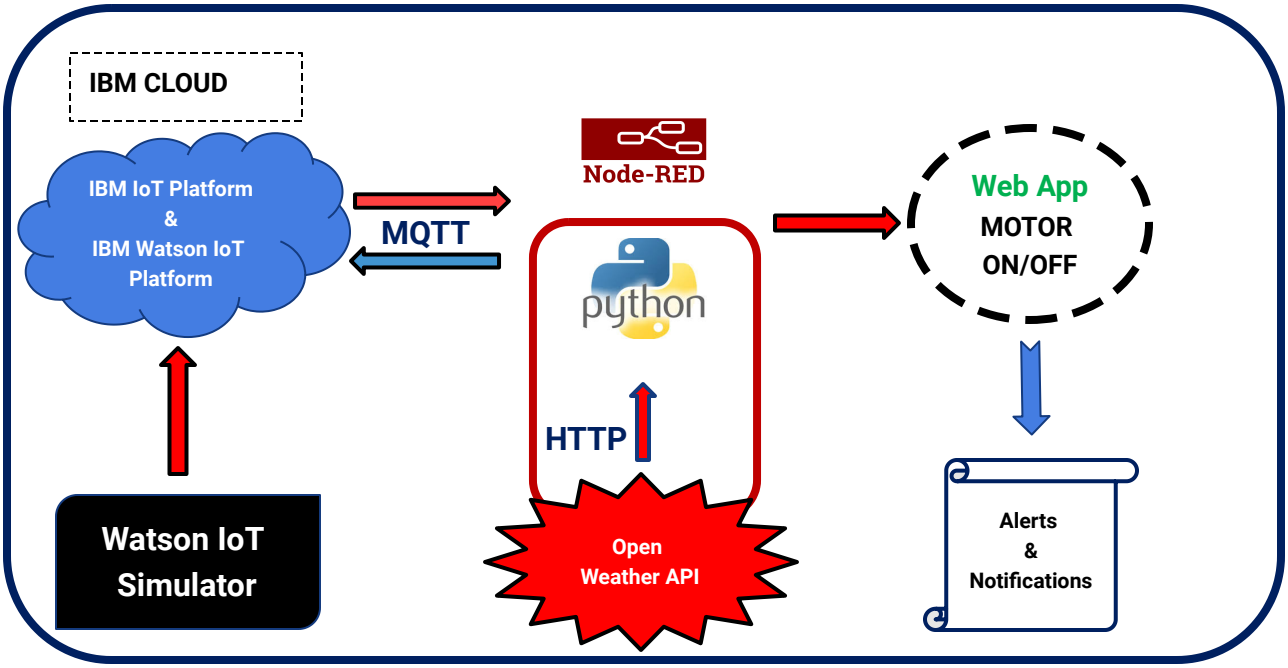
2.2 Proposed Solution:

IOT aids in social affair information on conditions like atmosphere, temperature and productivity of soil, level of water, alter improvement, cultivation.IOT utilize farmers to get related with his residence from wherever and at whatever point.In the proposed system collecting all the data from various sensor like temperature,humidity,moisture and other environmental factors and will do the analysis on the same.In this system planning to use the platform like IBM Watson IoT Platform, Node-RED, Node-RED Dashboard for the analysis.which will give idea to focus on the environmental factor, which are good for the crop or farm

Working of Smart Farming

3.THEORITICAL ANALYSIS

3.1 Block Diagram:



Project Block Diagram

3.2 Hardware/Software Designing:

To built this project it requires the following :

a. IBM IoT platform(IBM Cloud,IBM Watson IoT)
b. Watson IBM IoT Simulator
c. Node red
d. Python IDE
e. Open Weather API
f. Web App

As said this app requires above things to build a basic IoT device.

→ IBM IoT platform is where we can create online devices and get the data from sensors like temperature, humidity, object temperature and send the data to the user.

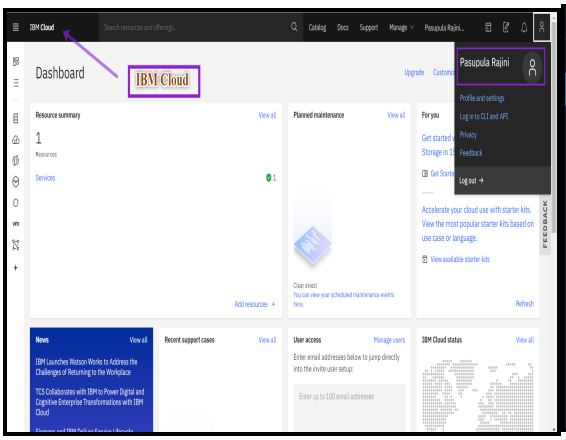
→ Node red is used to design user-interface by getting data from open weather API and IoT simulator.

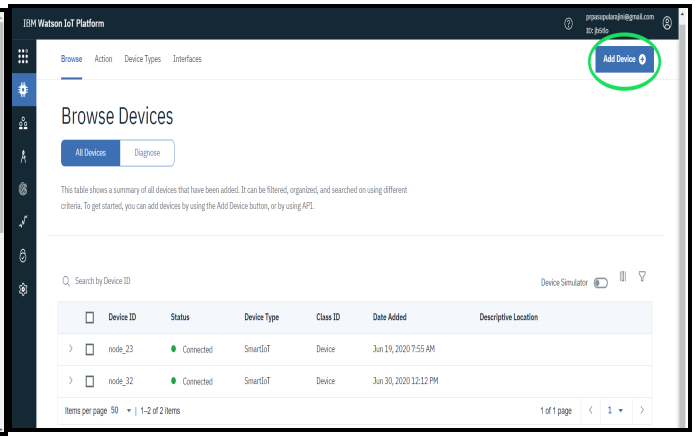
→ Web apps display the data and allow users to monitor the things to turn ON/OFF motor and other things.

4.EXPERIMENTAL INVESTIGATION

✓ IBM Cloud, Watson IBM IoT Platform & Device Creation

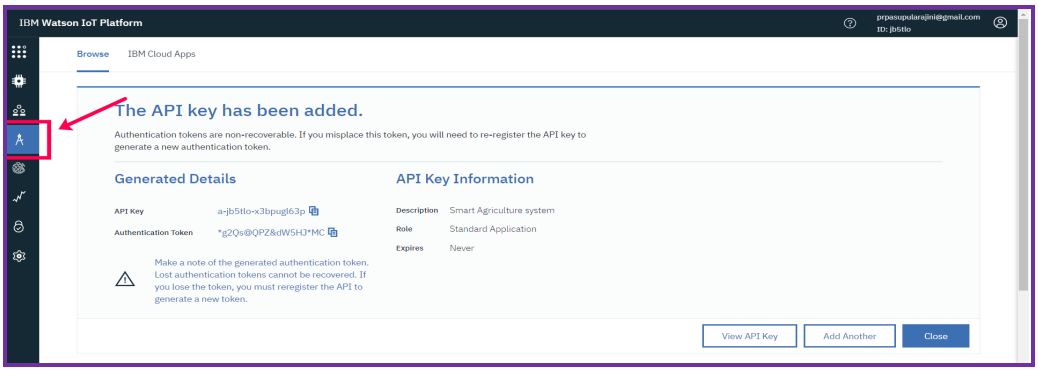
- One should have a IBM Cloud account to start with this project.
- If account isn't created,you can sign up for an IBM Cloud account by using your existing IBMid or by creating a new IBMid.
- Now create devices in IBM Watson IoT Platform as per requirement.Here I have created two devices.One is for getting data from IoT simulator and other for sending data to Node red or web app.



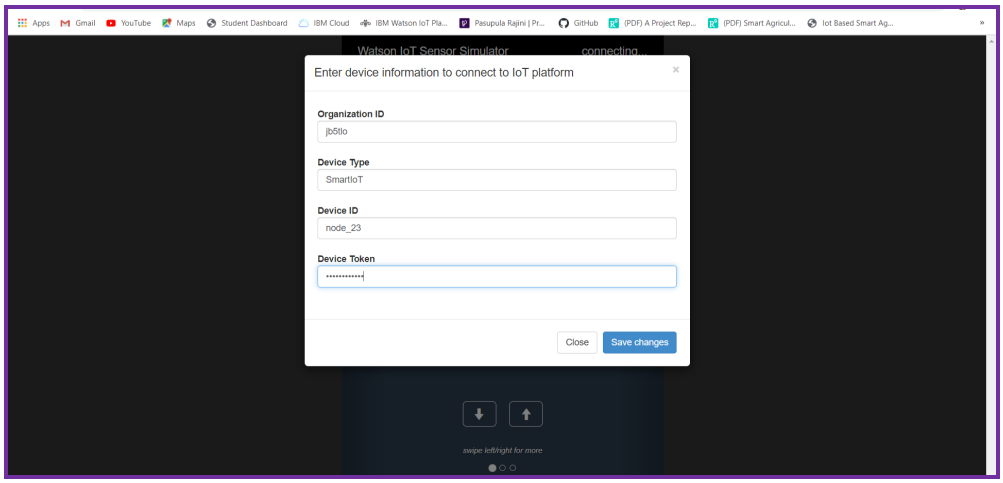


✓ API Key Creation & Watson IBM IoT Simulator

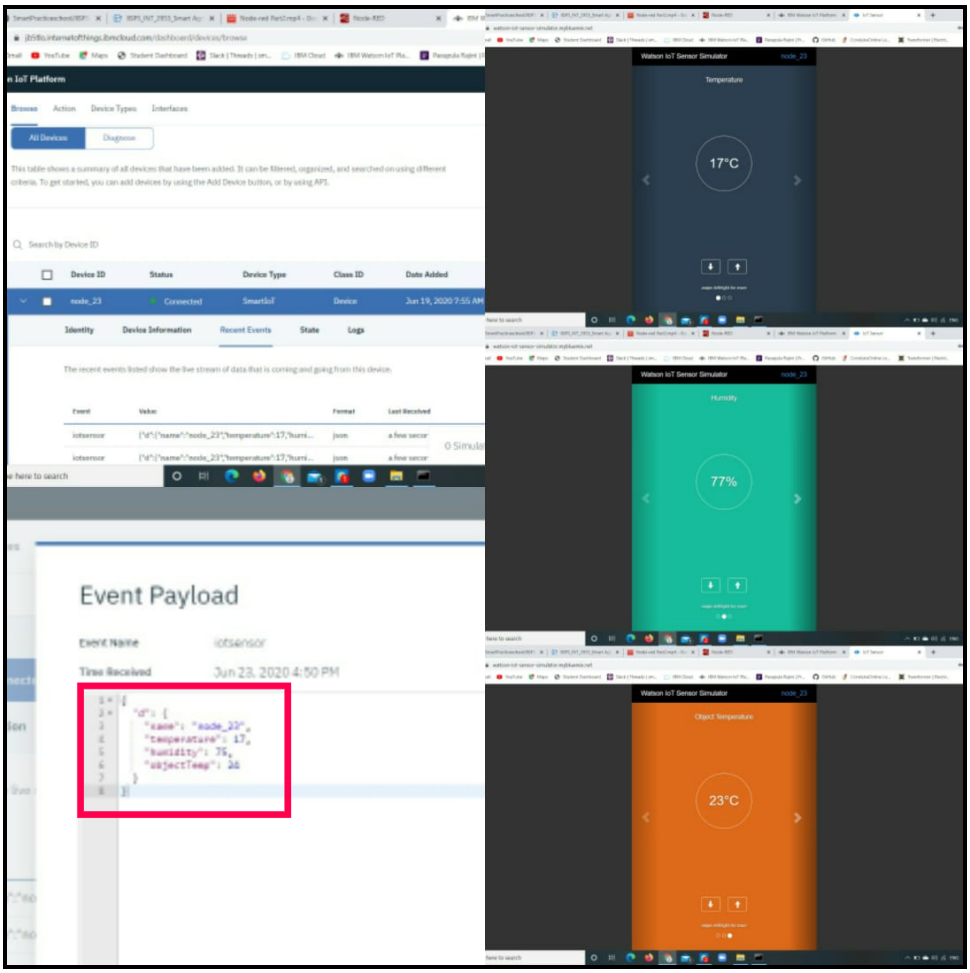
- Now create a API key for device as shown below.And ensure to copy device credentials and API Key details and save them.



- Now enter the device credentials organization ID,Device Type,Device ID,Device Token in the http://watson-iot-sensor-simulator.mybluemix.net/

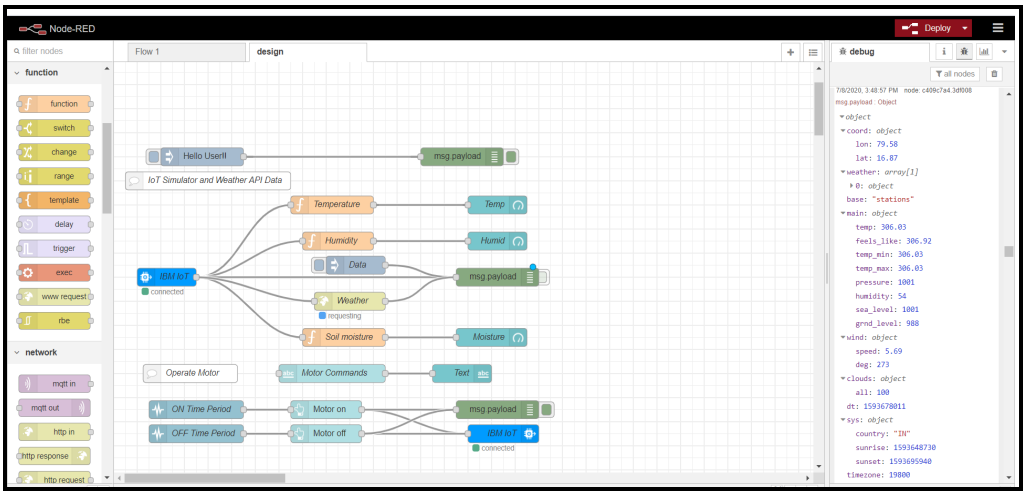


- The simulator gets connected to Watson IOT Platform as shown.Where we can visualize the simulator data such as temperature,humidity,object temperature(can be considered as soil moisture)



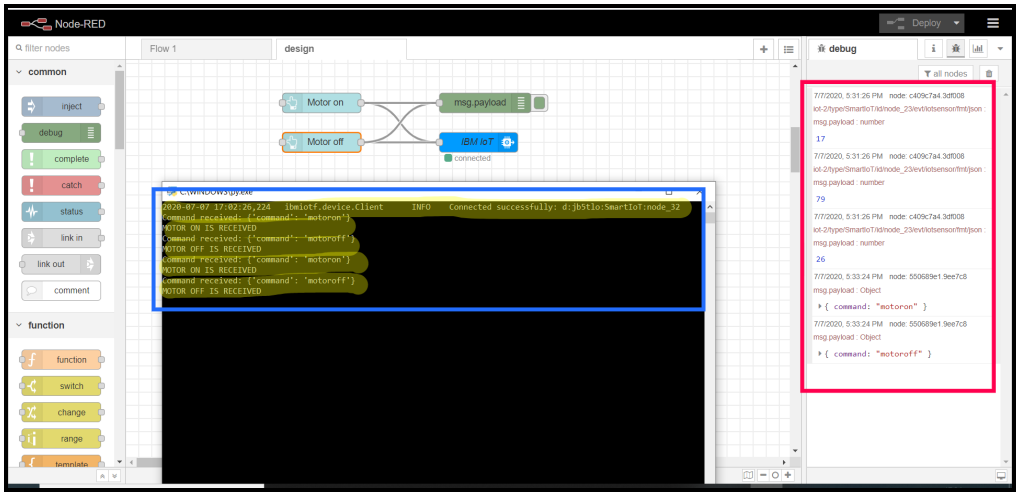
✓ Installing and Working with Node-Red

- Install node.js which is requisite for working of node-red.After that install node-red software using command prompt of your PC.
- Click on top right corner lines >go to manage pallets > there install the nodes that are required .Now install nodes that are required dashboard node,IBM node.
- Now create flow for getting data from IBM IoT simulator and open weather API.
- Weather API is obtained from https://openweathermap.org/.
- The data obtained from these is displayed on Node-RED Dashboard.

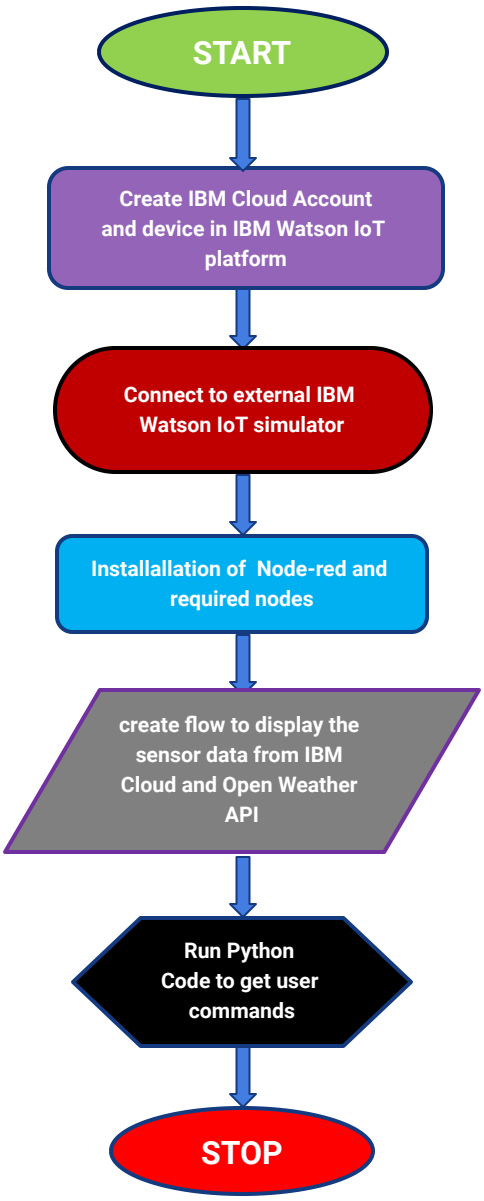


✓ Working with Python code

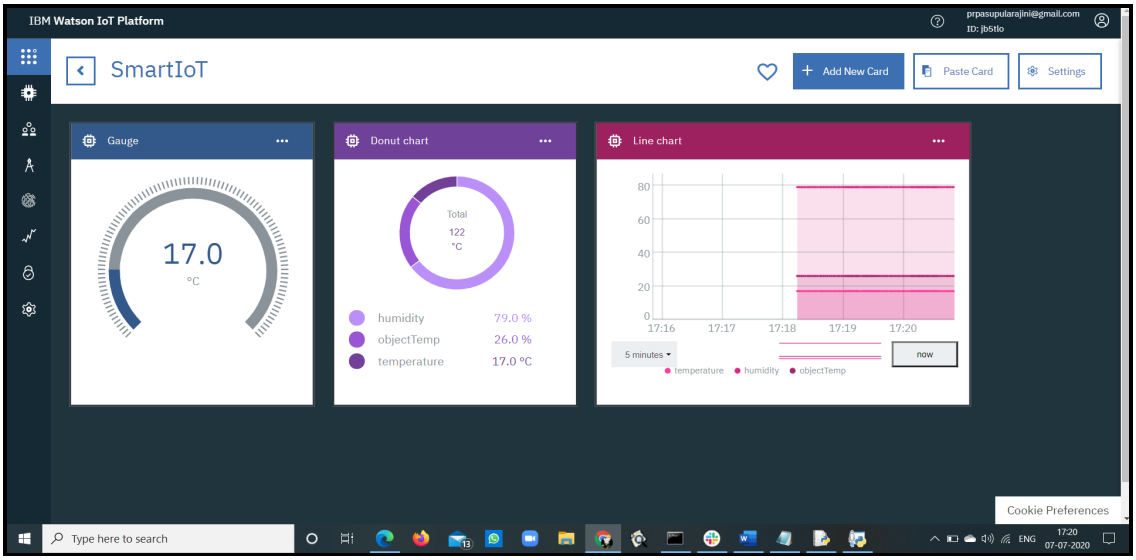
- Now write python code that get commands from the user.
- Here one can see whether the motor is turned ON/OFF.



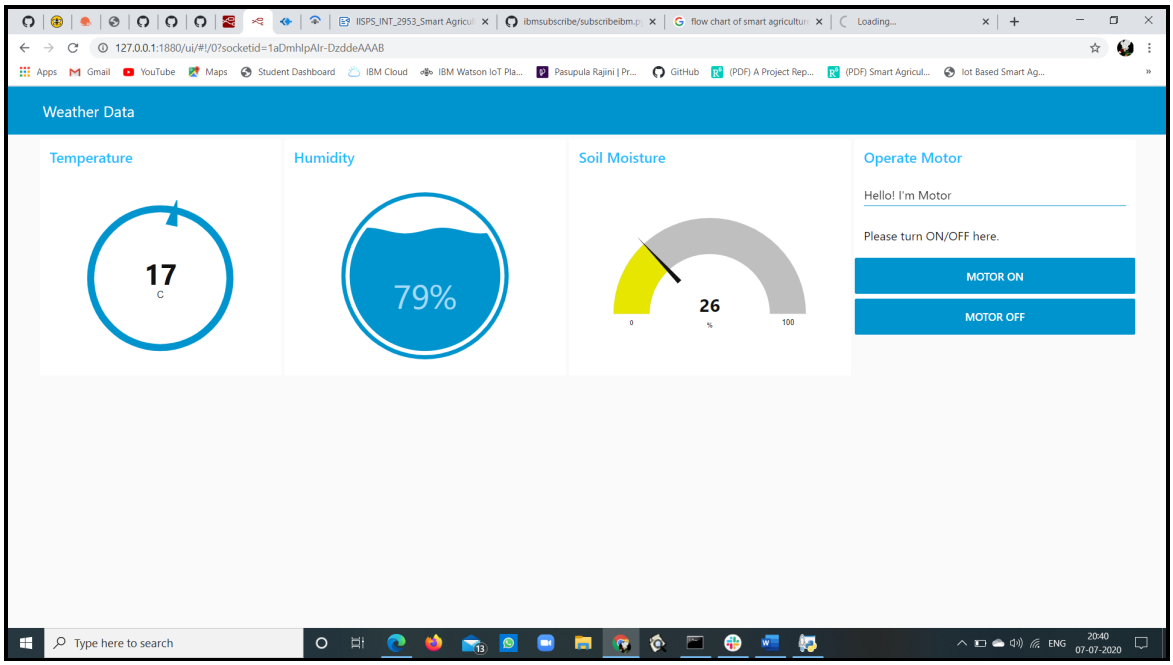
5.FLOW CHART


START
Create IBM Cloud Account and device in IBM Watson IoT platform
Connect to external IBM Watson IoT simulator
Installallation of Node-red and required nodes
create flow to display the sensor data from IBM Cloud and Open Weather API
Run Python Code to get user commands
STOP

6.RESULT



IoT Simulator Data representation

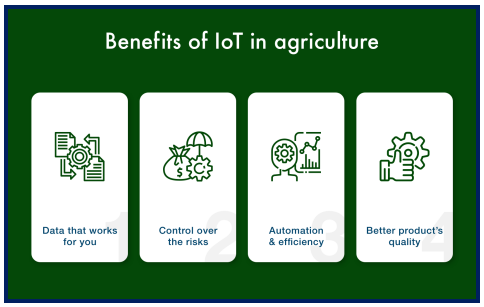


User Interface

7.ADVANTAGES & DISADVANTAGES

Advantages:

Smart agriculture with the help of automation and sensor technology, benefits society in the following ways



- Conservation of water
- Optimization of energy resources
- Pollution prevention.
- Eliminate human errors.
- It is cost effective method.
- It delivers high quality crop production.
- These improve data collection process and help in wireless monitoring and control.

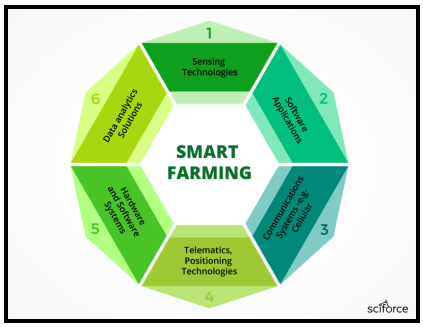
Disadvantages:

- Connection issues.
- Security and privacy issues
- The smart agriculture needs availability of internet continuously.
- Rural parts of most of the developing countries do not fulfill this requirement. Moreover internet connection is slower.
- The smart farming based equipment requires farmers to understand and learn the use of technology.
- This is a major challenge in adopting smart agriculture farming at large scale across the countries.

8.APPLICATIONS

APPLICATIONS OF IOT IN AGRICULTURE:

- **REMOTE SENSING**
  - ✓ Crop Monitoring
  - ✓ Weather conditions
  - ✓ Soil quality



- **ROBOTICS**
  - ✓ Weeding Robots
  - ✓ Machine Navigation
  - ✓ Harvesting Robotics
  - ✓ Material Handling

- **DRONES**

- **COMPUTER IMAGING**

Quality control | Sorting and grading | Irrigation Monitoring

9.CONCLUSION

- IoT based **SMART FARMING SYSTEM** for Live Monitoring of Temperature and Soil Moisture has been proposed using Node red and IBM Cloud Platform.
- 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 agricultural yield.
  - Take efficient care of food production
- The system will always provide helping hand to farmers for getting accurate live data of
  - environmental temperature
  - soil moisture

  with more than 99% accurate results.
- This idea of modernization of farming is straightforward, reasonable and operable

10.FUTURE SCOPE

For future developments it can be enhanced by developing this system for large acres of land. Also the system can be integrated to check the quality of the soil and the growth of crop in each soil. The sensors and micro controller are successfully interfaced and wireless communication is achieved between various nodes.All observations and experimental tests prove that this project is a complete solution to field activities and irrigation problems. Implementation of such a system in the field can definitely help to improve the yield of the crops and overall production.

11.BIBLIOGRAPHY

- IBM Cloud
- IBM Watson IoT Platform
- GitHub
- http://watson-iot-sensor-simulator.mybluemix.net/
- Node-RED
- Node-RED Dashboard
- https://www.hivemq.com/public-mqtt-broker/
- https://github.com/rachuriharish23/ibmsubscribe
- https://openweathermap.org/find?utf8=%E2%9C%93&q=Miryalaguda
- https://www.cropin.com/iot-internet-of-things-applications-agriculture/

12.APPENDIX

A. Source Code

```
import time
import sys
import ibmiotf.application # to install pip install ibmiotf
import ibmiotf.device

#Provide your IBM Watson Device Credentials
organization = "jb5tlo" #replace the ORG ID
deviceType = "SmartIoT"#replace the Device type
deviceId = "node_32"#replace Device ID
authMethod = "token"
authToken = "smart_agri@23" #Replace the authtoken

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

    elif cmd.data['command']=='lightoff':
        print("MOTOR 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()
```