Sprint Delivery 1

Project	IoT Enabled Smart Farming Application
Team ID	PNT2022TMID46489
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- 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 presencein the field.

- Problem Statement

Farmers are to be present at farm for its maintenance irrespective of the weather conditions. They have to ensure

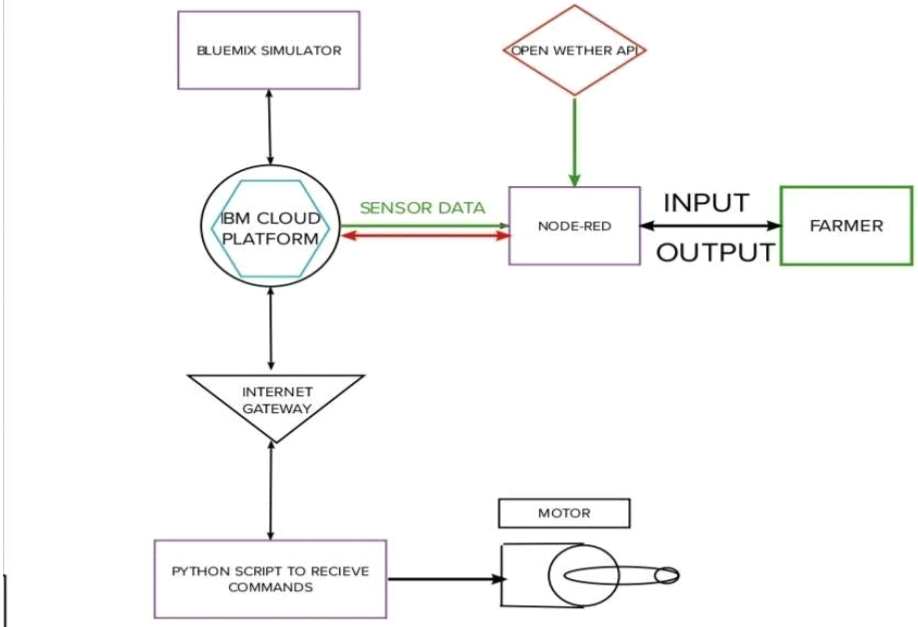
that the crops are well watered and the farm status is monitored by them physically. Farmer have to stay most of the time in field in order to get a good yield. In difficult times like in the presence of pandemic also they have to work hard in their fields risking their lives to provide food for the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

- 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.

- Theoretical Analysis
- Block Diagram

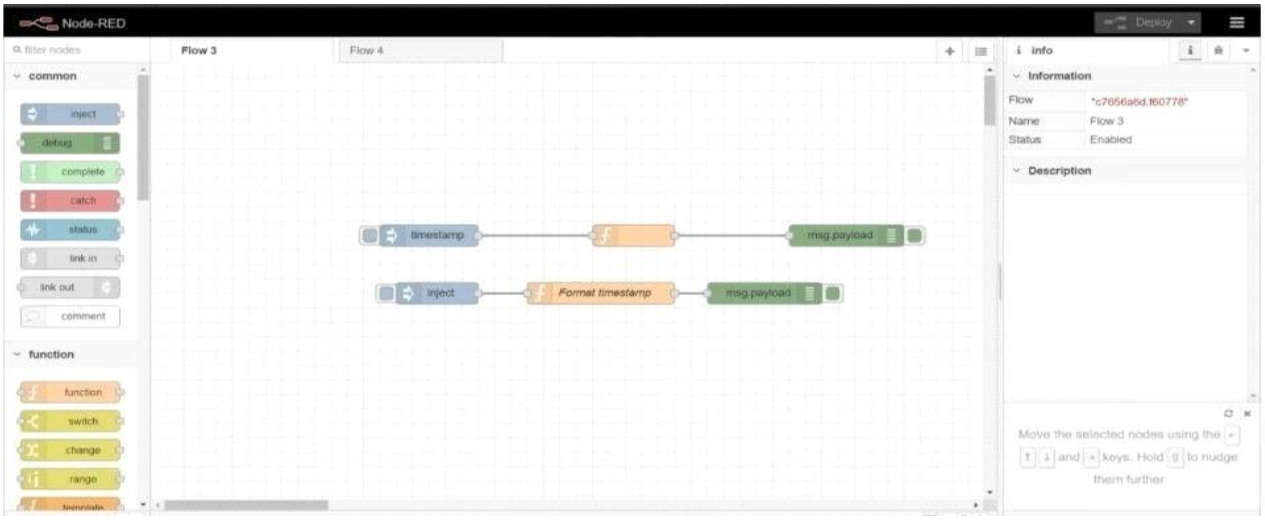
In order to implement the solution , the following approach as shown inthe blockdiagram is used



- Required Software Installation
- Node-Red

Node-RED is a flow-based development tool for visual programming developed originally by IBM for wiring together hardware devices, APIs and online services as

part of the Internet of Things. Node-RED provides a web browser-based flow editor,which can be used to create JavaScript functions.



Installation:

- First install npm/node.js
- Open cmd prompt
- Type => npm install node-red

To run the application :

- Open cmd prompt
- Type=>node-red
- Then open http://localhost:1880/ in browser

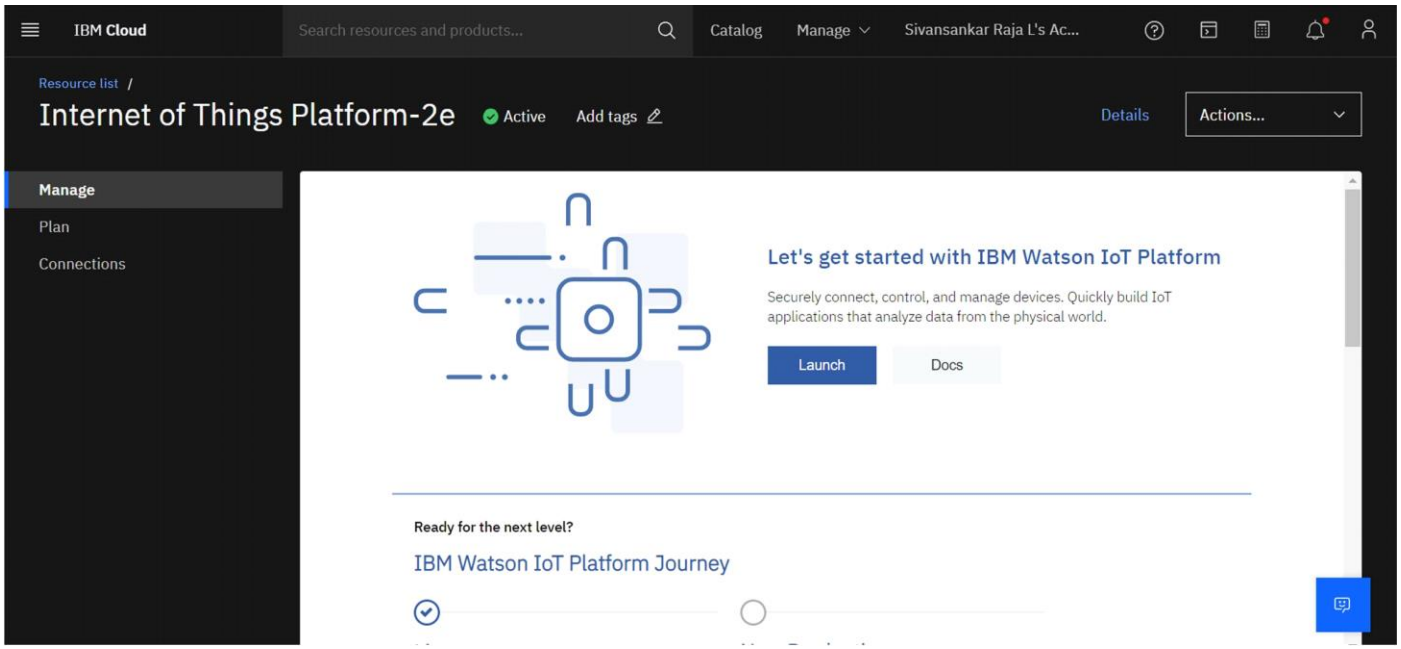
Installation of IBM IoT and Dashboard nodes for Node-Red

In order to connect to IBM Watson IoT platform and create the Web App UI these nodes are required 1. IBM IoT node

2. Dashboard node

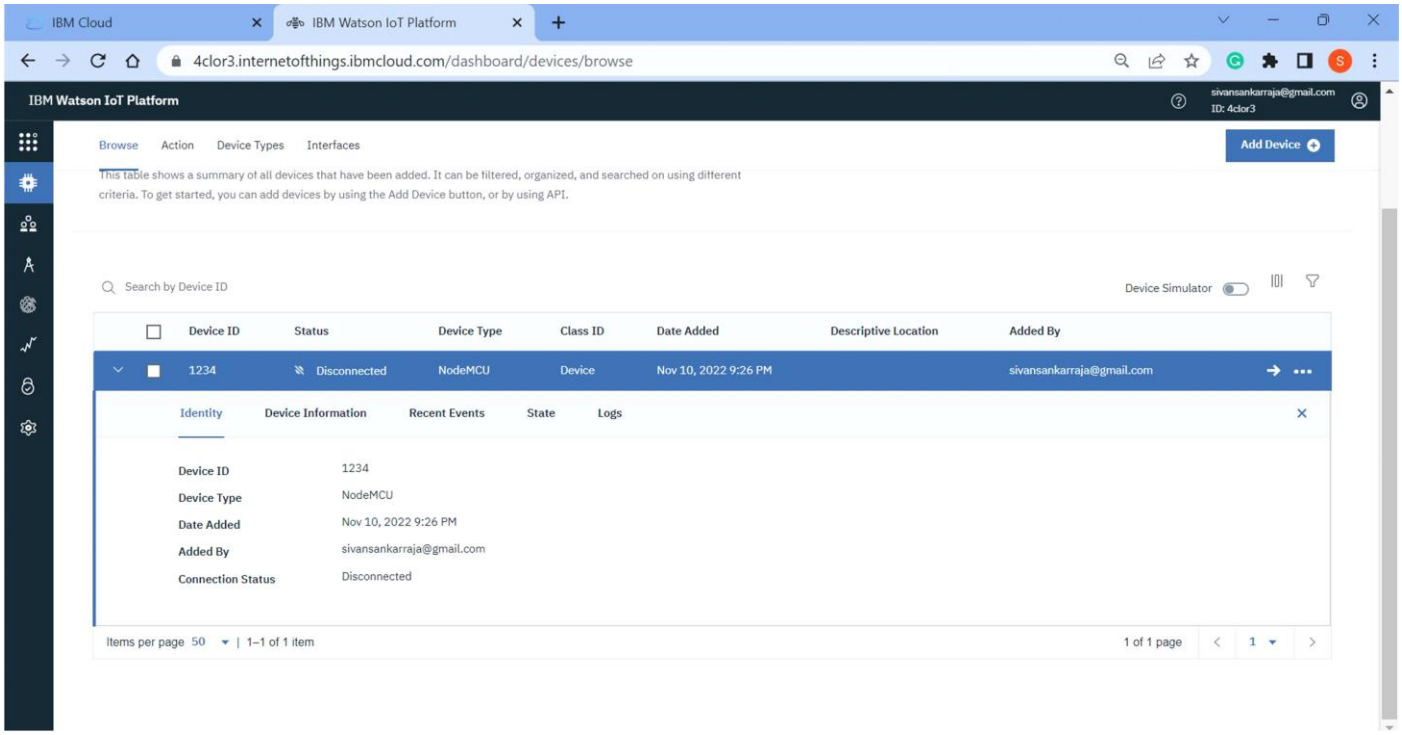
- IBM Watson IoT Platform

A fully managed, cloud-hosted service with capabilities for device registration, connectivity, control, rapid visualization and data storage. IBM Watson IoT Platform is a managed, cloud-hosted service designed to make it simple to derive value from your IoT devices.



Steps to configure:

- Create an account in IBM cloud using your email ID
- Create IBM Watson Platform in services in your IBM cloud account
- Launch the IBM Watson IoT Platform
- Create a new device
- Give credentials like device type, device ID, Auth. Token
- Create API key and store API key and token elsewhere.



- Python IDE

Install Python3 compiler

Install any python IDE to execute python scripts, in my case I used Spyder to executethe code.

Code:

```
import
time
import sys
import
ibmiotf.ap
plication
importibmi
otf.device
import
random
```

```
#Provide your IBM Watson
Device Credentialsorganization =
"157uf3" deviceType = "abcd"
deviceId = "7654321"
authMethod = "token" authToken
= "87654321"

# Initialize GPIO


def myCommandCallback(cmd):
                        print("Command
received: %s" % cmd.data['command'])
status=cmd.data['command']     if
status=="motoron": print ("motor is on")                elif status == "motoroff":       print("
      print ("please send proper command")


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 anevent of type "greeting" 10 times
deviceCli.connect()

while True:
    #Get Sensor Data from DHT11

    temp=random.
    randint(90,110)
    Humid=random
    .randint(60,100
    )

Mois=random.randint(20,120)

    data = { 'temp' : temp, 'Humid':
    Humid, 'Mois' :Mois}#print data def
myOnPublishCallback():
print ("Published Temperature
= %s C" % temp, "Humidity = %s
%%" %
Humid,
"Moisture
=%sdeg c"
```

%Mois, "to

IBM Watson")

success = deviceCli.publishEvent("IoTSensor", "json", data, qos=0, on_publish=myOnPublishCallback) if not success: print ("Not connectedto IoTF") time.sleep(10)

deviceCli.commandCallback = myCommandCallback

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

Arduino code for C :

```
//
 i
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 b
 r
 a
 ri
 e
 s
```

```
#i
n
cl
u
d
e
<
d
h
t.
h
>
#include <SoftwareSerial.h>



//define pins
#define dht_apin A0 // Analog Pin
sensor is connectedSoftwareSerial
mySerial(7,8);//serial port of gsm
const int sensor_pin = A1; // Soil moisture
sensor O/P pinint pin_out = 9;
//al
loc
ate
vari
abl
es
dht
DH
T;
int c=0;

void setup()
{
```

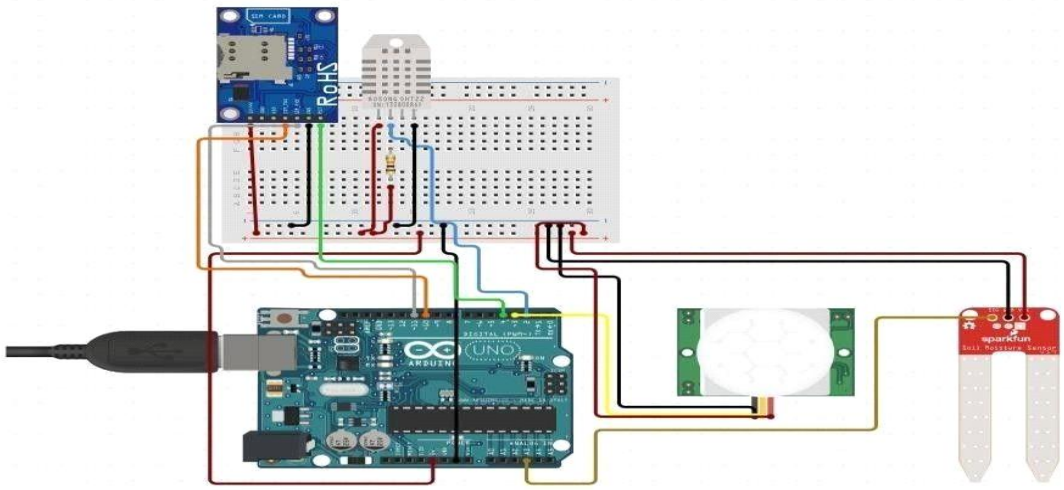
```
pinMode(2, INPUT); //Pin 2 as
INPUT pinMode(3, OUTPUT);
//PIN 3 as OUTPUTpinMode(9,
OUTPUT);//output for pump
}
void loop()
{
 if (digitalRead(2) == HIGH)
 {
 digitalWrite(3, HIGH); // turn
 the LED/Buzz ON delay(10000);
 // wait for 100 msecond
 digitalWrite(3, LOW); // turn
 the LED/Buzz OFFdelay(100);
 }
  Se
    ri
    al
    .b
    e
    gi
    n(
    9
    6
    0
    0)
    ;
    d
    el
    a
    y(
    1
    0
    0
    0)
    ;
```

```
 DHT.read11(dht_api
n); //tempraturefloat
h=DHT.humidity;
float
 t=DHT.t
 emperat
 ure;
 delay(50
 00);
 Serial.be
 gin(9600
 );
  float
moisture_percentage;//
moistureint
sensor_analog;
sensor_analog = analogRead(sensor_pin);
moisture_percentage = ( 100 - ( (sensor_analog/1023.00) * 100 ) );


float
m=moisture_p
ercentage;
delay(1000);
if(m<40)//pump
{
while(m<40)
{
digitalWrite(pin_out,HIGH);//o
pen pumpsensor_analog =
analogRead(sensor_pin);
moisture_percentage = ( 100 - ( (sensor_analog/1023.00) * 100 )
);m=moisture_percentage;
delay(1000);
}
digitalWrite(pin_out,LOW);//closepump
```

```
  }
  if(c>=0)
  {
  mySerial.begi
  n(9600);
  delay(15000);
  Serial.begin(9
  600);
  delay(1000);
  Serial.print("\
  r");
  delay(1000);
  Serial.print("
  AT+CMGF=1\
  r");
  delay(1000);
  Serial.print("AT+CMGS=\"+XXXXXXXXXX\"\r"); //replace X
with 10 digit mobile number
  delay(1000)
  ;
  Serial.print(
  (String)"upd
  ate-
>"+(String)"Temprature="+t+(String)"Humidity="+h+(String)"Moist
  ure="+m); delay(1000);
  Se
  ria
  l.w
  rit
  e(
  0x
  1A
  );
  de
  lay
  (1
```

```
  00
  0);
  mySerial.println("AT+CMGF=1");//Sets the GSM Module in Text
  Modedelay(1000);



  mySerial.println("AT+CMGS=\"+XXXXXXXXXX\"\r"); //replace X
with 10 digitmobile number
  delay(1000);
  mySerial.println(
  (String)"update-
>"+(String)"Temprature="+t+(String)"Humidity="+h+(String)"Moist
ure="+m);// message format
  m
  yS
  eri
  al.
  pri
  ntl
  n()
  ;
  de
  lay
  (1
  00
  );
  Se
  ria
  l.w
  rit
  e(
  0x
  1A
  );
  de
```

```
lay
(1
00
0);
c++;

  }


}
```



- IoT Simulator

In our project in the place of sensors we are going to use IoT sensor simulator whichgive random readings to the connected cloud.

The link to simulator:

https://watson-iot-sensor-simulator.mybluemix.net/

We need to give the credentials of the created device in IBM Watson IoT Platformtoconnect cloud to simulator.

- OpenWeather API

OpenWeatherMap is an online service that provides weather data. It providescurrent weather data, forecasts and historical data to more than 2 million customer.

Website link: https://openweathermap.org/guide

Steps to configure:

- Create account in OpenWeather o

Find the name ofyour city by searching o

Create API key to your account

- Replace “city name” and “your api key” with yourcityand API key in below red text

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