# SMART IRRIGATION SYSTEM USING WEATHER FORECASTING API


## ABSTRACT:

***IoT based smart irrigation systems can help in achieving optimum water-resource utilization in the precision farming landscape.The objective of the system includes conserve energy and water resources, handles the system manually and automatically, detects the level of water. Irrigation is mostly done using canal systems in which water is pumped into fields after regular interval of time,without any feedback of water level in field. This type of irrigation affects crop health and produces a poor yield because some crops are too sensitive to water content in soil.***


## INRODUCTION

Irrigation helps in stabilizing the output and crop yield levels. Rainfall does not always occur in right amount at the time when crops need water., Irrigation is not an easy task and the farmers endure lots of hardships during the process. The common issue encountered during manual irrigation is scheduling of the irrigation cycles. They need to be precise in order to maintain the water flow to the field. Also, manual irrigation during the night can be dangerous due to animal attacks. Thus several new automatic techniques have been deployed in the process of controlling and monitoring the irrigation process. The automated systems obtain the data from the field with the help of sensors. The real-time data collected by the sensors are used to analyses the field conditions.

## LITERATURE SURVEY

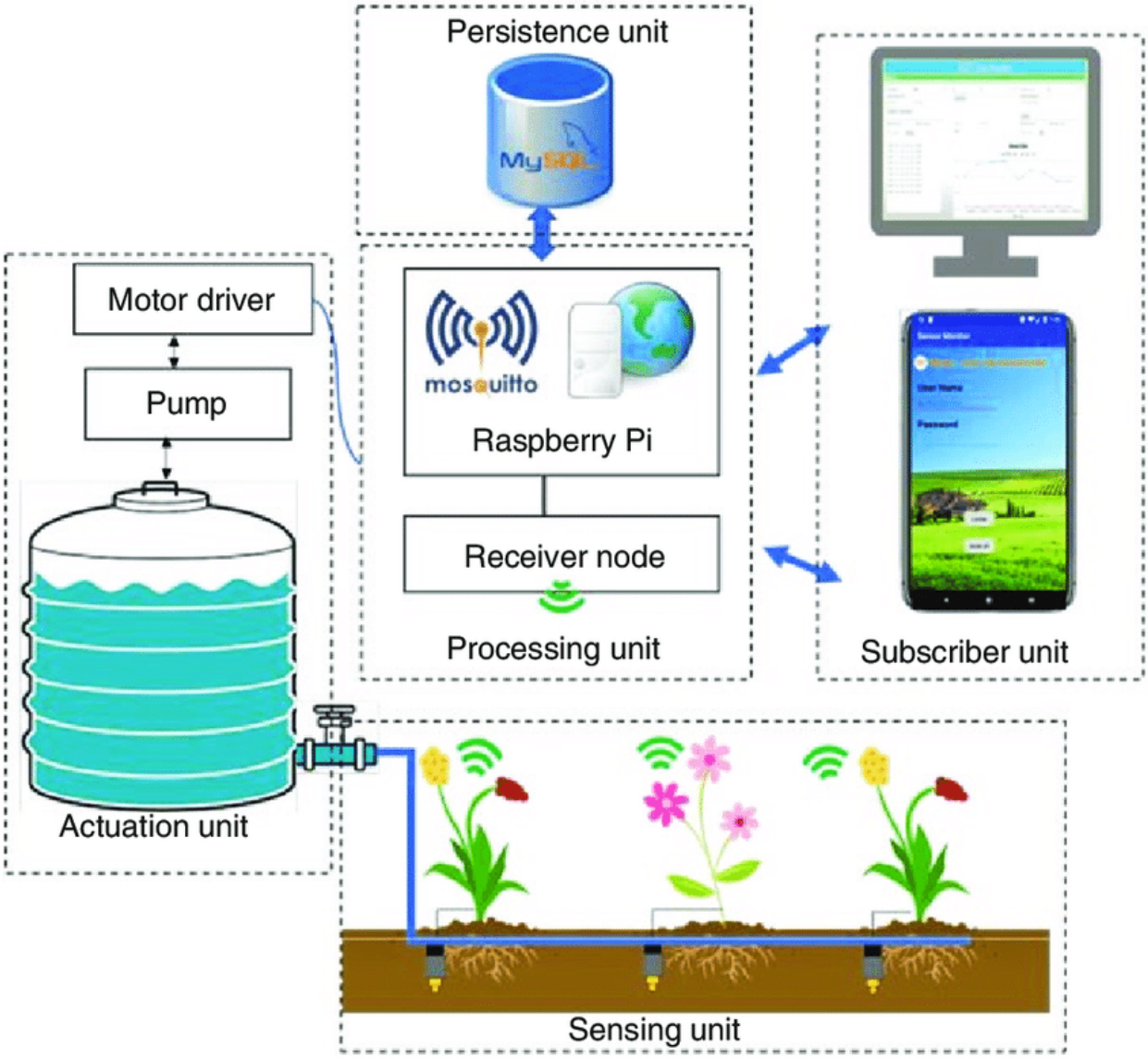
Existing problem:Rainfall and Water availability in **India** has huge Regional Imbalance.Water resources face challenges from climate change.The demand for water for various purposes is increasing due to population growth, urbanization and industrialization.Due to lack of awareness of the present technology many areas are far behind the present generation irrigation techniques. Now a days, as the farmers are using manual procedures to turn on the motors, and to check the soil moisture contents

in the soil, this may lead to the wastage of time and hardwork.

Proposed solution: Temperature, Humidity, Soil Moisture sensors are used in agriculture fields to sense the data automatically with in specified time regularly.And these sensored data can be transmitted to the mobile application which is used by the user.By monitoring these sensored data, the user can operate the motors with his finger tips.And also when the user is not available with the mobile application, then this type of technology can be used to operate the motors automatically depending upon the data values.

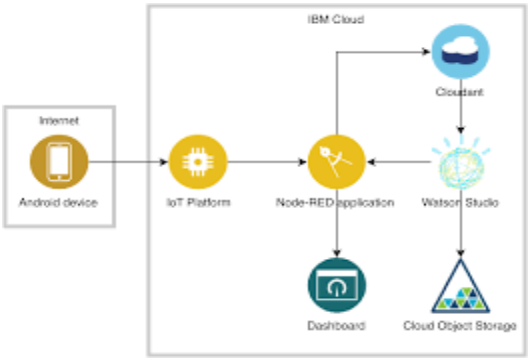
## THEORITICAL ANALYSIS

### Block diagram:

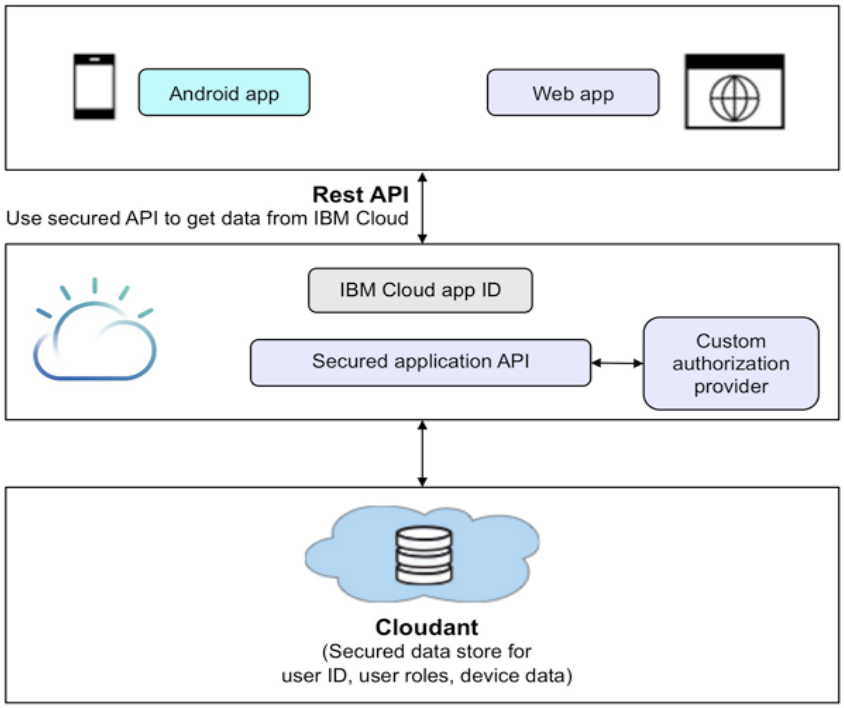


## Software Designing:

IBM IOT cloud is used to integrate the sensored values and to store data in regular time intervals.Node red Application is used to integrate the sensors and to send the respected values to the cloudant .MIT app is also used to monitor the sensored values and to operate the motors manually using MIT mobile application.

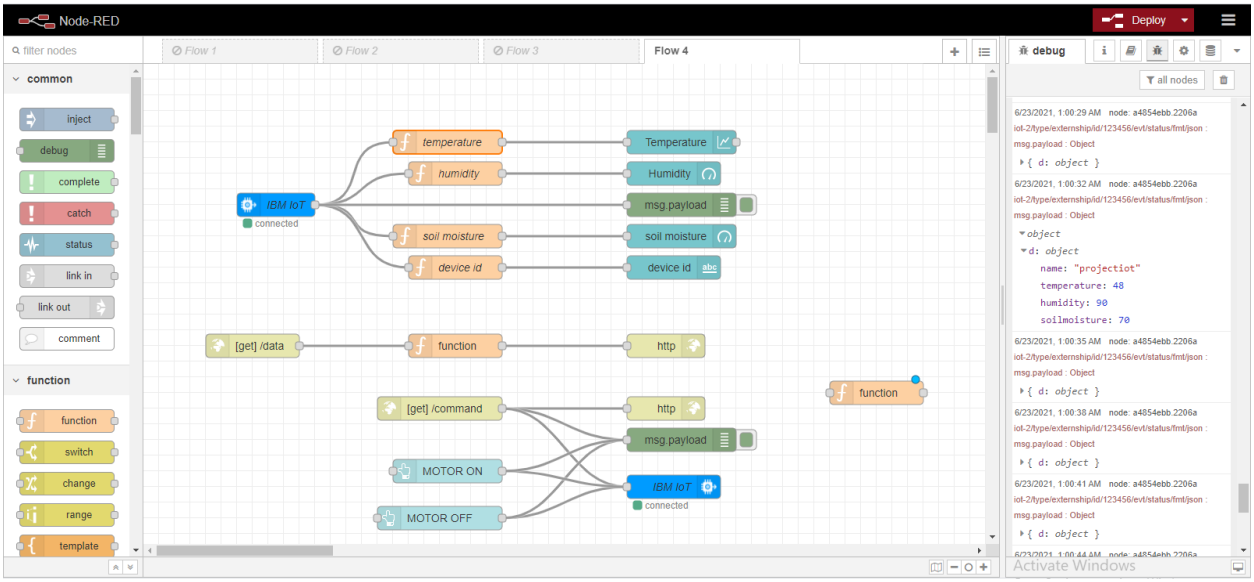



## FLOW CHART:



# RESULTS:

## 1.NODE RED FLOW




## 2.Python programming code

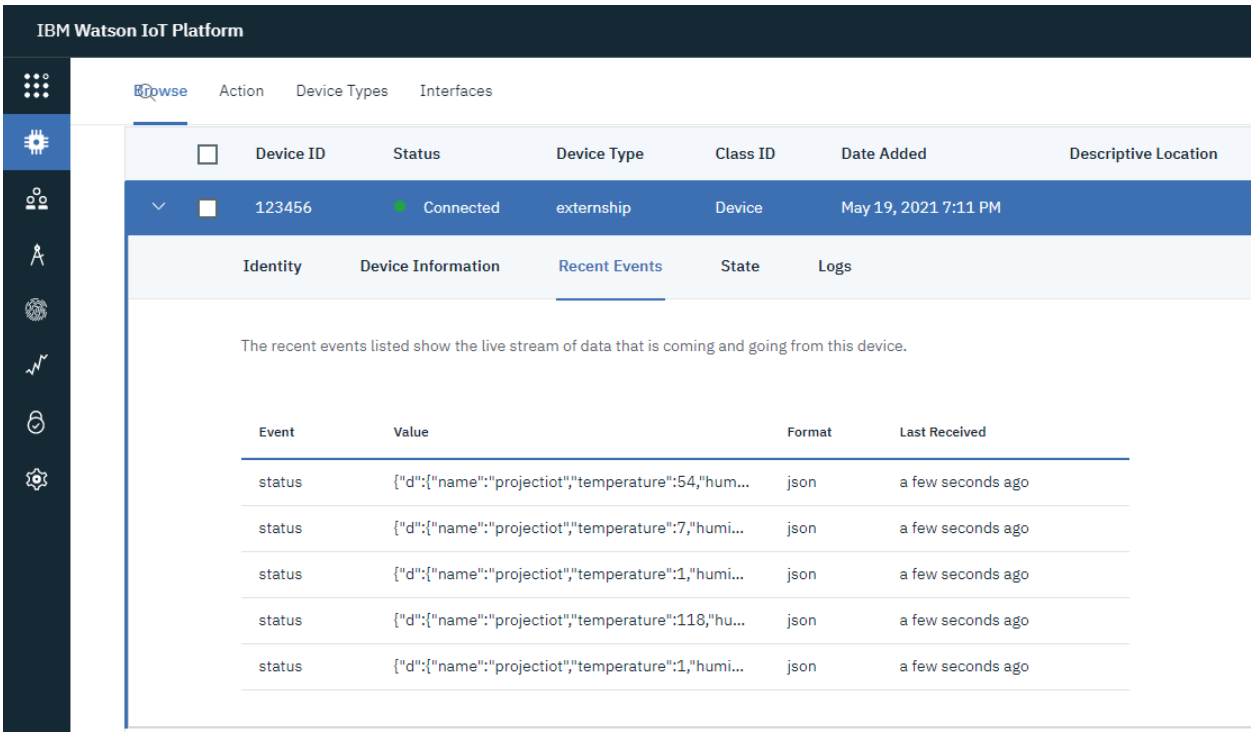
File Edit Format Run Options Window Help

```
import wiotp.sdk.device
import time
import random
myConfig = {
    "identity": {
        "orgId": "3t5oej",
        "typeId": "externship",
        "deviceId":"123456"
    },
    "auth": {
        "token": "1234567890"
    }
}

def myCommandCallback(cmd):
    p=cmd.data['command']
    print()
    if(p=="motoron"):
        print(".....Manually Motor is TURNED ON.....")
    elif(p=="motoroff"):
        print(".....Manually Motor is TURNED OFF.....")
    print()
client = wiotp.sdk.device.DeviceClient(config=myConfig, logHandlers=None)
client.connect()
while True:
    temp=random.randint(-20,125)
    hum=random.randint(0,100)
    moist=random.randint(0,100)
    myData={'d':{'name':"projectiot", 'temperature':temp, 'humidity':hum, 'soilmoisture':moist}}
    client.publishEvent(eventId="status", msgFormat="json", data=myData, qos=0, onPublish=None)
    print("Published data Successfully: %s", myData)
    print()
    print()
    if(moist<=30):
        print(".....According to Moisture levels Motor is TURNED ON Automatically.....")
    elif(moist>30):
        print(".....According to Moisture levels Motor is TURNED OFF Automatically.....")
    print()
    print()
    client.commandCallback = myCommandCallback
    time.sleep(3)
client.disconnect()
```

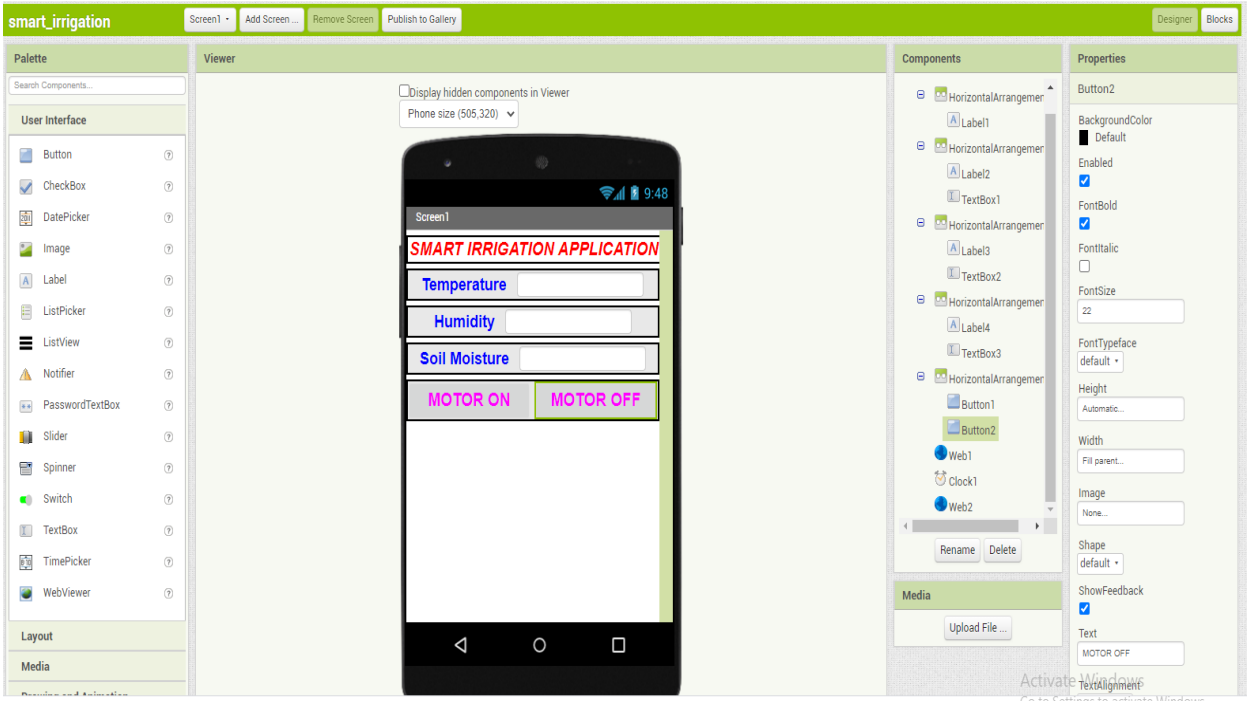
## 3.python output(motor turns ON and OFF automatically)

```
Python 3.9.4 (tags/v3.9.4:1f2e308, Apr  6 2021, 13:40:21) [MSC v.1928 64 bit (AMD64)] on win32
Type "help", "copyright", "credits" or "license()" for more information.
>>>
======== RESTART: C:\Users\RAVIBHANU\Desktop\ravi docs\extern_project.py =======
2021-06-23 01:16:02,977   wiotp.sdk.device.client.DeviceClient  INFO    Connected successfully: d:3t5oej:externship:123456
Published data Successfully: %s {'d': {'name': 'projectiot', 'temperature': 38, 'humidity': 45, 'soilmoisture': 99}}

.....According to Moisture levels, Motor is TURNED OFF Automatically.....

Published data Successfully: %s {'d': {'name': 'projectiot', 'temperature': -17, 'humidity': 99, 'soilmoisture': 37}}

.....According to Moisture levels, Motor is TURNED OFF Automatically.....

Published data Successfully: %s {'d': {'name': 'projectiot', 'temperature': -7, 'humidity': 65, 'soilmoisture': 26}}

.....According to Moisture levels , Motor is TURNED ON Automatically.....

Published data Successfully: %s {'d': {'name': 'projectiot', 'temperature': 124, 'humidity': 54, 'soilmoisture': 93}}

.....According to Moisture levels, Motor is TURNED OFF Automatically.....

Published data Successfully: %s {'d': {'name': 'projectiot', 'temperature': 125, 'humidity': 80, 'soilmoisture': 29}}

.....According to Moisture levels , Motor is TURNED ON Automatically.....
```

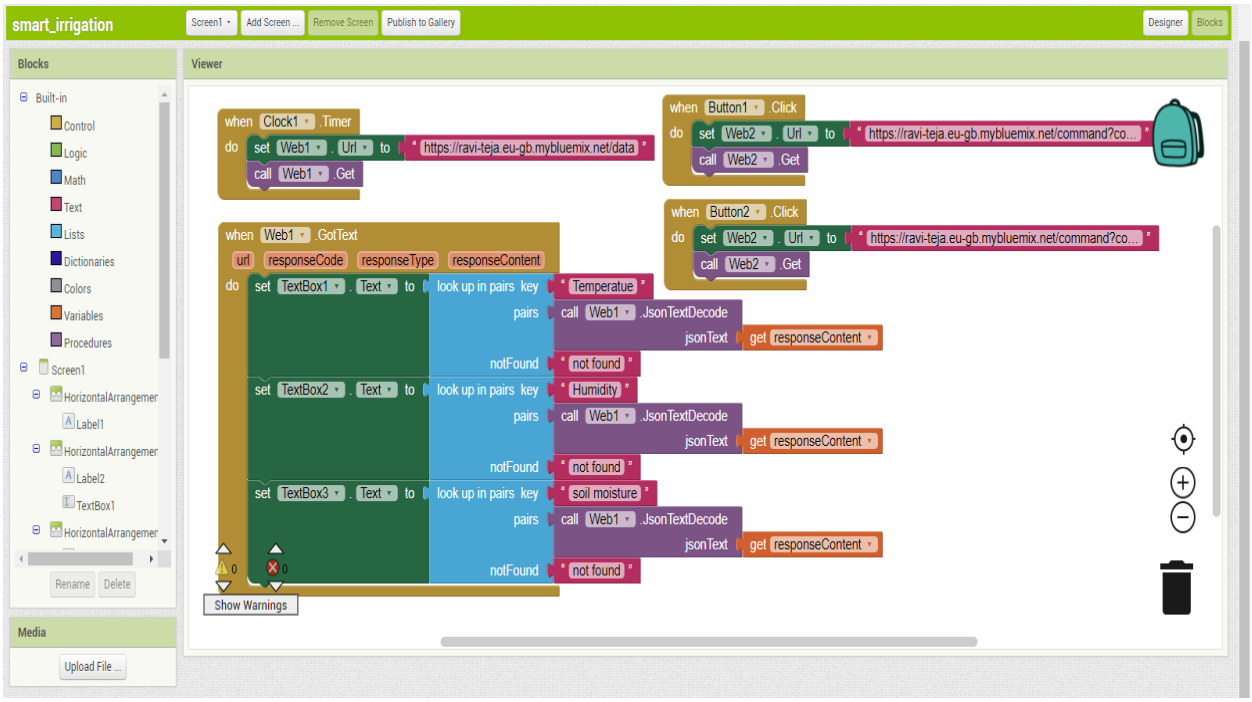
## 4.IBM Watson IOT platform



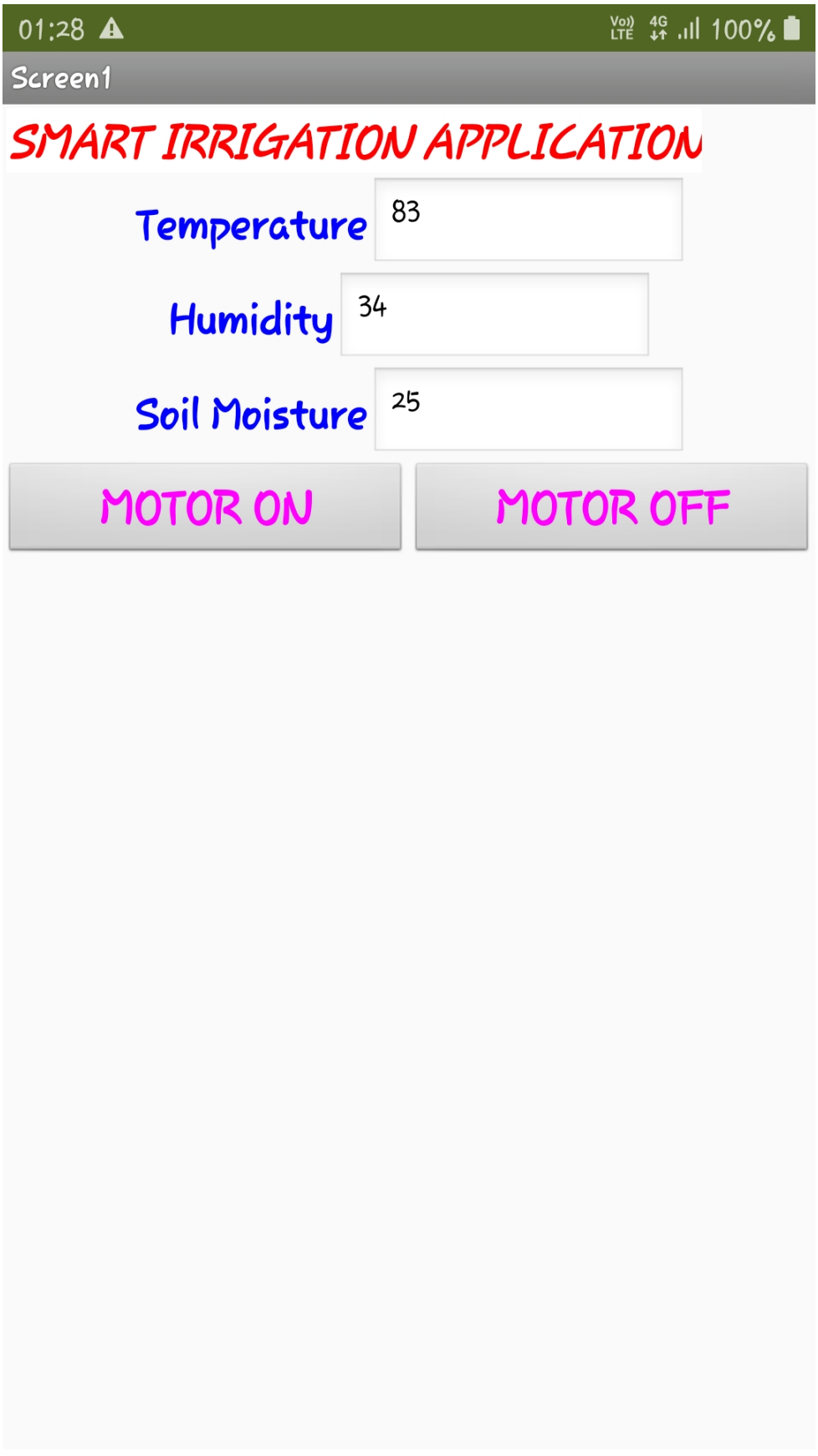
## 5.MIT APP designer



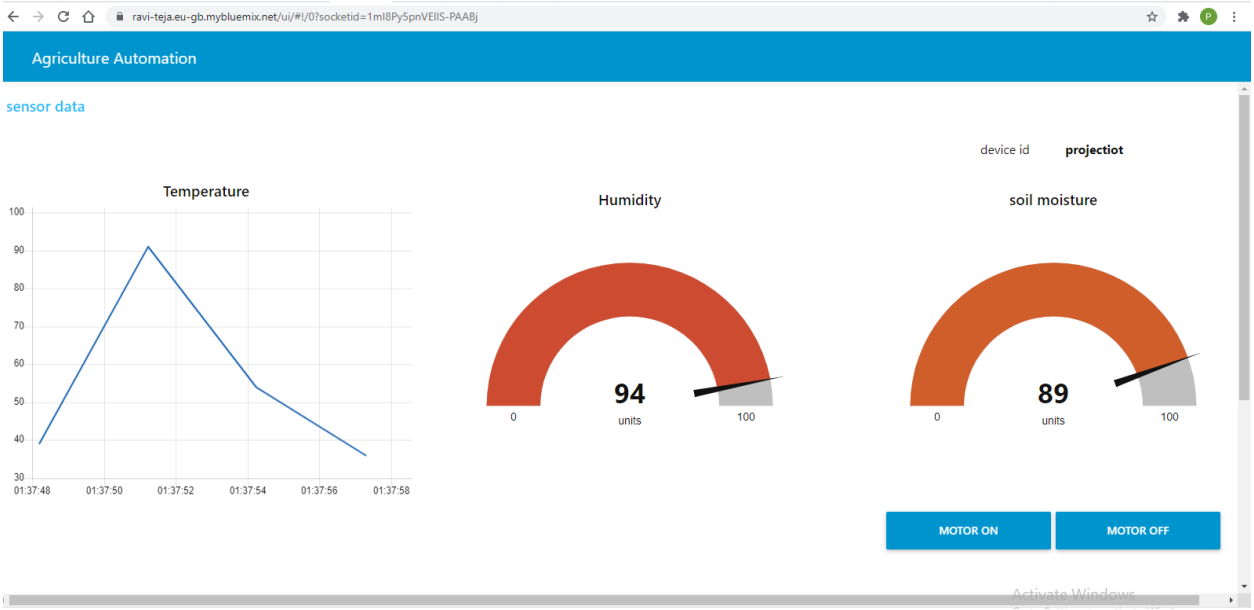

## 6.MIT APP blocks




## 7.MIT APP output in mobile


01:28
100%
Screen1
SMART IRRIGATION APPLICATION
Temperature
83
Humidity
34
Soil Moisture
25
MOTOR ON
MOTOR OFF

## 8. web UI output




## 9,python output(motor turn ON and OFF Manually)

```
Published data Successfully: %s {'d': {'name': 'projectiot', 'temperature': 41, 'humidity': 73, 'soilmoisture': 90}}

.....According to Moisture levels, Motor is TURNED OFF Automatically.....

Published data Successfully: %s {'d': {'name': 'projectiot', 'temperature': -10, 'humidity': 8, 'soilmoisture': 14}}

.....According to Moisture levels , Motor is TURNED ON Automatically.....


.....Manually Motor is TURNED OFF.....

.....Manually Motor is TURNED ON.....

.....Manually Motor is TURNED ON.....
Published data Successfully: %s {'d': {'name': 'projectiot', 'temperature': 25, 'humidity': 38, 'soilmoisture': 42}}

.....According to Moisture levels, Motor is TURNED OFF Automatically.....


.....Manually Motor is TURNED OFF.....
Published data Successfully: %s {'d': {'name': 'projectiot', 'temperature': 85, 'humidity': 3, 'soilmoisture': 44}}

.....According to Moisture levels, Motor is TURNED OFF Automatically.....


.....Manually Motor is TURNED ON.....

.....Manually Motor is TURNED OFF.....

.....Manually Motor is TURNED ON.....

.....Manually Motor is TURNED OFF.....
```

## ADVANTAGES AND DISADVANTAGES

### ADVANTAGES :

- Do watering as well as dunging.
- This system will be installed under the ground.
- This irrigation system will stop when it rains.
- It delivers high quality crop production.
- Mobile operated pumps saves cost of electricity.
- It allows farmers to maximize yields using minimum resources such as water, fertilizers, seeds etc.
- This improves data collection process and helps in wireless monitoring and control.

### DIS ADVANTAGES:

- The smart Irrigation needs availability of Internet continuously.
- The major challenge is that, farmers must understand the technology and how to use it.
- It is a cost effective system.

## APPLICATIONS

- Smart farming.
- Nursing with latest technology.
- Smart motoring control.

## CONCLUSION

In this paper , smart irrigation system is designed using IBM cloud and python programming to send the random values. This research is conducted on monitoring the sensor values and controlling the motoring action accordingly.As smart technology is used, this increases the opportunity of creating interest in present youth in Irrigation.With more advancement in the field of IOT expected in coming years, these systems can be more efficient, much faster and less costlier.The project concludes that automation of irrigation system will become easy and comfortable for farmers to operate the irrigation at remote location i.e. from home. This will save time and avoid problem of continuous vigilance.

## FUTURE SCOPE

IOT based smart farming is a system which is built for monitoring the crop field with the help of sensors and automating the irrigation system.The application of IOT in agriculture industry has helped the farmers to monitor the temperature, soil moisture levels in real time.This may increase the hope of farmers in farming with high confidence levels.

## APPENDIX

### SOURCE CODE:

```
import wiotp.sdk.device
import time
import random
myConfig = {
    "identity": {
        "orgId": "hj5fmy",
        "typeId": "NodeMCU",
        "deviceId":"12345"
    },
    "auth": {
        "token": "12345678"
    }
}

def myCommandCallback(cmd):
    print("Message received from IBM IoT Platform: %s" % cmd.data['command'])
    m=cmd.data['command']

client = wiotp.sdk.device.DeviceClient(config=myConfig, logHandlers=None)
client.connect()

while True:
    temp=random.randint(-20,125)
    hum=random.randint(0,100)
    myData={'temperature':temp, 'humidity':hum}
```

```
    client.publishEvent(eventId="status", msgFormat="json", data=myData, qos=0,
onPublish=None)
    print("Published data Successfully: %s", myData)
    client.commandCallback = myCommandCallback
     time.sleep(2)
client.disconnect()
```

## UI OUTPUT SCREENSHOT :