

PROJECT REPORT OF CLOUD COMPUTING



Project Name:

**SMART AGRICULTURE SYSTEM BASED CLOUD
COMPUTING**

Submitted To:

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INTRODUCTION

1.1 OVERVIEW

Agriculture plays a important role in country's economy and provides a large-scale employment to the people. However, agriculture is highly dependent upon weather and climate. For example, changes in temperature, soil moisture, carbon dioxide may result in low yield of crops. It is Significant to monitor environmental parameters in order to manage crop growth and increase the agricultural production yield. The sensed information is not only important for decision making but also for evaluating impacts of agricultural practices on environment.

Nowadays, it is more necessary than ever to increase the crop yields food grain production. Cloud connected, wireless system aid in this crop yield maximization, which automates day-to-day agricultural tasks and real time monitoring for smart decision-making.

1.2 PURPOSE

- Need for technology to monitor important parameters like soil moisture, temperature, Humidity etc. to improve the cultivation process.
- Need for technology to monitor weather of particular area with reliable source to save the crops at the time of natural calamities like flood, cyclone etc.
- Development of certain techniques to reduce the workforce, energy and time for cultivation.
- Development of a feasible method to control the electrical equipment in the farm from any part of the world.

CHAPTER-02

LITERATURE SURVEY

2.1 SMART AGRICULTURAL SYSTEM

Sukpal Singh Gill et al (2017) modeled an cloud based autonomic information system for delivering Agriculture-as-a-service, through the use of clouds and big data technology. From the experimental results it was observed that the proposed system offers better service and the quality of service was also better in terms of Qos parameter.

Ravi Kishore Kodali et al(2016) proposed a low cost weather monitoring device to retrieve the weather condition of any location from cloud data base management system. Since it is not using any peripheral device monitoring the weather. It was observed that cost of the device can be reduced.

Ibrahim Mat et al (2018) developed a smart Agricultural system using Iot. It was concluded that above proposed system using IoT can play a important role in conventional and large farming area. And a comparison b/w IoT and Conventional Mushrom farming was conducted. It was observed that the farm monitored by IoT had better growth rate than the conventional method.

Prathibha et al (2017) modeled a smart farming using IoT. The important parameters like Temperature and Humidity in agricultural field was monitored by using CC3200 chip and camera was interfaced with CC3200 to capture image and the captured image was forwarded to the farmer using MMS. The proposed system can be used in green house and temperature dependent plants.

Yifan Bo et al (2011) conducted a study on integrating cloud computing and IoT in the field of agriculture. It was observed that cloud computing and IoT had high reliability, expansibility and high accuracy.

Tien Wo-Hoang et al (2017) proposed an IoT System architecture based on wireless Sensor Network. The various parameters like temperature, relative humidity, luminosity, air pressure etc were monitored from a web browser. A WIFI interface device was used to transfer this environmental data's from sensor to the web browser. It was observed that yield of crops can be improved by this method.

M.K.Gayatri et al (2015) proposed a technology to hold the huge data's coming from the agrarian output. ZigBee module was used to measure various parameters like temperature, humidity, and illumination. A Wireless communication was used to communicate between the sensor and the data centre.

Samudra et al (2019) developed an intelligent farming with wireless Networking and MQTT, to monitor the real time agricultural environment. The parameters like luminicence, Soil moisture and Temperature were monitored. By comparing these data's the output like motor was controlled.

Qiulan Wu et al (2017) developed an smarter agricultural system based on technologies like GIS, Cloud computing, IoT, Big data and sensing technology. This method allows the user to get the information at faster rate. This method will reduce the cost and energy consumption.

2.2 EXISTING PROBLEM

1. Controlling the device from longer distance from web application.
2. Getting the weather data from weather station.
3. Transfer of node data to the gateway at faster rate.
4. Unavailability of data's such as PH level, potassium, Nitrogen etc related to the soil.

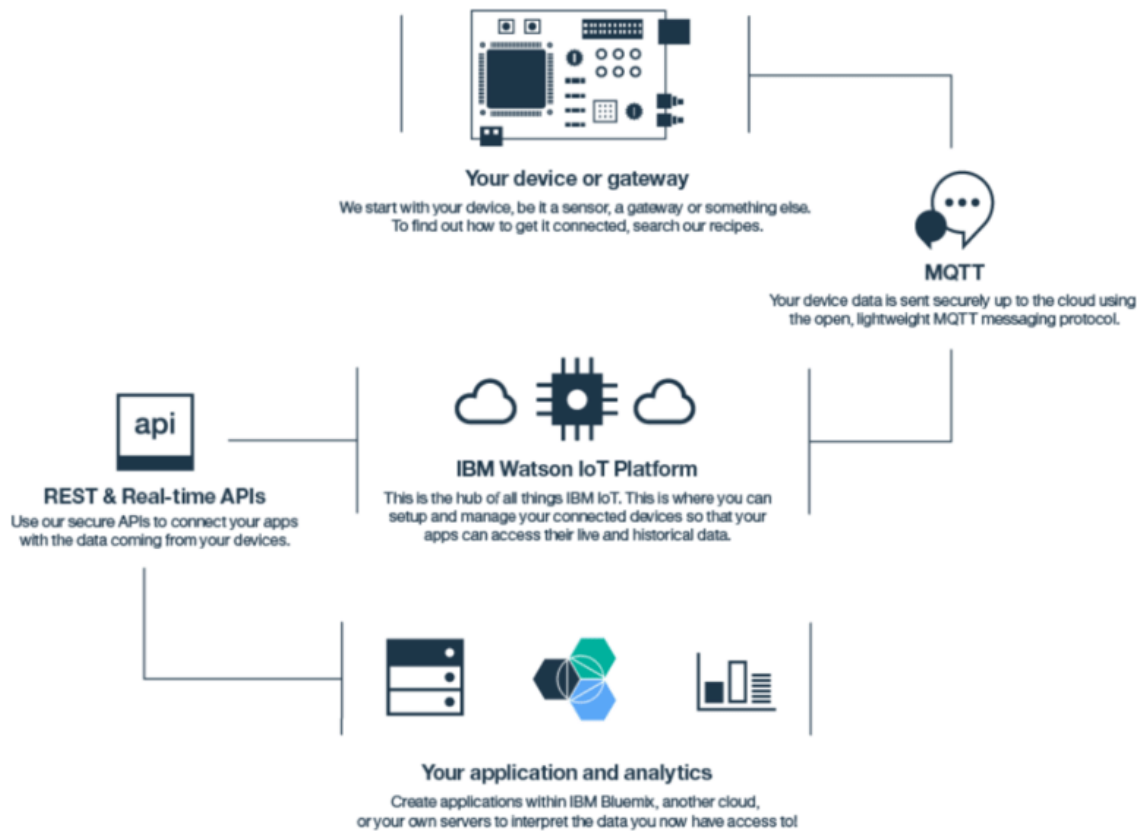
2.3 PROPOSED SOLUTION

1. To control a device from longer distance from web application.
2. To get the weather details like wind speed, temperature, humidity from weather station through weather API.
3. To display the data in the web application.

CHAPTER-03

THEORITICAL ANALYSIS

3.1 BLOCK DIAGRAM

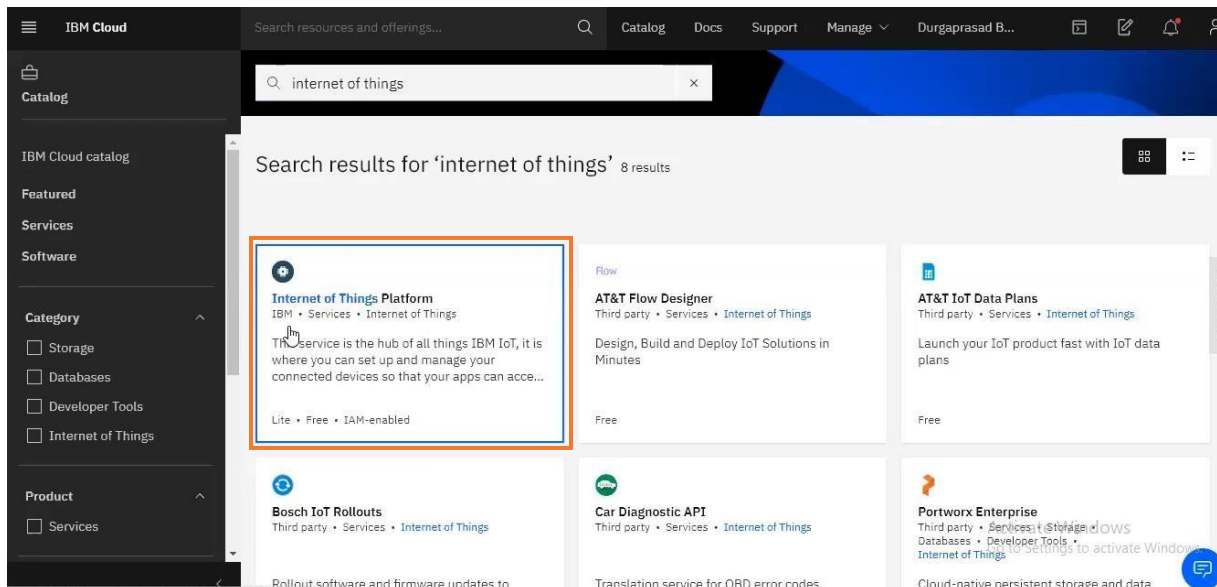


CHAPTER-04

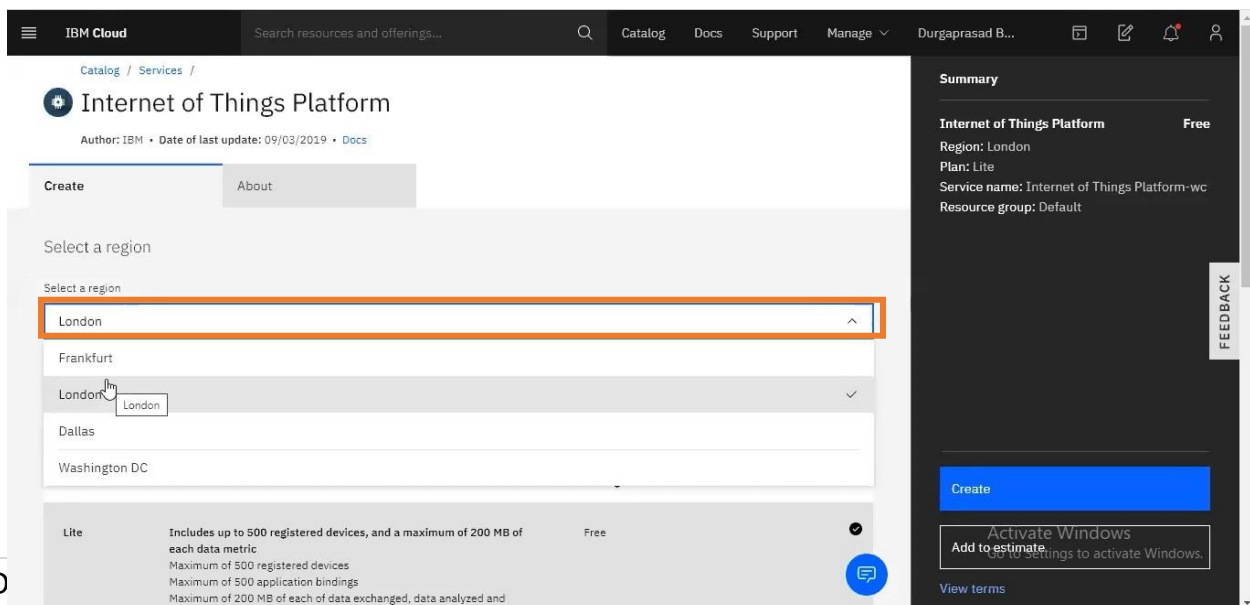
EXPERIMENTAL INVESTIGATION

4.1 SETTING THE DEVICE IN IOT PLATFORM IN IBM CLOUD

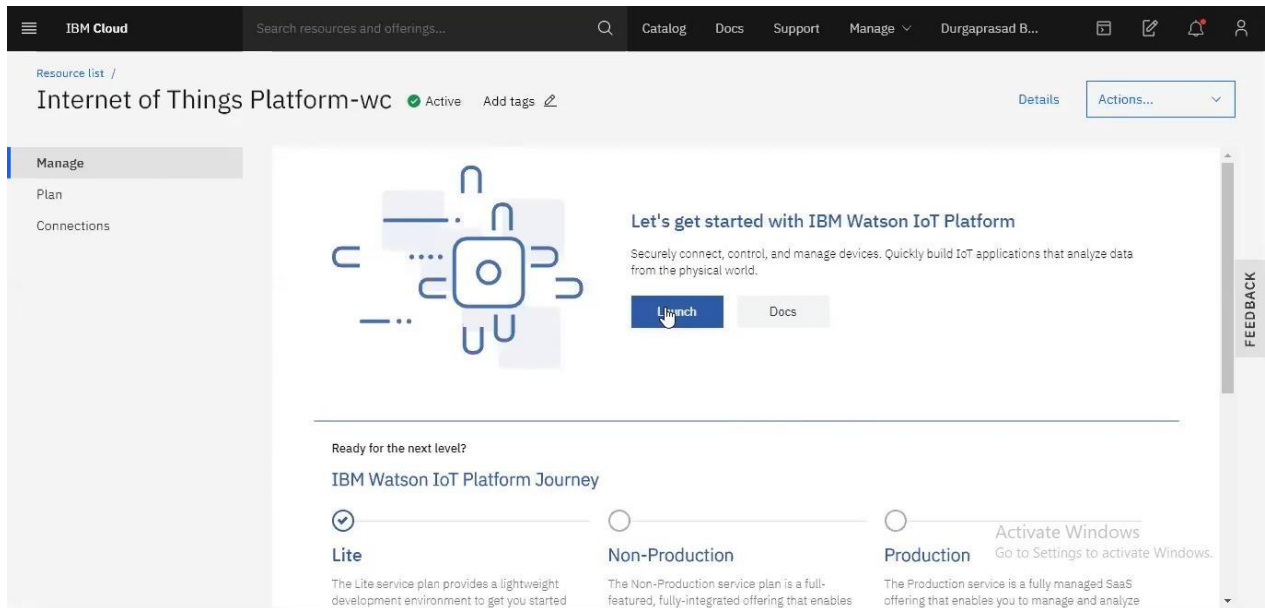
Step1: After logging into the system a dash board will appear and in the search pane type IBM IoT platform.



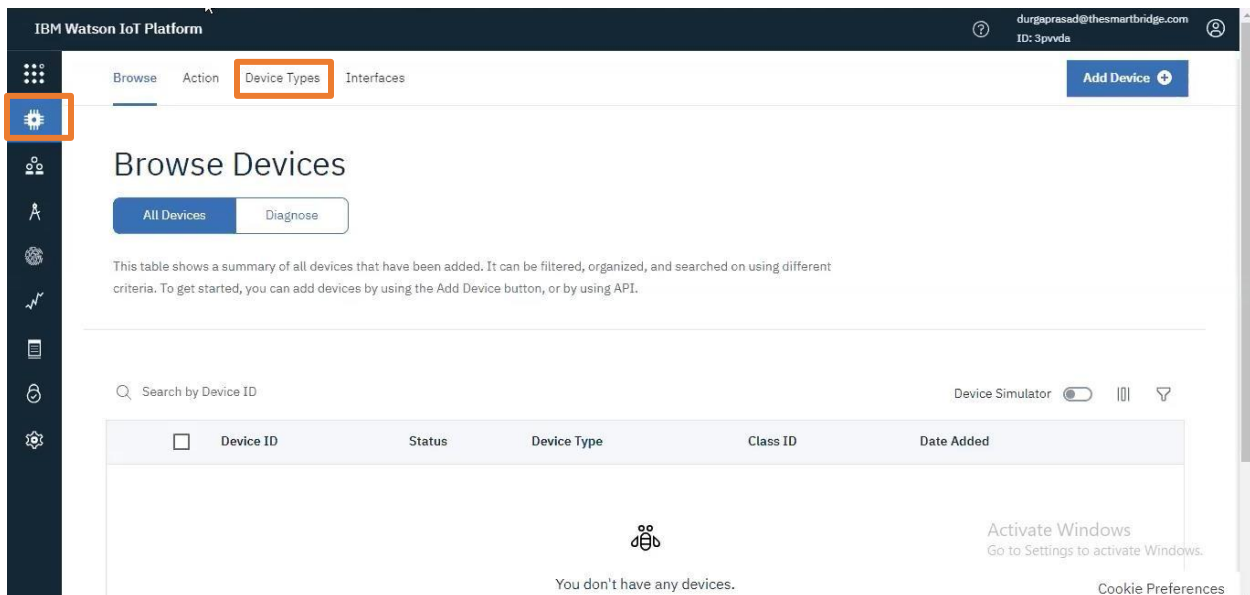
Step2: Select the London option from drop down list and click create.



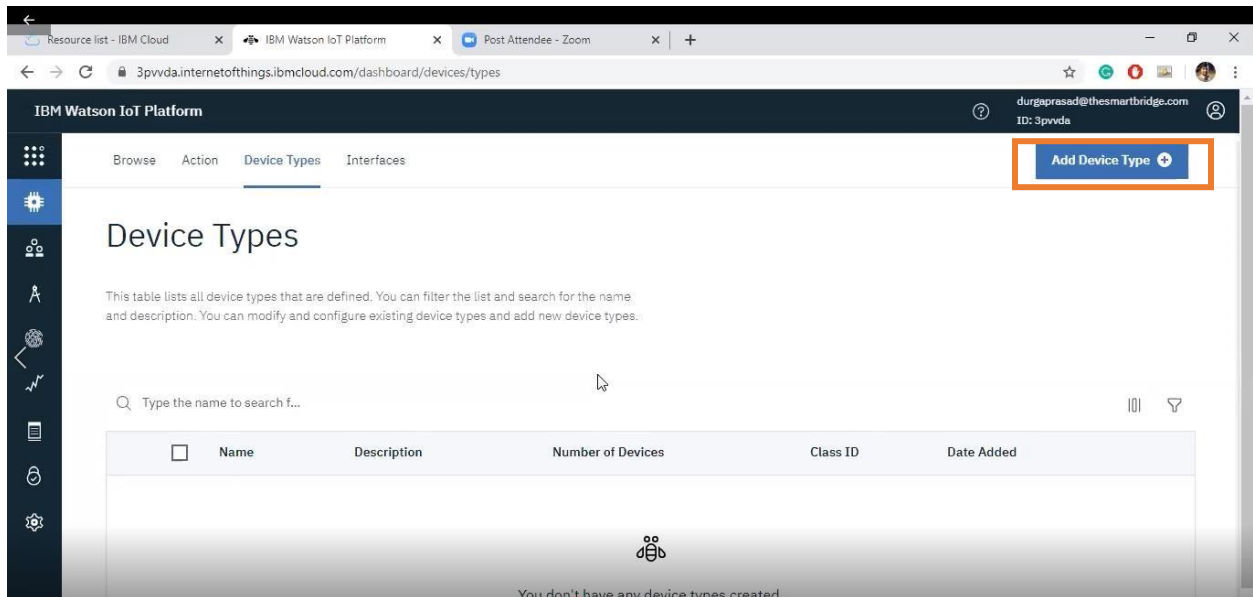
Step3: Click on the Launch button.



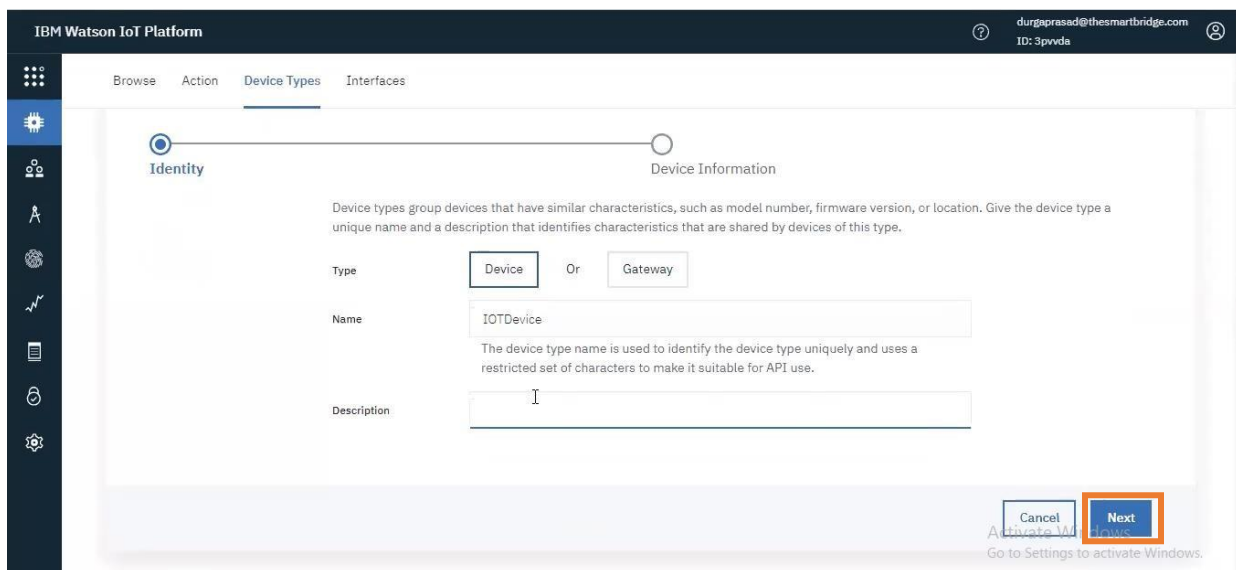
Step4: Click on the Device type.



Step5: Click on the add device button



Step6: Enter the Device name and Description and click Next.



Step7: No need to fill the field of the Device Information and click Finish.

The screenshot shows the 'Device Information' step in the IBM Watson IoT Platform. The interface has a dark blue header with the platform name and user details. A sidebar on the left contains icons for various functions. The main content area has a progress bar with 'Identity' and 'Device Information' steps. The 'Device Information' step is active, showing a form with two columns of input fields. The left column includes 'Serial Number', 'Model', 'Description', and 'Hardware Version'. The right column includes 'Manufacturer', 'Device Class', 'Firmware Version', and 'Descriptive Location'. Each field has a placeholder text like 'Enter Serial Number'. An 'Edit Metadata' button is in the top right. At the bottom right, there are 'Back' and 'Finish' buttons. A Windows watermark is visible in the bottom right corner.

Field	Placeholder
Serial Number	Enter Serial Number
Model	Enter Model
Description	Enter Description
Hardware Version	Enter Hardware Version
Manufacturer	Enter Manufacturer
Device Class	Enter Device Class
Firmware Version	Enter Firmware Version
Descriptive Location	Enter Descriptive Location

Step8: Click on the Register Device.

The screenshot shows the 'Register Devices, Define Interfaces' screen in the IBM Watson IoT Platform. The interface has a dark blue header and a sidebar. The main content area has a title 'Register Devices, Define Interfaces' and a subtitle 'Optional'. Below the subtitle, there is a text block: 'Now that you added a device type, you can register and connect devices for this type.' A blue button labeled 'Register Devices' is highlighted with an orange rectangle. To the right of the text block is a large grey area with a blue gear icon. At the bottom right, there are 'Cancel' and 'Next' buttons. A Windows watermark is visible in the bottom right corner.

Optional

Register Devices, Define Interfaces

Now that you added a device type, you can register and connect devices for this type.

[Register Devices](#)

Step9: Enter the device name and click Next.

IBM Watson IoT Platform

duragaprasad@thesmartbridge.com
ID: 3pvvda

Browse Action Device Types Interfaces

Add Device

Identity Device Information Security Summary

Select a device type for the device that you are adding and give the device a unique ID.

Device Type IOTDevice

Device ID NodeM

Cancel Next

Browse Devices

All Devices Diagnose

Activate Windows
Go to Settings to activate Windows.
Cookie Preferences

Step10: No need to fill the field and click Next button.

IBM Watson IoT Platform

duragaprasad@thesmartbridge.com
ID: 3pvvda

Browse Action Device Types Interfaces

Add Device

Identity Device Information Security Summary

You can modify the default device information and enter more information about the device for identification purposes.

Serial Number Enter Serial Number

Model Enter Model

Description Enter Description

Hardware Version Enter Hardware Version

Manufacturer Enter Manufacturer

Device Class Enter Device Class

Firmware Version Enter Firmware Version

Descriptive Location Enter Descriptive Location

Add Metadata

Back Next

Activate Windows
Go to Settings to activate Windows.
Cookie Preferences

Step11: Filling the Authentication token and click Next button.

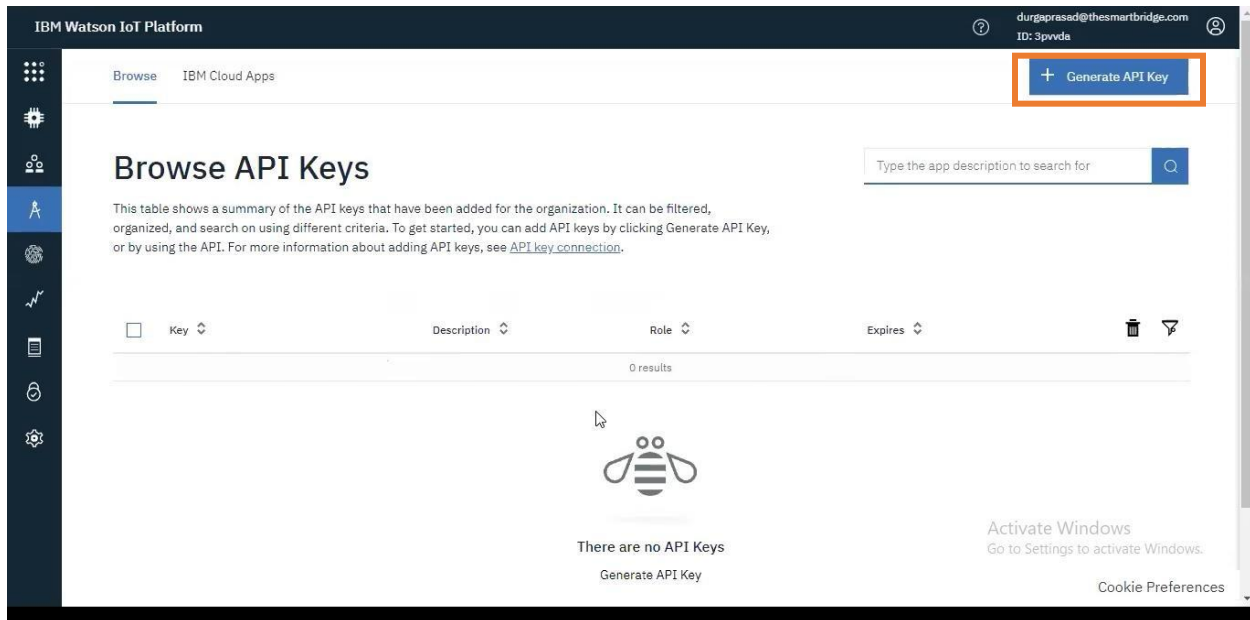
The screenshot shows the 'Add Device' wizard in the IBM Watson IoT Platform. The 'Security' tab is selected, showing two options for authentication tokens: 'Auto-generated authentication token (default)' and 'Self-provided authentication token'. The 'Auto-generated' option is selected. Below the options, there is a text input field labeled 'Authentication Token' with the placeholder text 'Enter an optional token'. A note below the field states: 'Make a note of the generated token. Lost authentication tokens cannot be recovered. Tokens are encrypted before being stored.' and 'Authentication token are encrypted before we store them.' The 'Next' button is visible at the bottom right of the wizard.

Step12: Final summary tab will show the device type and device name information.

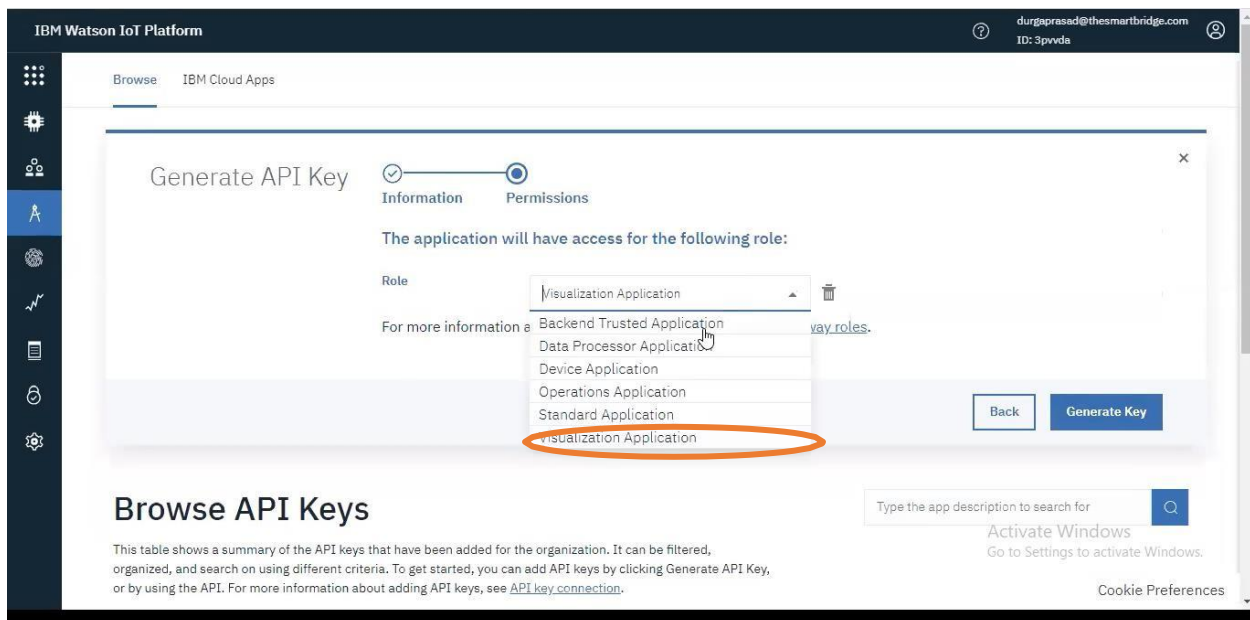
The screenshot shows the 'Add Device' wizard in the IBM Watson IoT Platform, now at the 'Summary' tab. The 'Summary' tab is selected, showing the final information for the device: 'Device Type: IOTDevice', 'Device ID: Arduino', and 'Security Token: 123456789'. A 'View Metadata' button is visible below the device information. The 'Next' button is visible at the bottom right of the wizard.

4.2 GENERATING THE DEVICE API

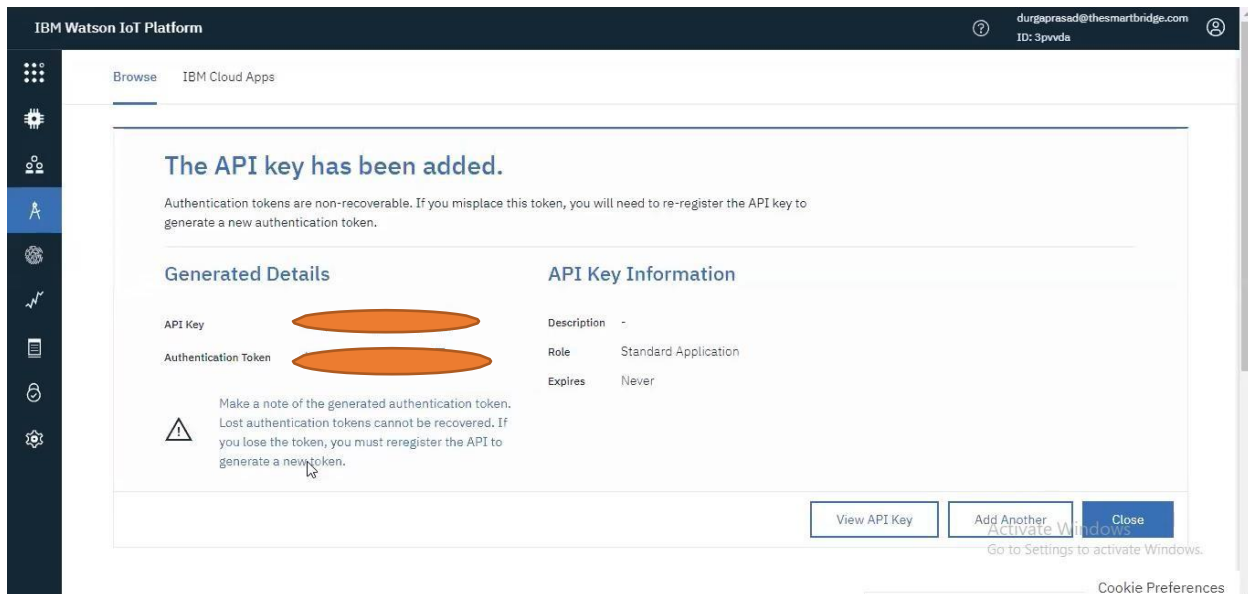
Step1: Click on the app icon and click on generate api key button.



Step2: Click on the standard application from the drop down list and click generate key.

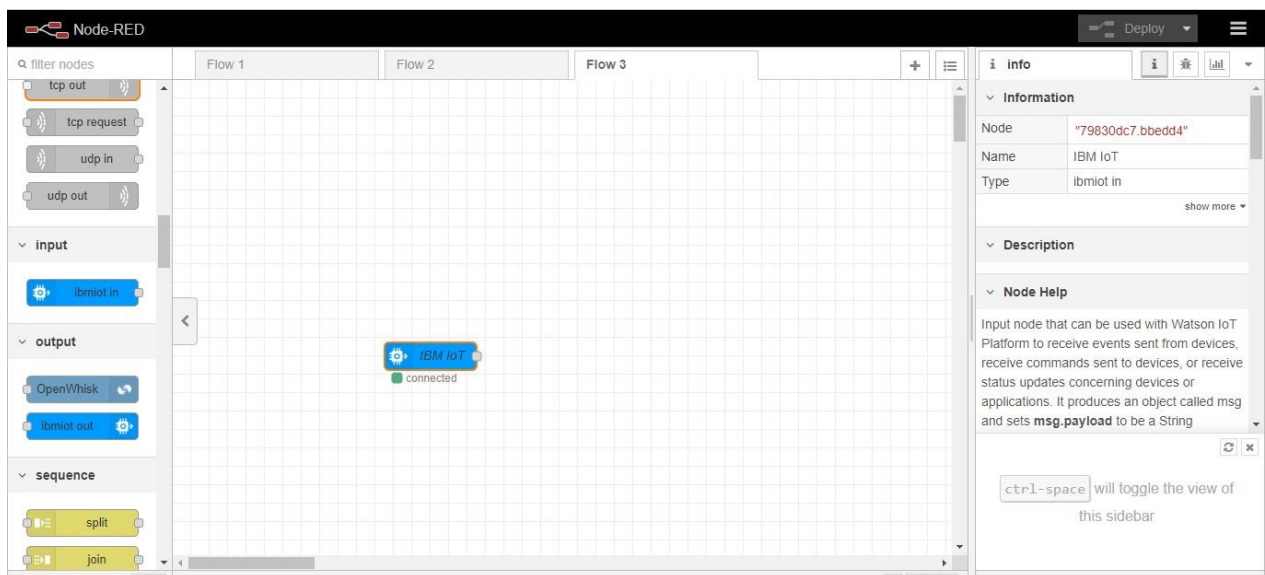


Step3: Note the Api key and authentication token for future reference

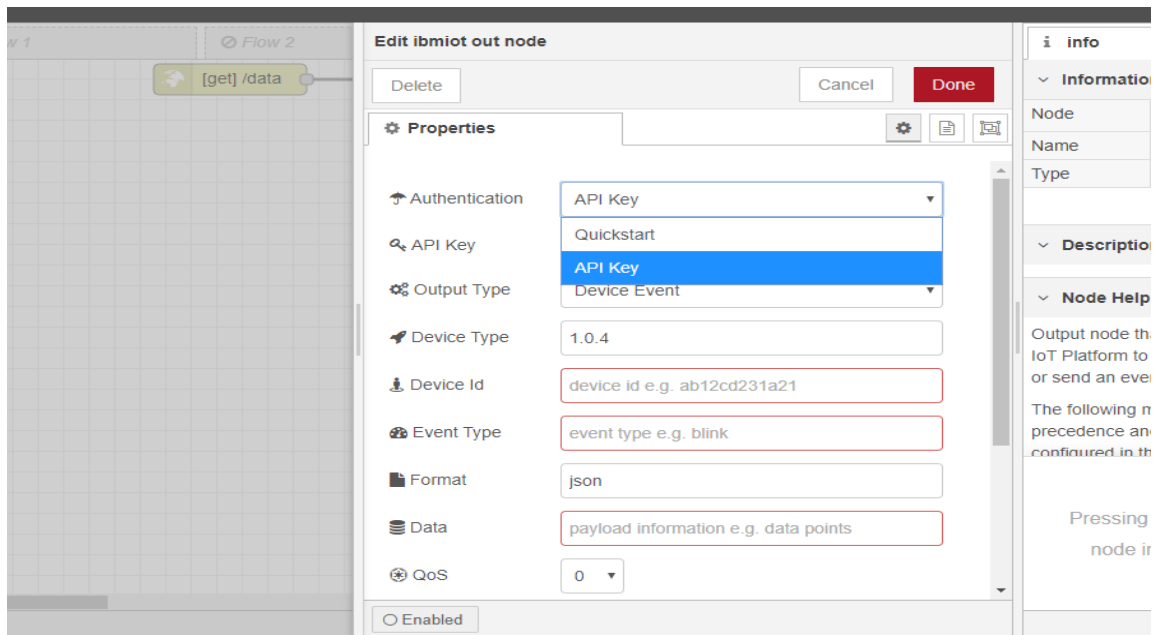


4.3 SETTING UP THE UI USING NODE-RED

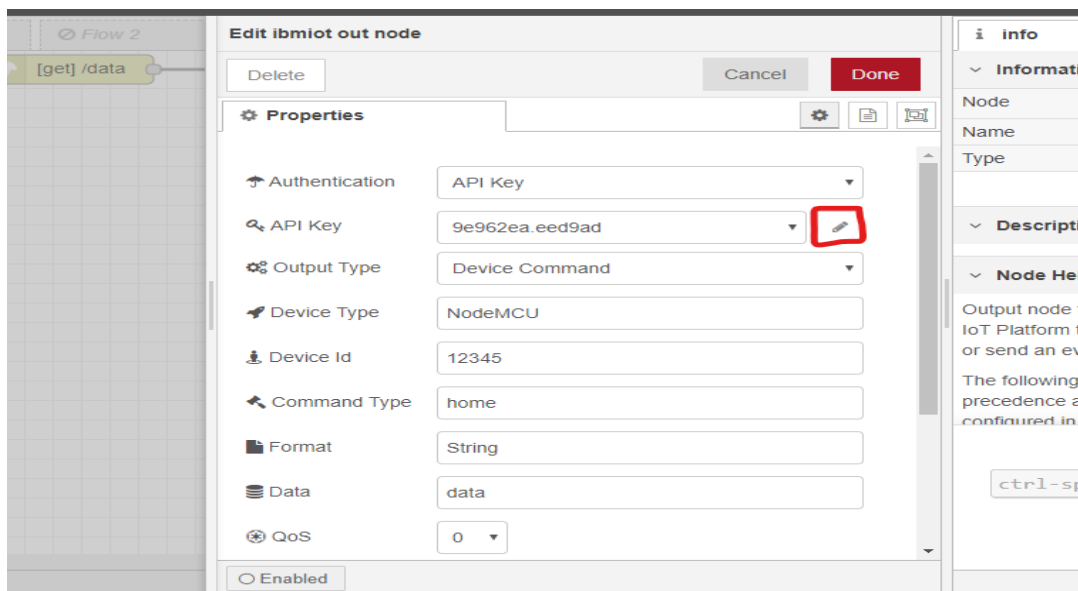
Step1: Select the IBM IoT in node from pallet



Step2: Double click the IBM IoT node, select the API option from the drop down and click the **Device Event**.



Step3: Click the pencil key icon in the API key.



Step4: Enter the API key, API token and click update button.

Flow 2

Edit ibmiot out node > Edit ibmiot node

Delete Cancel Update

Properties

Name

API Key

API Token

Server-Name n51a7p.messaging.internetofthings.ibmcloud.com

Scalable Application ID

Keep Alive 60 Seconds Use Clean Session

Enabled 6 nodes use this config On all flows

Info

Information

Node "9e962ea.eed9ad"

Type ibmiot

Description

Node Help

To use Shared subscription, check **Scala** and provide the **Application ID**. The **Application ID** must be same across different clients.

Hold down when you click node to also select all of its connected nodes

Step5: click on the Done button and click the deploy button.

Edit ibmiot out node

Delete Cancel Done

Properties

Authentication API Key

API Key api_key

Output Type Device Event

Device Type motor

Device Id motor1

Event Type status

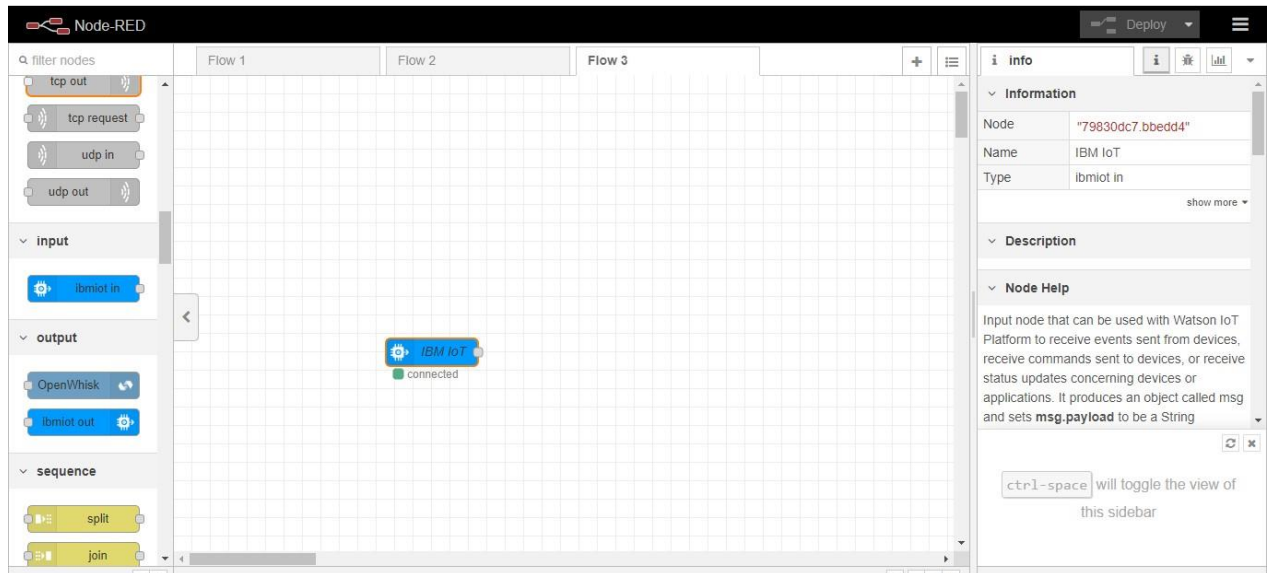
Format json

Data payload

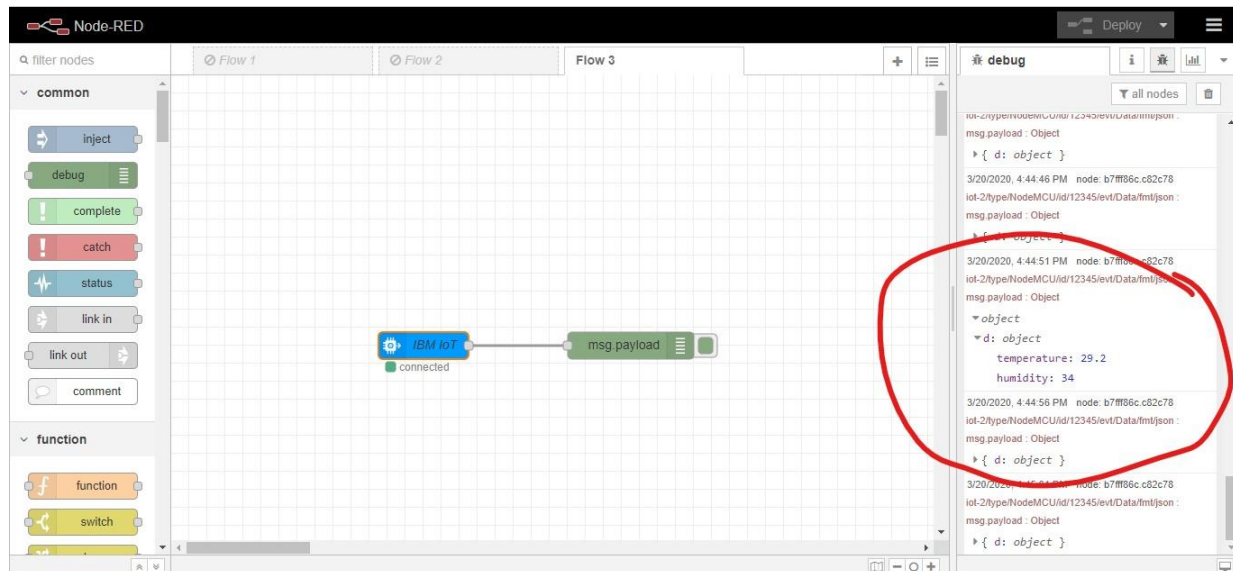
QoS 0

Name Motor

Step6: After deploying Connection indication will be highlighted in the IBM IoT node.



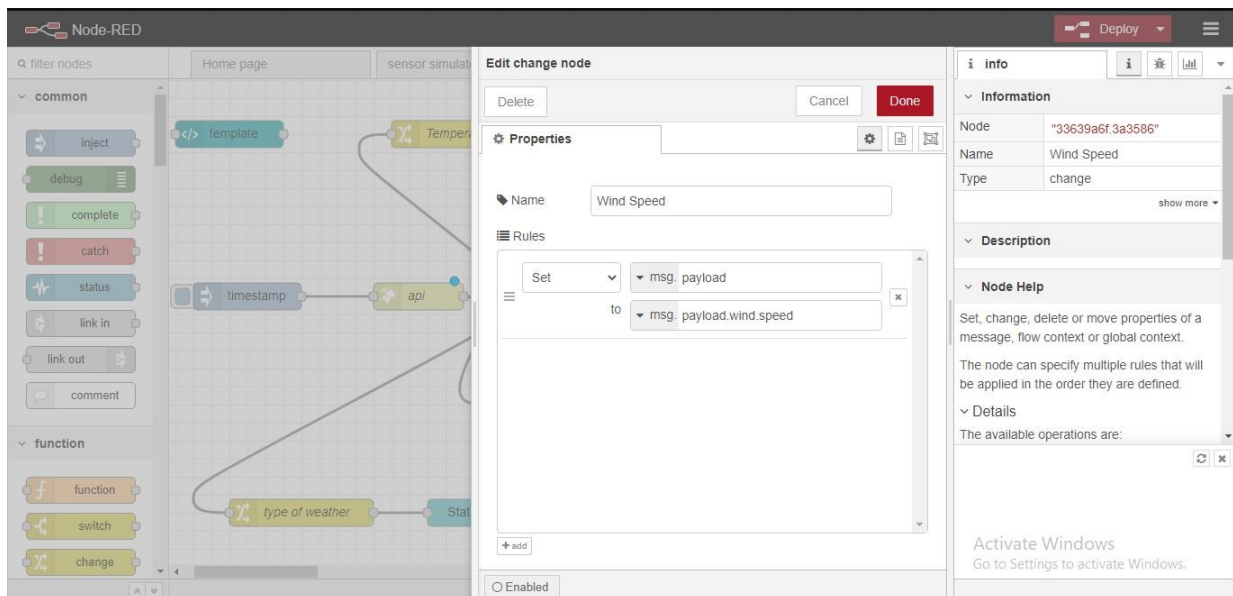
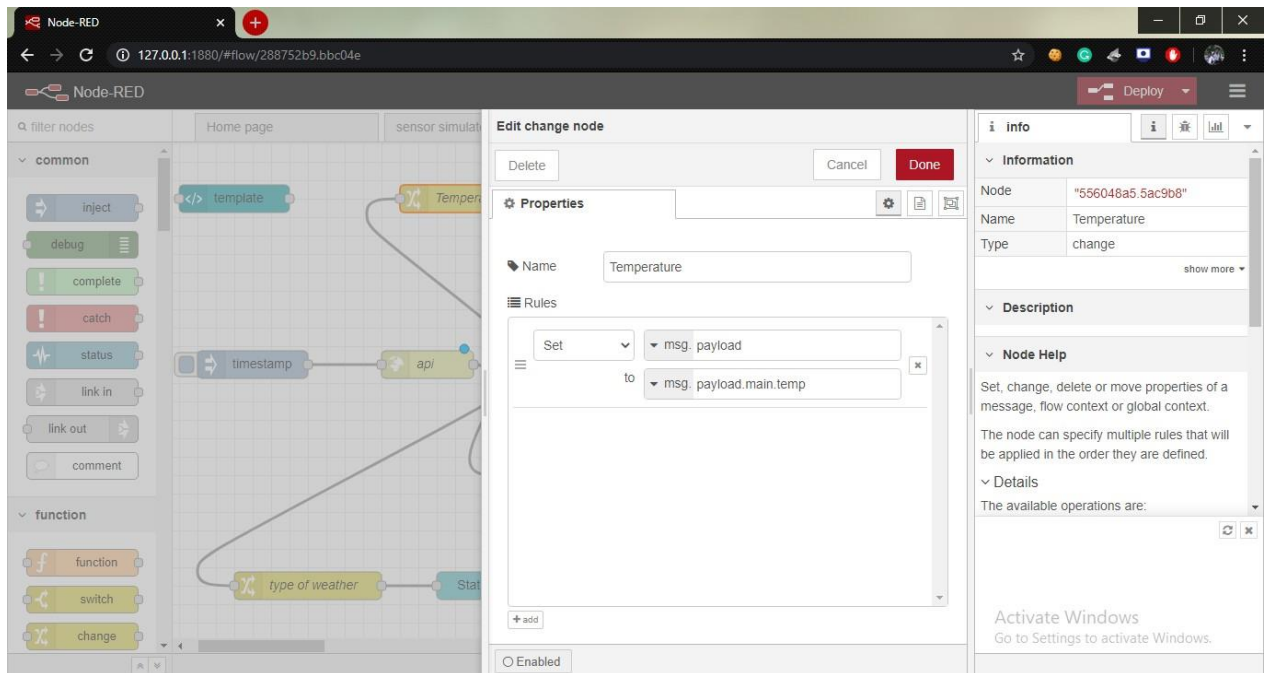
Step7: Place the debug node in the flow editor and click on deploy to see the temperature and humidity value in the debug tab.



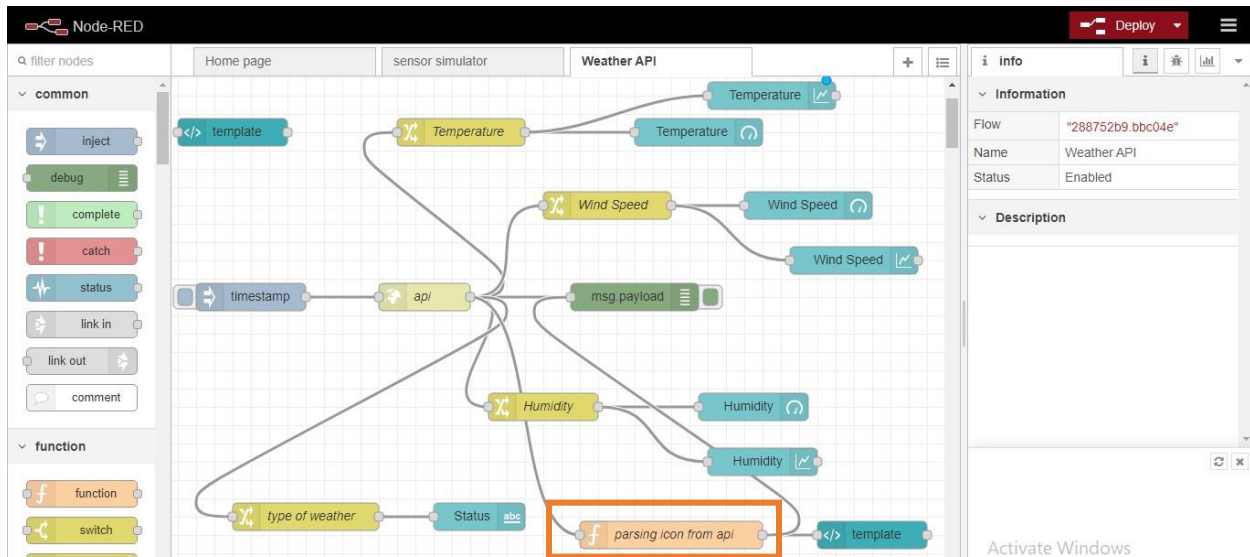
Step1: Timestamp node will trigger the API for certain interval of time. Set the required timing for the triggering.



Step3: In the change node separate temperature value from the payload by following code given in the image. Repeat the same procedure for wind speed and Humidity.



Step4: To get set the different images based on the cloud condition. We need to get the id of the image and to concatenate the id to the API link.



Node-RED JavaScript editor showing the code for the 'parsing icon from api' function node:

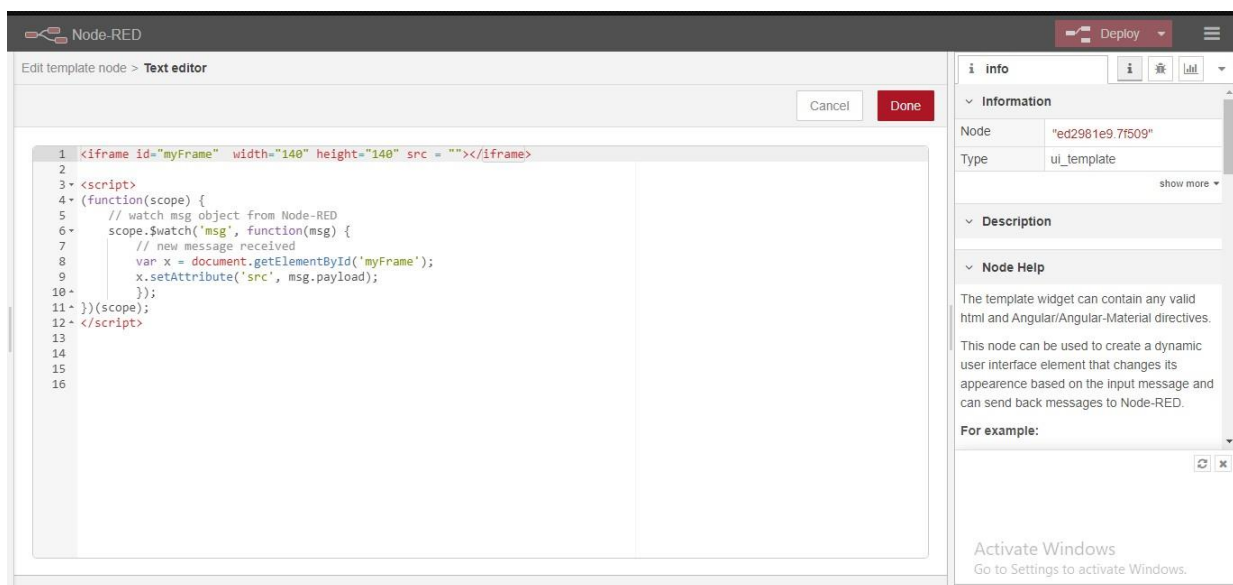
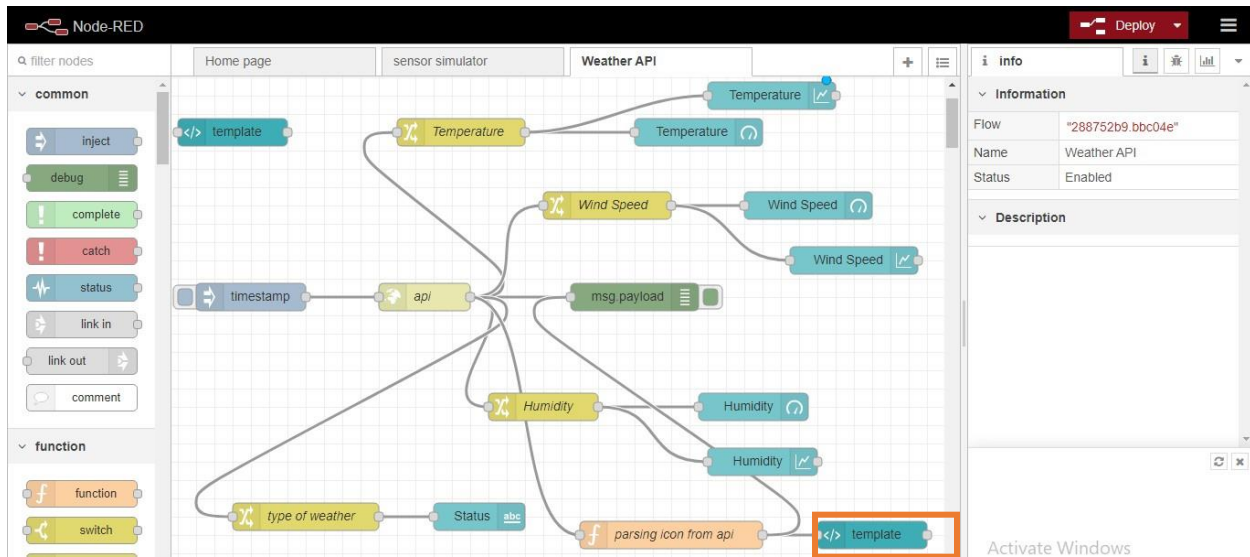
```

1 msg.payload="http://openweathermap.org/img/wn/"+msg.payload.weather[0].icon+"@2x.png"
2
3
4 return msg;

```

The right sidebar shows the 'info' panel for the function node, displaying the node ID 'f39f43de.e0461', the name 'parsing icon from api', and the type 'function'. The 'Node Help' section provides information about the JavaScript function block.

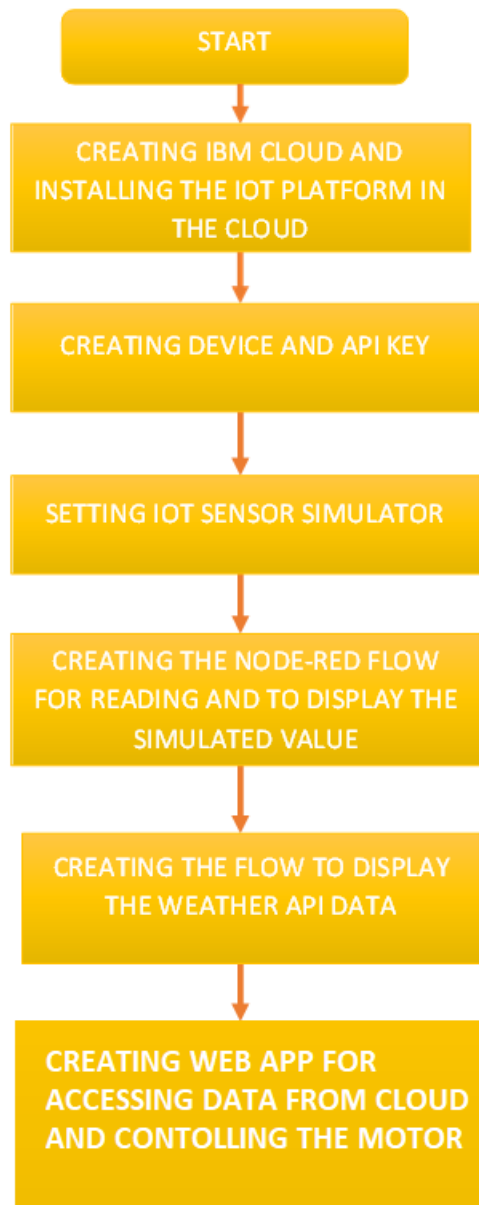
Step5: To display the image in the HTML. A template node was created and image will be displayed in the particular layout.



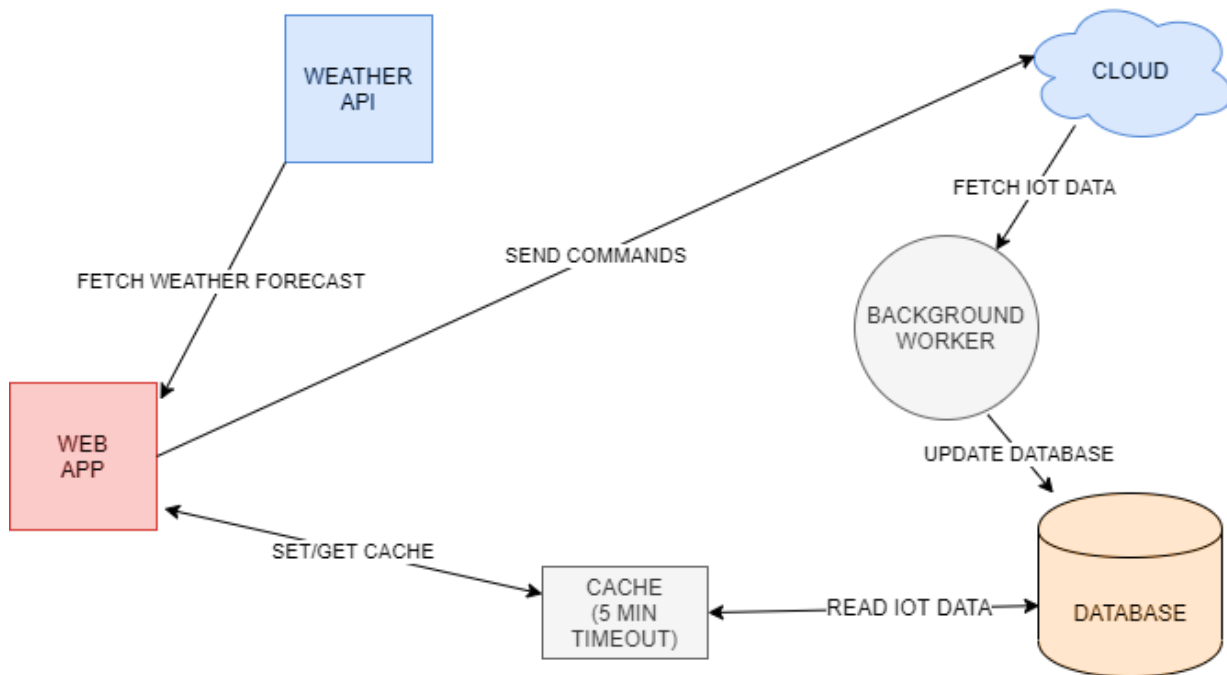
CHAPTER-05

FLOW CHART

5.1 METHODOLOGY



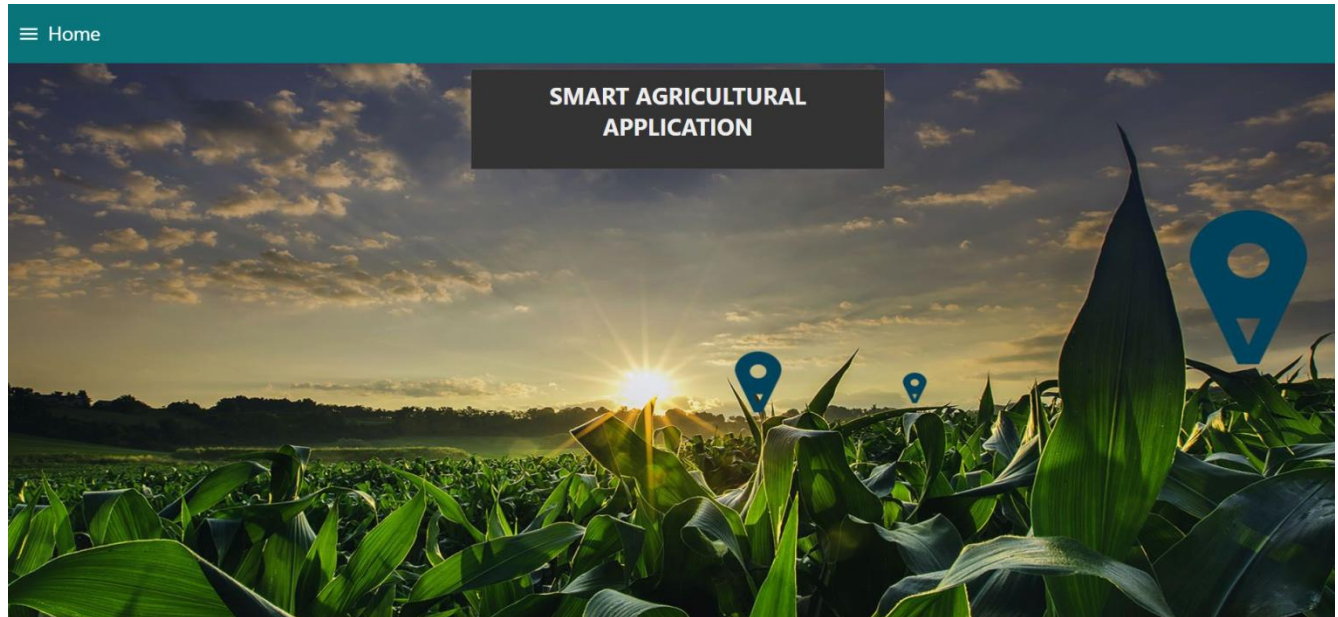
5.2 Data Flow Diagram for the Web App



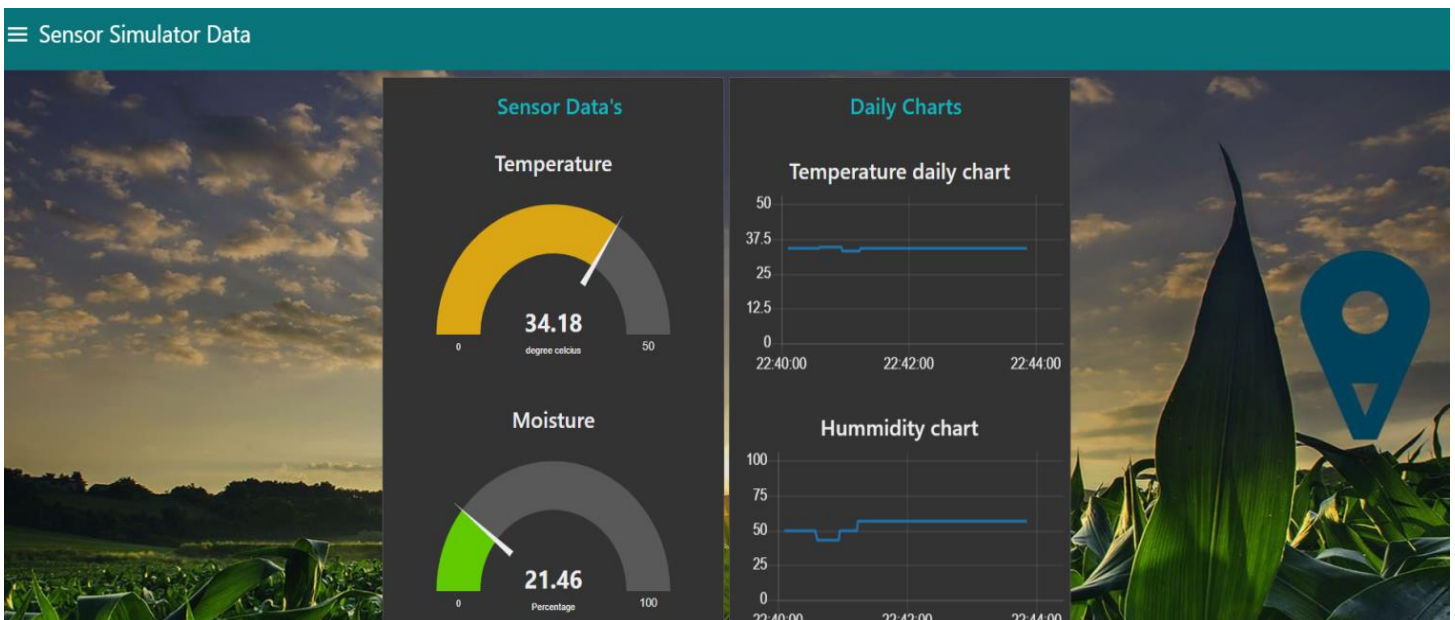
CHAPTER-06

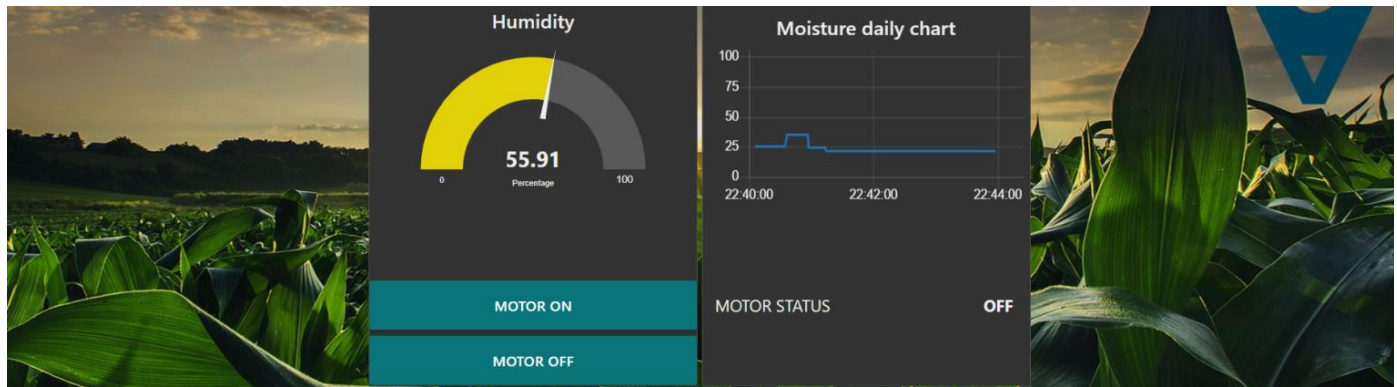
RESULT

6.1 HOME PAGE

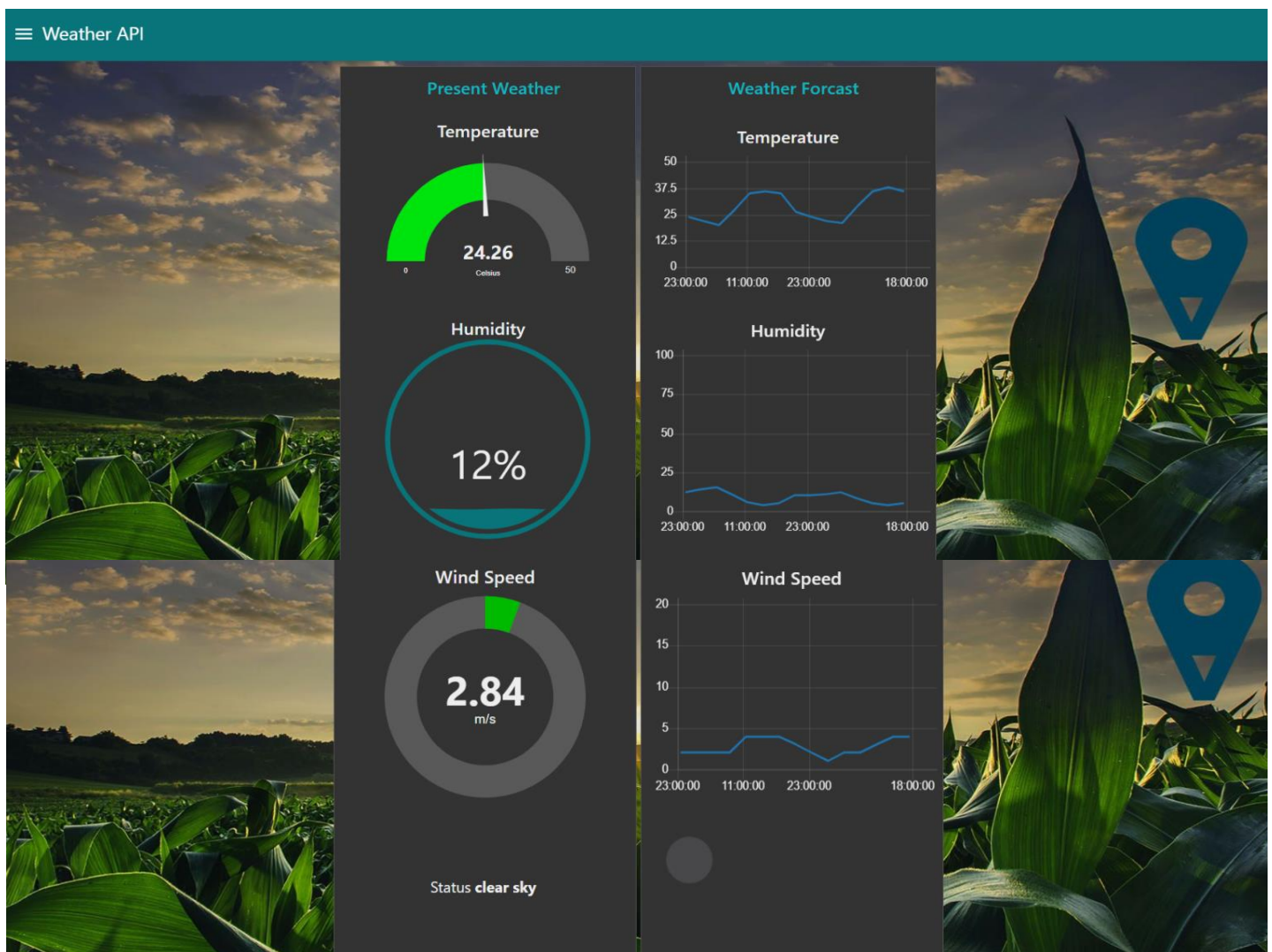


6.2 SENSOR SIMULATOR AND MOTOR CONTROL PAGE



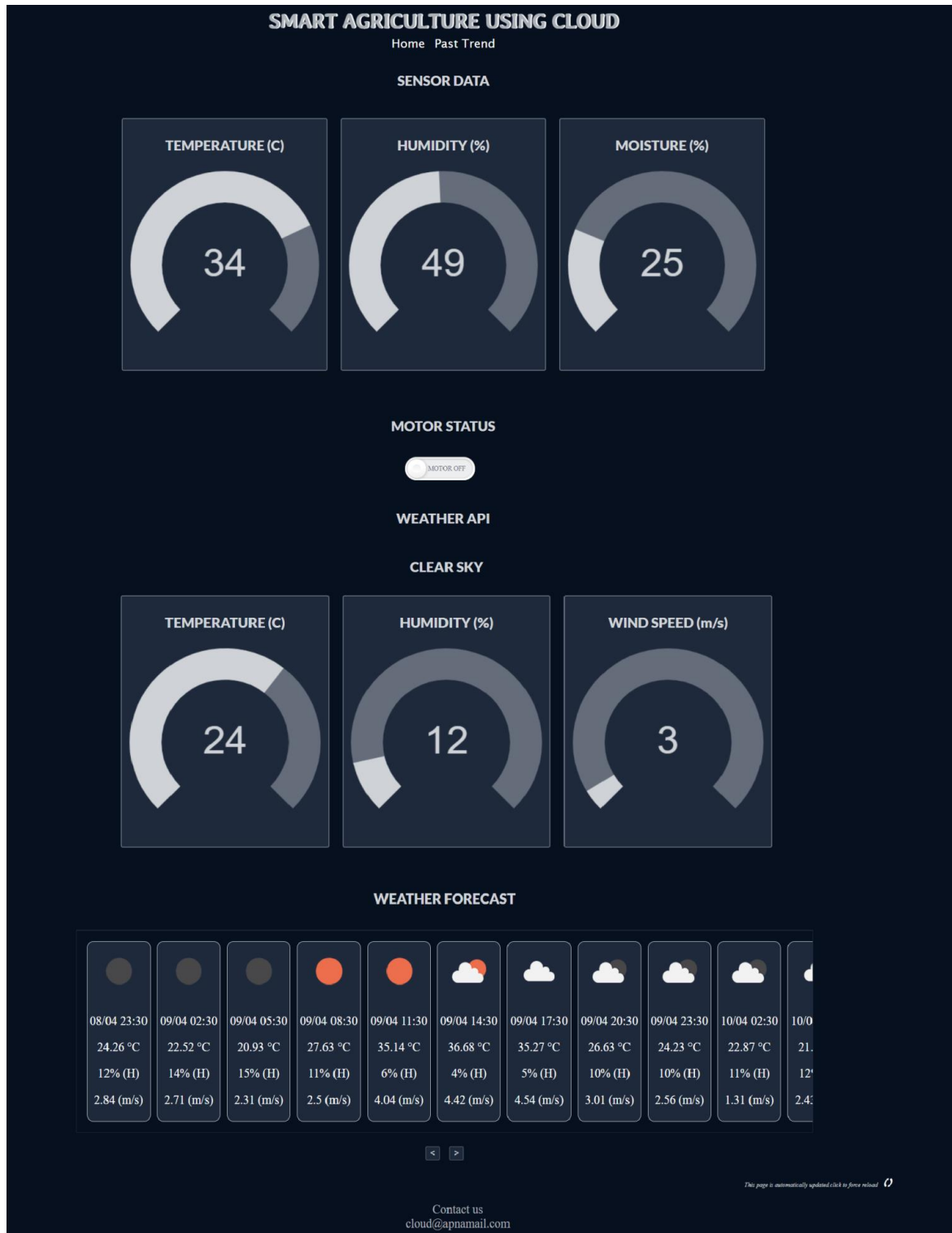


6.3 WEATHER API DATA STREAMING

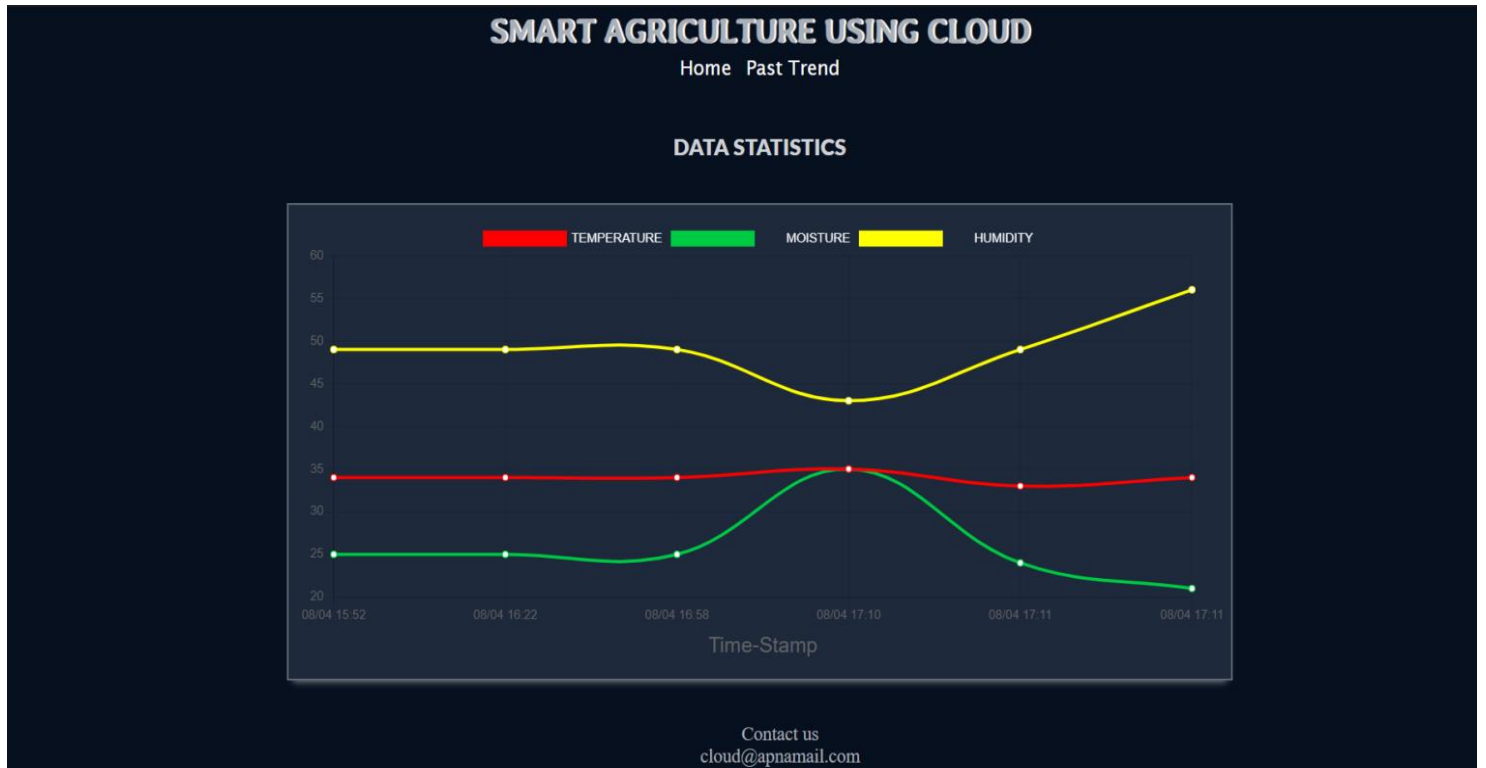


6.4 WEB APP UI

HOME



PAST TRENDS



CHAPTER-07

ADVANTAGE AND DISADVANTAGE

7.1 ADVANTAGE

1. Communicating the device at larger distance through web application. It will play an important role in reducing the man power and travelling expenses of a farmer.
2. Monitoring the parameter like temperature, humidity etc will play an important role in improving the growth of the plant.
3. Integrating the weather station to the web browser will provide the details of status of the cloud, wind speed etc. It will allow the farmer to prevent their plants from natural calamities.

7.2 DISADVANTAGE

1. Since the real time sensor will be connected to the controller, the controller requires continuous supply of internet to transfer the data.
2. Non availability of weather prediction for long period of time. Since the long weather prediction require additional payment to open weather.

CHAPTER-08

CONCLUSION

The various parameters like temperature, humidity etc were monitored using web application. The data from weather station like wind speed, temperature, humidity etc were displayed in the web browser. The device like motor, light etc can also controlled by the web application.

CHAPTER-9

FUTURE SCOPE

- The various data's of soil nutrients is not added in the web browser, that canbe added to the web application.
- Long range forecast is not available in the web application, it can also beadded to provide accurate information about weather.
- Controlling the device through mobile application and voice will playimportant role in enhancing this project.
- Providing the GPS and GIS information will also improve productivity of thefarmer.

APPENDIX

The complete code can be seen by clicking on the following link:

<https://github.com/Baljotsinghchoudhary/project-iotdata>