

**A REMOTE SUMMER INTERNSHIP PROGRAM
PROJECT REPORT
ON
Smart Agriculture system based on IoT
2020**

Submitted By-

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Acknowledgement

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I extend my warm gratitude and regards to everyone who helped me during my

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Table of Content

S.NO.	TOPICS	PAGES
1.	Introduction	4
2.	Literature Survey	5
3.	Theoretical Analysis.	6
4.	Experimental Investigation	8
5.	Flowchart	12
6.	Result	13
7.	Advantages and Disadvantages	16
8.	Applications	17
9.	Conclusion	18
10.	Future Scope	19
11.	Bibliography	20
	Appendix	21

CHAPTER 1

INTRODUCTION

a. **Overview**

Plants had and still have a key role in the history of life on earth. They are responsible for presence of oxygen needed for human survival on this planet. At the same time agriculture is also important to human beings because they forms the basis for food security. Agriculture plays a vital role in India's economy. It is very important that farmer who are responsible for agriculture should have better control over his field. The objectives of this report is to proposed IoT based Smart Agriculture System which will enable farmers to have live data of soil moisture, humidity and temperature. Apart from this he will also able to have an eye on climatic data such as pressure, temperature and humidity of their region. This system help farmer to have control over his motor. He will be able to control motor remotely even if he is far away from his field.

b. **Purpose**

The purpose of this project is to make a farmer enable his control over control unit of water motor and he will be able to switch it OFF or ON on the basis of needs of his crops. By judging on the basis of his crops factor also climatic condition, he can supply water to his crops.

CHAPTER 2

LITERATURE SURVEY

a. **Existing problem**

In the present scenario, we can observe that farmer have to face lot of struggle in farming. He has to make everything good, so that the yield will be good. He also has to stay near to his field. He has to make sure that watering of crop should be done properly, soil moisture and humidity should be perfect. Due to this farmer has to face a lot of problems.

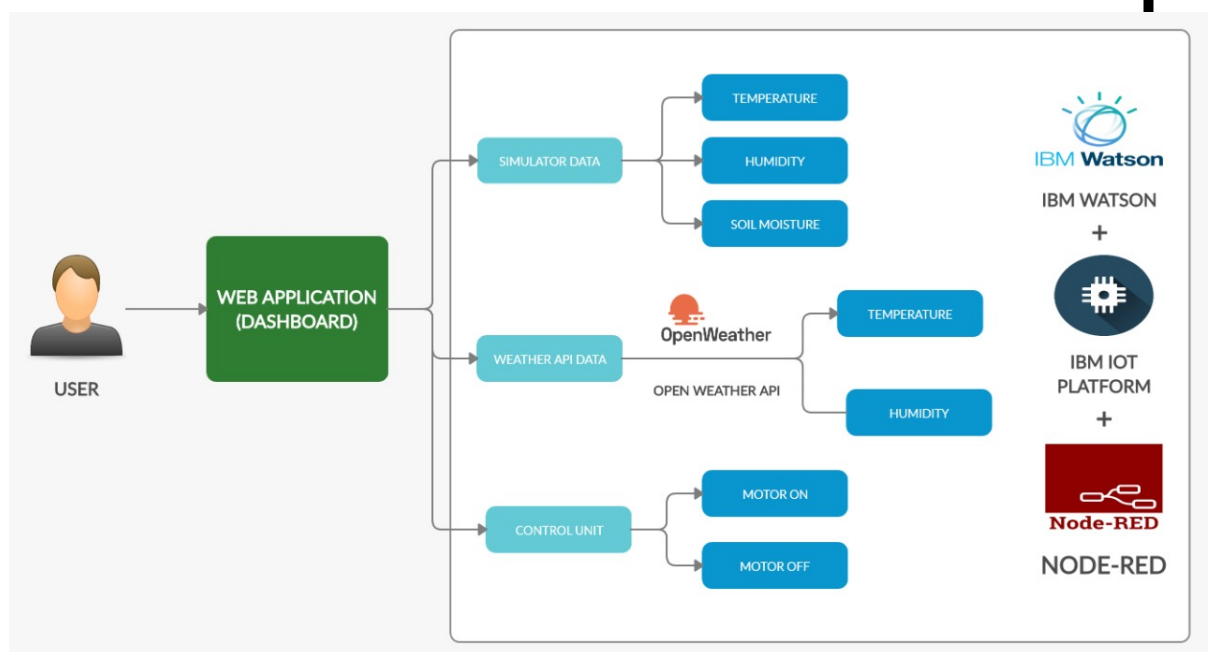
b. **Proposed solution**

The only solution to his problem is automation of control unit of water motor. If farmer was able to control how much amount of water should be used for agriculture on the basis of soil moisture, temperature and humidity remotely then he can also utilize his time in other activity. Our solution to this problem is that to provide an application which is user interactive which retrieves data from the field through the IoT sensor and also changes is hardware of water motor, so that on a button click he will be able to make motor either ON or OFF. Also he can supply sufficient amount of water on the basis of live weather condition.

CHAPTER 3

THEORETICAL ANALYSIS

a. Block diagram



3.2 Hardware / Software designing

Smart agriculture system implements on simulator, so there is no use of hardware designing and software designing includes

- Creation of web application through node red
- Creation of device on IBM IoT platform available on IBM cloud
- Use of IBM simulator instead of data from hardware.
- Retrieving data from open weather API to get details about climatic condition of a region
- Use of node red dashboard nodes to create interactive control unit.
- Use of python language to make control on motor.

In this project, web application is created by node red which also collapse with device created on IBM IoT platform through API and other authentication. IBM simulator is used to change data of IoT device instead of using any hardware sensor. Python language is used to depicts the control over motor. Node-red's node also used to take data from open weather API.

CHAPTER 4

EXPERIMENTAL INVESTIGATION

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.

The screenshot displays the SMARTINTERNZ dashboard for a user with the role of 'IoT Application Developer'. The dashboard is divided into a left sidebar with navigation links (DASHBOARD, INTERNSHIPS, CHALLENGES, PROFILE, CERTIFICATES, CHANGE PASSWORD, LEARNING PATH) and a main content area. The main content area shows internship details for 'Smart Agriculture system based on IoT - SB28544', including Project ID 'SPS_PRO_101', Project Title 'Smart Agriculture system based on IoT', Duration '16.2 Days', and a link to view the description. It also features two progress indicators: 'Overall Project Progress' at 100% and 'Assigned Tasks Progress' at 100%. A 'MENTOR INSTRUCTIONS' section provides a list of guidelines for the internship. At the bottom, there are buttons to 'Go to Git Repository', 'Go to Writer', and 'Go to Slack Channel', along with a countdown timer showing '17 Days 16:9:37'.

Field	Value
Internship Title	Smart Agriculture system based on IoT - SB28544
Project ID	SPS_PRO_101
Project Title	Smart Agriculture system based on IoT
Duration	16.2 Days
Internship Description	Click here to view the Internship Description
Team	SG

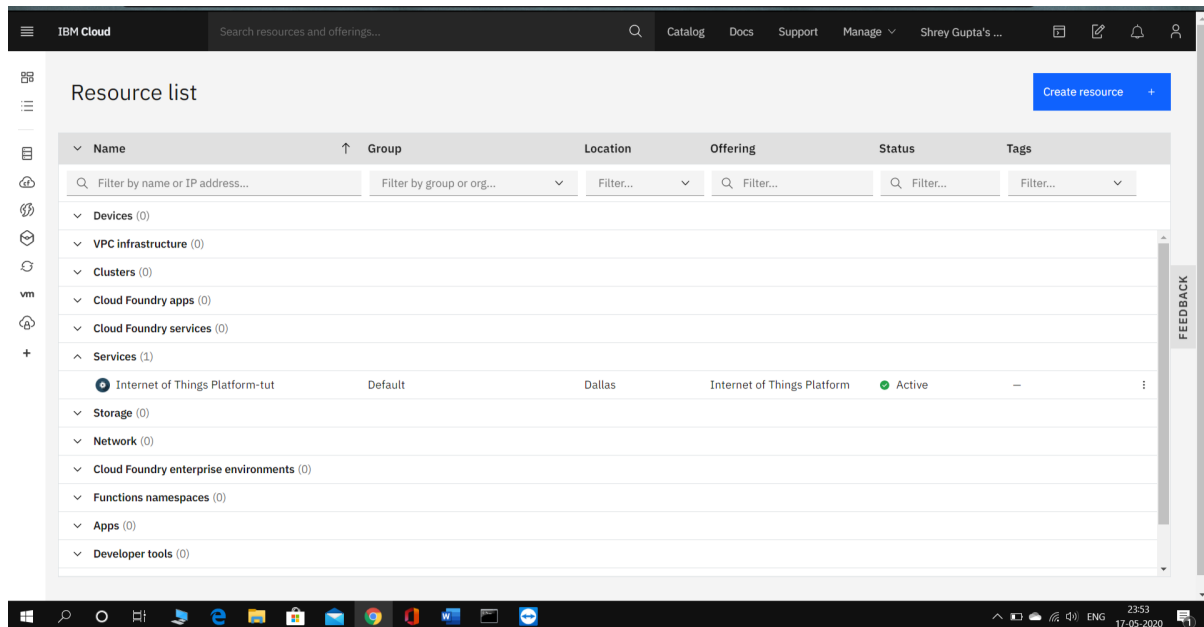
MENTOR INSTRUCTIONS

- Click on Go to Workspace Option to access the Project Workspace
- Total Internship duration is 1 month, within this time you have to complete project with expected outcome
- References & Learning resources are provided for every activity
- Your login and logouts to the workspace are monitored, it is mandatory to maintain 5-days a week attendance.
- All the project deliverables shall be pushed to GitHub Repository & daily work status shall be updated to mentor via Slack Channel
- Use Zoho Writer to update the project documentation regularly
- Individual activity status shall be updated in the Kanban Board without fail
- Use commenting option on activity card to communicate with mentor in case of any query. Mentor replies can be accessed from Mentor View tab
- Once mentor approves all activities, you have to capture a project demonstration video and upload to the GitHub
- Your profile shall be filled completely to get the Internship Certificate, you can access the certificate anytime from the dashboard.
- We wish you all the best!!

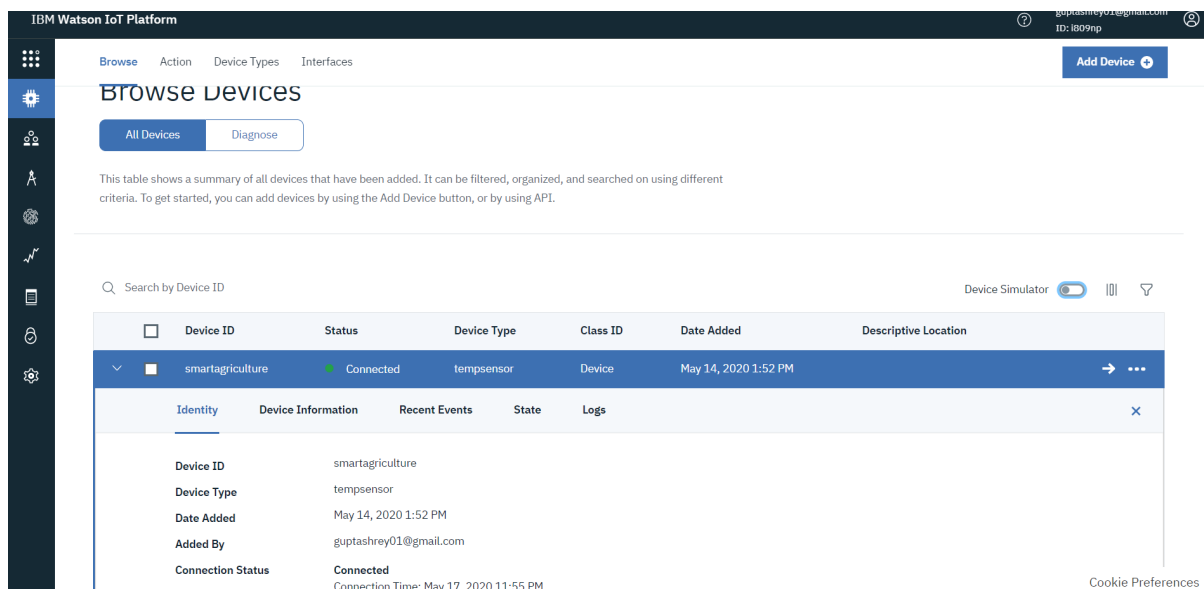
[Go to Git Repository](#) [Go to Writer](#) [Go to Slack Channel](#) [17 Days 16:9:37](#)

Note: Use password **BBhEiRA** to get access for writer

Internship Title

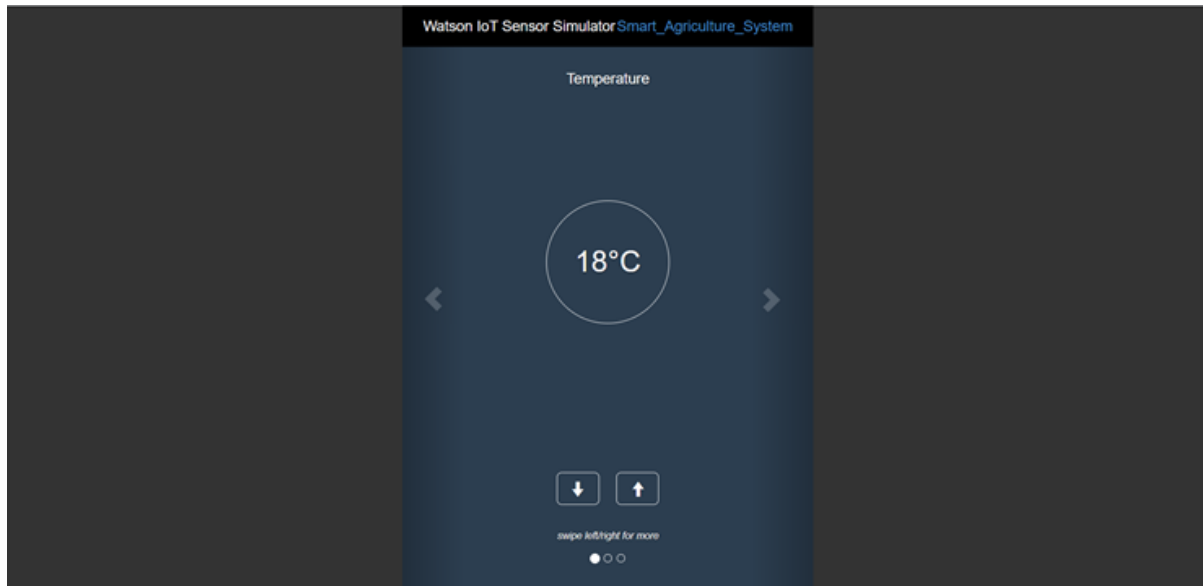


Internet of Things Platform service on IBM Cloud

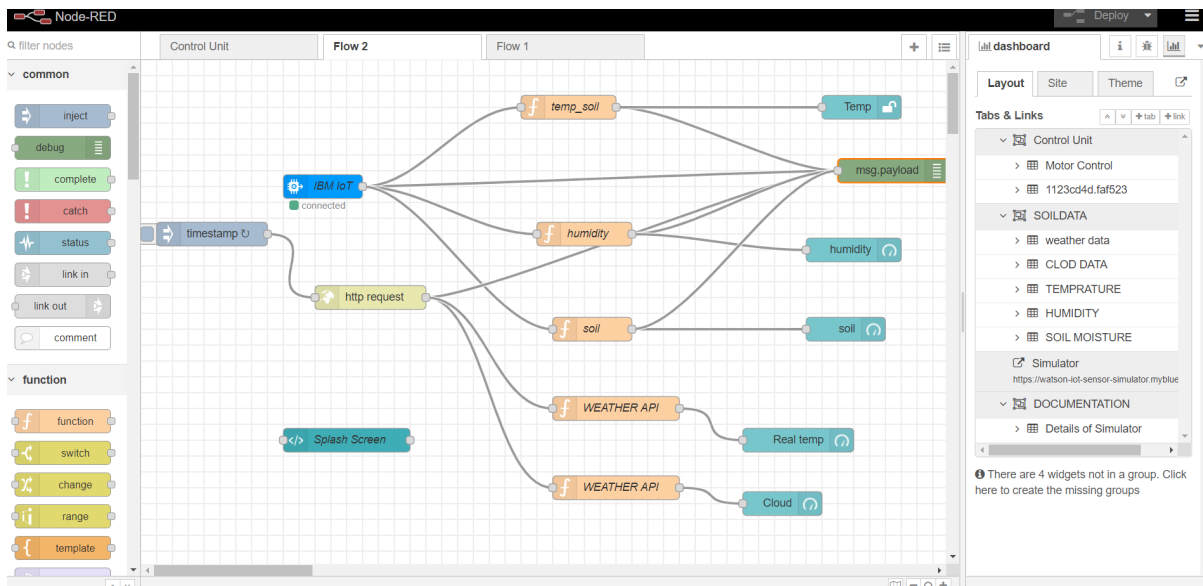


The device which we have created is showing status as “Connected”
on IBM Watson

IOT Platform

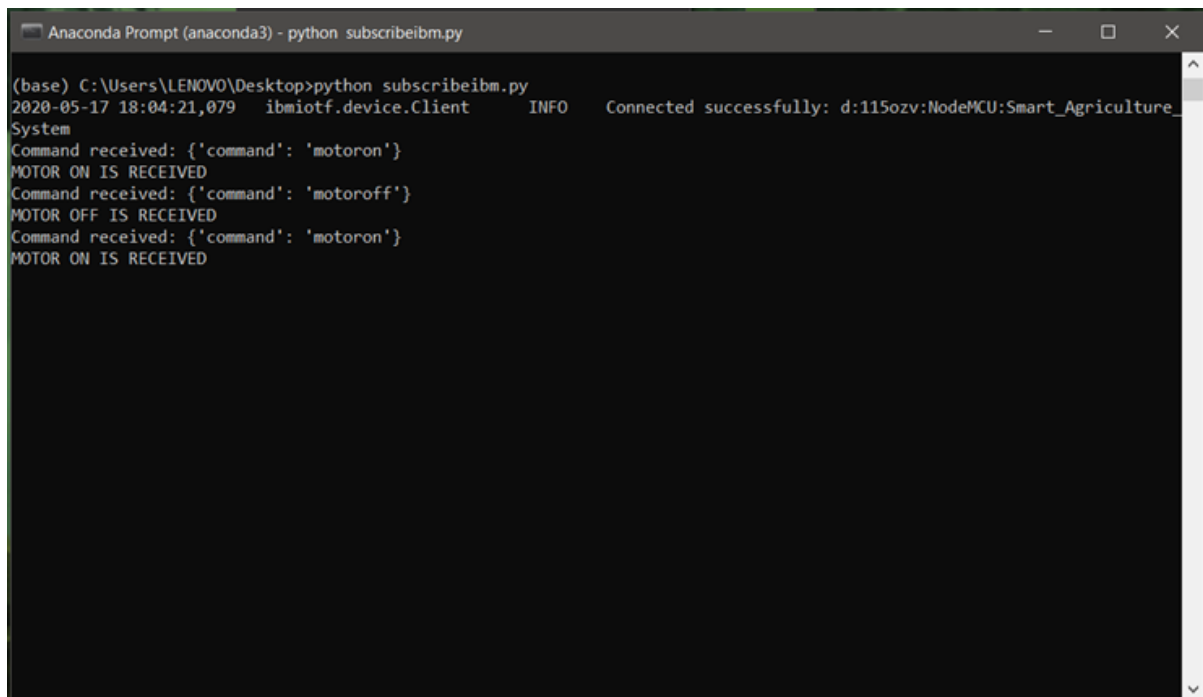


Watson IOT Sensor Simulator is connected and sending data to the Cloud



Watson IOT Sensor Simulator data is being received on Node-RED

using IBM IOT Input node

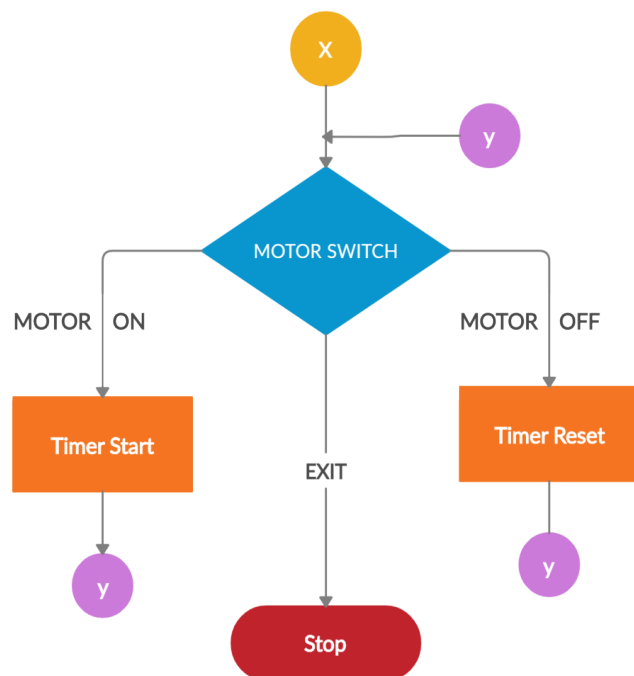
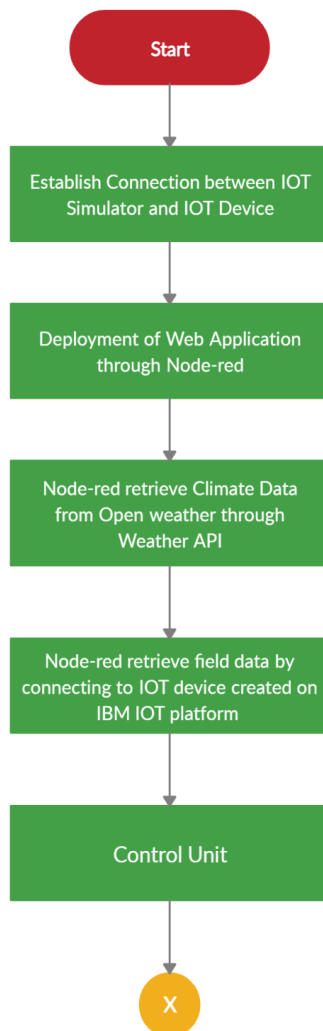


```
Anaconda Prompt (anaconda3) - python subscribeibm.py
(base) C:\Users\LENOVO\Desktop>python subscribeibm.py
2020-05-17 18:04:21,079  ibmiotf.device.Client  INFO  Connected successfully: d:115ozv:NodeMCU:Smart_Agriculture_System
Command received: {'command': 'motoron'}
MOTOR ON IS RECEIVED
Command received: {'command': 'motoroff'}
MOTOR OFF IS RECEIVED
Command received: {'command': 'motoron'}
MOTOR ON IS RECEIVED
```

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

CHAPTER 5

FLOWCHART



CHAPTER 6

RESULT

The Smart Agriculture make ease to farmer through which he can easily & effectively can do land cultivation .The farmer can control the flow of water through the web application. Through the web application, the farmer got the remote connectivity to his water supply motor.

The connectivity of farmer becomes easy with this IoT application. The IOT application helps to justify the weather of that area so farmer can do water supply effectively.

CHAPTER 7

ADVANTAGES & DISADVANTAGES

- **Advantages**

- ➡It allows farmers to maximize yields using minimum resources such as water, etc.

- ➡Water Conservation

- ➡It is cost effective method.

- ➡It delivers high quality crop production.

- **Disadvantages**

- Following are the drawbacks of Smart Agriculture System:

- ➡The smart agriculture needs availability of internet continuously. Rural part of most of the developing countries does not fulfill this requirement. Moreover internet connection is slower.

- ➡The smart farming based equipments require farmers to understand and learn the use of technology. This is major challenge in adopting smart agriculture farming at large scale across the countries.

CHAPTER 8

APPLICATIONS

1 Precision Farming

The adoption of access to high-speed internet, mobile devices, and reliable, low-cost satellites (for imagery and positioning) by the manufacturer are a few key technologies characterizing the precision agriculture trend. By adopting this system, it helps in reduction of cost and yield will also increase.

2. Live Monitoring

This system can be implemented in any small scale, medium scale or large scale agriculture. Through this live monitoring of field can be done which will be useful to increase the growth. By monitoring different parameter accurately, there will be proper supply of water, pesticides, fertilizers etc.

CHAPTER 9

CONCLUSION

IoT based SMART Agriculture SYSTEM for live Monitoring of Temperature, Humidity and Soil Moisture has been proposed using IBM Simulator and Cloud Computing . The System has high efficiency and accuracy in fetching the live data of temperature, humidity and soil moisture not only from field but also collecting weather data. The IoT based smart agriculture 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.

CHAPTER 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. This project is now implemented through web application but it also find it utilities in mobile application. Apart from controlling water supply motor, we can also enhance it with other functionalities such as pH determination of soil, plant growth etc.

CHAPTER 11

BIBLIOGRAPHY

Following resources are helpful in creation of this project:

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[s](#)
2. <https://cloud.ibm.com/docs>
3. <https://nodered.org/>
4. <https://internetofthings.ibmcloud.com/>
5. <https://cloud.ibm.com/docs/services/IoT?topic=iot-platform-ref-index>
6. <https://nodered.org/docs/getting-started/windows#3-run-node-red>

EXTRAS

APPENDIX

- **Device Credentials:**

Organization ID:	i809np
Device Type:	tempsensor
Device ID:	smartagriculture
Authentication Method:	use-token-auth
Authentication Token:	123456780

- **Web Application:**

API Key:	a-i809np-9rscmkne66
Authentication token: -	u@?WNcX&m72H+UNb?Z

- **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:
1e572465a6f7b6478bbd61535f6b9e28
City: Bhopal
URL:
[https://api.openweathermap.org/data/2.5/weather?q=Bho
pal&appid=1e572465a6f7b6478bbd61535f6b9e28](https://api.openweathermap.org/data/2.5/weather?q=Bhopal&appid=1e572465a6f7b6478bbd61535f6b9e28)

- **Python Code**

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

#Provide your IBM Watson Device Credentials

```

organization = "i809np" #replace the ORG ID
deviceType = "tempsensor"#replace the Device type wi
deviceId = "SmartAgriculture"#replace Device ID
authMethod = "token"
authToken = "123456780" #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']=='motoroff':
        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()
```

JSON FILE

```
{
  "id": "75302319.df7a7c",
  "type": "tab",
  "label": "Flow",
  "disabled": false,
  "info": "",
  "id": "3f9120c3.c4e57",
  "type": "tab",
  "label": "Flow",
  "disabled": false,
  "info": "",
  "id": "807e19fb.f6a9f8",
  "type": "tab",
  "label": "Control",
  "disabled": false,
  "info": "",
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```

```

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global.set(\"Current\", day.getTime())\n  global.set(\"Temp\", 0)\n  \n
global.set(\"Status\", true)\n}\nelse\nif (msg.payload.command == \"motoroff\")\n{\n  \n
global.set(\"Status\", false)\n  difference = day.getTime() - global.get(\"Current\");\n  {\n    var
milliseconds = parseInt((difference%1000)/100)\n    , seconds = parseInt((difference/1000)%60)\n
, minutes = parseInt((difference/(1000*60))%60)\n    , hours =
parseInt((difference/(1000*60*60))%24);\n\n    hours = (hours < 10) ? \"0\" + hours : hours;\n
minutes = (minutes < 10) ? \"0\" + minutes : minutes;\n    seconds = (seconds < 10) ? \"0\" + seconds
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background-position: center;\n    background-repeat: no-repeat;\n    background-size: cover;\n
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