

Project Report

On

**Smart Agriculture system
based on IOT**



Submitted by

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1. INTRODUCTION
 - 1.1 Overview
 - 1.2 Purpose
 2. LITERATURE SURVEY
 - 2.1 Existing problem
 - 2.2 Proposed solution
 3. THEORITICAL ANALYSIS
 - 3.1 Block diagram
 - 3.2 Hardware / Software designing
 4. EXPERIMENTAL INVESTIGATIONS
 5. FLOWCHART
 6. RESULT
 7. ADVANTAGES & DISADVANTAGES
 8. APPLICATIONS
 9. CONCLUSION
 10. FUTURE SCOPE
 11. BIBILOGRAPHY
- APPENDIX
- Source code

INTRODUCTION:

Overview:

The project “Smart Agriculture System Based on IOT “is a Web Application, which the farmer is provided with a mobile app and he can monitor the temperature, humidity & soil moisture along his weather casting details. He could able to water his crop by controlling motor ON/OFF from anywhere at any time through this App.

Project Requirements:

- Project planning and kickoff
- Explore IBM cloud platform
- Explore IBM Watson platform
- Install python IDE
- connect the IOT simulator to Watson IOT platform
- configure the Node-red to get the data from IBM IOT platform & open weather API
- Building a web app
- configuring the device to receive the data from the web application & controlling the motors

Functional Requirements:

- Creating an account in IBM cloud account
- Creating a device to IBM Watson IOT Simulator

Technical Requirements:

- Building a web application to monitor weather conditions & water fields.

Software Requirements:

Python, IBM cloud account, Node red, IBM IOT Simulator

Project Deliverables:

The scope of the project is, the web app display the weather conditions & even if the farmer is not present near his crop he can be able to water his crop by controlling the motors using the mobile application from anywhere.

Project Team:

Individual project

Purpose:

IOT based Smart Farming improves the entire **Agriculture** system by monitoring the field in real-time. With the help of sensors and interconnectivity, the Internet of Things in **Agriculture** has not only saved the time of the farmers but has also reduced the extravagant use of resources such as Water and Electricity.

In **IOT-based smart farming**, a system is **built** for monitoring the crop field with the help of sensors (light, humidity, temperature, soil moisture, etc.) and automating the irrigation system. But in this project we are using IBM IOT Watson Simulator to configure the humidity, temperature, soil moisture. And integrate through Node-red application. The farmers can monitor the field conditions from anywhere and control the motor through the mobile app.

LITERATURE SURVEY:

Existing problem:

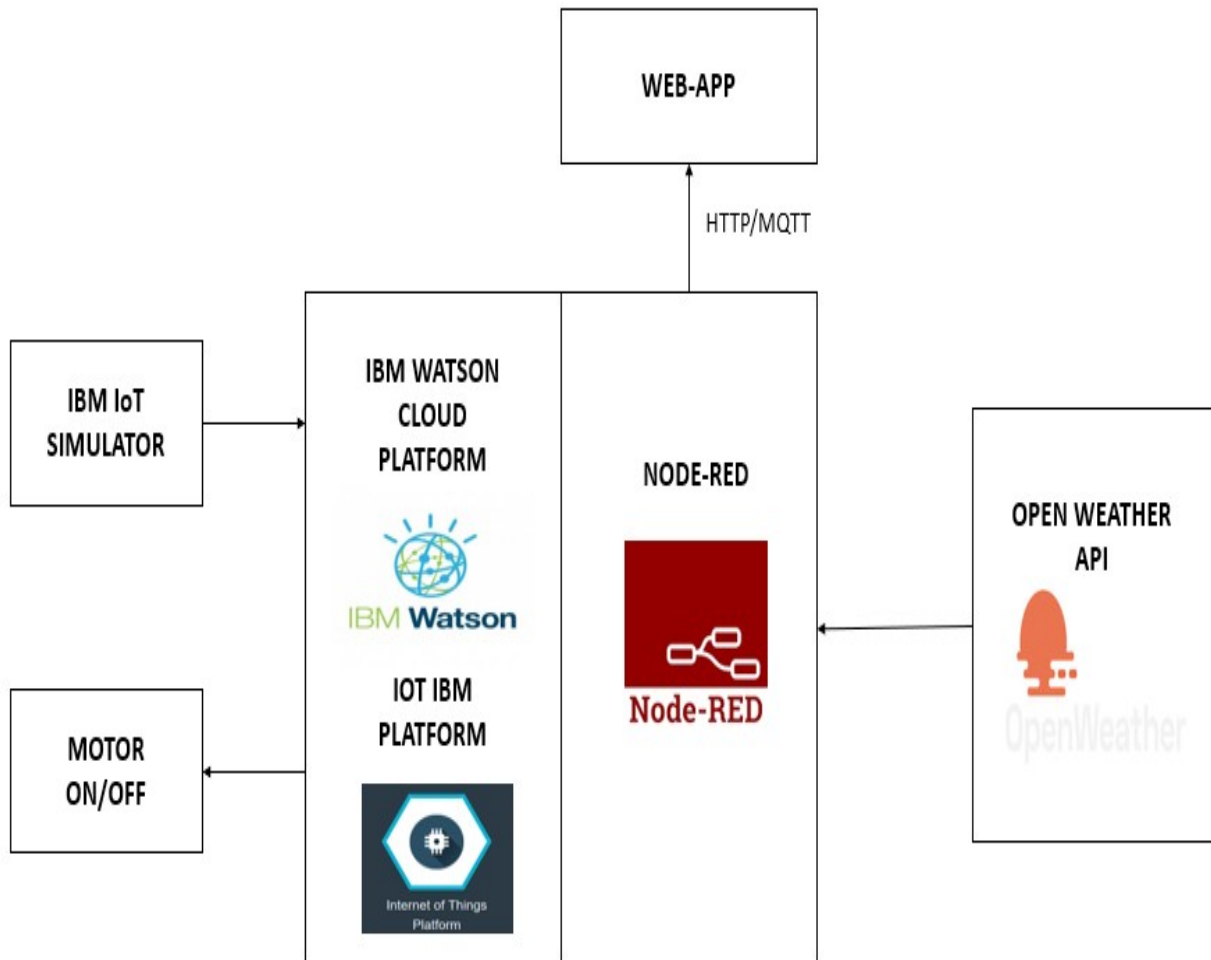
The presence of malware and data thefts is a risk in practically all types of 'connected systems', and **smart agriculture** is not an exception from that. ... Since the third-party attacks on a complex IoT system are often decentralized, detecting and removing them emerges as a big **challenge**. In some critical conditions the farmers could not be able to go to their fields and not be able to water their crops.

Proposed solution:

Providing **Smart Agricultural Solutions** to Farmers for Better Yielding using IOT. IOT **solution** for **Smart Farming** technology offers complete details in all the spectrums of **agriculture**. It will help provide insights and stats for crops and livestock. **A Smart Farming system uses** modern technology to increase the quantity and quality of **agricultural** products. A web application can easily solve the maintenance of the fields. Getting information from the sensors present in the fields and controlling the motor to water the crops.

THEORITICAL ANALYSIS:

Block/Flow Diagram:



Hardware / Software designing:

1. Create IBM Cloud Account
2. Create IBM Cloud services
3. Create device in IBM IOT platform
4. Create flow and configure node
5. Deploy and run Node Red app
6. Install python IDLE

➤ firstly, create a device in IBM Cloud.

➤ Connect the device to IBM Simulator by giving device credentials to get the weather conditions.

➤ Build a Node-RED flow to display the weather conditions and control the devices for displaying data in the web application.

➤ Get the real time weather condition data from open weather API and integrate it in the Node-RED.

➤ Control the working of the created web application to the devices by python coding.

EXPERIMENTAL INVESTIGATIONS:

Device Creation:

Q Search by Device ID

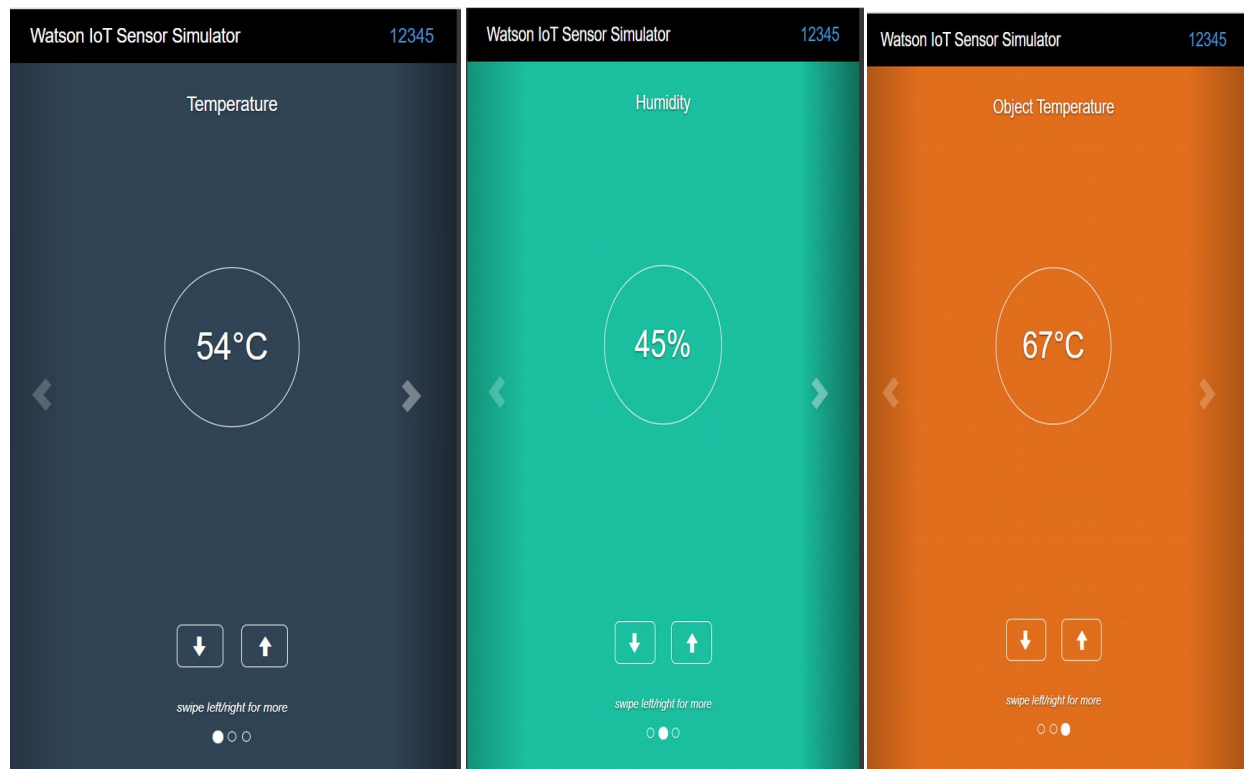
Device Simulator   

	Device ID	Status	Device Type	Class ID	Date Added	Descriptive Location
> 	12345	 Connected	nodemcu	Device	May 29, 2020 4:30 PM	
> 	78945	 Connected	Motor_control	Device	Jun 12, 2020 10:38 AM	

Items per page 50 ▾ | 1-2 of 2 items

1 of 1 page < 1 ▾ >

IOT Device Simulator:

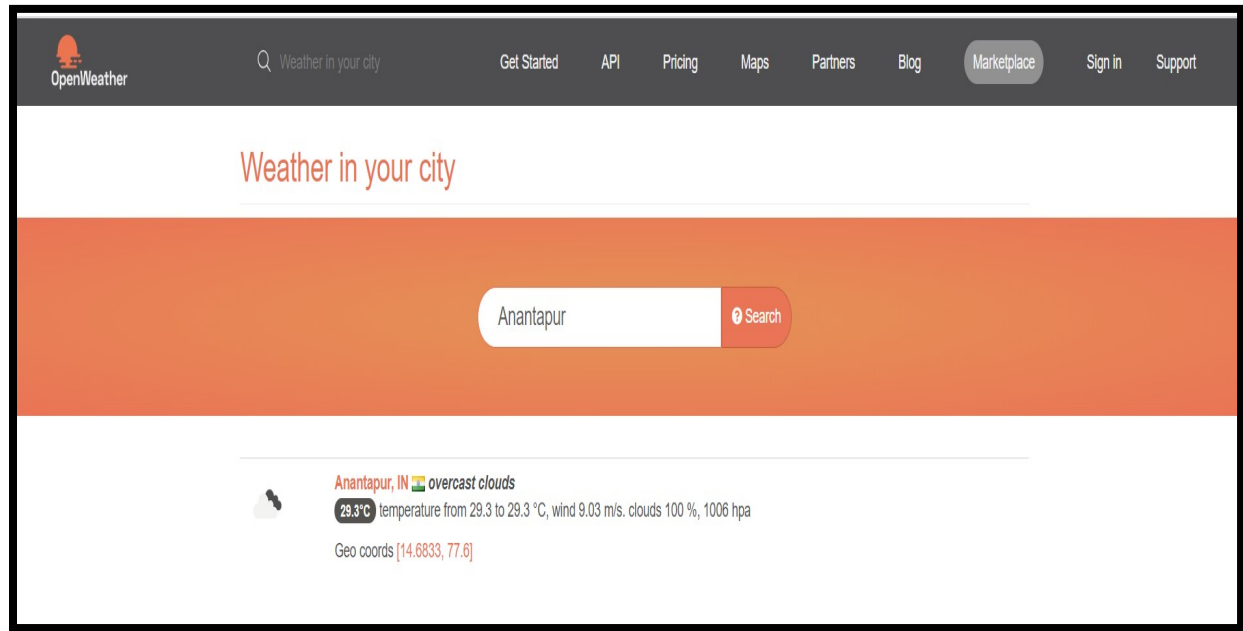


Temperature

Humidity

Object-Temp

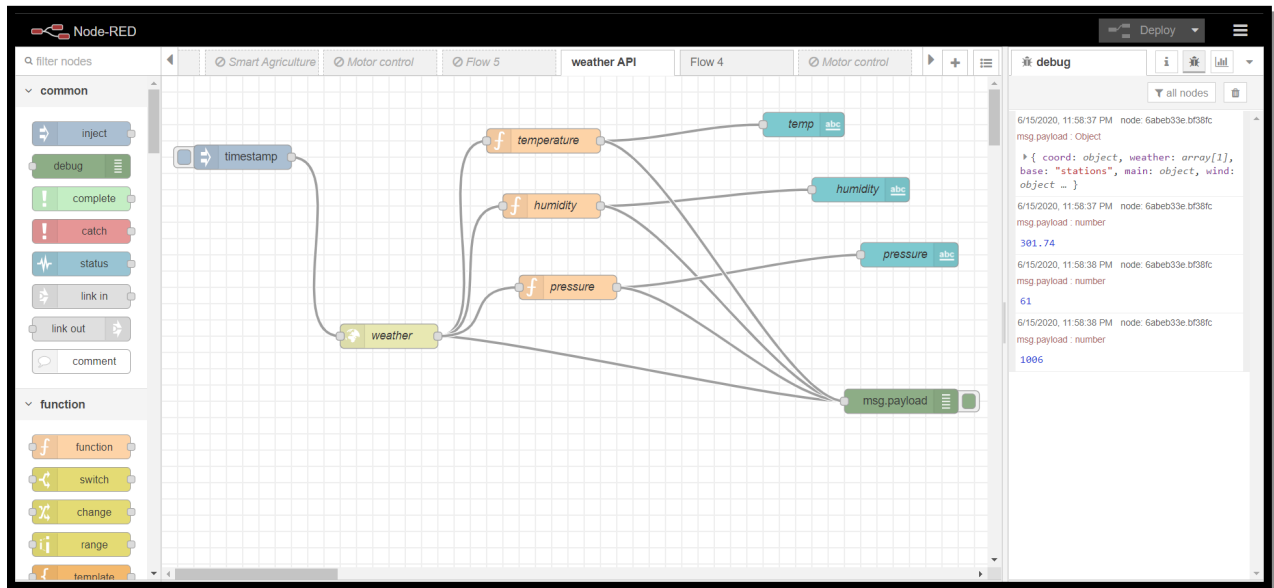
Open Weather API:

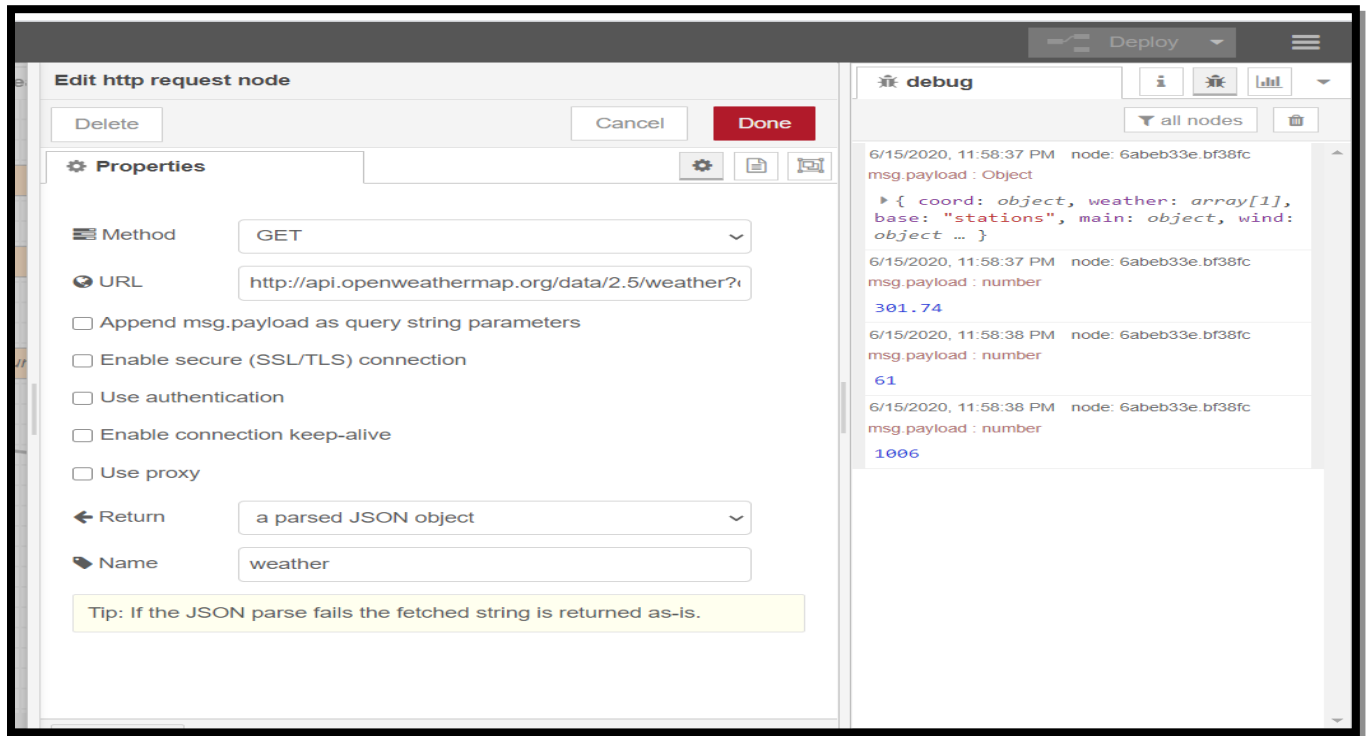


JSON data fetched from API:

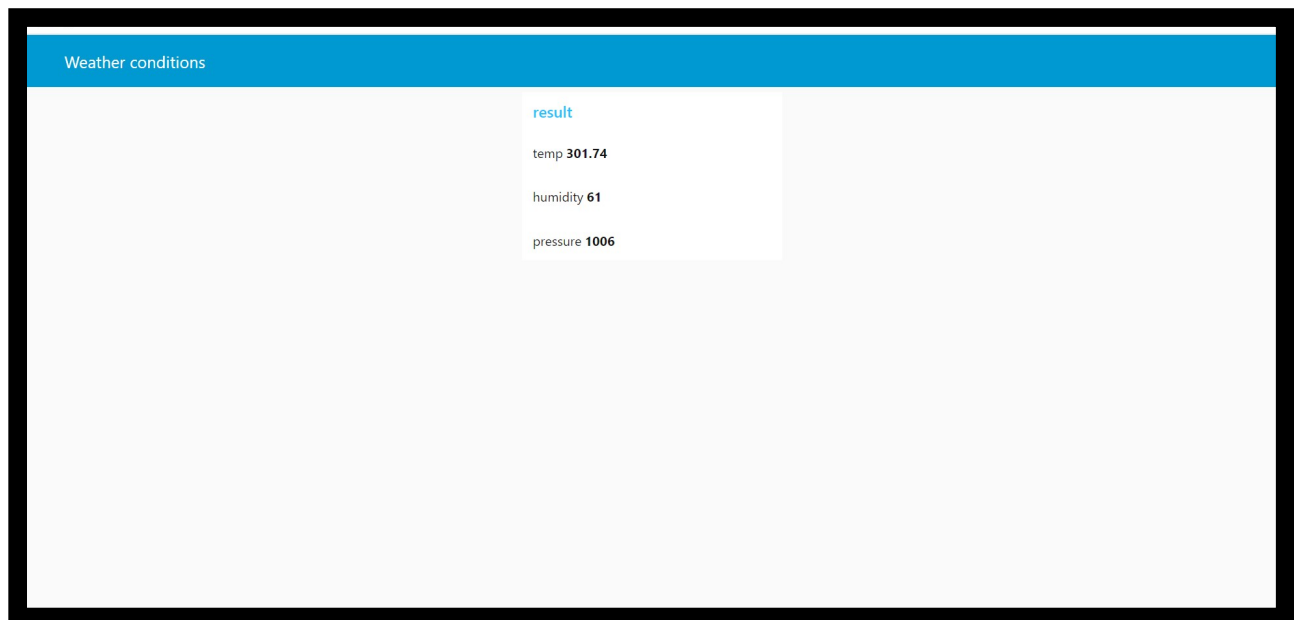


Node-RED HTTP Request:





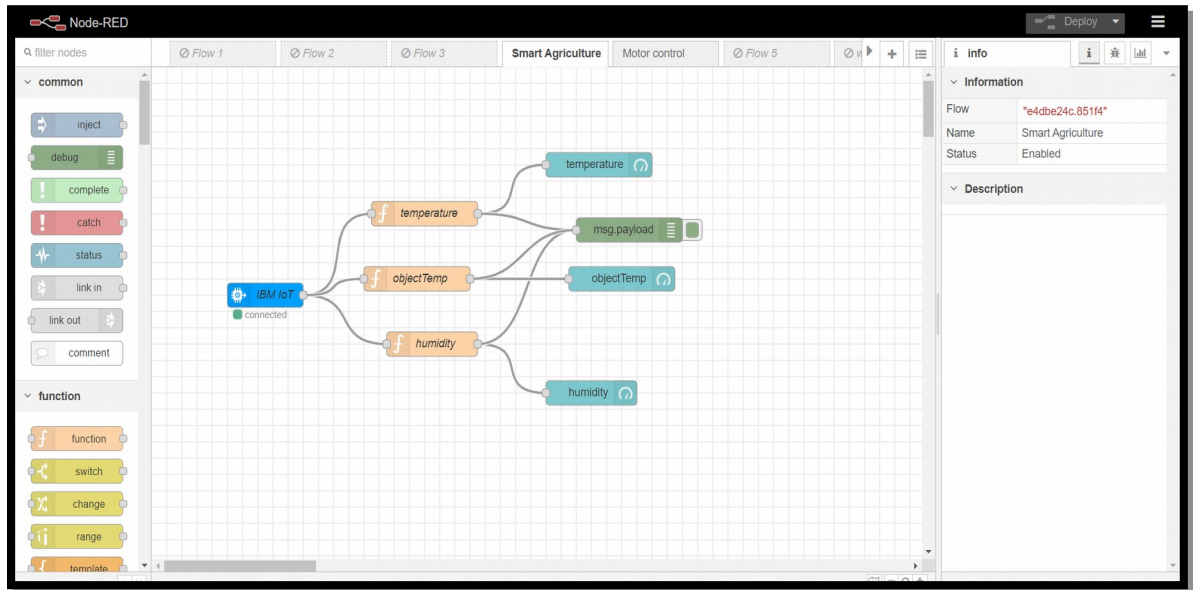
Node-red UI:



FLOW CHART:

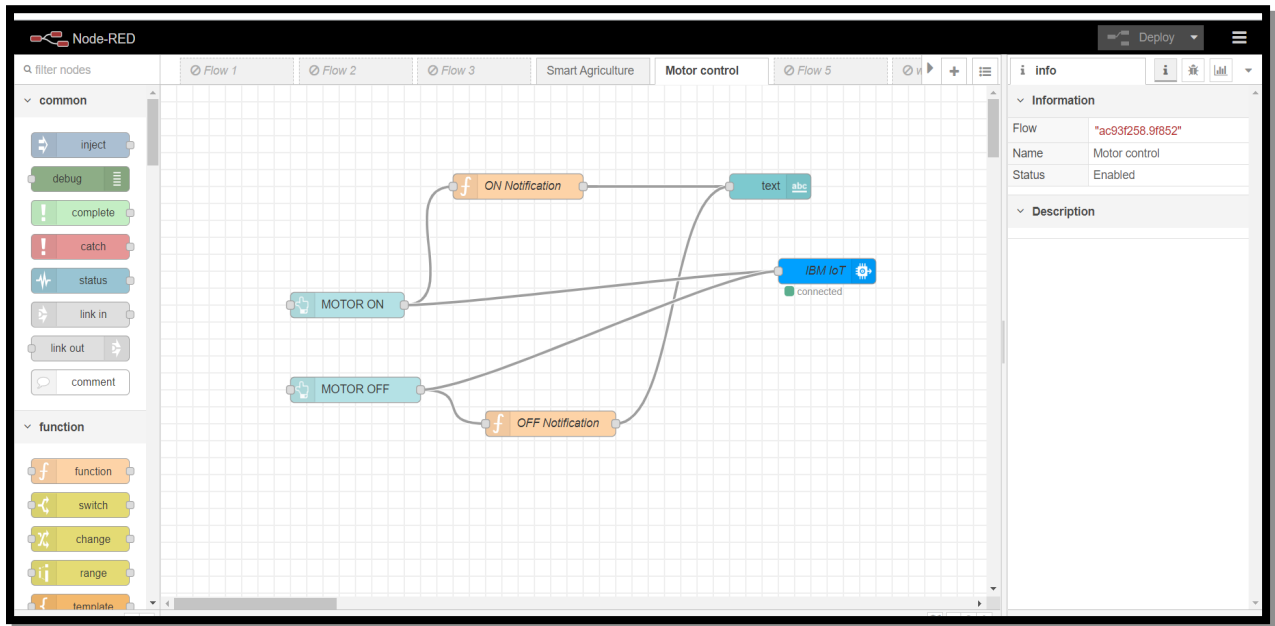
Getting values of temperature, humidity, object

Temperature:



- Create flow and configure all nodes
- Enter the device credentials to the IBM input node to connect IBM IOT Simulator

Controlling motor by web app:

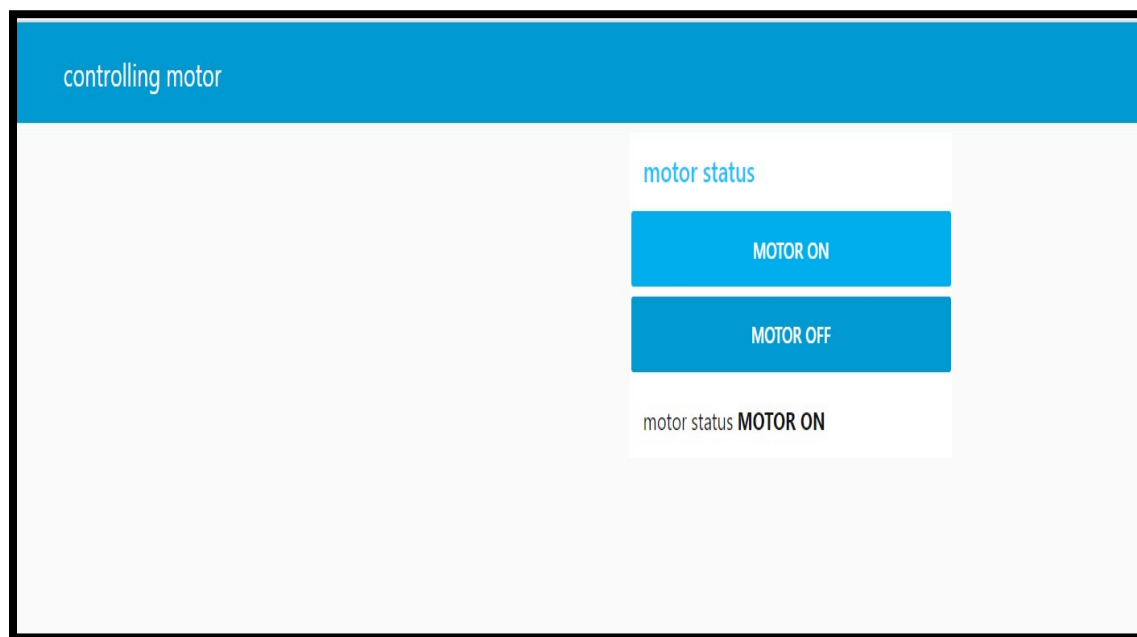


RESULT:

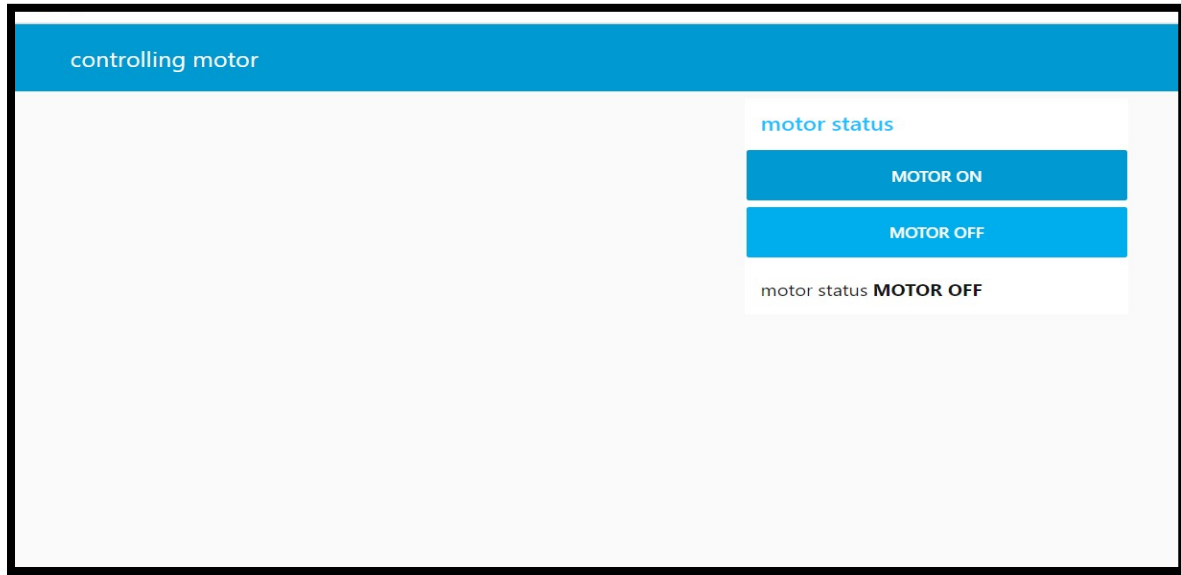
Node-red UI:



When Motor is ON:



When Motor is OFF:



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Nodes used in Web-App

- IBM IOT IN &OUT Nodes
- Function Nodes
- Debug Node
- Gauge Nodes
- Chart Nodes
- Button Nodes

- Timestamp Node
- Text Nodes
- Http request Node

We have successfully built a web-based UI and integrated the services using Node-RED.

By, configuring the nodes MOTOR ON/OFF we can control the motor. If we click the button MOTOR ON the motor status is MOTOR ON. If we click the button MOTOR OFF the motor status is MOTOR OFF respectively. Then the command is received to the motor & shows the output. The output can be seen on the python IDLE.



```
Python 3.7.4 Shell
File Edit Shell Debug Options Window Help
Python 3.7.4 (tags/v3.7.4:09350112e, Jul 8 2019, 19:29:22) [MSC v.1916 32 bit (Intel)] on win32
Type "help", "copyright", "credits" or "license()" for more information.
>>>
===== RESTART: E:\SmartAgriculture\git Uploads\SmartAgriculture.py =====
2020-06-15 23:01:50.889 lbmiotf.device.Client INFO Connected successfully: d:fhfz4:SMtr:0002
Command received: {'command': 'MOTOR ON'}
MOTOR ON IS RECEIVED
Command received: {'command': 'MOTOR OFF'}
MOTOR OFF IS RECEIVED
|
```

ADVANTAGES & Disadvantages :

The agriculture sector fulfils demand of food of the nation. The agriculture which uses sensors and latest technologies such as IoT/cellular is known as smart agriculture or smart farming. The Smart Agriculture System is an IoT based device which is capable of automating the irrigation process by analysing the moisture of soil and the climate condition.

ADVANTAGES:

- ✓ It allows farmers to maximize yields using minimum resources such as water, fertilizers etc
- ✓ Mobile operated pumps save cost of electricity.

- ✓ It is cost effective method.
- ✓ It delivers high quality crop production.
- ✓ Real-Time Data and Production Insight
- ✓ Improved Livestock Farming.
- ✓ Remote Monitoring.
- ✓ Efficient and saves time.

DISADVANTAGES:

- The smart agriculture need availability on internet continuously.
- The smart farming-based equipment's require farmers to understand and learn the use of technology.
- Lesser employment of menial staff or unskilled workers.

APPLICATIONS OF SMART AGRICULTURE SYSTEM:

Smart agriculture through the use of IOT

Technologies will help farmers to reduce generated wastes and enhance productivity. It is basically a hi-tech system of growing food that is clean and is sustainable for the masses. It is the induction as well as the application of modern ICT (Information and Communication Technologies) into agriculture. Some of the applications for IOT in agriculture are:

- Precision Farming
- Agriculture Drones
- Livestock Monitoring
- Smart Greenhouses

- Wearables
- Smart City
- Smart Grids
- Industrial Internet
- Connected Car. ...
- Connected Health (Digital Health/Telehealth/Telemedicine) ...
- Smart Retail.

CONCLUSION & FUTURE SCOPE:

CONCLUSION:

The proposed model explores the use of IOT in the agriculture sector. The objectives of this project “Smart Agriculture System” is to increase the crop production and to avoid the wastage of water. This smart agriculture system is feasible and cost effective. It also focuses on optimizing water resources which combats issues like water scarcity and ensures sustainability and monitors the environmental parameters. It also focuses on the utilization of IOT in agriculture and the solutions proposed in this paper will improve farming methods, increase productivity and lead to effective use of limited resources. A farmer should visualize his agricultural land’s moisture content and the weather conditions from time to time and water level of source is sufficient or not. The agriculture field can be monitored and controlled by an android app at user end. Hence ,will have a good production of crops and great saving of irrigation water, stronger and healthier plants.

FUTURE SCOPE:

The future scope of this project could be including variety of soil sensors like pH sensor, Rain sensor which helps in the predicting and analyzing processes more accurate. We can also monitor the life cycle of the plants. Through smart agriculture system we can analysis the crop yield and can monitor the soil moisture and plant health.

IOT sensors capable of providing farmers with information about crop yields, rainfall, pest infestation, and soil nutrition are invaluable to production and offer precise data which can be used to improve **farming** techniques over time.

BIBILOGRAPHY:

- Node Red: (script is in github)

Source code:

githublink:

<https://github.com/SmartPracticeschool/IISPS-INT-2313-Smart-Agriculture-system-based-on-IoT.git>