PROJECT REPORT

OF

CLOUD COMPUTING

Project Name:

SMART AGRICULTURE SYSTEM BASED CLOUD COMPUTING

Submitted To:

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CHAPTER-01

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 luminicense, 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.

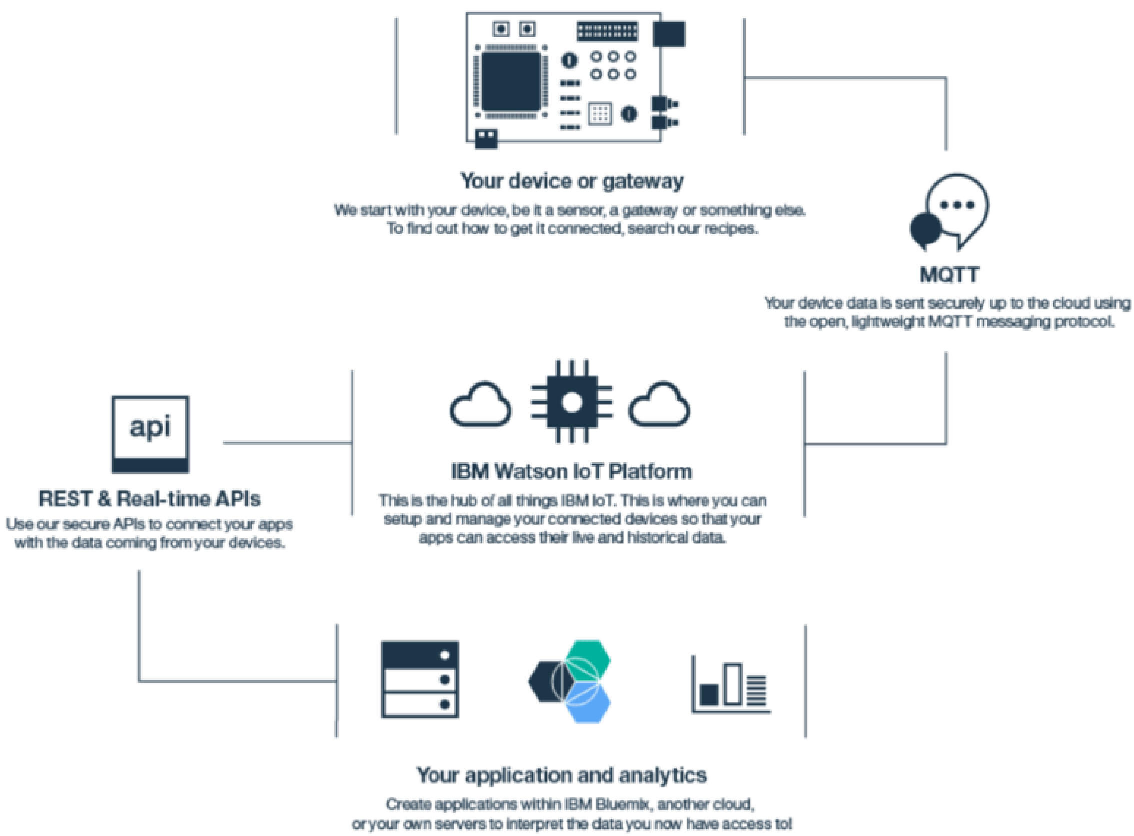
3. To display the data in the web and android application.

4. To help farmer in increasing the crop yield by suggesting the farmer the motor status based on soil moisture, humidity, temperature and number of days the farming of crop started.

CHAPTER-03

THEORITICAL ANALYSIS

3.1 BLOCK DIAGRAM



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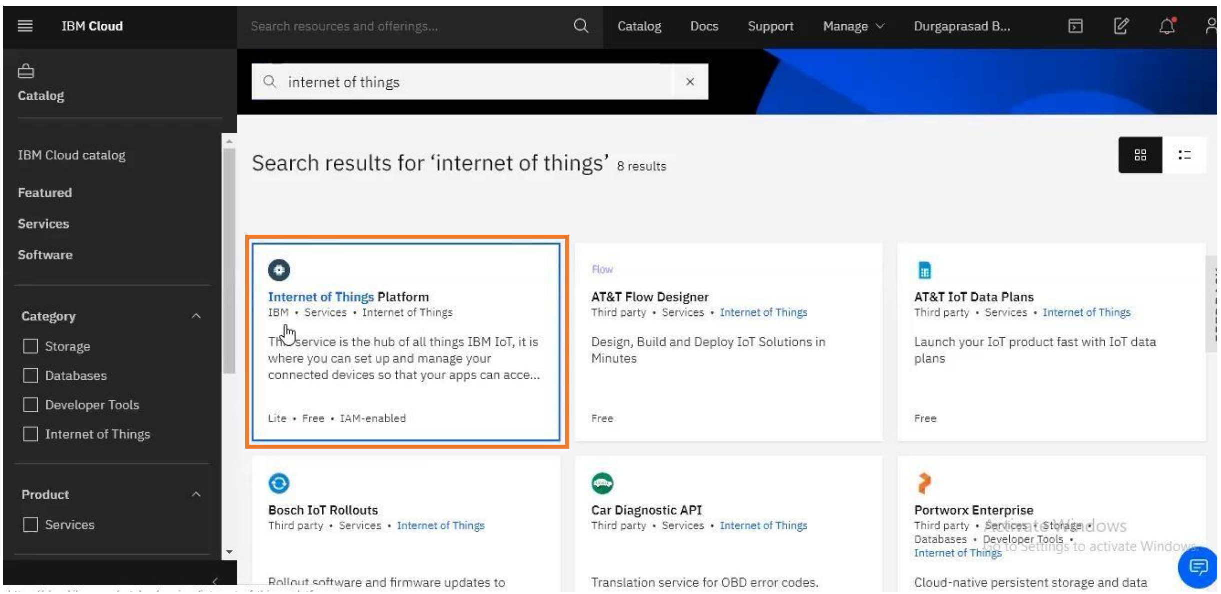
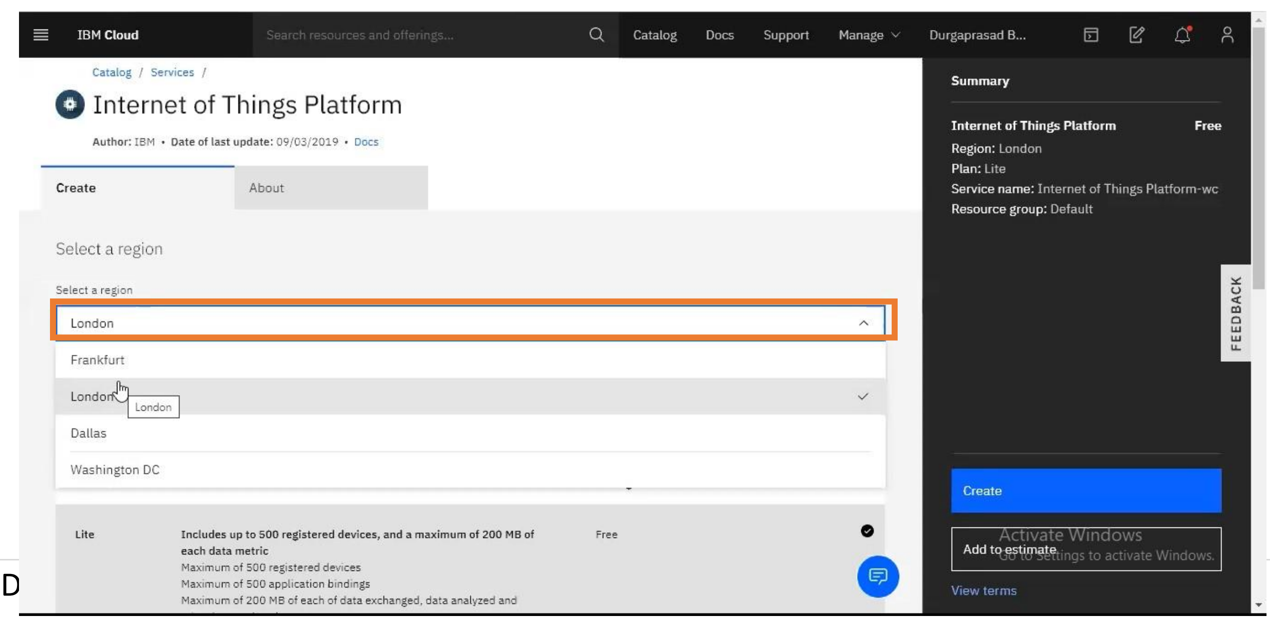
EXPERIMENTAL INVESTIGATION

4.1 SETTING THE DEVICE IN IOT PLATFORM IN IBM CLOUD

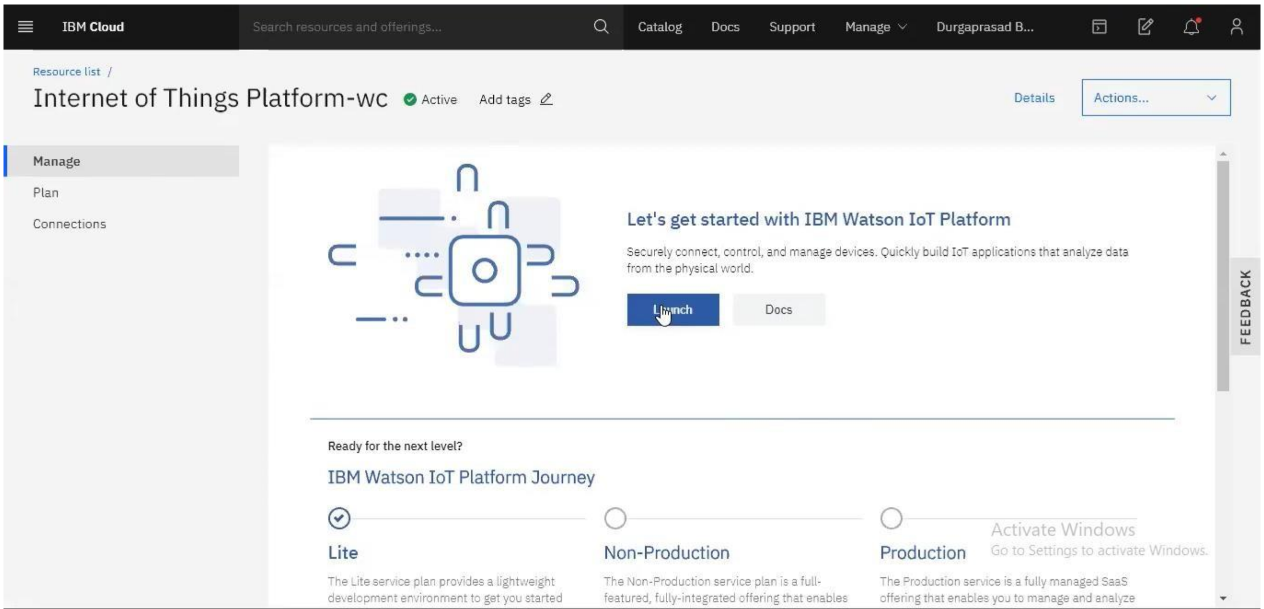
Step1: After logging into the system a dash board will appear and in the search pane type IBM IoT platform.



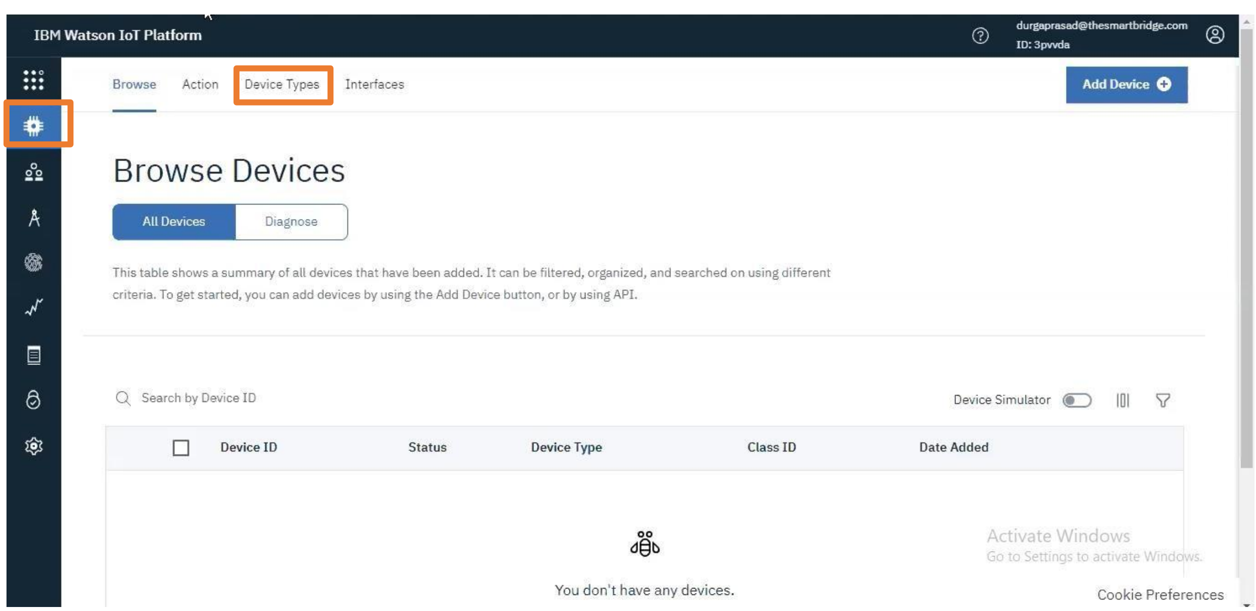
Step2: Select the London option from drop down list and click create.



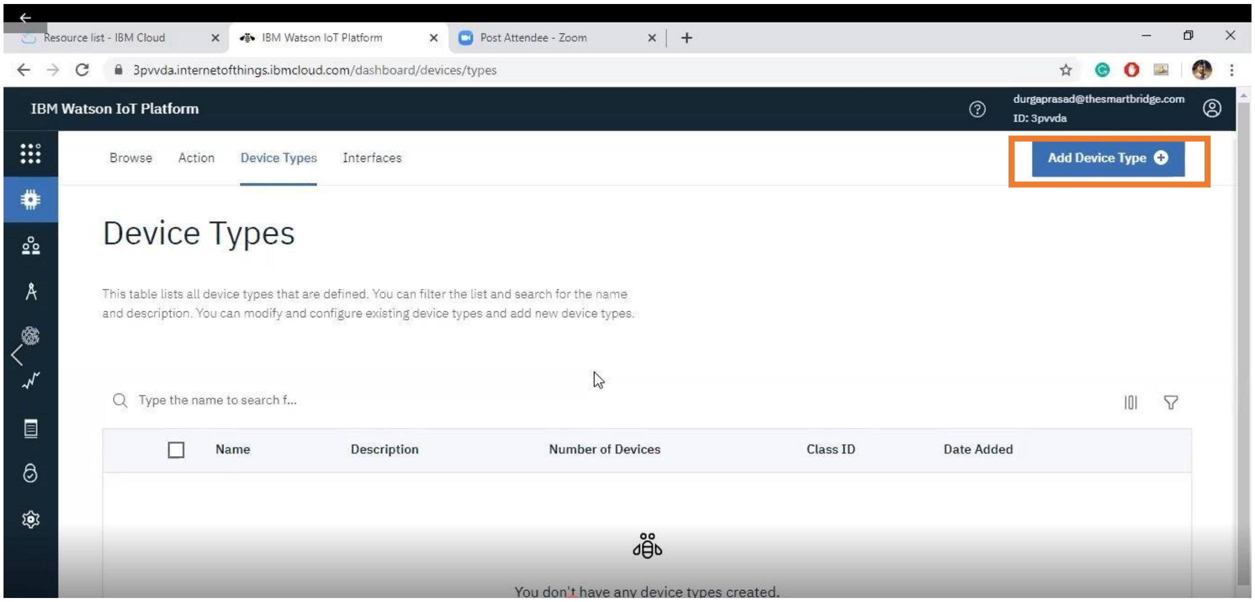
Step3: Click on the Launch button.



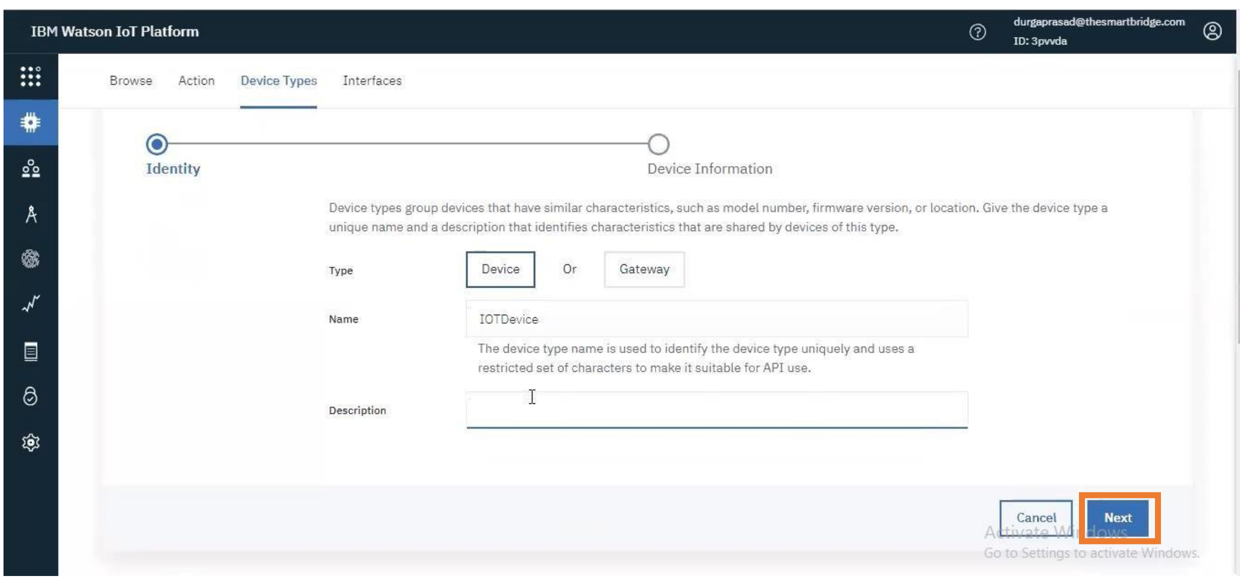
Step4: Click on the Device type.



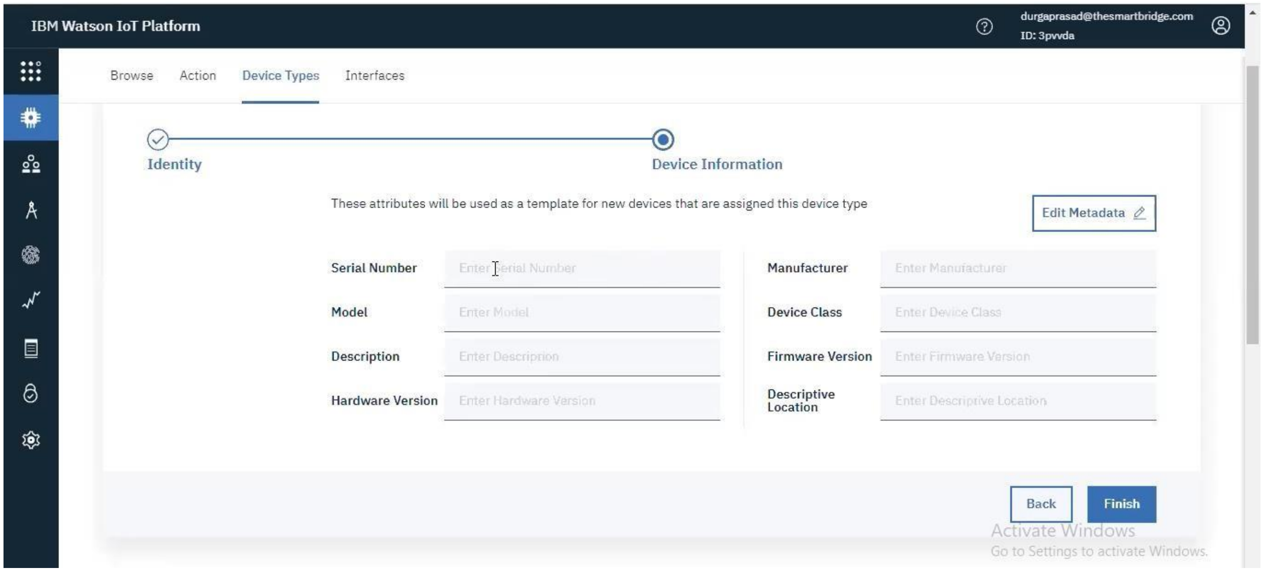
Step5: Click on the add device button



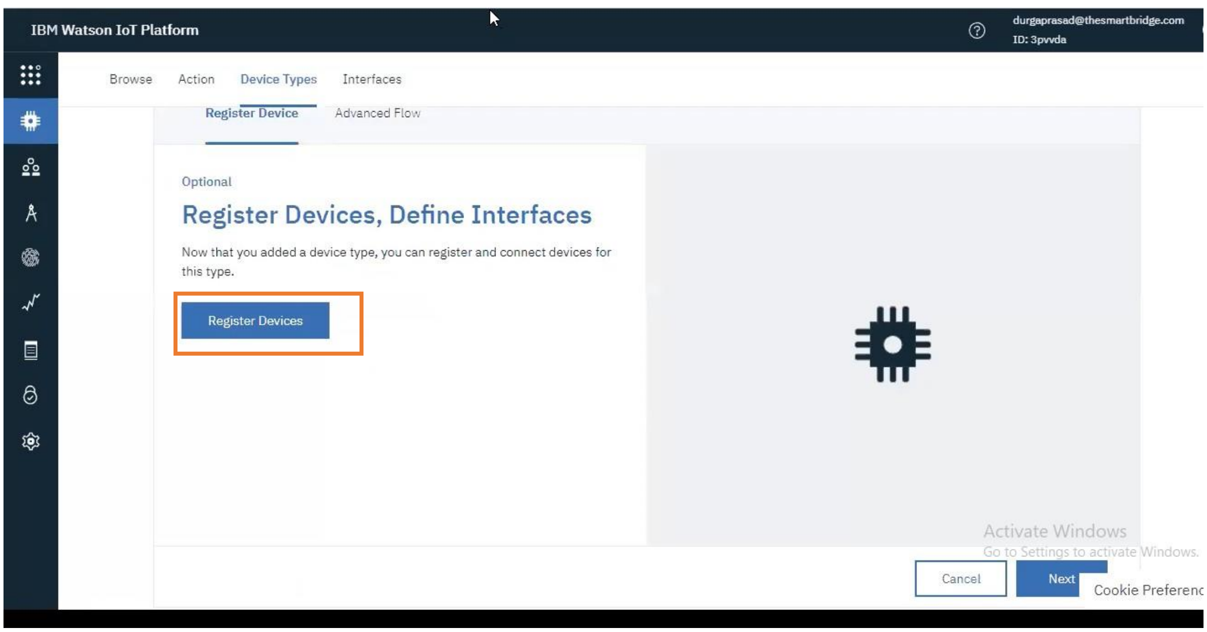
Step6: Enter the Device name and Description and click Next.



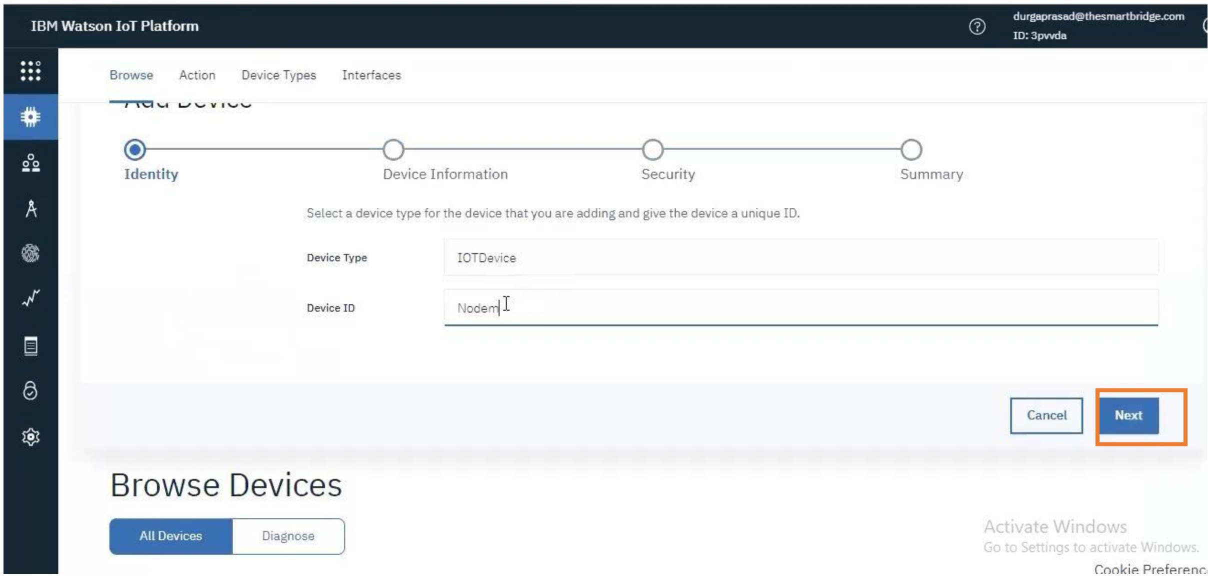
Step7: No need to fill the field of the Device Information and click Finish.



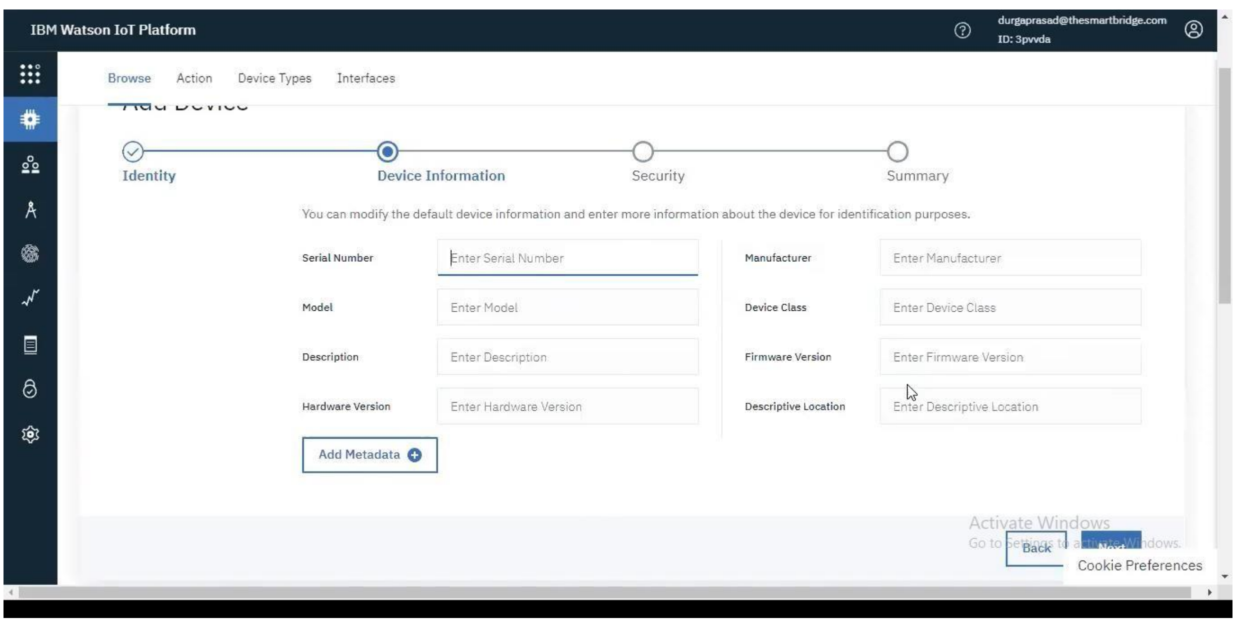
Step8: Click on the Register Device.



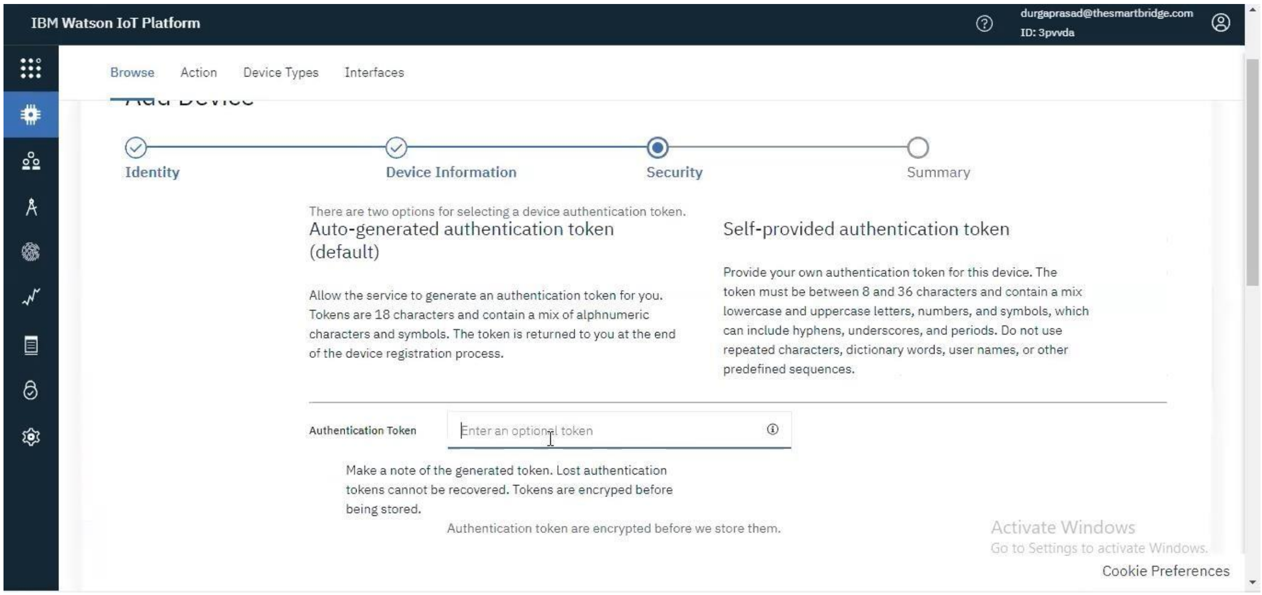
Step9: Enter the device name and click Next.



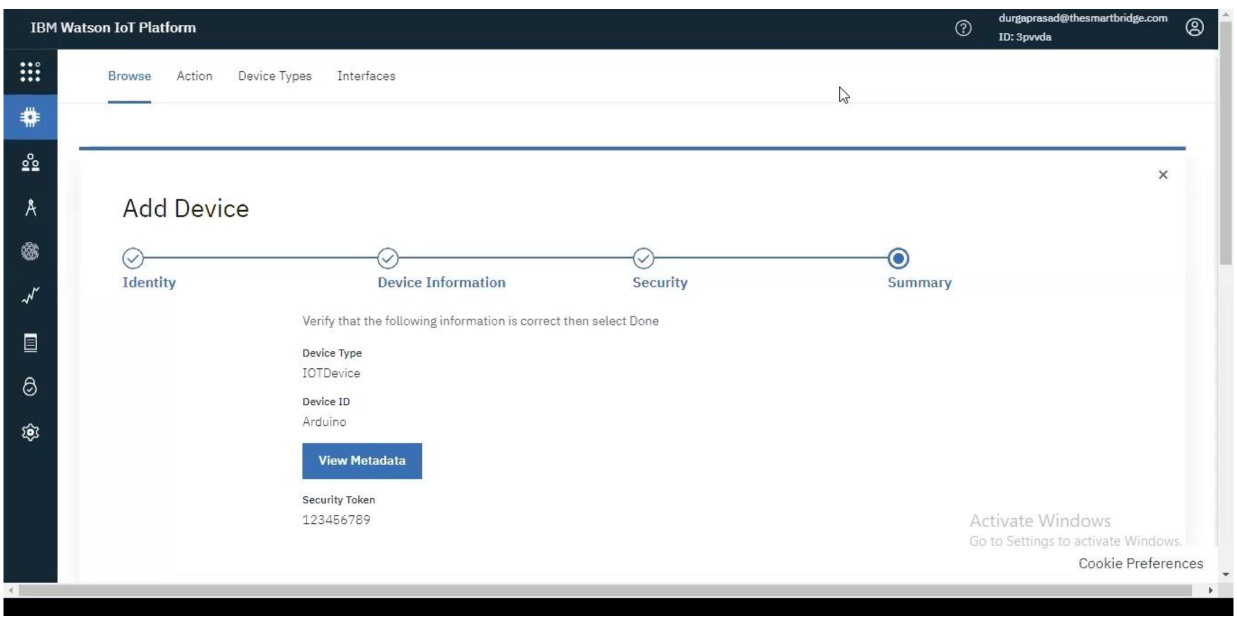
Step10: No need to fill the field and click Next button.



Step11: Filling the Authentication token and click Next button.

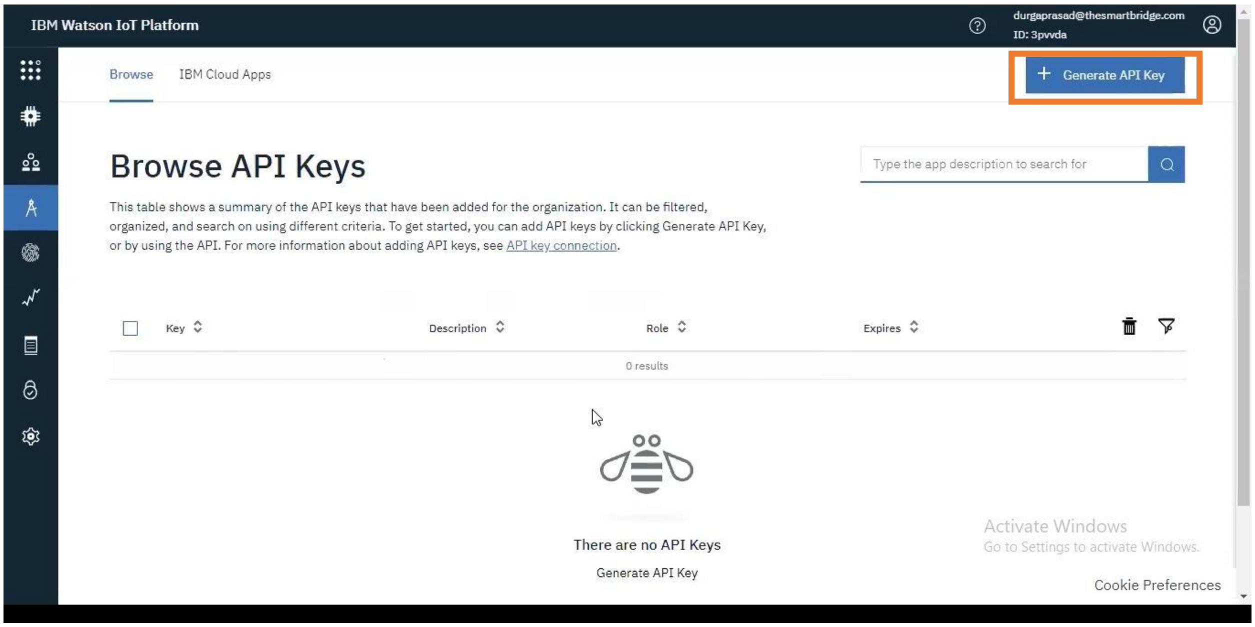


Step12: Final summary tab will show the device type and device name information.

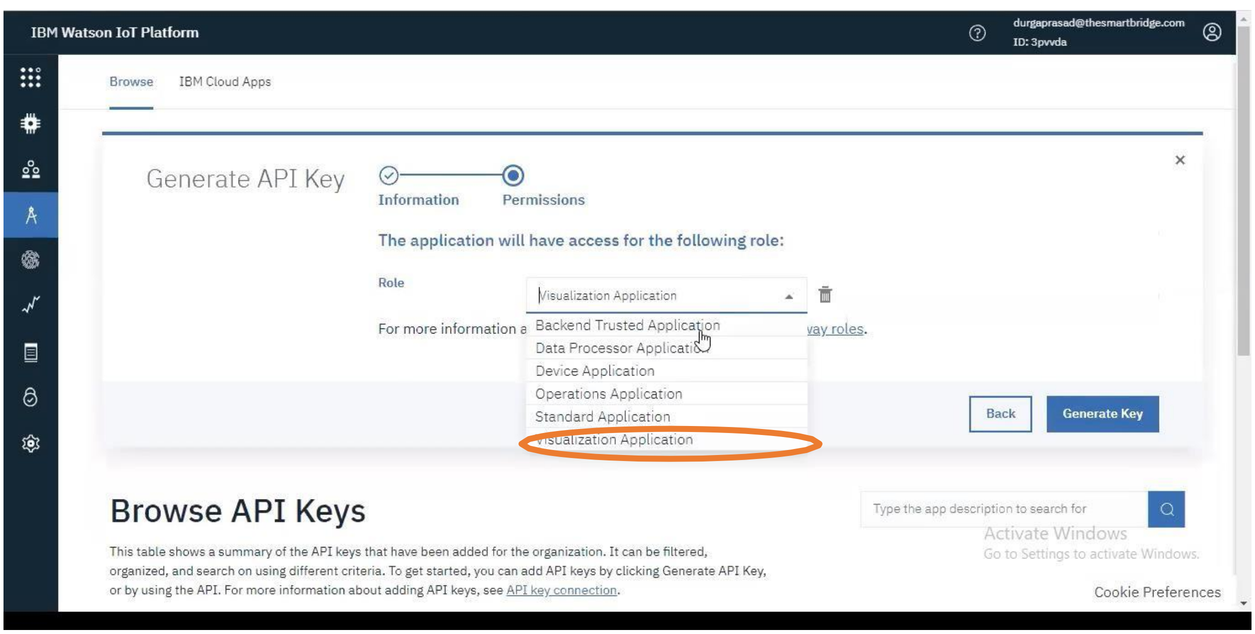


4.2 GENERATING THE DEVICE API

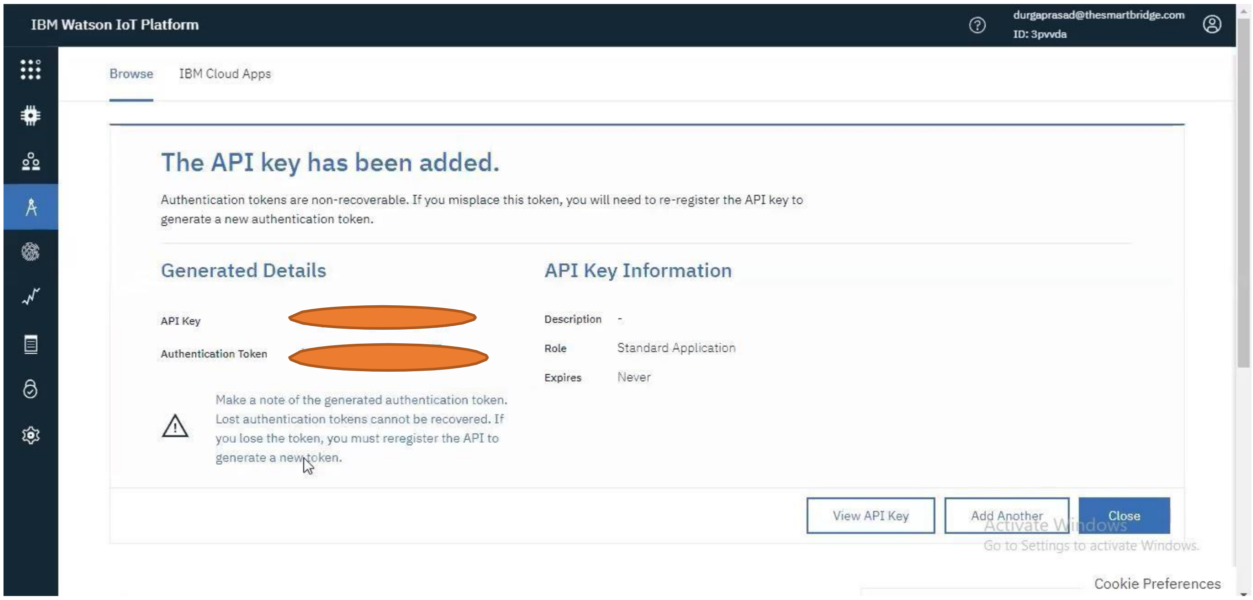
Step1: Click on the app icon and click on generate api key button.



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

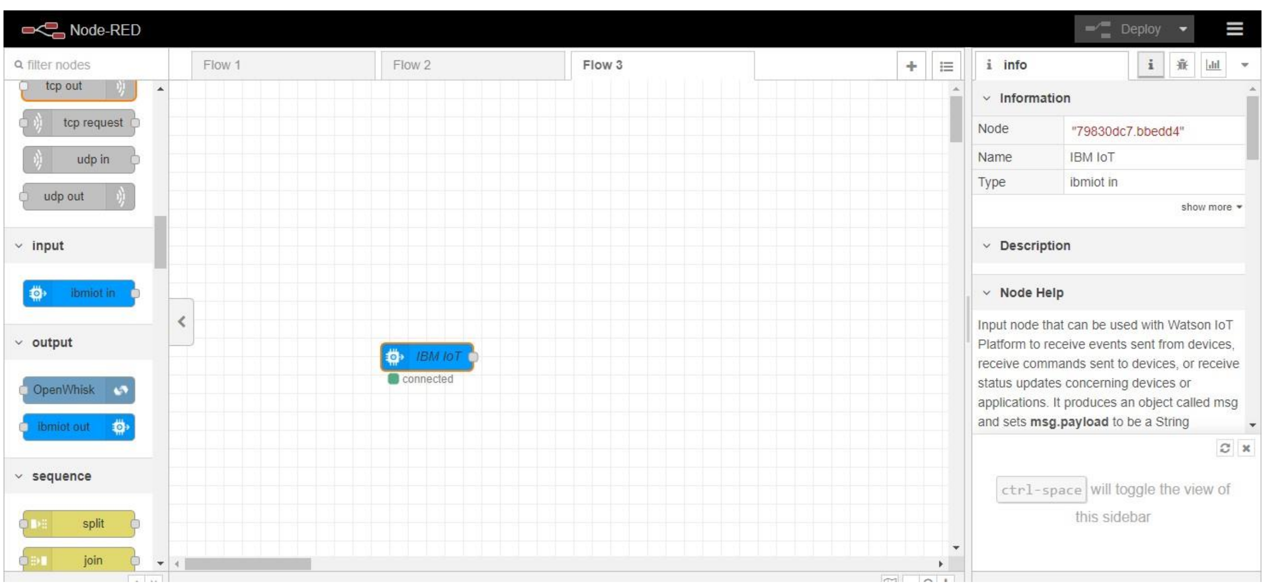


Step3: Note the Api key and authentication token for future reference

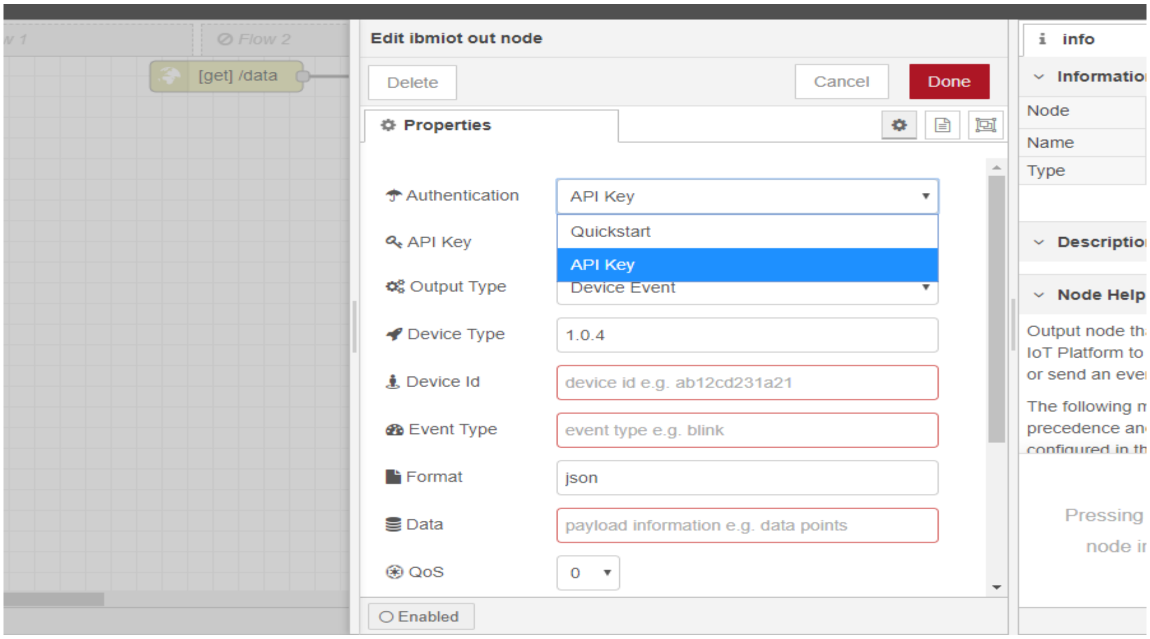


4.3 SETTING UP THE UI USING NODE-RED

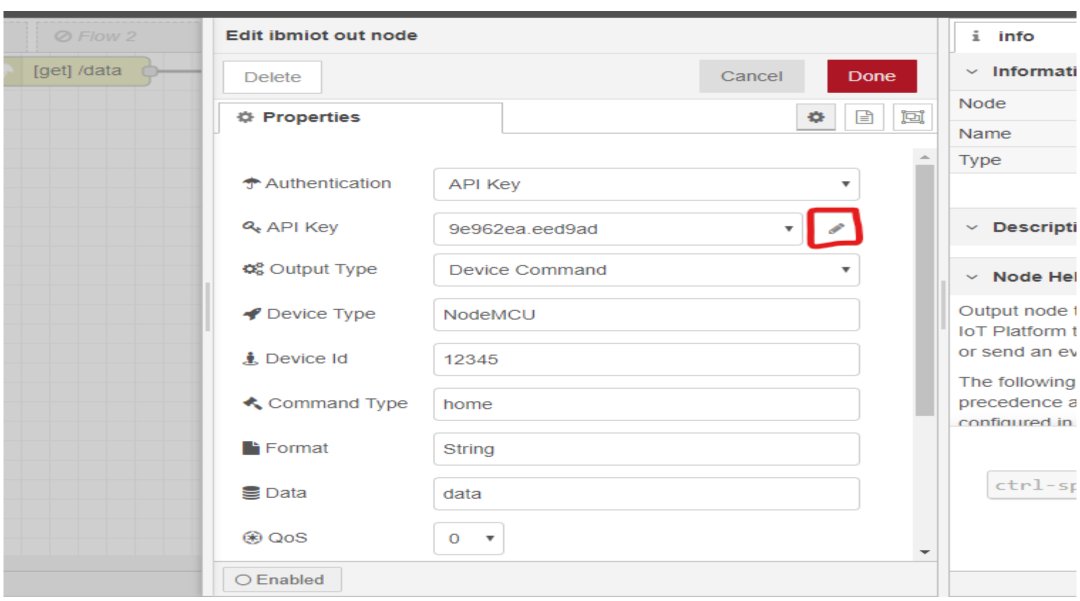
Step1: Select the IBM IoT in node from pallet



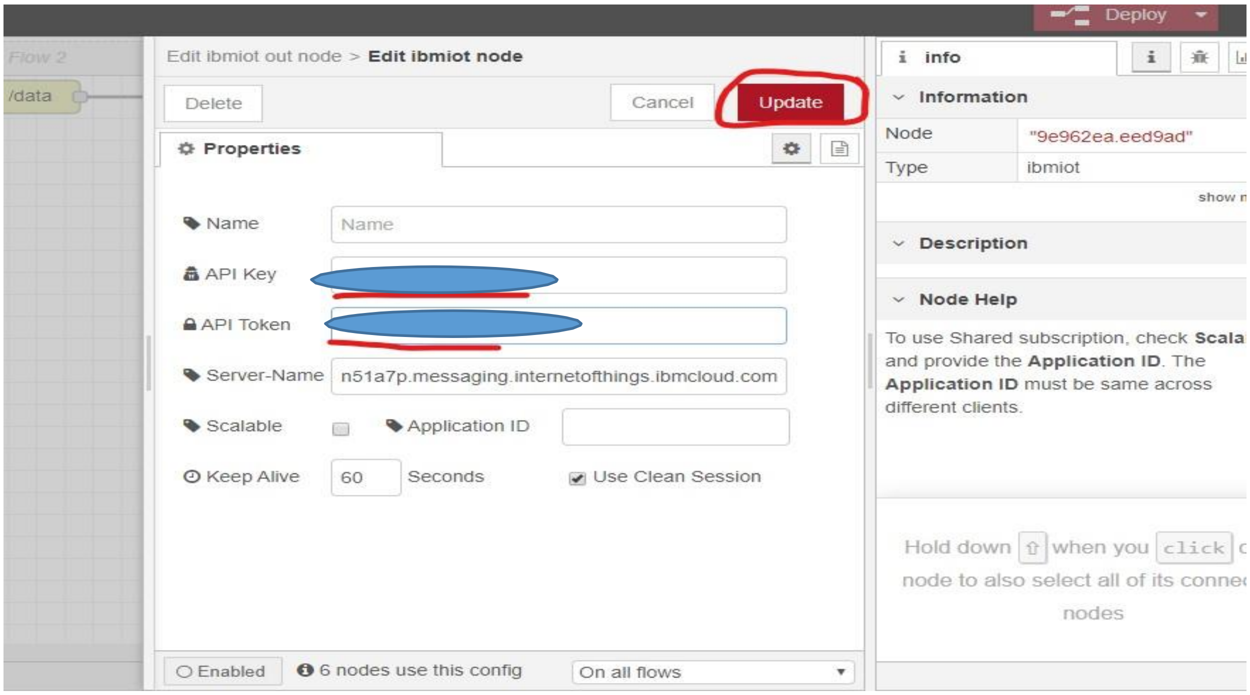
Step2: Double click the IBM IoT node, select the API option from the drop down and click the **Device Event**.



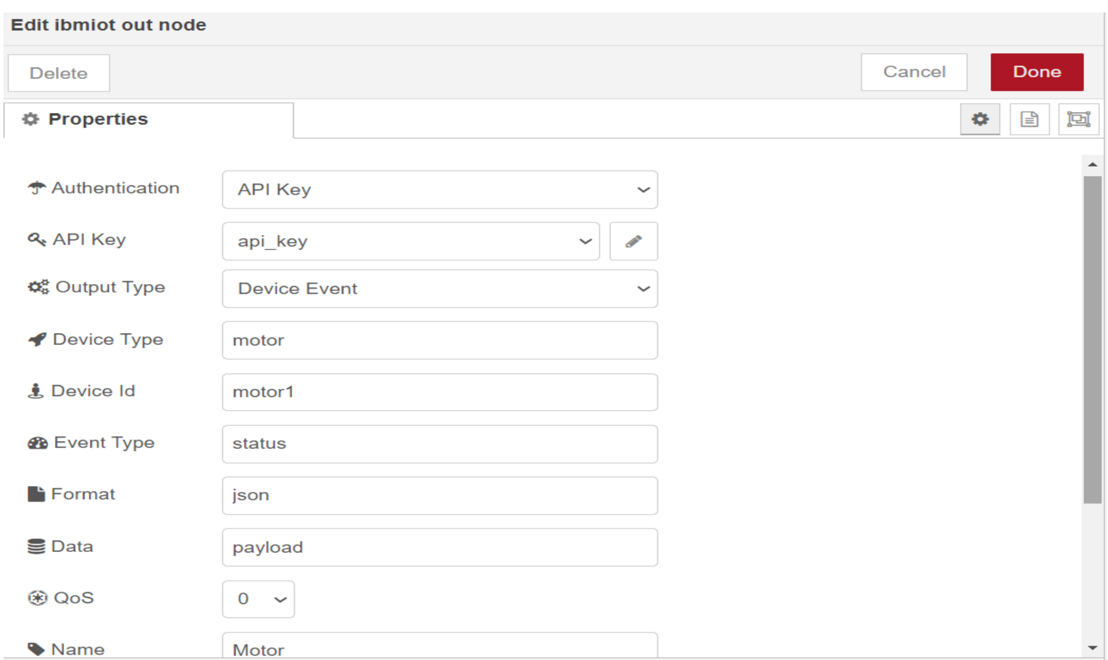
Step3: Click the pencil key icon in the API key.



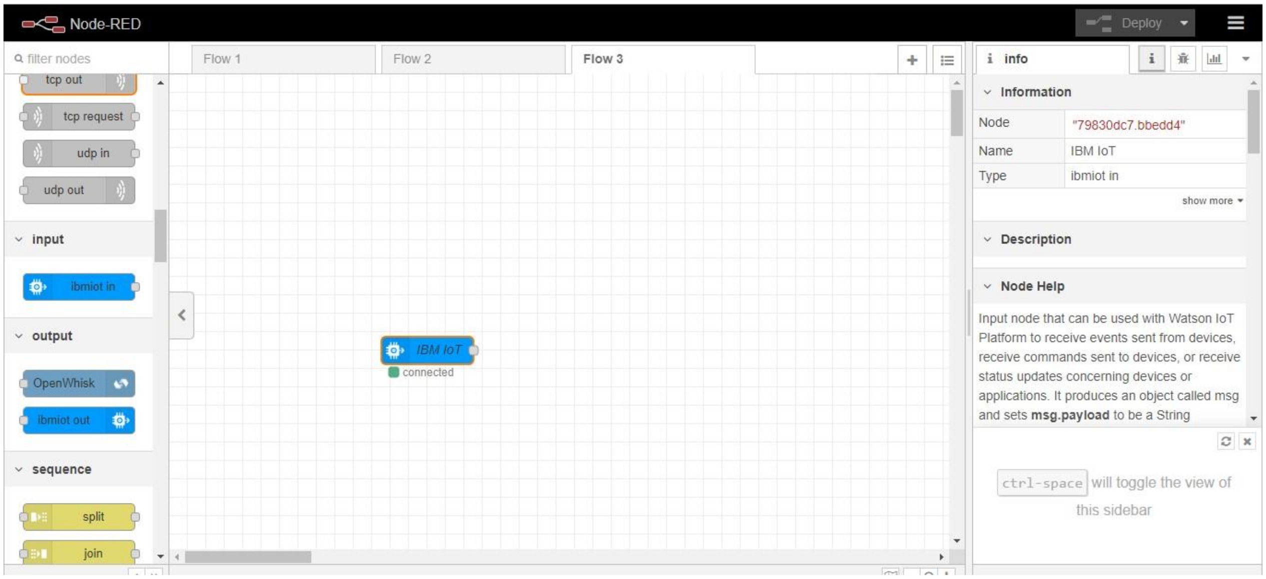
Step4: Enter the API key, API token and click update button.



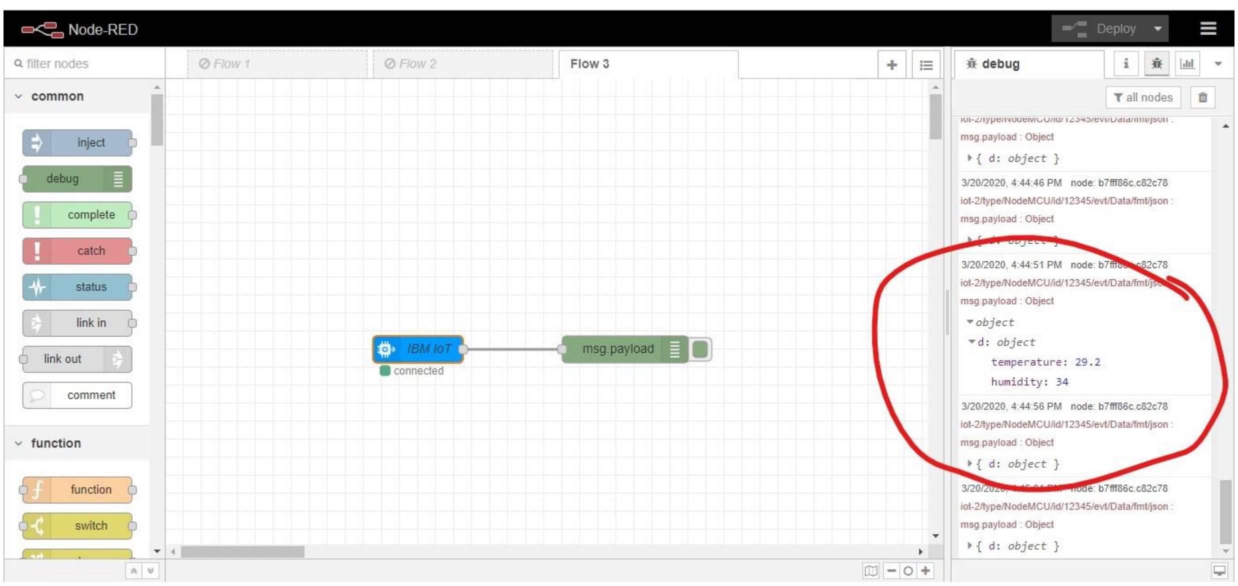
Step5: click on the Done button and click the deploy button.



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

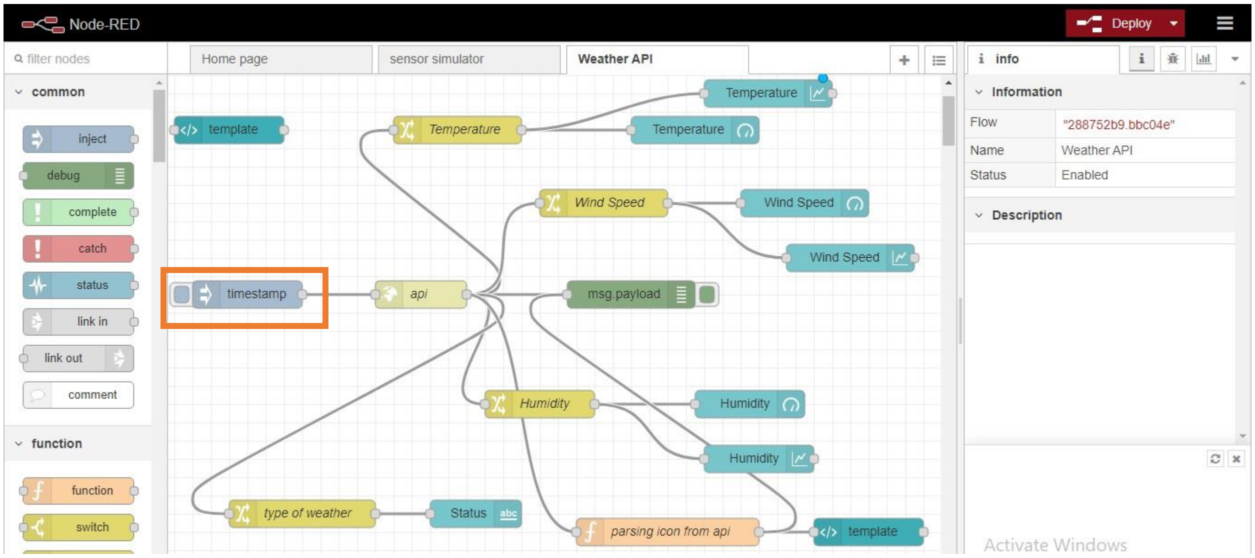


Step7: Place the debug node in the flow editor and click on deploy to see the temperature and humidity value in the debug tab.

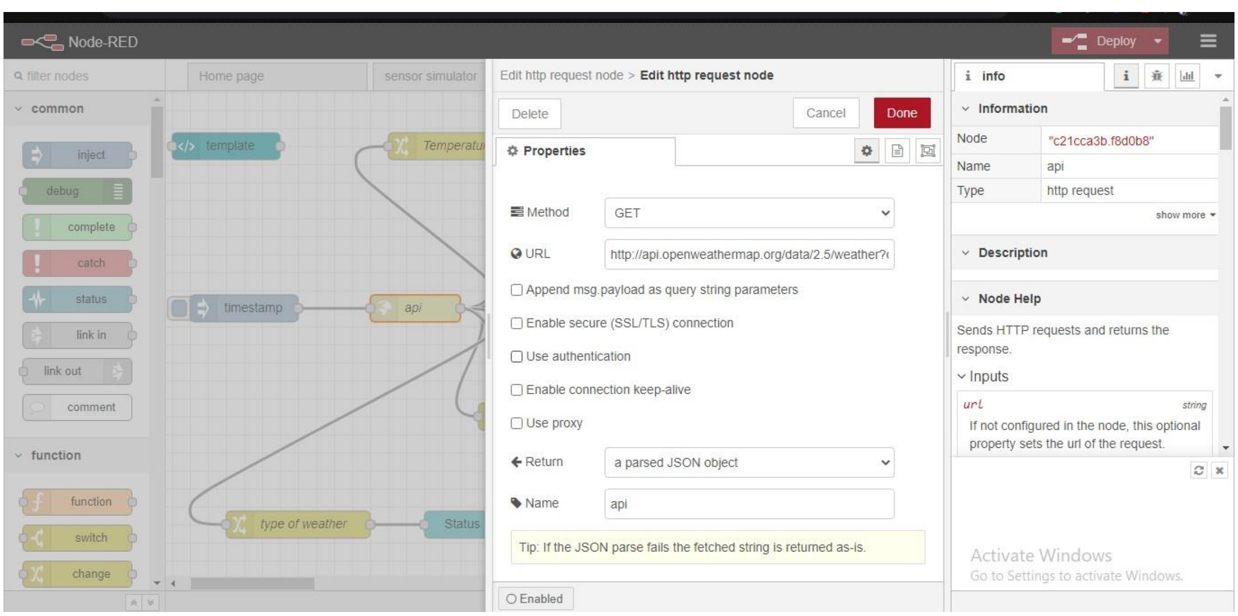


4.4 SETTING THE API FROM OPEN WEATHER.

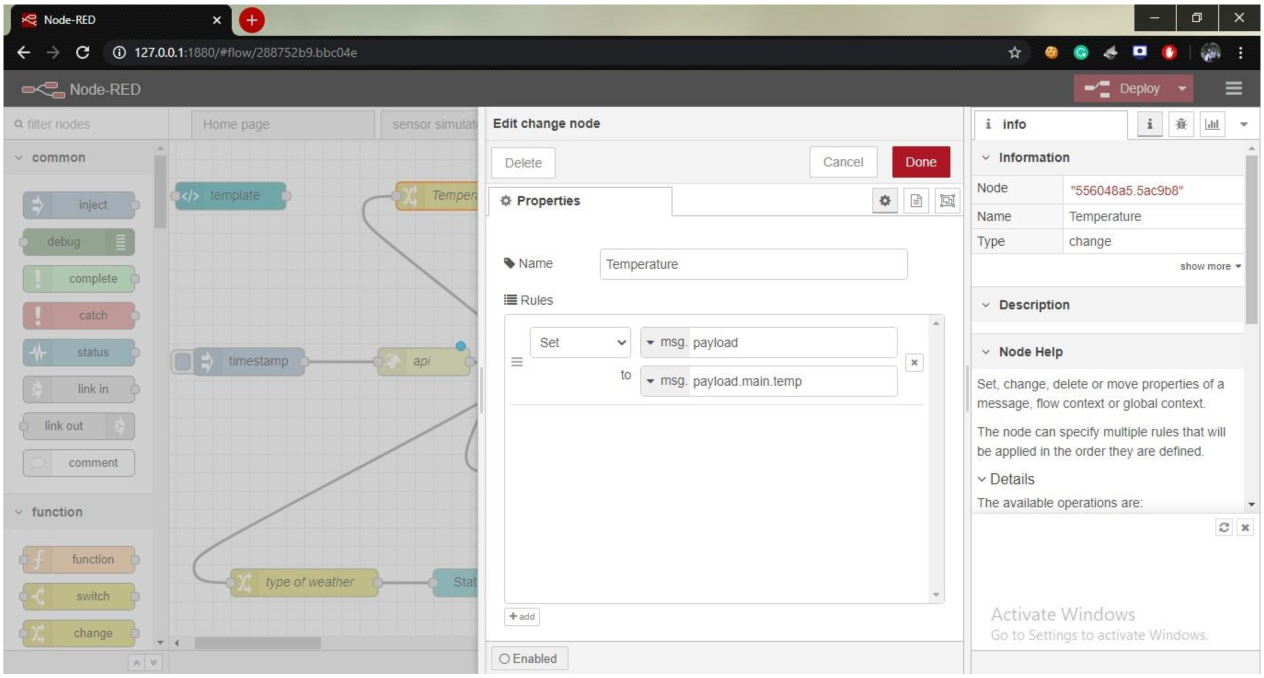
Step1: Timestamp node will trigger the API for certain interval of time. Set the required timing for the triggering.

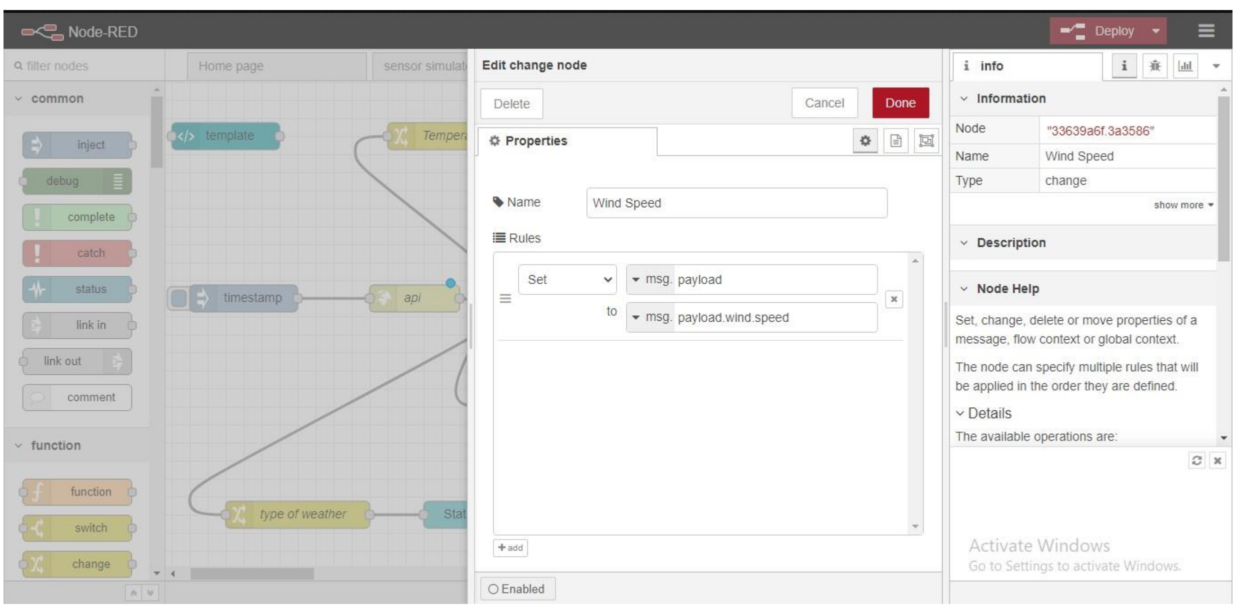


Step2: In the API node, give the API link and Return type as Jason parson to separate the API data.

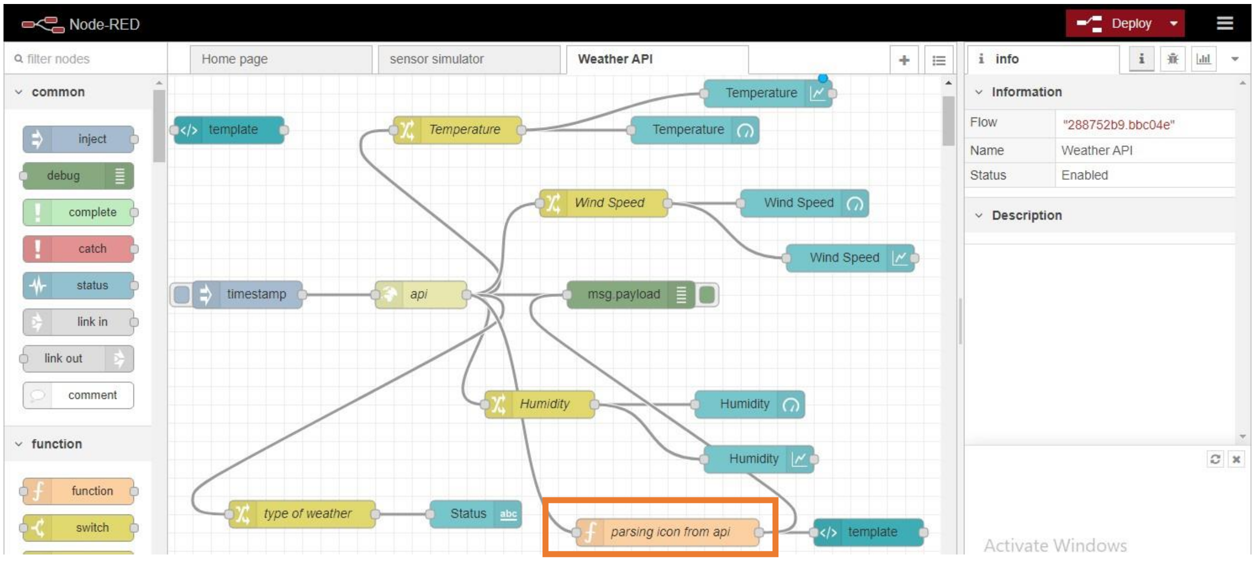


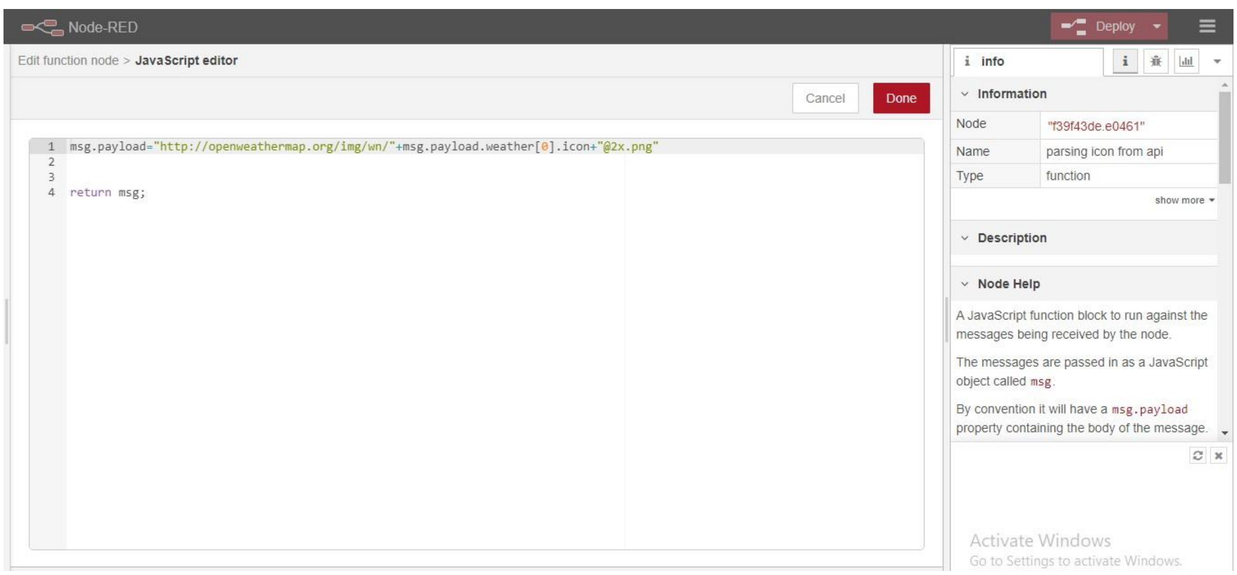
Step3: In the change node separate temperature value from the payload by following code given in the image. Repeat the same procedure for wind speed and Humidity.



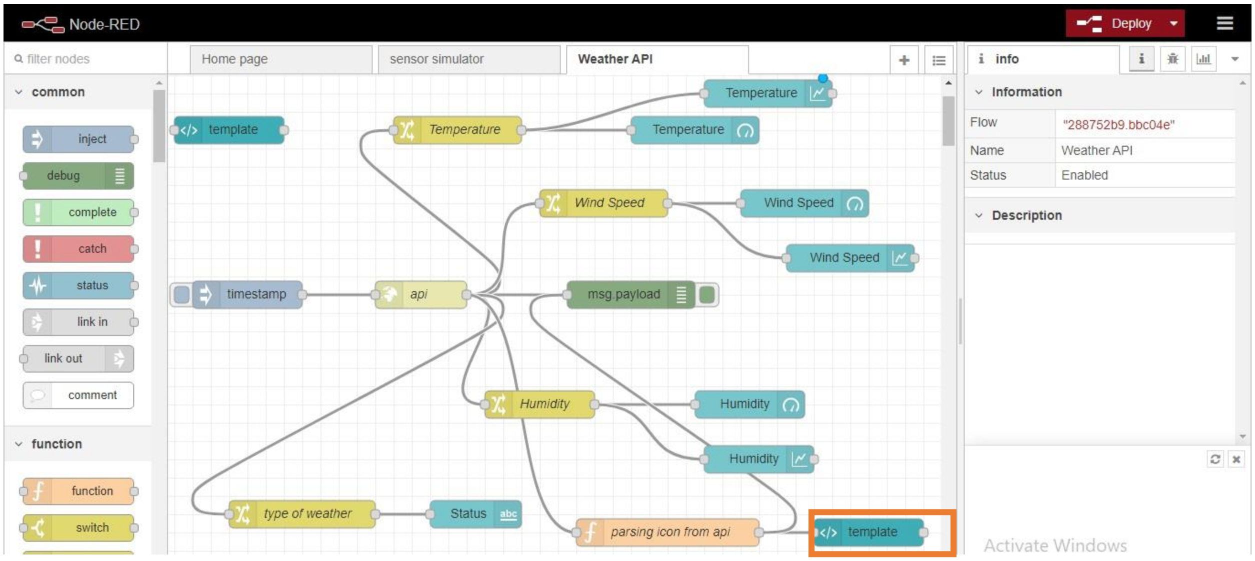


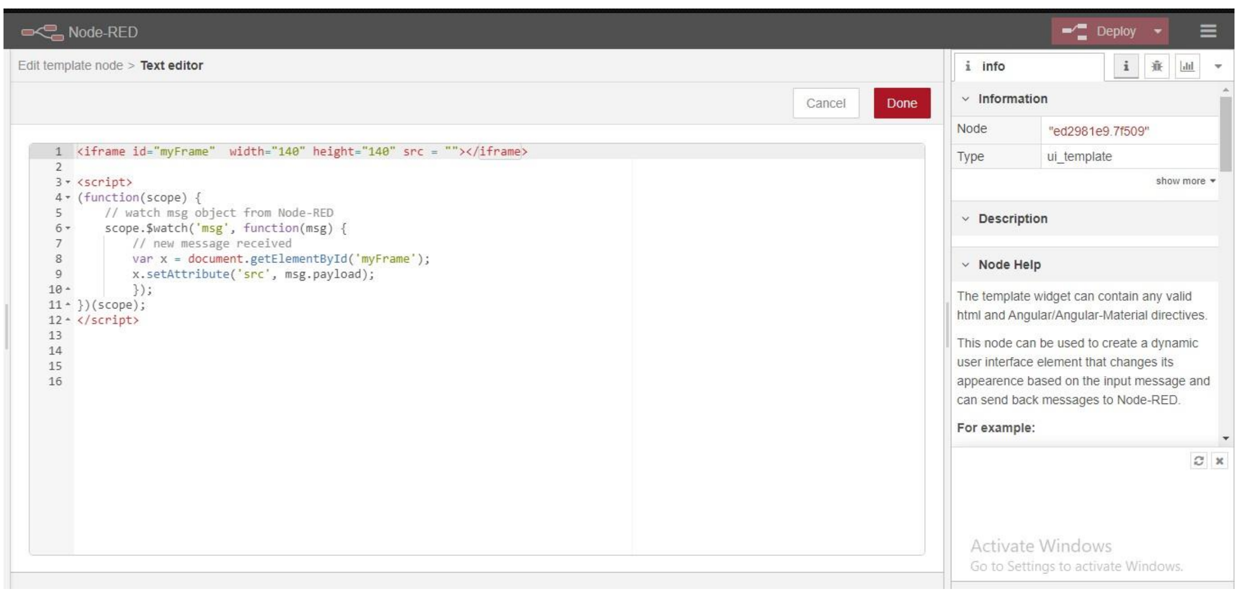
Step4: To get set the different images based on the cloud condition. We need to get the id of the image and to concatenate the id to the API link.





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





CHAPTER-05

Creating Machine learning model

Machine learning technology can play important role in smart irrigation system. It uses computational method to learn agriculture data. The focus of the learning process is to learn from training data to perform a given task. Set of examples in data which is described by set of features. That feature can be a nominal, binary or numeric. Irrigation system uses machine learning for water management, plant growth, and soil management. Also in agriculture it uses for crop management.

We have used the data for Rice crop where based on temperature, humidity, soil moisture and age of crop (in days) the status of motor is suggested.

Dataset example:

	Soil Moisture	Temperature	Humidity	Time	Status
0	54	22	70	21	ON
1	12	20	40	104	OFF
2	34	26	35	62	ON
3	7	44	44	93	OFF
4	50	38	23	92	OFF

Based on data and comparing different classifiers the accuracy of Random Forest Classifier comes to be 99.963% which is the highest.

```
accuracy=metrics.accuracy_score(Y_test,y_pred)
accuracy
```

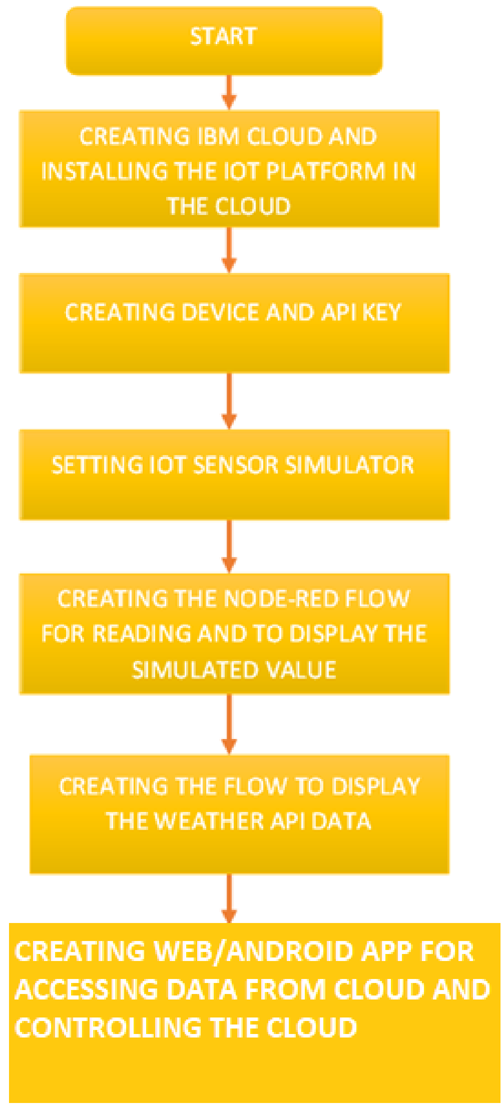
```
0.9996333333333334
```

Hence Random Forest Classifier is used for training the model.

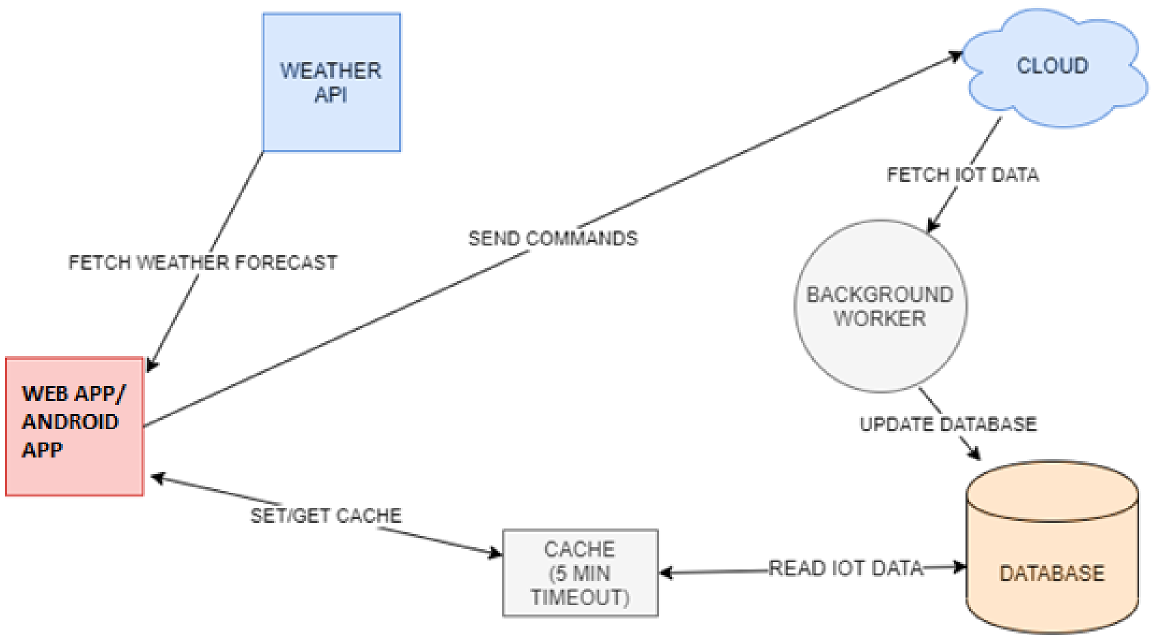
CHAPTER-06

FLOW CHART

6.1 METHODOLOGY



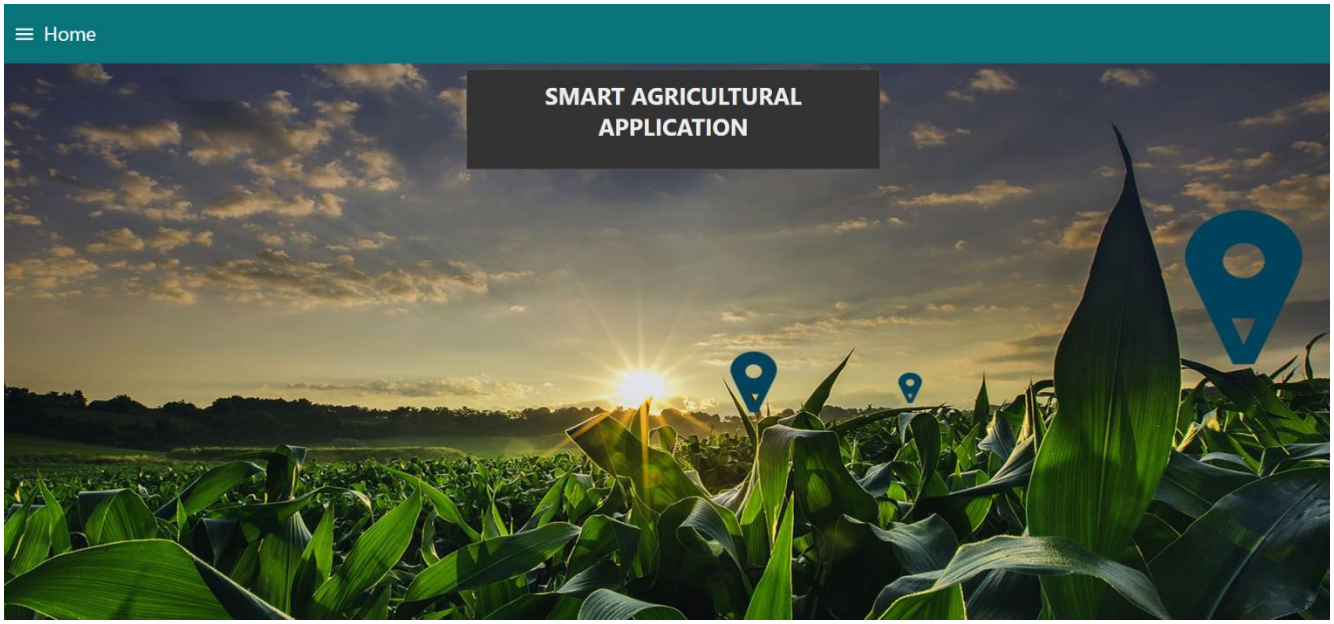
6.2 Data Flow Diagram for the Web / Android App



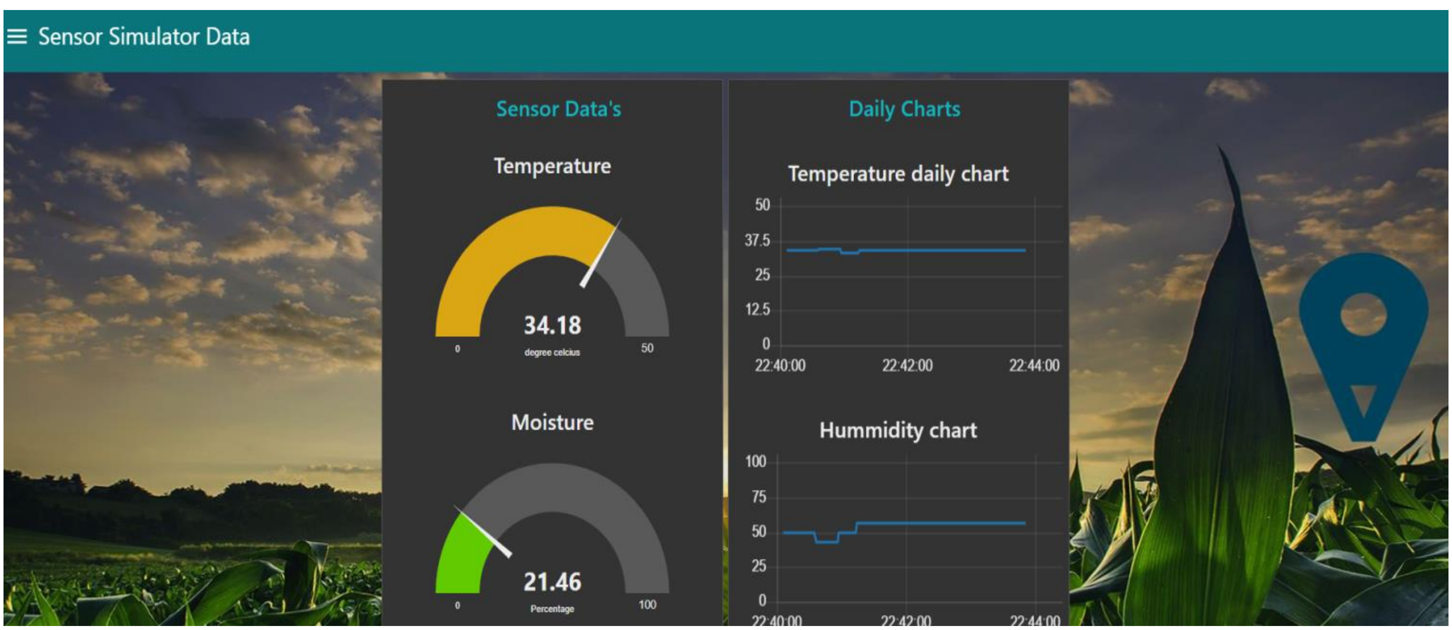
CHAPTER-07

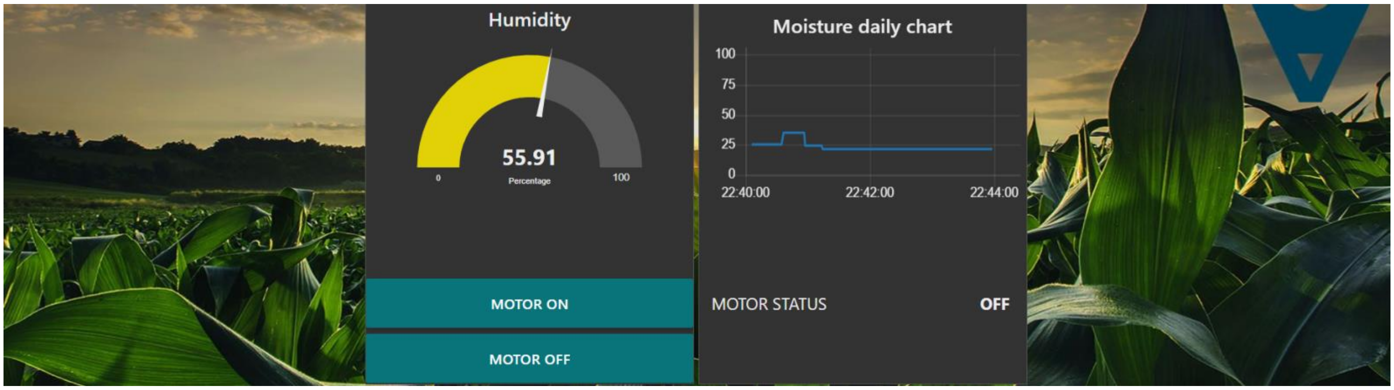
RESULT

7.1HOME PAGE

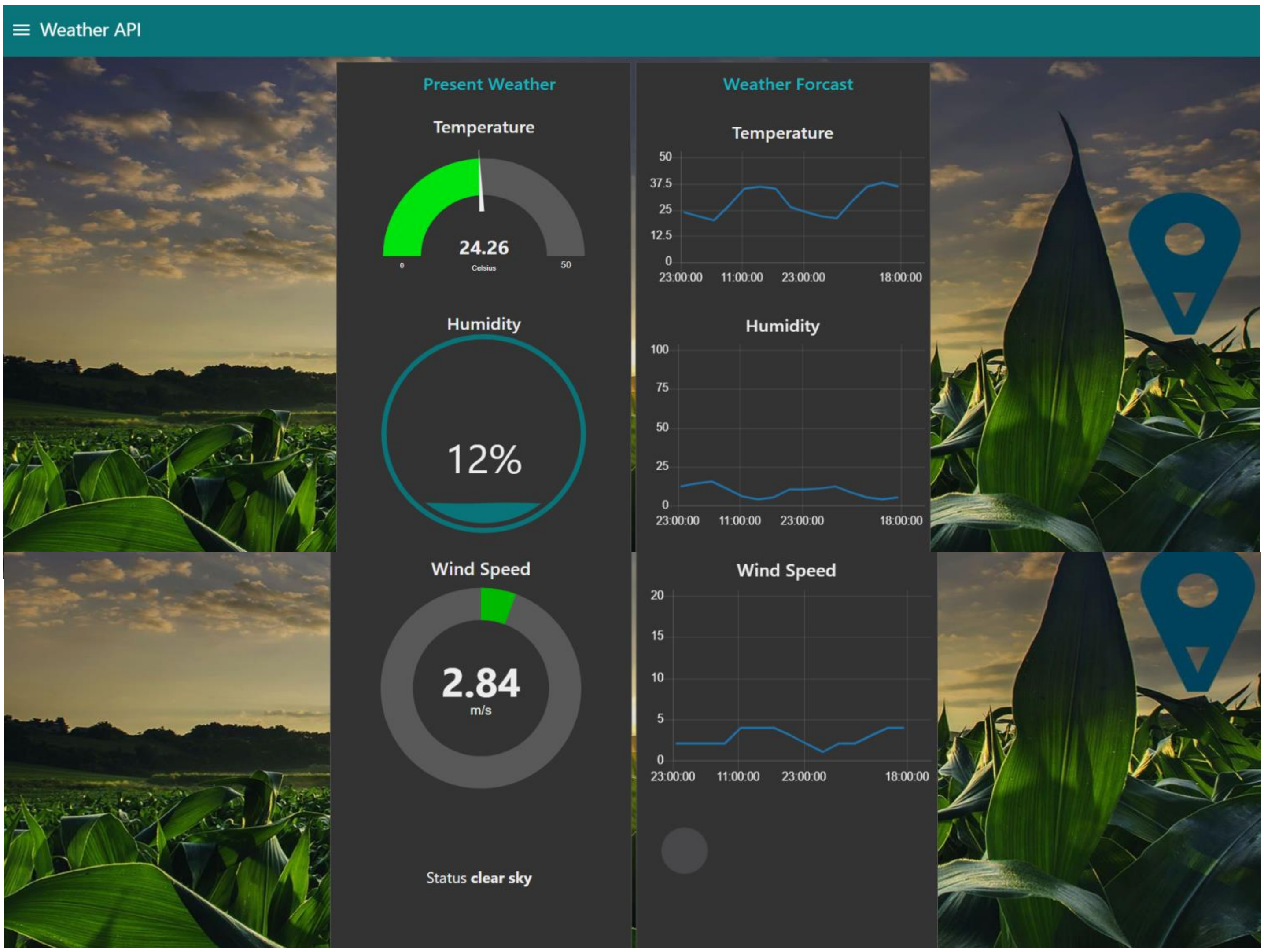


7.2SENSOR SIMULATOR AND MOTOR CONTROL PAGE



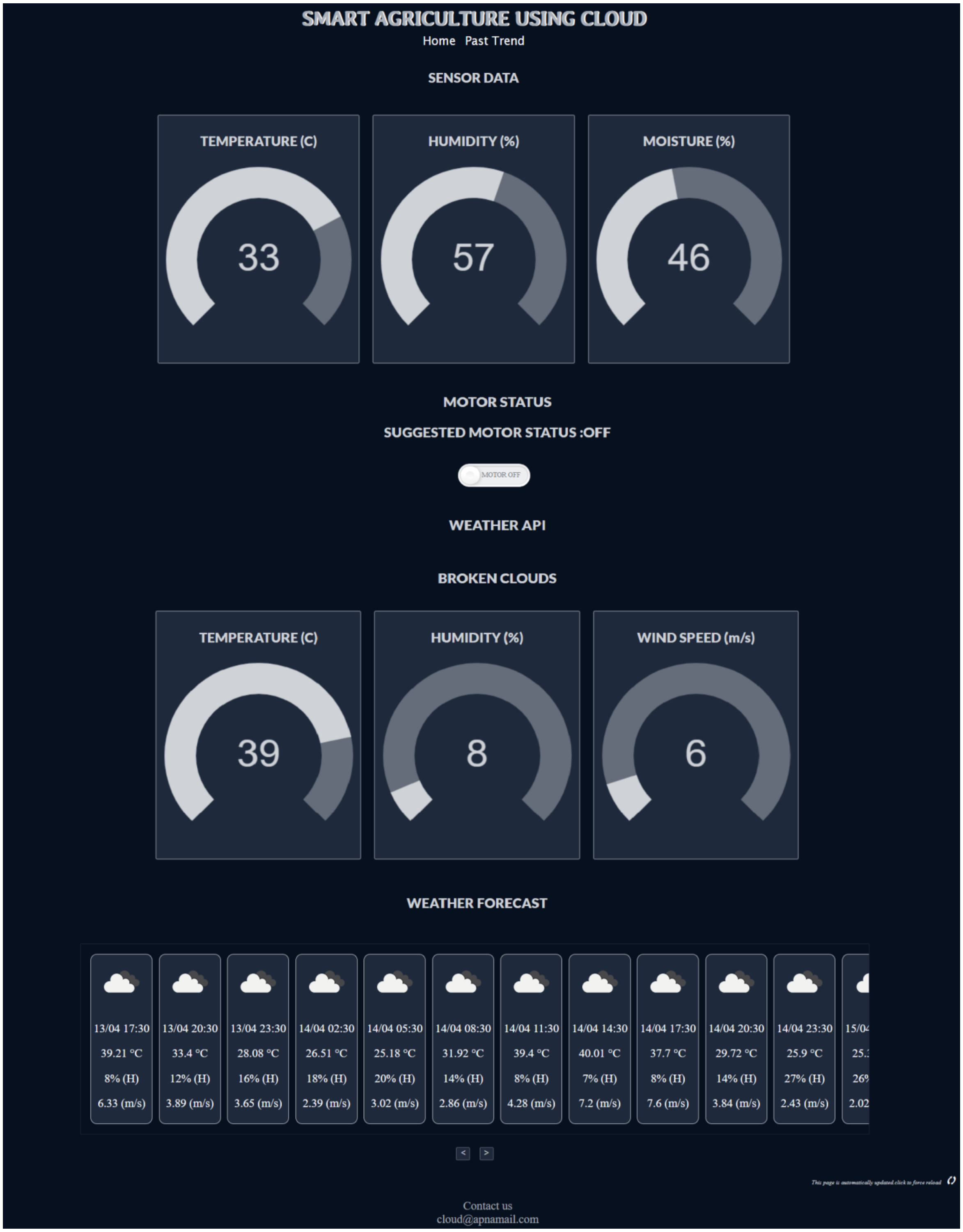


7.3WEATHER API DATA STREAMING

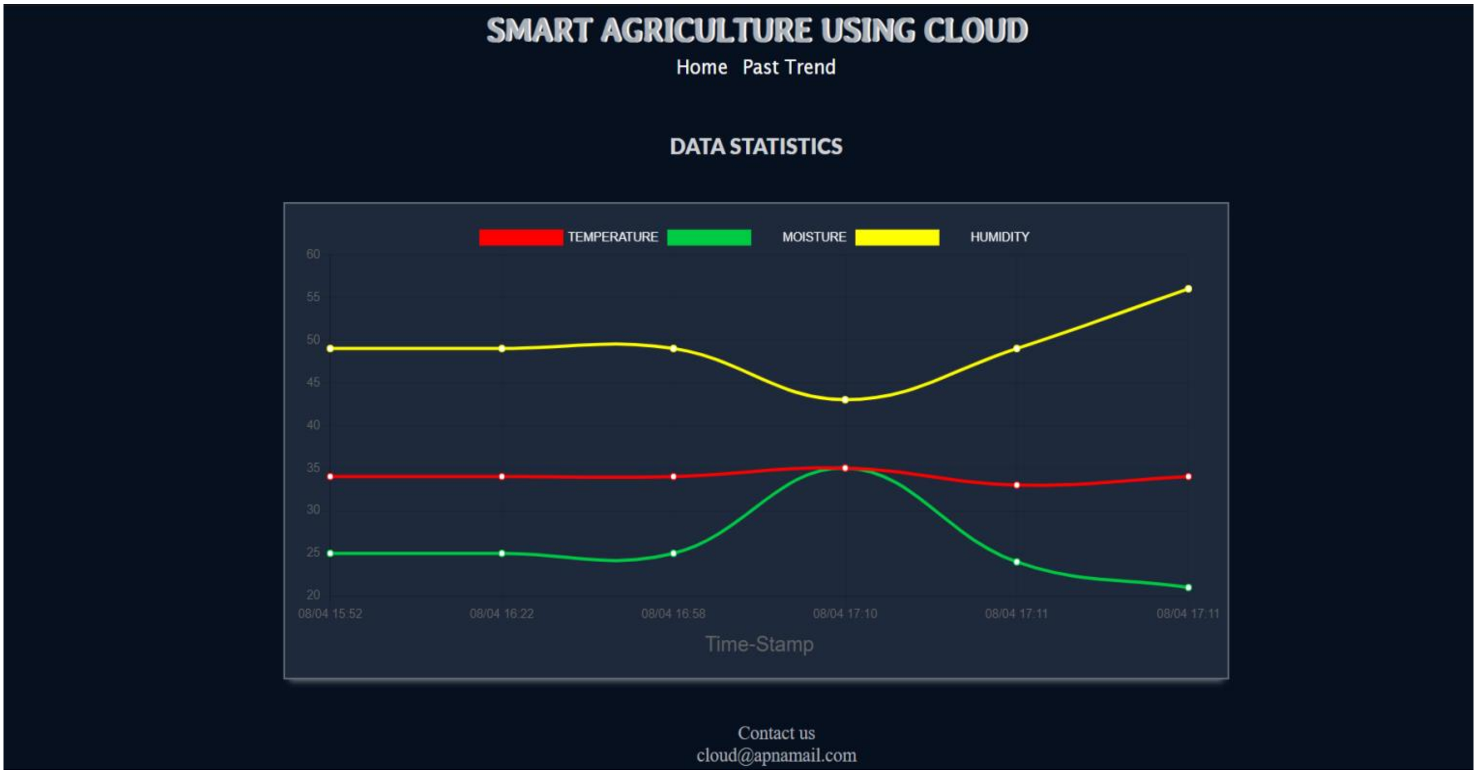


7.4 WEB APP UI

HOME

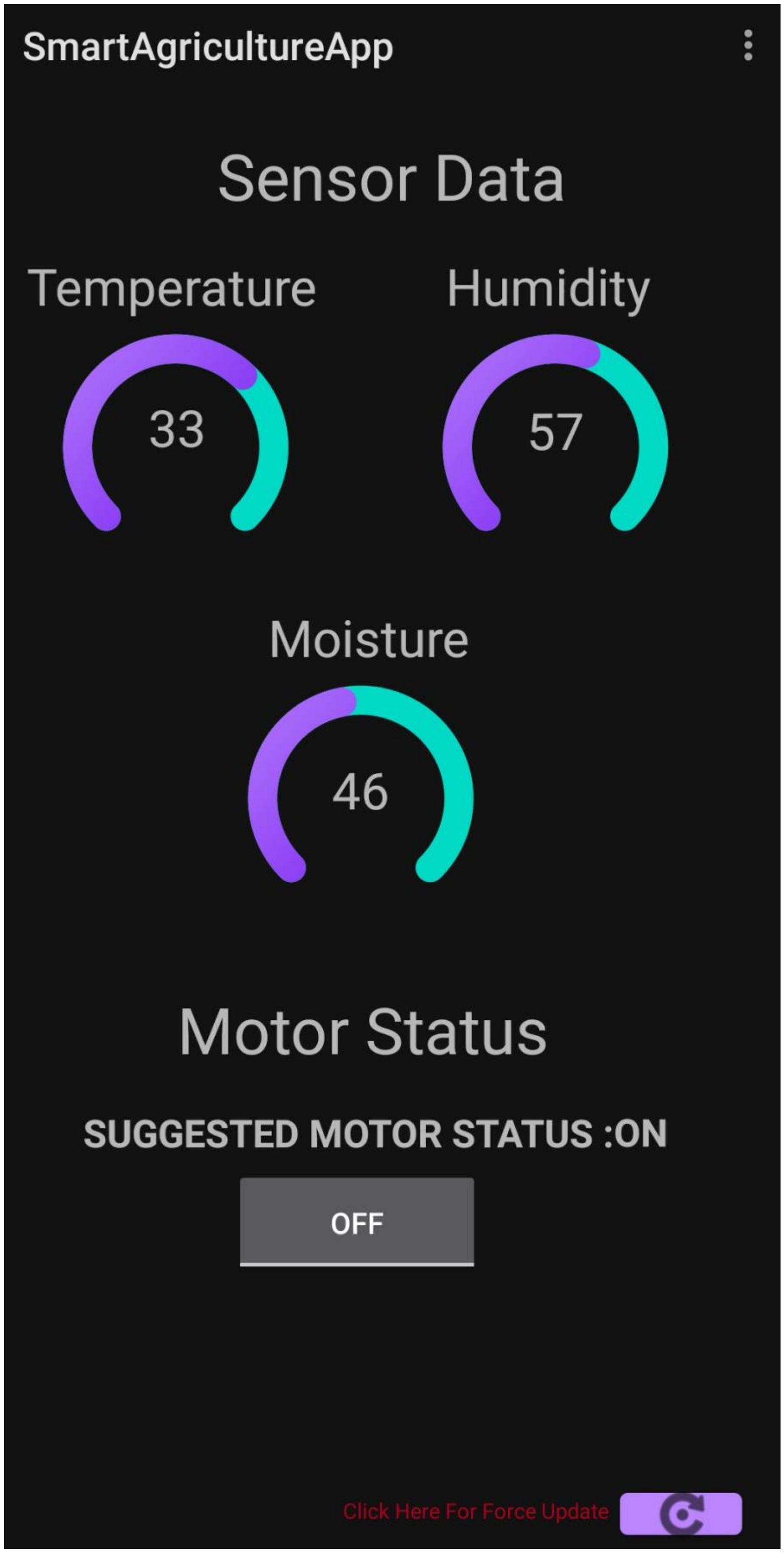


PAST TRENDS

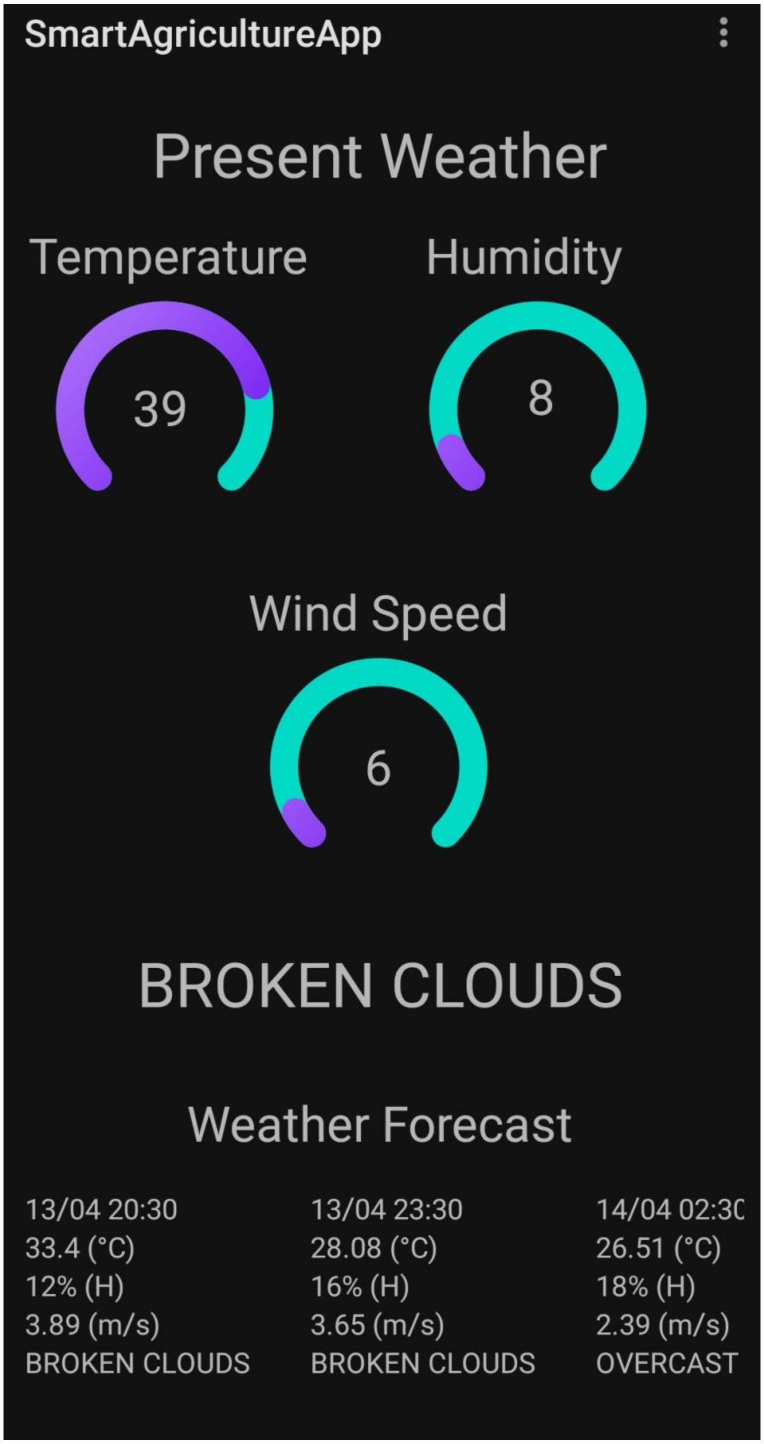

SMART AGRICULTURE USING CLOUD
Home Past Trend
DATA STATISTICS
TEMPERATURE
MOISTURE
HUMIDITY
60
55
50
45
40
35
30
25
20
08/04 15:52
08/04 16:22
08/04 16:58
08/04 17:10
08/04 17:11
08/04 17:11
Time-Stamp
Contact us
cloud@apnamail.com

7.5 ANDROID APP UI

SENSOR DATA UI



WEATHER FORECAST UI



CHAPTER-08

ADVANTAGE AND DISADVANTAGE

8.1 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.

8.2DISADVANTAGE

8.2.1 Since the real time sensor will be connected to the controller, the controller requires continuous supply of internet to transfer the data.

8.2.2 Non availability of weather prediction for long period of time. Since the long weather prediction require additional payment to open weather.

CHAPTER-09

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-10

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 voice will playimportant role in enhancing this project.
- Providing the GPS and GIS information will also improve productivity of thefarmer.

APPENDIX

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

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