Project Development Phase

Delivery of Sprint -1

Team ID	PNT2022TMID08469
Project Name	Smart Farmer-IOT Enabled Smart Farming Application

In Sprint-1 we are going to develop the python code and Wokwi Online ESP32 Simulator and connecting to IBM Watson Platform

1. Introduction

The main aim of this project is to help farmers automate their farms by providing them with a Web App through which they can monitor the parameters of the field like Temperature, soil moisture, humidity and etc .And control the equipment like water motor and other devices remotely via internet without their actual presence in the field.

2. Problem Statement

Farmers are to be present at farm for its maintenance irrespective of the weather conditions. They have to ensure that the crops are well watered and the farm status is monitored by them physically. Farmer have to stay most of the time in field in order to get a good yield. In difficult times like in the presence of pandemic also they have to work hard in their fields risking their lives to provide food for the country.

3. Proposed Solution

In order to improve the farmer’s working conditions and make them easier, we introduce IoT services to him in which we use cloud services and internet to enable farmer to continue his work remotely via internet. He can monitor the field parameters and control the devices in farm.

4 . Software Requirements

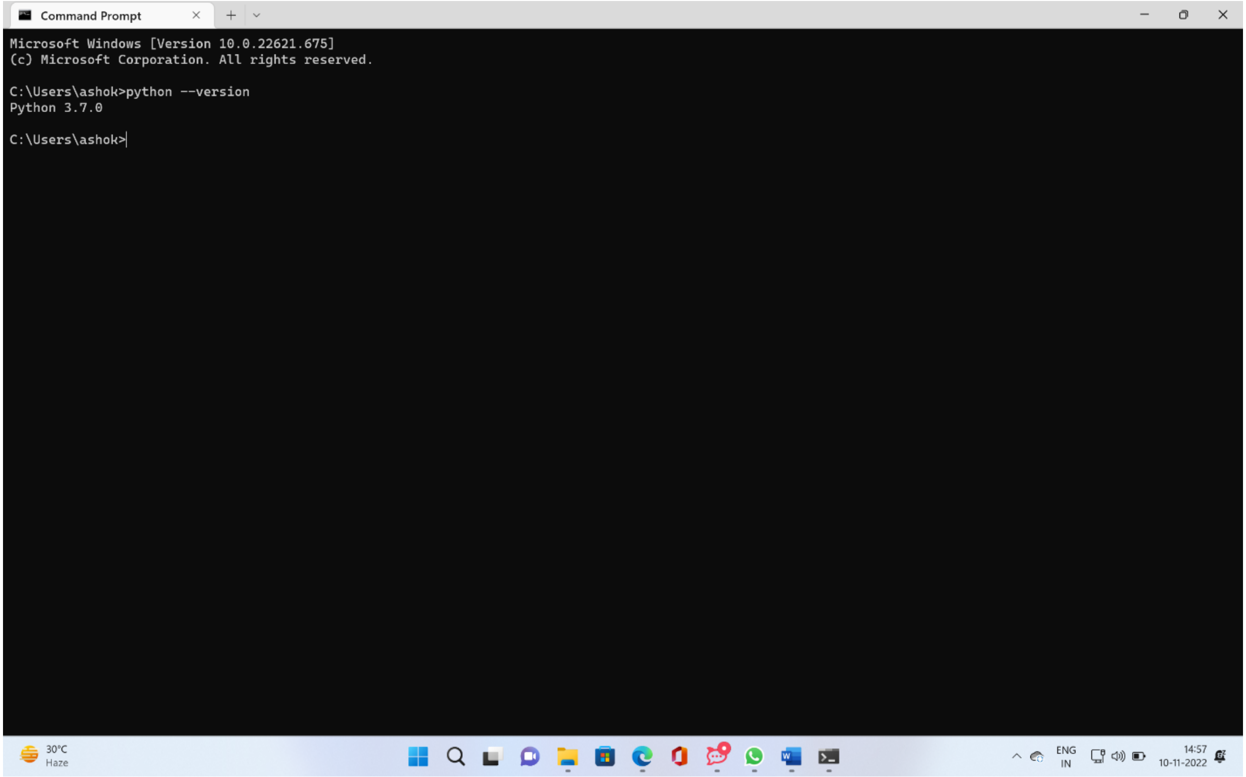
1.Python IDLE 3.7.0 (64-Bit)

2.IBM Watson Platform

3.IBM Node-Red

4. MIT App Inventor

First install the python 3.7.0 version idle . Go to command prompt and type python –version we can get version.

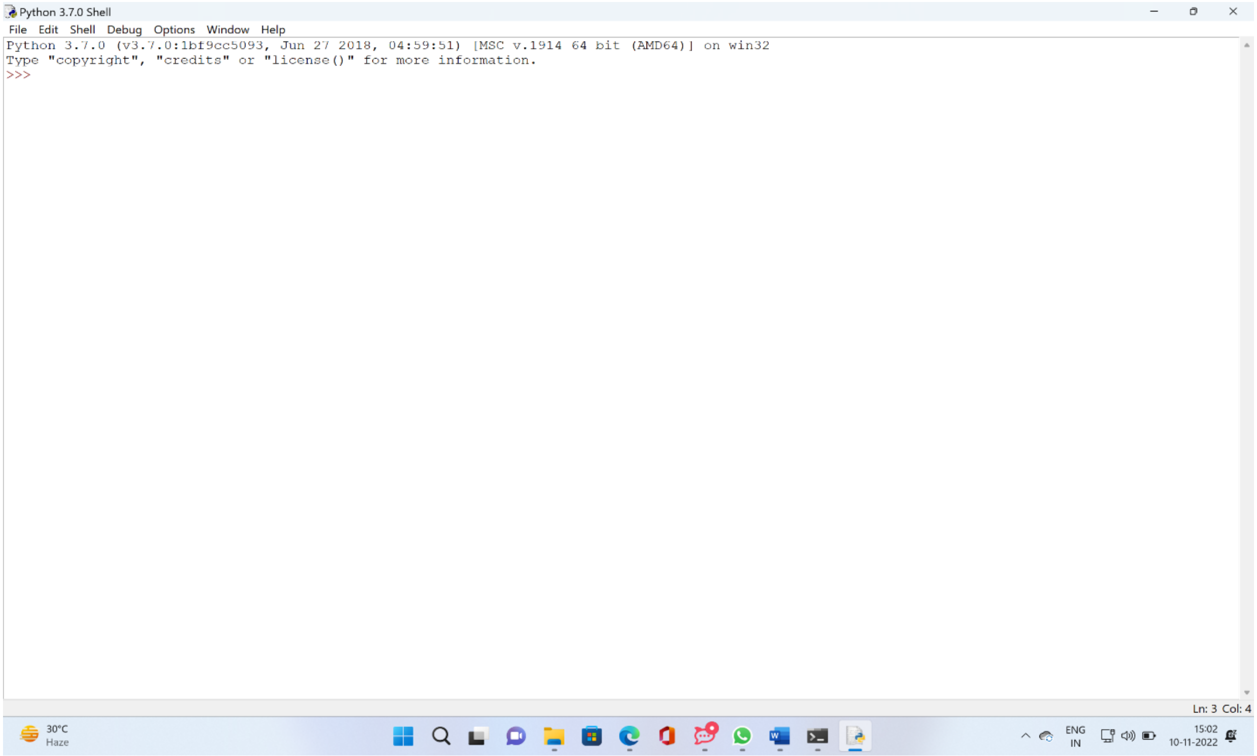


```
Microsoft Windows [Version 10.0.22621.675]
(c) Microsoft Corporation. All rights reserved.

C:\Users\ashok>python --version
Python 3.7.0

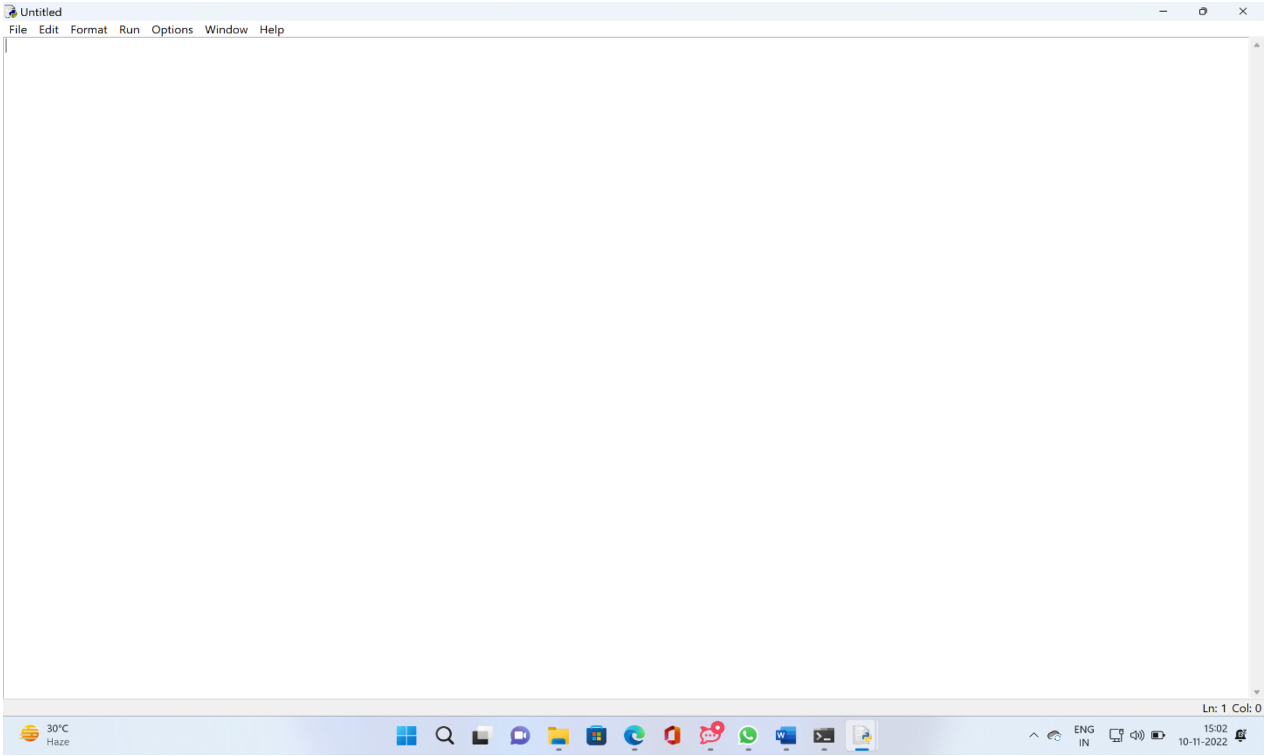
C:\Users\ashok>
```

After that open python idle we can see python shell.

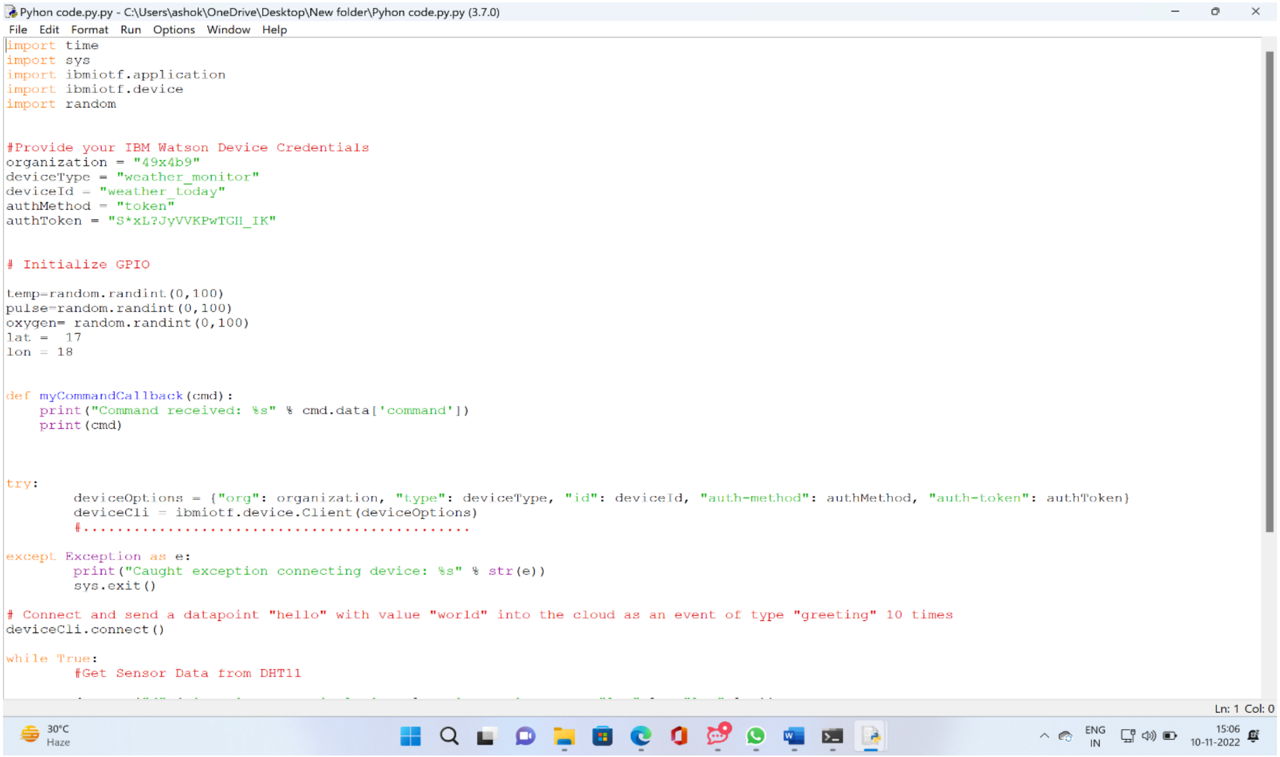


```
Python 3.7.0 (v3.7.0:1bf9cc5093, Jun 27 2018, 04:59:51) [MSC v.1914 64 bit (AMD64)] on win32
Type "copyright", "credits" or "license()" for more information.
>>>
```

Click on file and open new file the window appear as shown below.



Before writing the python script we have install pip ibmiotf install. After that we have to write the python code.


Pyhon code.py.py - C:\Users\ashok\OneDrive\Desktop\New folder\Pyhon code.py.py (3.7.0)
File Edit Format Run Options Window Help
Ln: 1 Col: 0
30°C
Haze
ENG
IN
15:06
10-11-2022

```
import time
import sys
import ibmiotf.application
import ibmiotf.device
import random


#Provide your IBM Watson Device Credentials
organization = "49x4b9"
deviceType = "weather_monitor"
deviceId = "weather_today"
authMethod = "token"
authToken = "S*xL?JyVVKPwTGH_IK"


# Initialize GPIO

temp=random.randint(0,100)
pulse=random.randint(0,100)
oxygen= random.randint(0,100)
lat =  17
lon = 18


def myCommandCallback(cmd):
    print("Command received: %s" % cmd.data['command'])
    print(cmd)

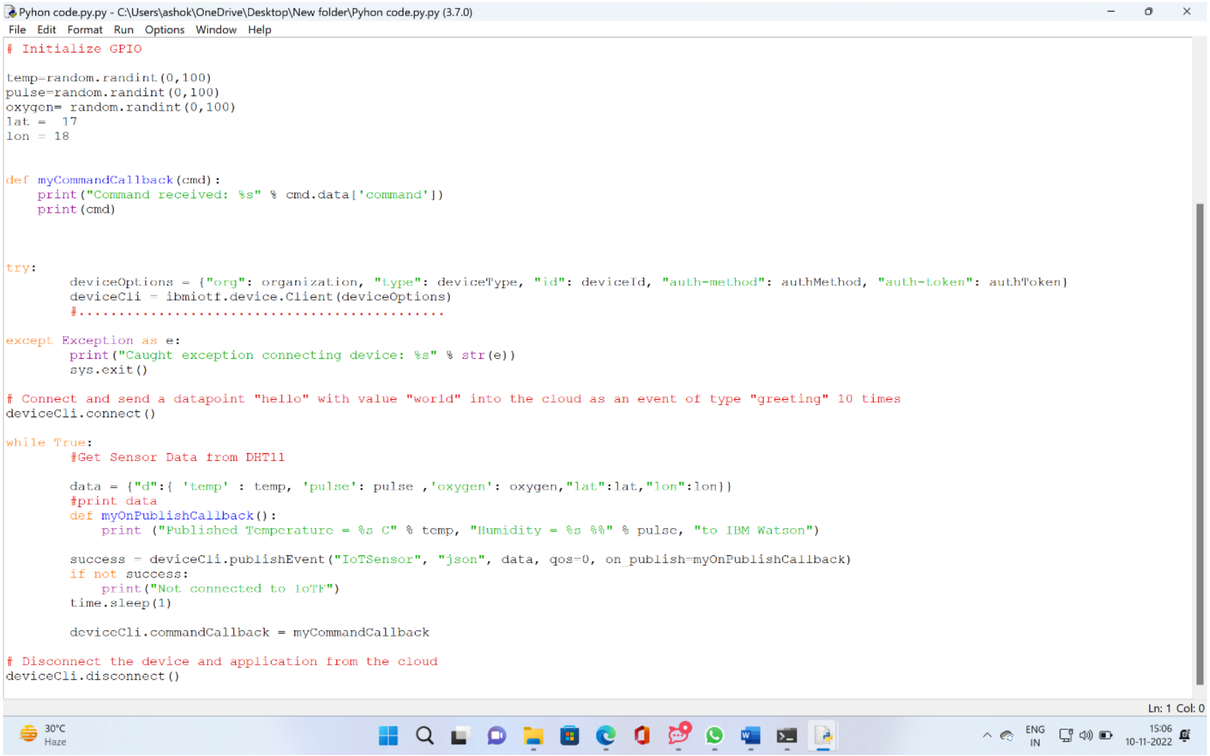


try:
        deviceOptions = {"org": organization, "type": deviceType, "id": deviceId, "auth-method": authMethod, "auth-token": authToken}
        deviceCli = ibmiotf.device.Client(deviceOptions)
        #..............................................

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:
        #Get Sensor Data from DHT11
```


Pyhon code.py.py - C:\Users\ashok\OneDrive\Desktop\New folder\Pyhon code.py.py (3.7.0)
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Ln: 1 Col: 0
30°C
Haze
ENG
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# Connect and send a datapoint "hello" with value "world" into the cloud as an event of type "greeting" 10 times
deviceCli.connect()

while True:
        #Get Sensor Data from DHT11

        data = {"d":{ 'temp' : temp, 'pulse': pulse ,'oxygen': oxygen,"lat":lat,"lon":lon}}
        #print data
        def myOnPublishCallback():
            print ("Published Temperature = %s C" % temp, "Humidity = %s %%" % pulse, "to IBM Watson")

        success = deviceCli.publishEvent("IoTSensor", "json", data, qos=0, on_publish=myOnPublishCallback)
        if not success:
            print("Not connected to IoTF")
        time.sleep(1)

        deviceCli.commandCallback = myCommandCallback

# Disconnect the device and application from the cloud
deviceCli.disconnect()
```

Python code to connect the IBM Watson platform

CODE:

```
import time
import sys
import ibmiotf.application
import ibmiotf.device
import random



#Provide your IBM Watson Device Credentials
organization = "49x4b9"
deviceType = "weather_monitor"
deviceId = "weather_today"
authMethod = "token"
authToken = "S*xL?JyVVKPwTGH_IK"
```

```
# Initialize GPIO

temp=random.randint(0,100)
pulse=random.randint(0,100)
oxygen= random.randint(0,100)
lat =  17
lon = 18


def myCommandCallback(cmd):
    print("Command received: %s" % cmd.data['command'])
    if status=="lighton":
        print ("led is on")
    else:
        print("led is off")
# print(cmd)

try:
deviceOptions = {"org": organization, "type": deviceType, "id": deviceId, "auth-method": authMethod, "auth-token": authToken}
deviceCli = ibmiotf.device.Client(deviceOptions)
#..............................................

except Exception as e:
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    time.sleep(1)


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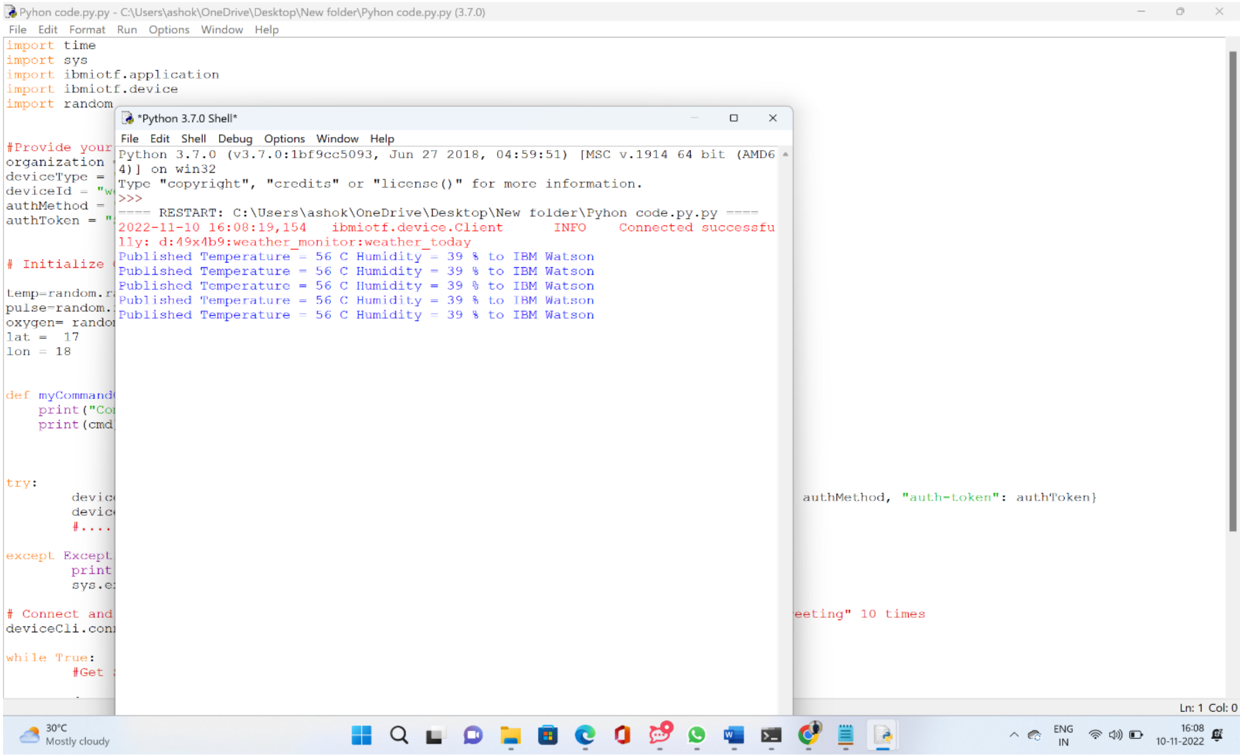
# Disconnect the device and application from the cloud
deviceCli.disconnect()
```

Simulation output in the python idle:



Pyhon code.py.py - C:\Users\ashok\OneDrive\Desktop\New folder\Pyhon code.py.py (3.7.0)

```
import time
import sys
import ibmiotf.application
import ibmiotf.device
import random
```

Python 3.7.0 Shell

```
Python 3.7.0 (v3.7.0:1bf9cc5093, Jun 27 2018, 04:59:51) [MSC v.1914 64 bit (AMD6
4)] on win32
Type "copyright", "credits" or "license()" for more information.
>>>
==== RESTART: C:\Users\ashok\OneDrive\Desktop\New folder\Pyhon code.py.py ====
2022-11-10 16:08:19,154   ibmiotf.device.Client      INFO    Connected successfu
lly: d:49x4b9:weather_monitor:weather_today
Published Temperature = 56 C Humidity = 39 % to IBM Watson
Published Temperature = 56 C Humidity = 39 % to IBM Watson
Published Temperature = 56 C Humidity = 39 % to IBM Watson
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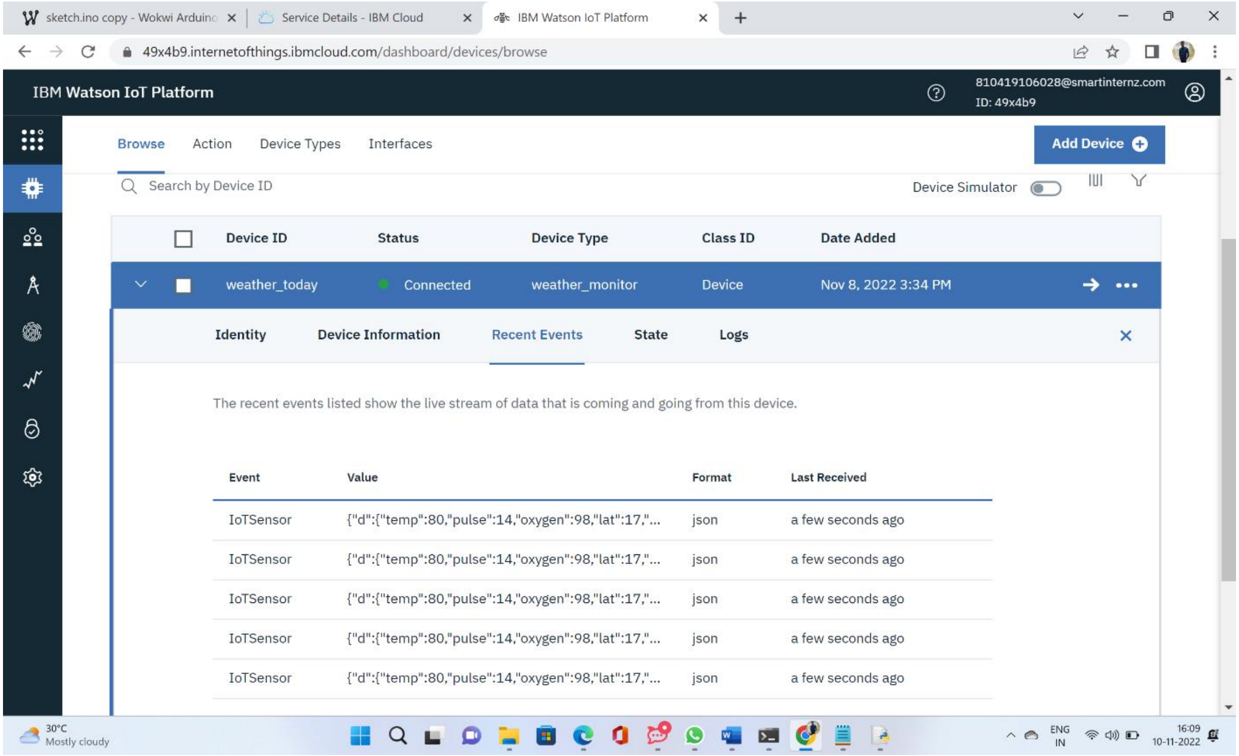
```

File Edit Format Run Options Window Help
File Edit Shell Debug Options Window Help
Ln: 1 Col: 0
30°C
Mostly cloudy
ENG
IN
16:08
10-11-2022

Python output Showing in IBM Watson platform:



49x4b9.internetofthings.ibmcloud.com/dashboard/devices/browse

IBM Watson IoT Platform

810419106028@smartinternz.com
ID: 49x4b9

Device ID	Status	Device Type	Class ID	Date Added
weather_today	Connected	weather_monitor	Device	Nov 8, 2022 3:34 PM

The recent events listed show the live stream of data that is coming and going from this device.

Event	Value	Format	Last Received
IoTSensor	{"d":{"temp":80,"pulse":14,"oxygen":98,"lat":17,"...	json	a few seconds ago
IoTSensor	{"d":{"temp":80,"pulse":14,"oxygen":98,"lat":17,"...	json	a few seconds ago
IoTSensor	{"d":{"temp":80,"pulse":14,"oxygen":98,"lat":17,"...	json	a few seconds ago
IoTSensor	{"d":{"temp":80,"pulse":14,"oxygen":98,"lat":17,"...	json	a few seconds ago
IoTSensor	{"d":{"temp":80,"pulse":14,"oxygen":98,"lat":17,"...	json	a few seconds ago

WOKWI Online Simulator ESP32 :

https://wokwi.com/projects/347919595659592274

```
#include <WiFi.h>//library for wifi
#include <PubSubClient.h>//library for MQtt
#include "DHT.h"// Library for dht11
#define DHTPIN 15     // what pin we're connected to
#define DHTTYPE DHT22   // define type of sensor DHT 11
#define LED 2

DHT dht (DHTPIN, DHTTYPE);// creating the instance by passing pin and typr of
dht connected

void callback(char* subscribetopic, byte* payload, unsigned int
payloadLength);

//-------credentials of IBM Accounts------

#define ORG "49x4b9"//IBM ORGANITION ID
#define DEVICE_TYPE "weather_monitor"//Device type mentioned in ibm watson IOT
Platform
#define DEVICE_ID "weather_today"//Device ID mentioned in ibm watson IOT
Platform
#define TOKEN "S*xL?JyVVKPwTGH_IK"     //Token
String data3;
float h, t;


//-------- Customise the above values --------
char server[] = ORG ".messaging.internetofthings.ibmcloud.com";// Server Name
char publishTopic[] = "iot-2/evt/Data/fmt/json";// topic name and type of
event perform and format in which data to be send
char subscribetopic[] = "iot-2/cmd/command/fmt/String";// cmd  REPRESENT
command type AND COMMAND IS TEST OF FORMAT STRING
char authMethod[] = "use-token-auth";// authentication method
char token[] = TOKEN;
char clientId[] = "d:" ORG ":" DEVICE_TYPE ":" DEVICE_ID;//client id


//-----------------------------------------
WiFiClient wifiClient; // creating the instance for wificlient
PubSubClient client(server, 1883, callback ,wifiClient); //calling the
predefined client id by passing parameter like server id,portand
wificredential


void setup()// configureing the ESP32
```

```
{
  Serial.begin(115200);
  dht.begin();
  pinMode(LED,OUTPUT);
  delay(10);
  Serial.println();
  wificonnect();
  mqttconnect();
}

void loop()// Recursive Function
{

  h = dht.readHumidity();
  t = dht.readTemperature();
  Serial.print("temp:");
  Serial.println(t);
  Serial.print("Humid:");
  Serial.println(h);

  PublishData(t, h);
  delay(1000);
  if (!client.loop()) {
    mqttconnect();
  }
}
/*.....................................retrieving to
Cloud...............................*/

void PublishData(float temp, float humid) {
  mqttconnect();//function call for connecting to ibm
  /*
     creating the String in in form JSon to update the data to ibm cloud
  */
  String payload = "{\"temp\":";
  payload += temp;
  payload += "," "\"Humid\":";
  payload += humid;
  payload += "}";


  Serial.print("Sending payload: ");
  Serial.println(payload);


  if (client.publish(publishTopic, (char*) payload.c_str())) {
    Serial.println("Publish ok");// if it sucessfully upload data on the cloud then it will print publish ok in Serial monitor or else it will print publish failed
  } else {
    Serial.println("Publish failed");
  }

}


void mqttconnect() {
  if (!client.connected()) {
    Serial.print("Reconnecting client to ");
    Serial.println(server);
    while (!!!client.connect(clientId, authMethod, token)) {
      Serial.print(".");
      delay(500);
    }

     initManagedDevice();
     Serial.println();
  }
}
void wificonnect() //function defination for wificonnect
{
  Serial.println();
  Serial.print("Connecting to ");

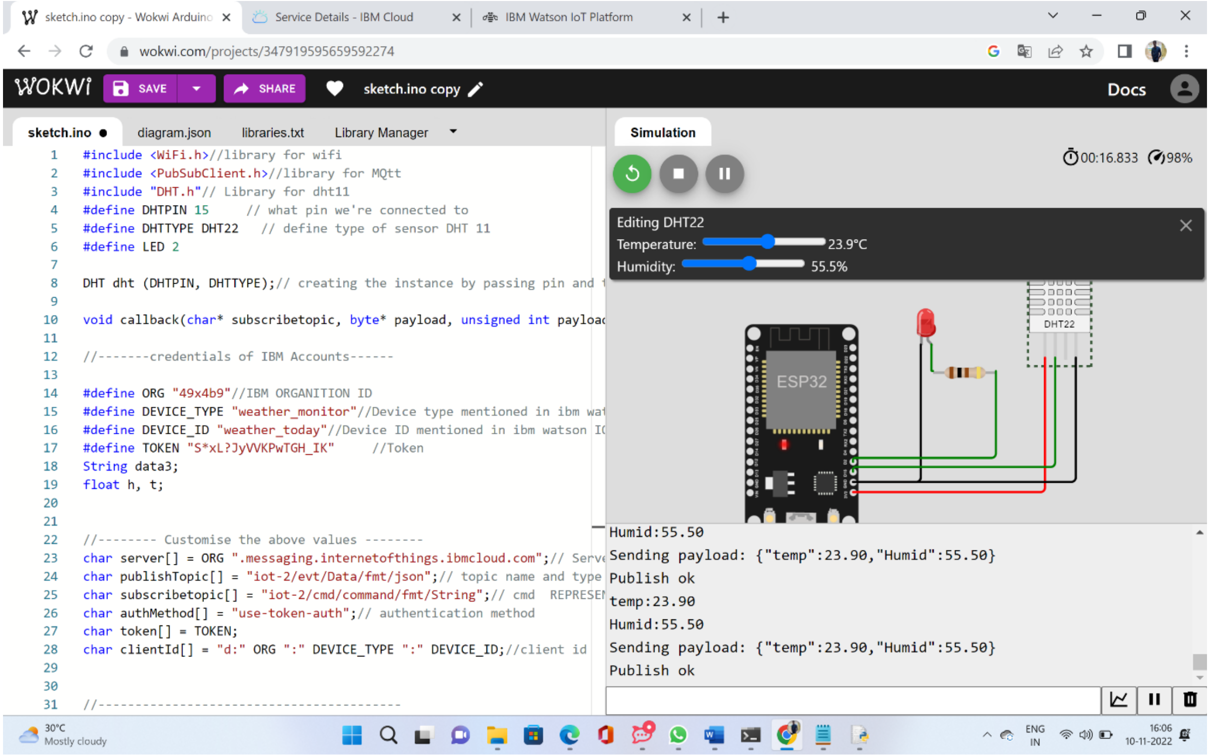
  WiFi.begin("Wokwi-GUEST", "", 6);//passing the wifi credentials to establish the connection
  while (WiFi.status() != WL_CONNECTED) {
    delay(500);
    Serial.print(".");
  }
  Serial.println("");
  Serial.println("WiFi connected");
  Serial.println("IP address: ");
  Serial.println(WiFi.localIP());
}

void initManagedDevice() {
  if (client.subscribe(subscribetopic)) {
    Serial.println((subscribetopic));
    Serial.println("subscribe to cmd OK");
  } else {
    Serial.println("subscribe to cmd FAILED");
  }
}
```

```
void callback(char* subscribetopic, byte* payload, unsigned int payloadLength)
{

  Serial.print("callback invoked for topic: ");
  Serial.println(subscribetopic);
  for (int i = 0; i < payloadLength; i++) {
    //Serial.print((char)payload[i]);
    data3 += (char)payload[i];
  }
  Serial.println("data: "+ data3);
  if(data3=="lighton")
  {
Serial.println(data3);
digitalWrite(LED,HIGH);
  }
  else
  {
Serial.println(data3);
digitalWrite(LED,LOW);
  }
data3="";
}
```

Simulation Output in the Wokwi web site:



```
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void callback(char* subscribetopic, byte* payload, unsigned int payload

//-------credentials of IBM Accounts------

#define ORG "49x4b9"//IBM ORGANITION ID
#define DEVICE_TYPE "weather_monitor"//Device type mentioned in ibm wat
#define DEVICE_ID "weather_today"//Device ID mentioned in ibm watson IO
#define TOKEN "S*xL?JyVVKPwTGH_IK"     //Token
String data3;
float h, t;


//-------- Customise the above values --------
char server[] = ORG ".messaging.internetofthings.ibmcloud.com";// Serve
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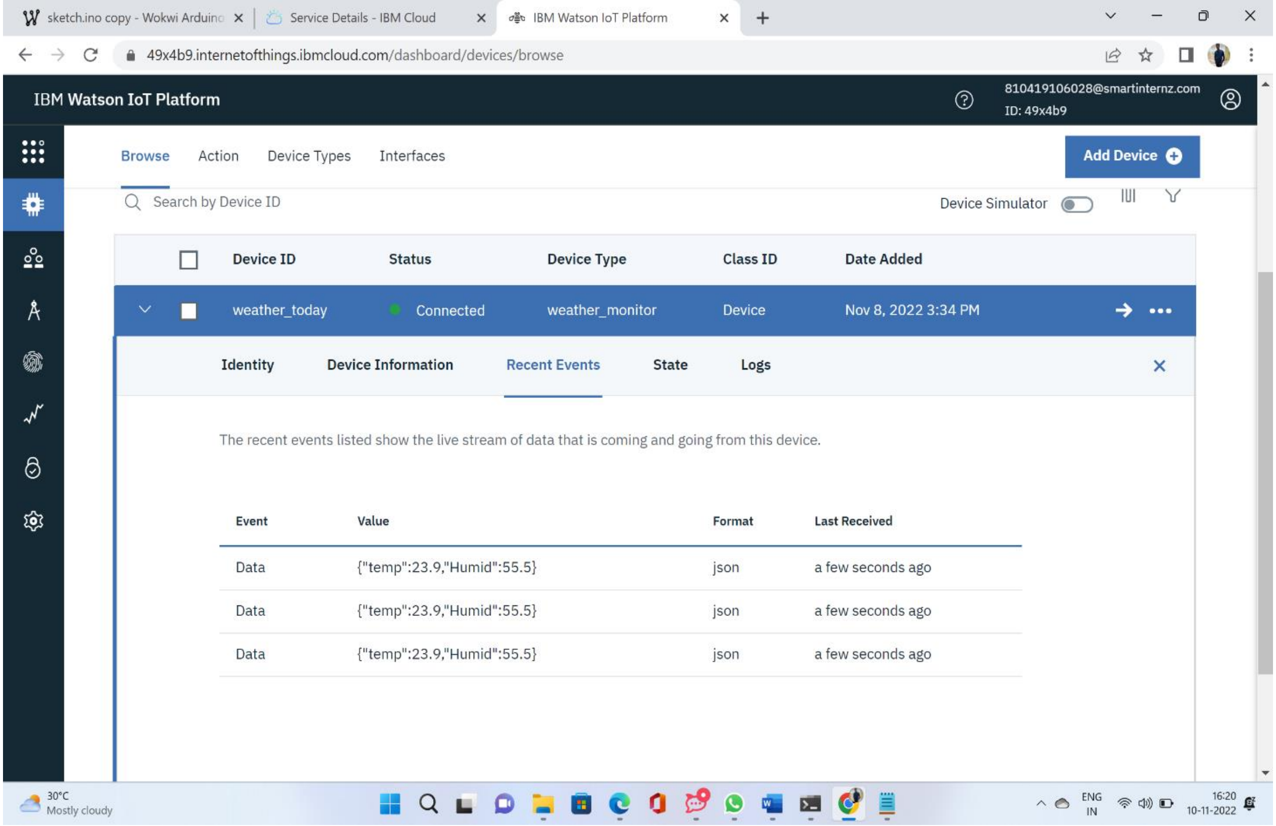
char subscribetopic[] = "iot-2/cmd/command/fmt/String";// cmd  REPRESEN
char authMethod[] = "use-token-auth";// authentication method
char token[] = TOKEN;
char clientId[] = "d:" ORG ":" DEVICE_TYPE ":" DEVICE_ID;//client id


//----------------------------------------
```

```
Humid:55.50
Sending payload: {"temp":23.90,"Humid":55.50}
Publish ok
temp:23.90
Humid:55.50
Sending payload: {"temp":23.90,"Humid":55.50}
Publish ok
```

Wokwi Simulation Output in the IBM Watson Platform:



Device ID	Status	Device Type	Class ID	Date Added
weather_today	● Connected	weather_monitor	Device	Nov 8, 2022 3:34 PM

The recent events listed show the live stream of data that is coming and going from this device.

Event	Value	Format	Last Received
Data	{"temp":23.9,"Humid":55.5}	json	a few seconds ago
Data	{"temp":23.9,"Humid":55.5}	json	a few seconds ago
Data	{"temp":23.9,"Humid":55.5}	json	a few seconds ago