SMART HOME

(SMART AGRICULTURAL SYSTEM)

COURSE: Smart bridge internship

BRANCH: ECE

TOPIC : IOT

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ABSTRACT

An IOT based web application, smart agricultural system, smart home

The Internet of things is a system of interrelated computing devices, mechanical and digital machines provided with unique identifiers and the ability to transfer data over a network without requiring human-to-human or human-to-computer interaction. By means of low-cost computing, the cloud, big data, analytics, and mobile technologies, physical things can share and collect data with minimal human intervention. In this hyperconnected world, digital systems can record, monitor, and adjust each interaction between connected things. The physical world meets the digital world—and they cooperate.

Smart agricultural system based on IOT helps in monitoring soil moisture and climatic conditions, accordingly helps the farmer to turn on the motor and water the farm. This web application decreases the labour work and helps to finish the work efficiently and smartly. The farmer will no longer worry about his presence in the farm and can turn the motor on from anywhere and anytime.

With growing population and increasing demand of products we need to come up with smart methods to meet the needs accordingly. This web application can improve the production with less labour and less efforts.

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1.INTRODUCTION

1.1 Overview

With growing population and increasing demand of products we need to come up with smart methods to meet the needs accordingly.

Smart agricultural system based on iot helps in monitoring soil moisture and climatic conditions to grow and yield a good crop. Farmer is provided a mobile app using which he can monitor the temperature, humidity and soil moisture parameters along with weather forecasting details. Based on all the parameters. This measurement can be done by fixing sensors. Sensors help to know the moisture content and soil conditions. So accordingly, he can water his crop by controlling the motors using the mobile application. Even if the farmer is not present near his crop, he can water his crop by controlling the motors using the mobile application from anywhere. This way the work can be done with less labour and more efficiently.

With the help of this project by using newer and smarter methods the yield can be increased.

1.2 Purpose

The stronger the base, the better the built. Agriculture forms the base of an economy. Better the agricultural system, better is the economy.

Agriculture provides raw materials to many industries which form the backbone of the nation. Most importantly, it helps a nation to strive by providing food and other agrarian products. India, for example, which is primarily an agrarian country, has a bulk of the working population engaged in agricultural activities.

Agriculture is important not only for the Supply of Food but also for the Provision of Raw Materials for other Industries such as Textiles, Sugar, Jute, Vegetable oil and Tobacco. Agriculture is not only an Occupation for People but also a Way of life. Most Customs and Cultures in the World revolve around Agriculture.

To increase the output and stabilize the growth, smarter systems like smart agricultural system can be used.

2.LITERATURE SURVEY

2.1 Existing problems

Indian agriculture is continuously subjected to instability arising out of fluctuations in weather and gamble of monsoon. As a result, the production of food-grains and other crops fluctuates widely leading to continuous fluctuation of prices of agricultural crops. This has created the element of instability in the agricultural operation of the country.

Agricultural labourers are the most exploited unorganized class in the rural population of the country. From the very beginning landlords and Zamindars exploited these labourers for their benefit and converted some of them as slaves or bonded labourers and forced to continue the system generation after generation. All these led to wretched condition and total deprivation of the rural masses. After 50 years of independence, the situation has improved marginally. But as they remain unorganized, thus economic exploitation of these workers continues. The level of income, the standard of living and the rate of wages remained abnormally low.

The farmers in India have been adopting orthodox and inefficient method and technique of cultivation. It is only in recent years that the Indian farmers have started to adopt improved implements like steel ploughs, seed drills, barrows, hoes etc. to a limited extent only. Most of the farmers were relying on centuries old. Wooden plough and other implements. Such adoption of traditional methods is responsible for low agricultural productivity in the country.

Better methods need to used for better output and better life.

2.2 Proposed solution

To overcome the problems faced in traditional agriculture methods, smart agricultural system can be used.

- Smart Agriculture System based on IoT can monitor soil moisture and climatic conditions to grow and yield a good crop.

- The farmer can also get the real time weather forecasting data by using external platforms like Open Weather API.
- Farmer is provided a mobile app using which he can monitor the temperature, humidity and soil moisture parameters along with weather forecasting details.
- Based on all the parameters he can water his crop by controlling the motors using the mobile application.
- Even if the farmer is not present near his crop he can water his crop by controlling the motors using the mobile application from anywhere.
- Here we are using the Online IoT simulator for getting the Temperature, Humidity and Soil Moisture values.

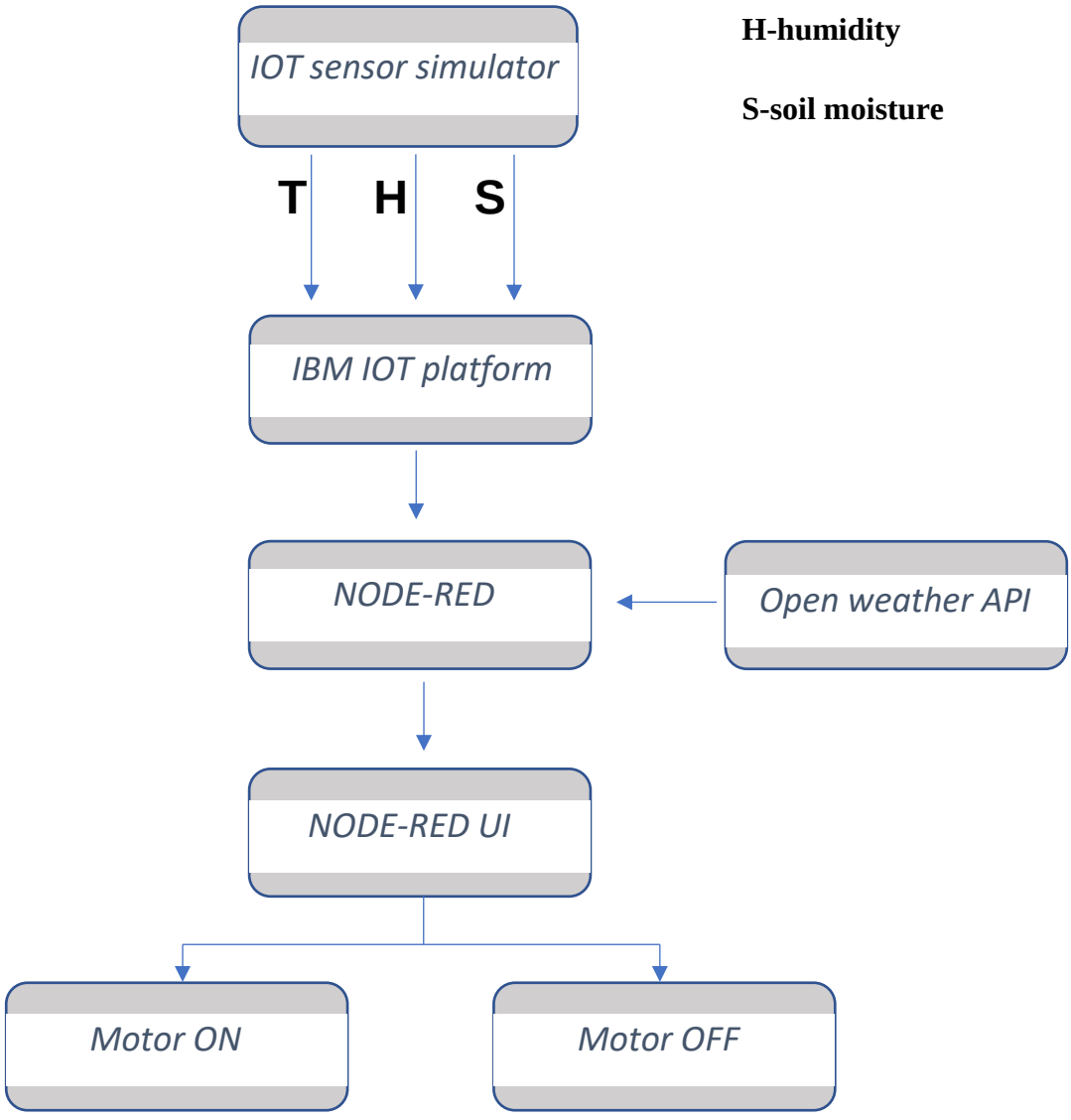
3.Theoretical analysis

2.1 Block diagram

T-temperature

H-humidity

S-soil moisture

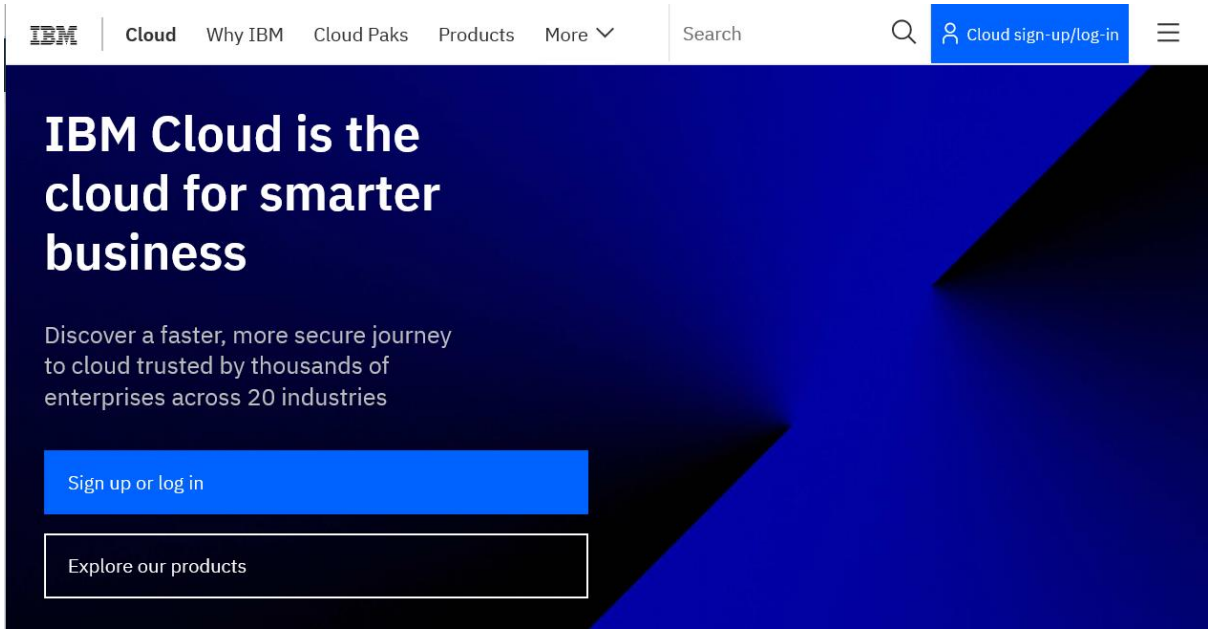


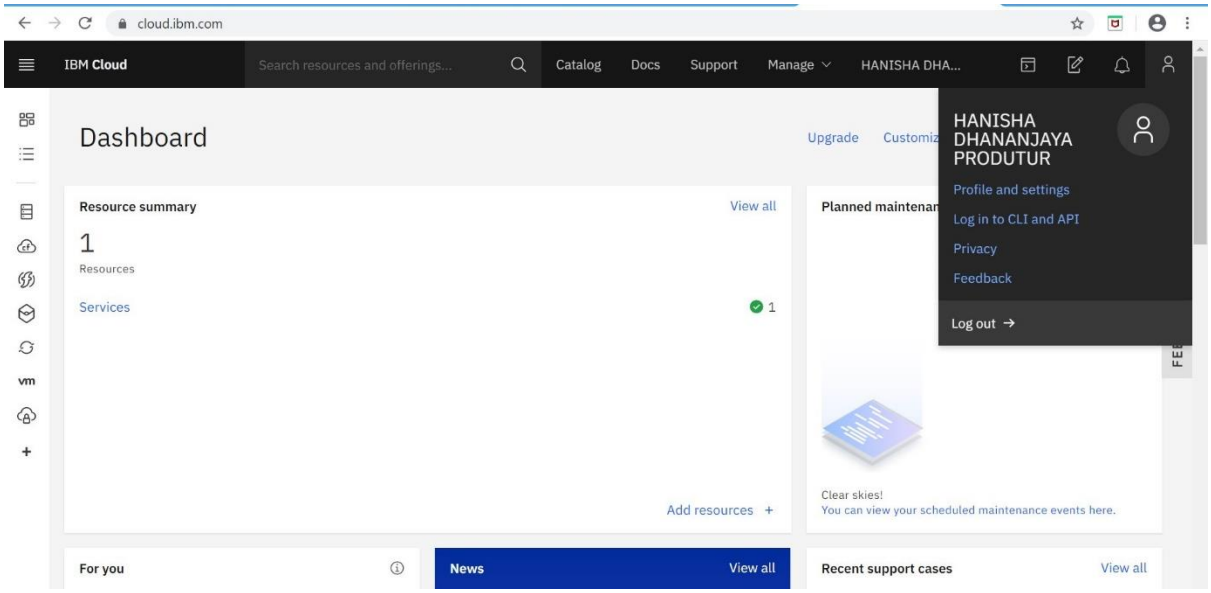
3.2 Software designing

3.2.1 Creating a IBM cloud account

IBM Cloud is a suite of cloud computing services from IBM that offers both platform as a service (PaaS) and infrastructure as a service (IaaS). With IBM Cloud IaaS, organizations can deploy and access virtualized IT resources -- such as compute power, storage and networking -- over the internet.

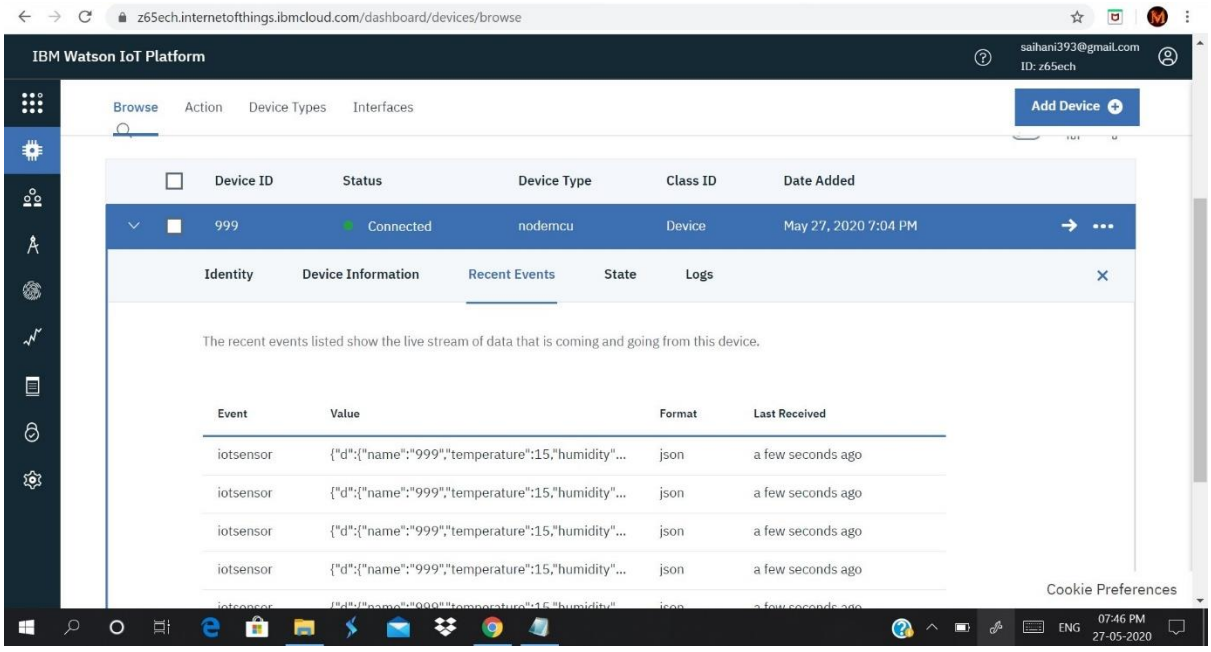
Link:https://cloud.ibm.com/



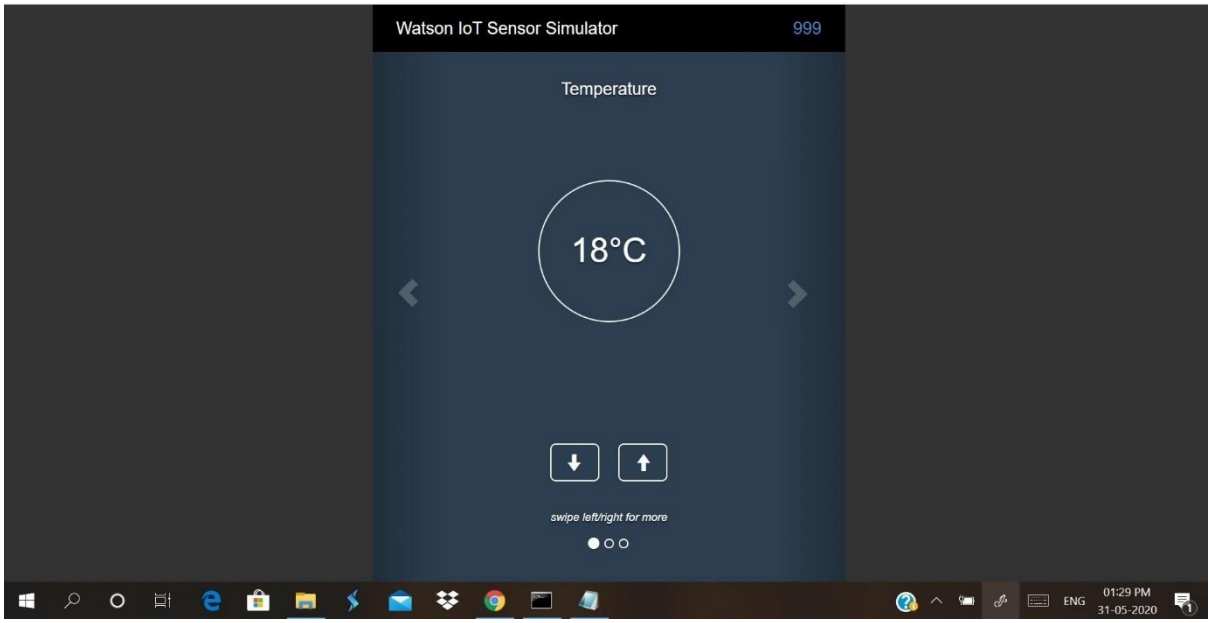


3.2.2 Creating a device in IBM Watson account

Login to your IBM cloud account and click on services. In services section click on the IoT platform you have created. In IoT platform service tab click on Launch to launch the IoT platform service. Click on the Device you have created.

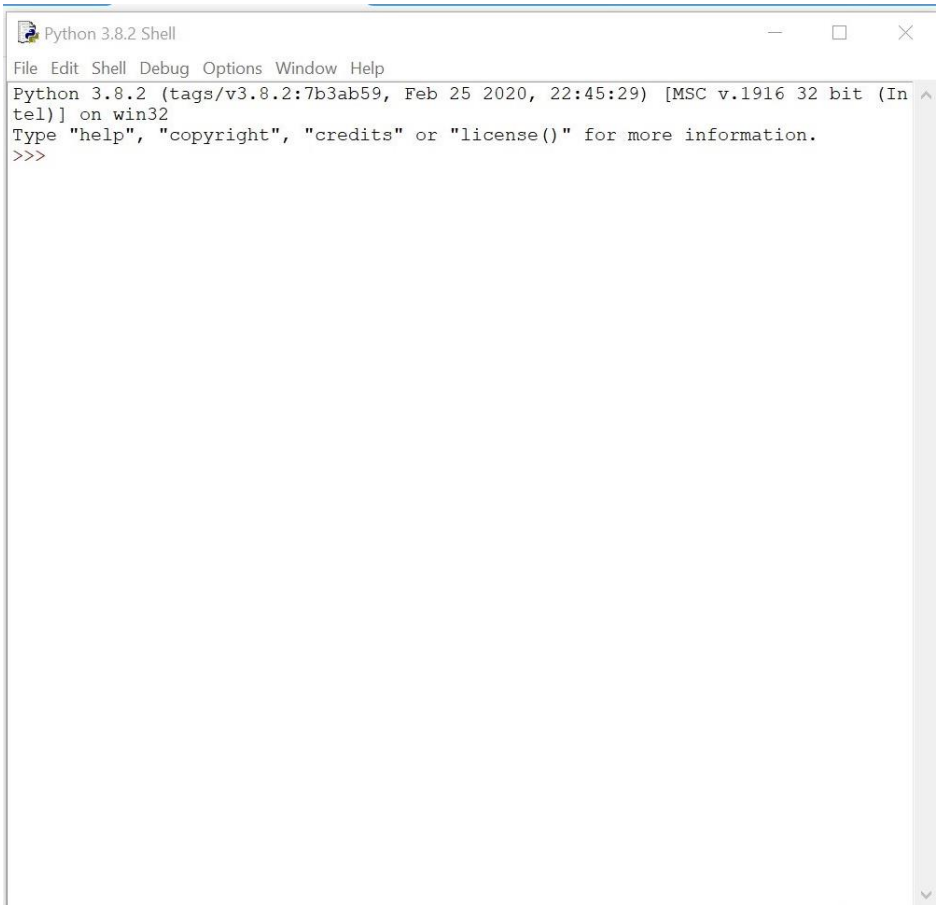


3.2.3 Connecting the device to IBM IOT simulator



Correct credentials of the device are entered to connect it to IBM IOT simulator.

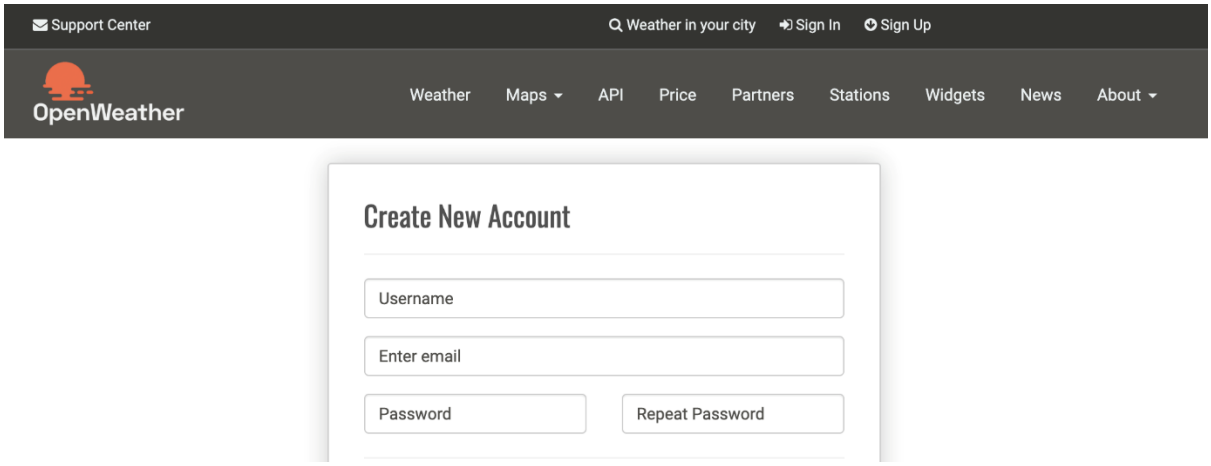
3.2.3 Installing python IDLE



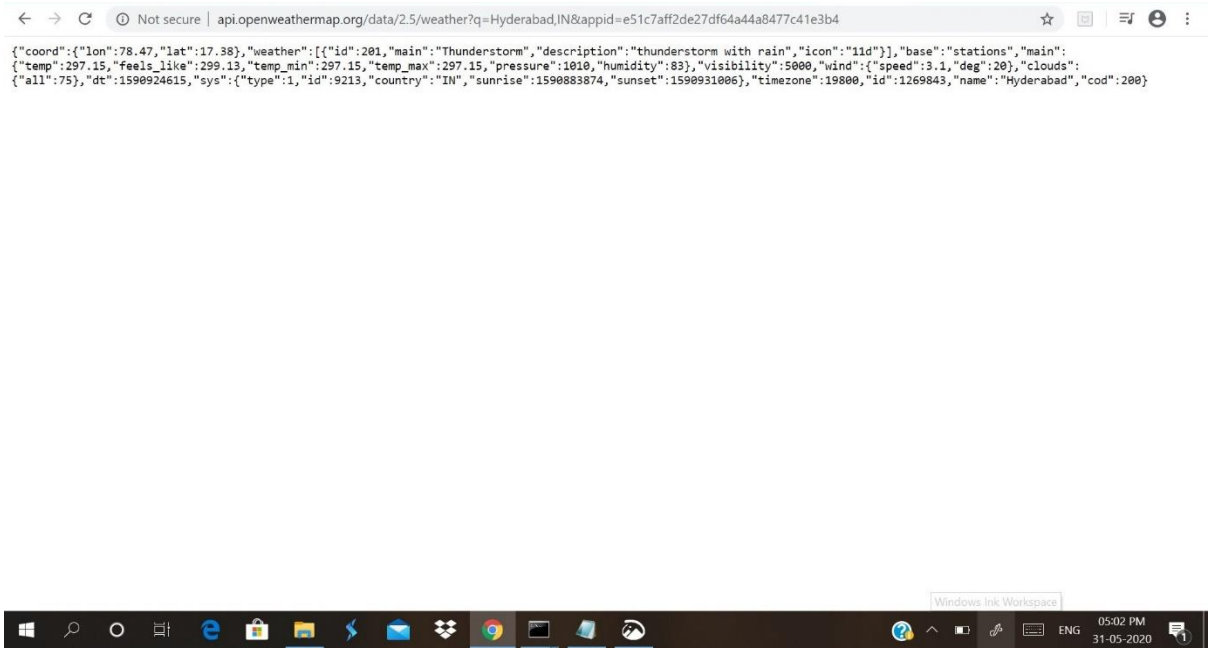
Python code is written to turn the motors on and off.

3.2.4 Open Weather API

The Open Weather Map service provides a Current Weather API, along with several types of forecasts with different depths and measurement steps



3.2.5 Configuring Open Weather API

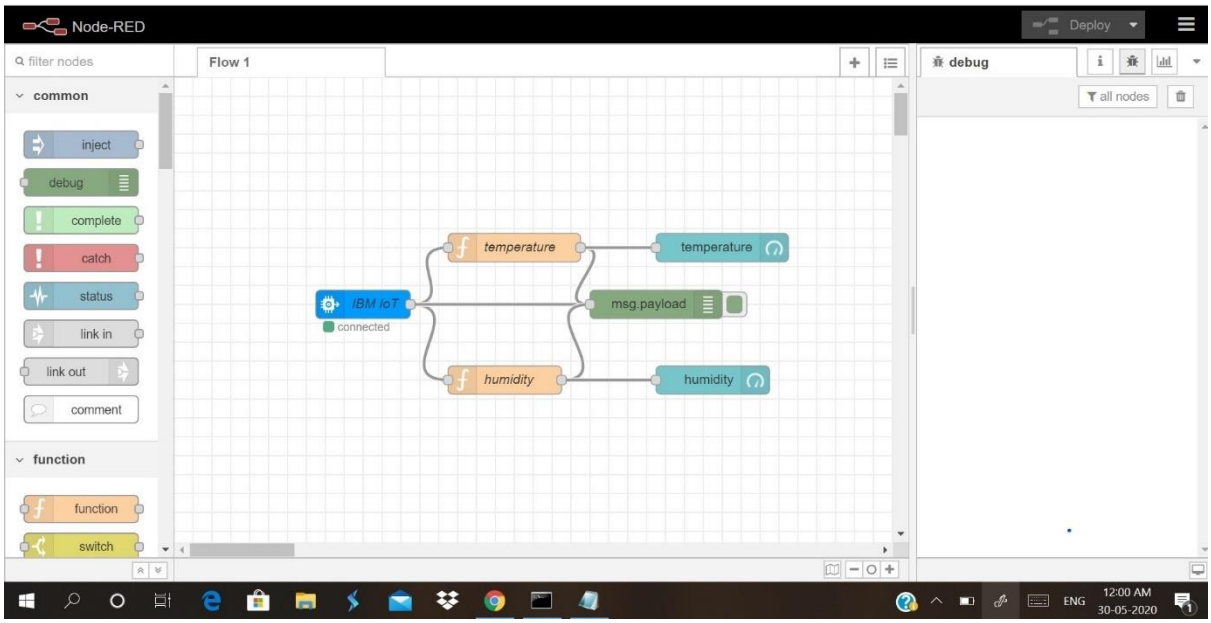


URL:api.openweathermap.org/data/2.5/weather?q={city name}&appid={your api key}

3.2.6 NODE RED

Node-RED is a programming tool for wiring together hardware devices, APIs and online services. Primarily, it is a visual tool designed for the Internet of Things, but it can also be used for other applications to very quickly assemble flows of various services.

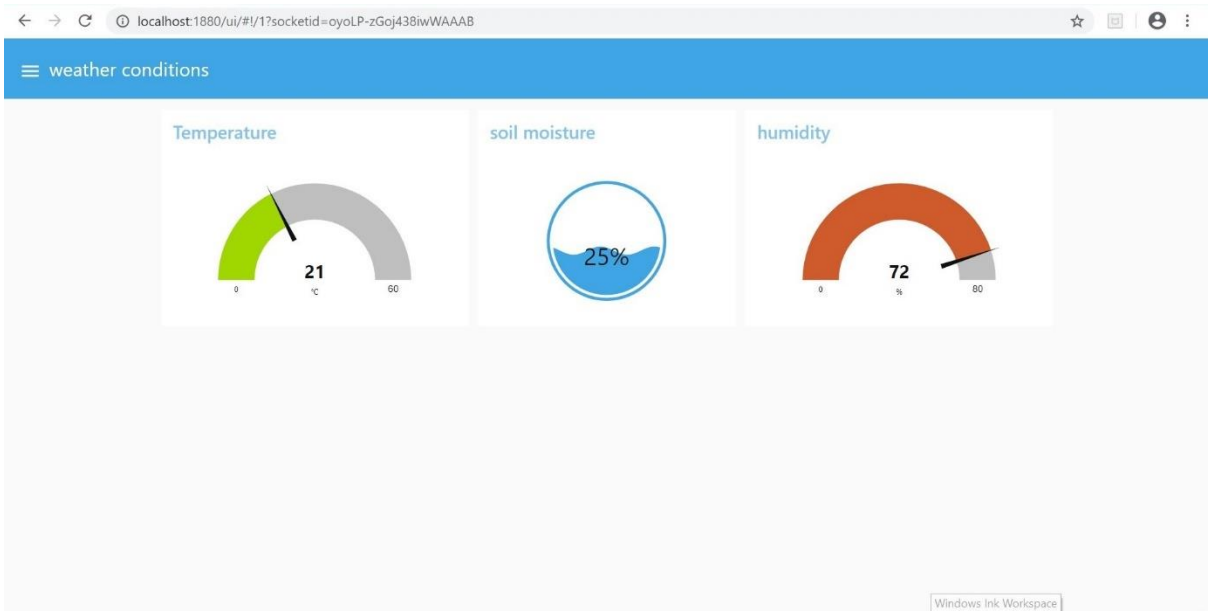
3.2.7 Creating the flow



By installing the required nodes and connecting them a flow is made, when deployed output can be seen in debug console.

3.2.8 Creating UI

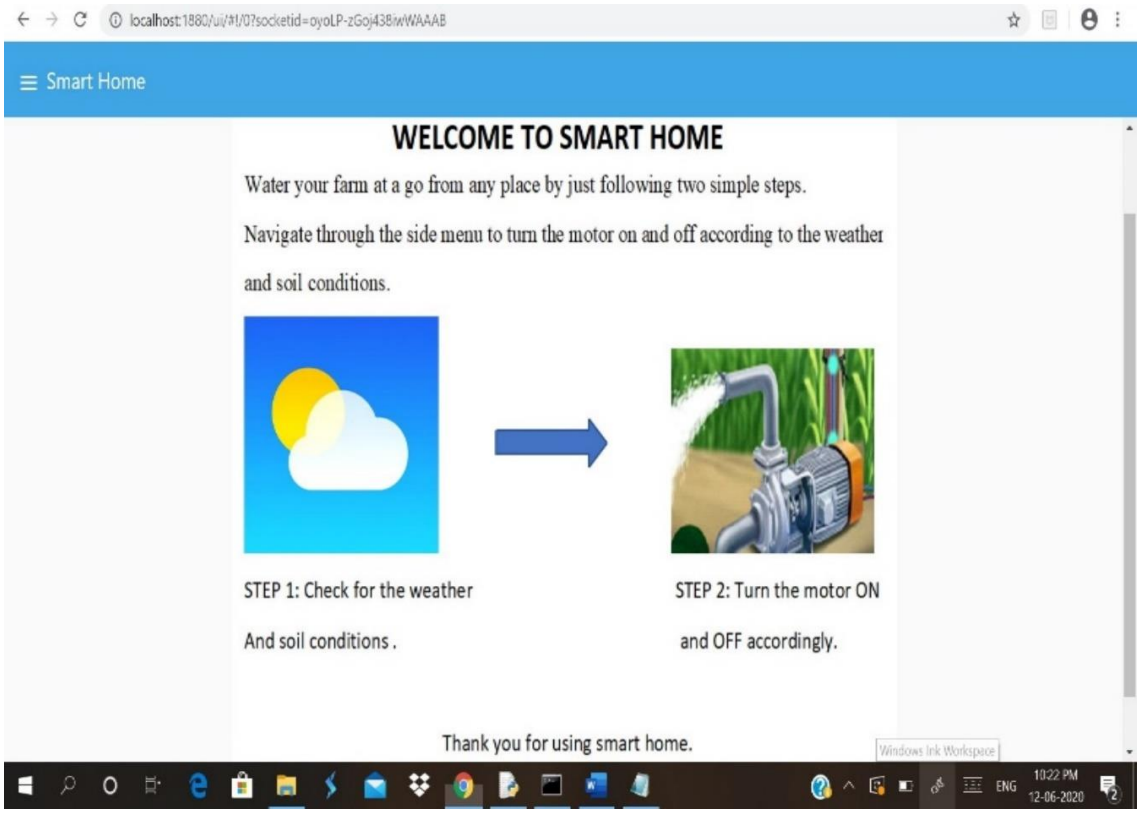
By copying the url of node red and adding /ui user interface can be created.

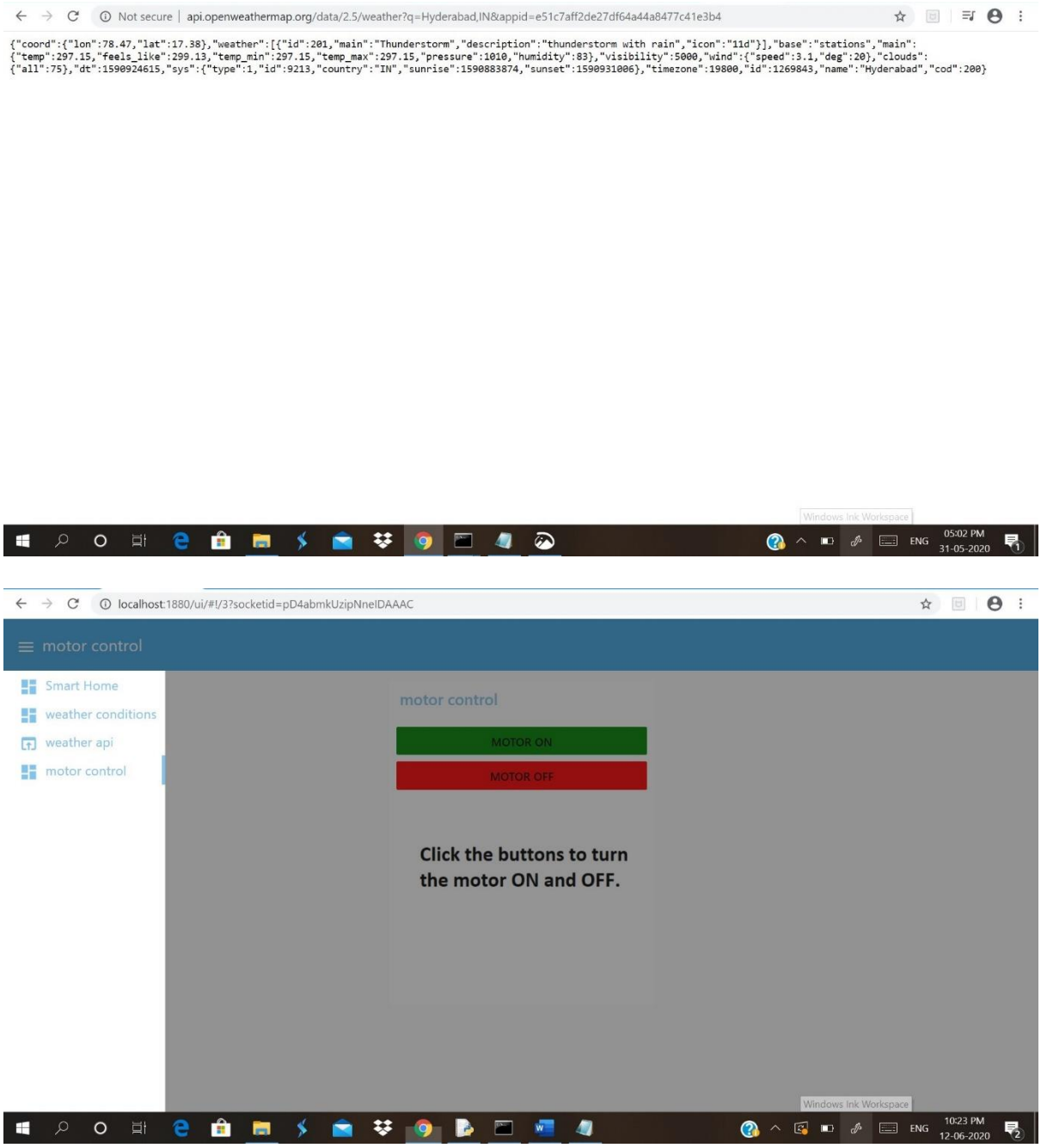


4.Experimental investigation

The project is completely software and there were no issues executing it. All the research, results and designing were carried out ethically without any obligations.

5.Result





The above pictures are the result of the project-the user interface that makes smart agricultural system(smart home) possible.

6. Advantages and disadvantages

ADVANTAGES

The sensor which measures water content in a soil is known as moisture sensor. This sensor is a plus point to the farmer. A probe contains multiple such sensors. It helps in managing irrigation systems more effectively and efficiently.
It helps farmers to save water, to increase yields and to increase quality of the crop. Simple method of measurement. It delivers the results immediately. Watermark sensors and tensiometers are very low in cost. Offers accurate results.

The farmer need not depend on other people to water the farm or turn the motor on and hence can be independent. Farmer no longer need to be worried about his presence in the farm. He can still look after the farm from anywhere and anytime.

DISADVANTAGES

The main concerns that accompany the Internet of Things are the breach of privacy, over-reliance on technology, and the loss of jobs. As time has progressed, our current generation has grown up with the readily availability of the internet and technology in general. However, relying on technology on a day to day basis, making decisions by the information that it gives up could lead to devastation. No system is robust and fault-free. We see glitches that occur constantly in technology, specifically involving the internet. Moreover weak internet connection can make the system ineffective.

7.Applications

Application of IoT in agriculture could be a life changer for humanity and the whole planet. Currently, we witness how extreme weather, deteriorating soil and drying lands, collapsing ecosystems that play a crucial role in agriculture make food production harder and harder.
In the meantime, we are not getting fewer. Famous prediction says there will be more than 9 billion people in 2050. That's a lot of mouths to feed.
The most common IoT applications in smart agriculture are:

- Sensor-based systems for monitoring crops, soil, fields, livestock, storage facilities, or basically any important factor that influences the production.
- Smart agriculture vehicles, drones, autonomous robots and actuators.

- Connected agriculture spaces such as smart greenhouses or hydroponics.
- Data analytics, visualization and management systems.

8.Conclusion

Agriculture is the backbone of the economic system of a given country. To survive we need food, its not an option but an only solution. The most important barrier that arises in traditional farming is climatic change. The number of effects of climatic change includes heavy rainfall, most intense storm and heat waves, less rainfall etc. Due to these the productivity decreases to major extent. Climatic change also raises the environmental consequences such as seasonal changes in life cycle of plants. To boost the productivity and minimize the barriers in agriculture field, there is need to use innovative technology and techniques called Internet of Things. Today, the Internet of Things (IoT) is transforming towards agriculture industry and enabling farmers to compete with the enormous challenges they face. Farmers can get huge information and knowledge about recent trends and technology using IoT.

9.Future scope

IoT works in different domains of farming to improve time efficiency, water management, crop monitoring, soil management, control of insecticides and pesticides etc. It also minimizes human efforts, simplifies techniques of farming and helps to gain smart farming. Along with these features smart farming can help to grow the market for farmer with single touch and minimum efforts.

10.Bibliography

Sources: iosrjournals.org

Sites.google.com

Rfwireless-world.com

11.Appendix

A. Source code

```
import time
import sys
import ibmiotf.application # to install pip install ibmiotf
import ibmiotf.device
import paho.mqtt.client as paho
#Provide your IBM Watson Device Credentials
organization = "z65ech" #replace the ORG ID
deviceType = "iot9"#replace the Device type
deviceId = "9999"#replace Device ID
authMethod = "token"
authToken = "aSp!zUyWVZxTUMCO1F"
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()
```