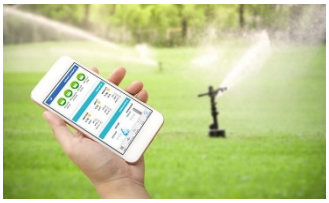
REALTIME WEATHER BASED SMART SPRINKLER SYSTEM FOR GOLF COURSE



Date: 18/08/2020

DONE BY:
JAWAHAR V

Real Time Weather Based Sprinkler System

I. Introduction:

1.1 Overview:

Continuous monitoring and storage of weather and soil moisture information. Alert is generated if the soil moisture is above the threshold value. The water sprinklers can be controlled remotely using mobile app. Less latency in communication from device to cloud with MQTT.

1.2 Purpose:

By using this project one can view the temperature, humidity and the soil moisture details in real time. He/she can also switch on or off the motor and sprinkler using a web application or mobile application.

II. Literature Survey:

2.1 Existing Problem:

The owner of the golf course has to appoint a person to properly turn on or off the sprinkler but in doing so the person may not know if rain is going to come or not also he doesn't calculate the moisture content present in the soil. Therefore, if the person switches on the sprinkler then the soil may get more wet than it is supposed to be.

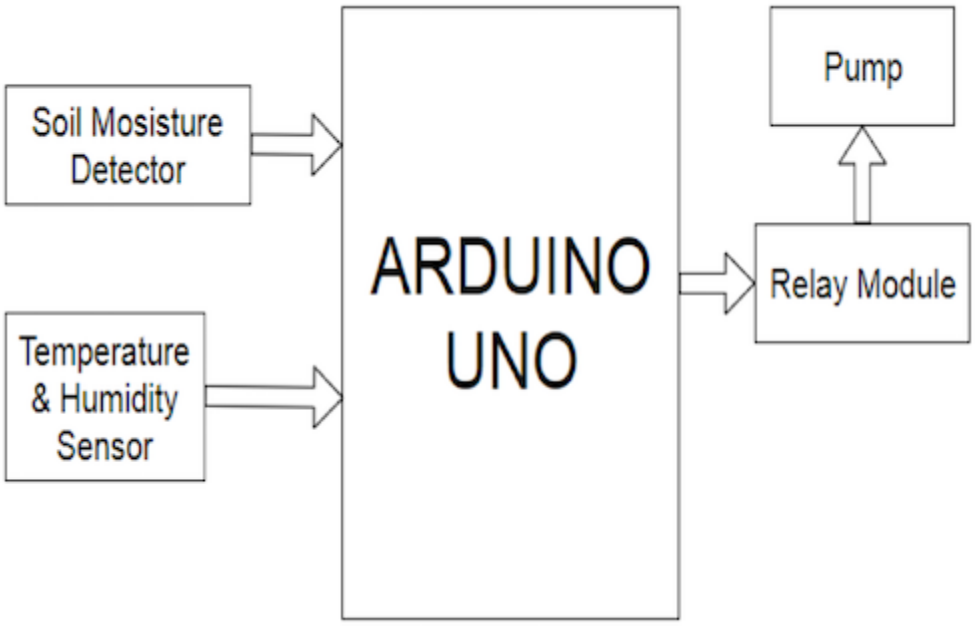
2.2 Proposed Solution:

The solution proposed to solve the problem is an integrated system using IBM IoT Platform where all the devices are connected through IBM Watson and two interfaces one is

website and other is a mobile application is created to monitor the current temperature and humidity readings and with the help of the readings soil moisture can be calculated thus sprinkler can be turned on and off at any time from any place.

III. Theoretical Analysis:

3.1 Block Diagram:



3.2 Hardware/Software Designing:

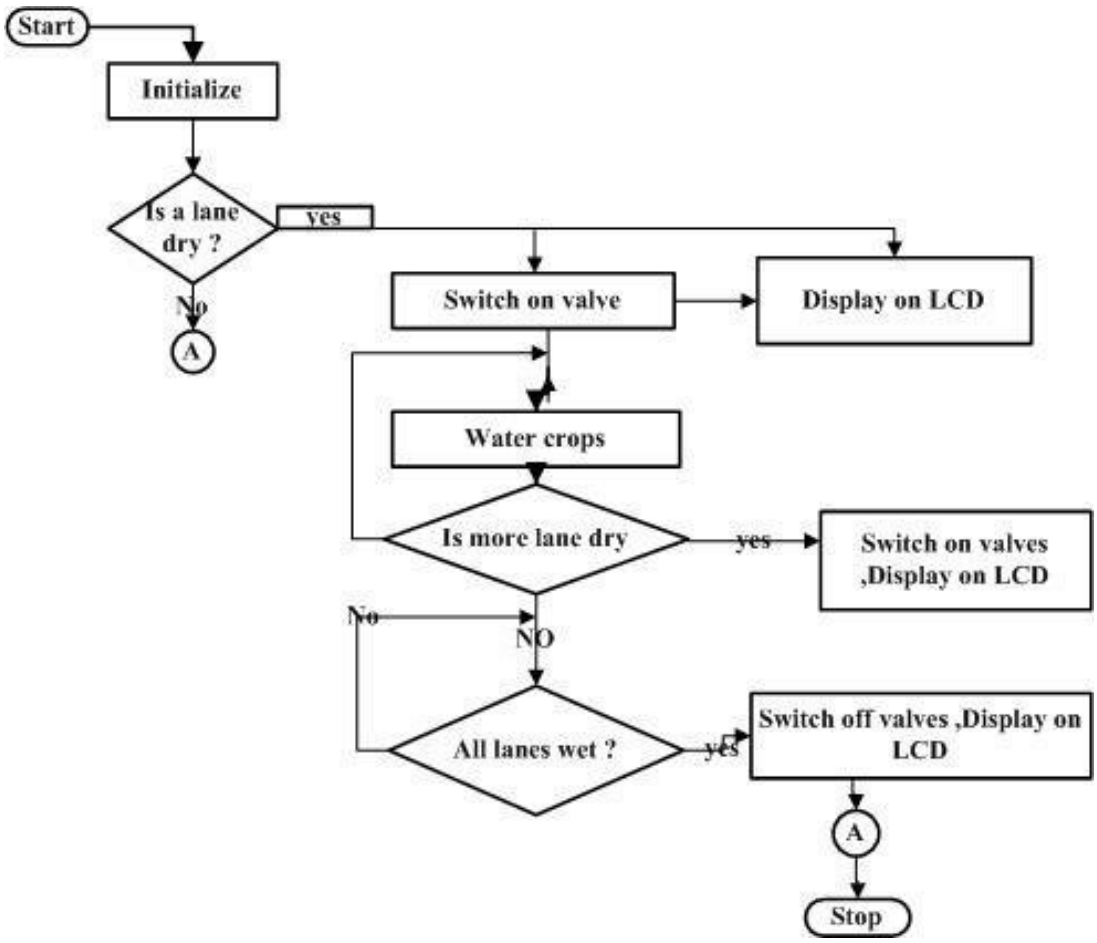
Hardware components use are: 1.Temperature sensor, 2.Humidity sensor, 3.Soil moisture sensor, 4.Connecting Wires.

Software components used are: 1.IBM cloud 2.IBM IOT platform 3.IBM Watson 4.node-red 5.Python IDLE 6.MIT app inventor.

IV. Experimental Investigations:

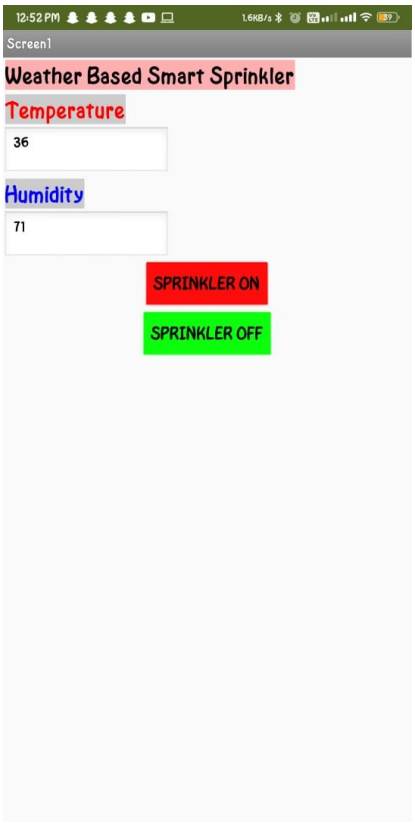
By integrating the applications using Watson IoT all the devices can be connected and thus they can be controlled from any place and at any time. Real time data can be seen from the mobile application and the online web application.

V. Flowchart:



VI. Result:

One can view the temperature, humidity and soil moisture anywhere and anytime and can control the sprinkler to spray water in the golf course.



VII. Advantages and Disadvantages:

7.1 Advantages of Smart Sprinkler:

i. Can be accessed from anywhere and anyplace.
ii. Real time data is available at all times.
iii. Soil moisture content of golf course can be predicted.

7.2 Disadvantages of Smart Sprinkler:

i. User must have some basic knowledge to use the web and mobile applications.
ii. The server must be running all time and it must be maintained properly.

VIII. Applications:

- Easy and intuitive app controls.
- Real time monitoring of weather and weather awareness.
- Anytime and anywhere access.
- Water can be saved.
- Golf course can be maintained properly.
- Also can be used for smart irrigation.

IX. Conclusion:

Real time weather based smart sprinkler for golf course was developed, web and mobile applications were created to monitor the temperature, humidity and soil moisture content.

X. Future Scope:

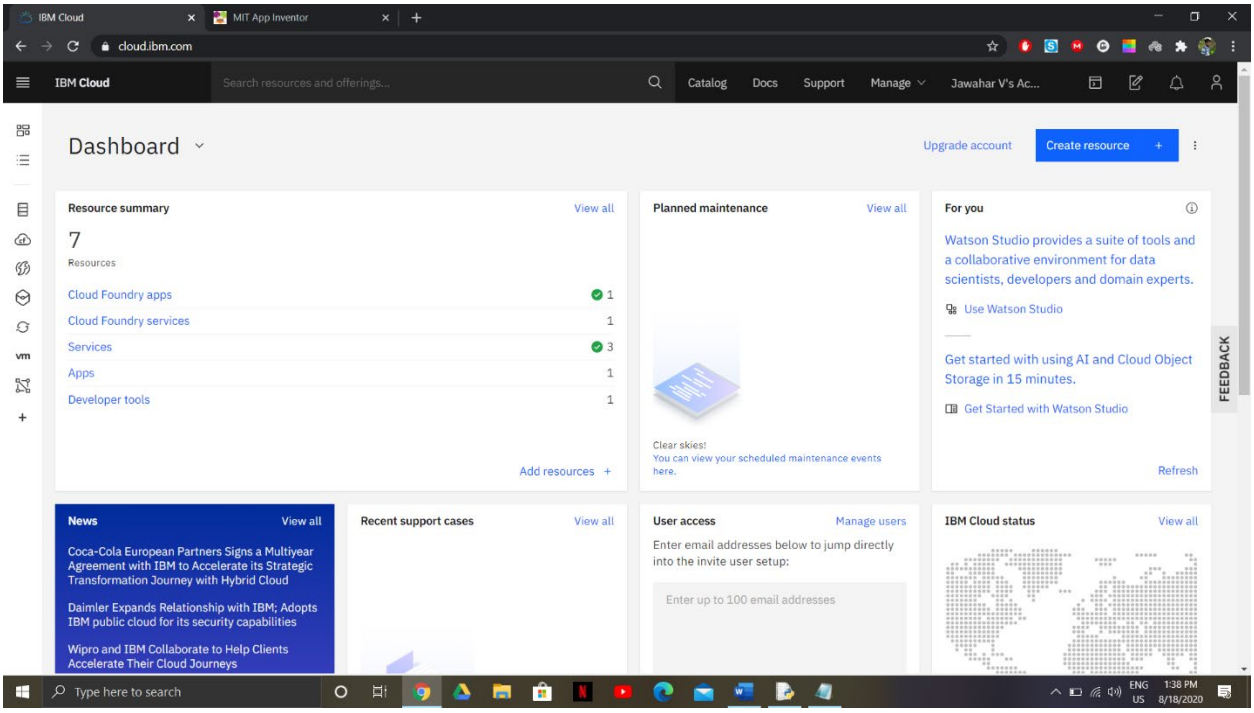
In future the application can be modified to be used in smart irrigation systems to save water.

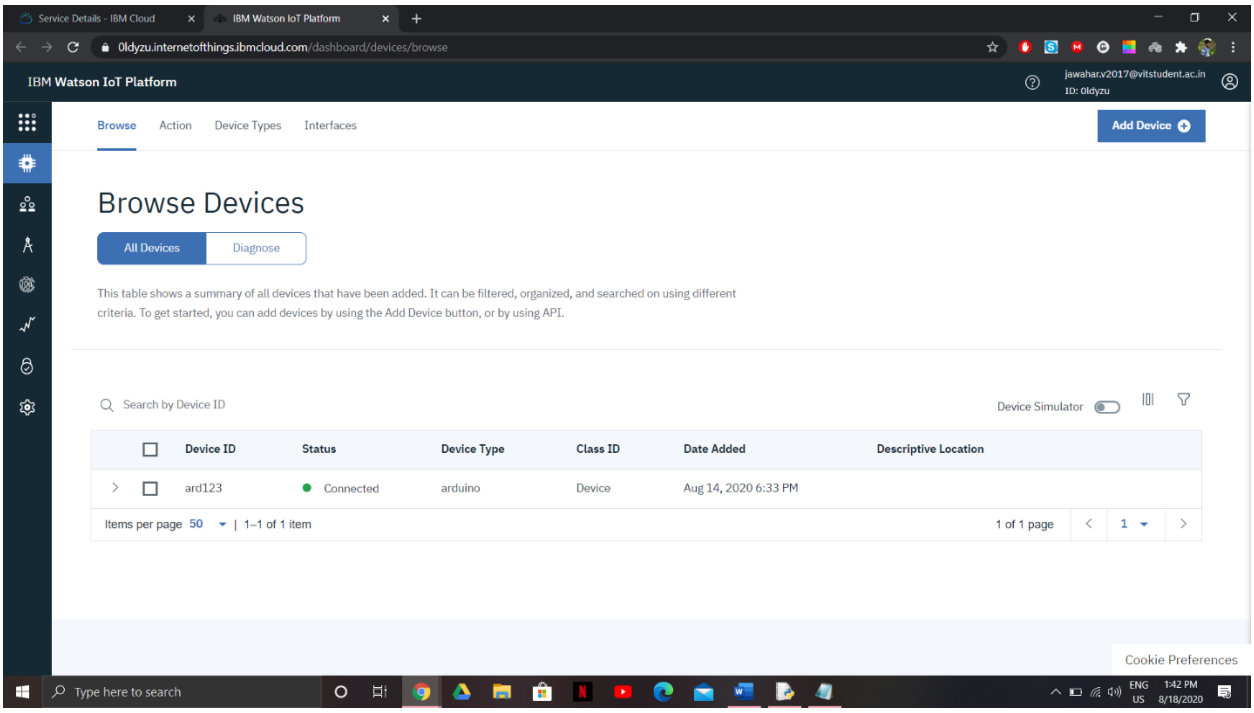
Voice controls can also be added as additional features for the system.

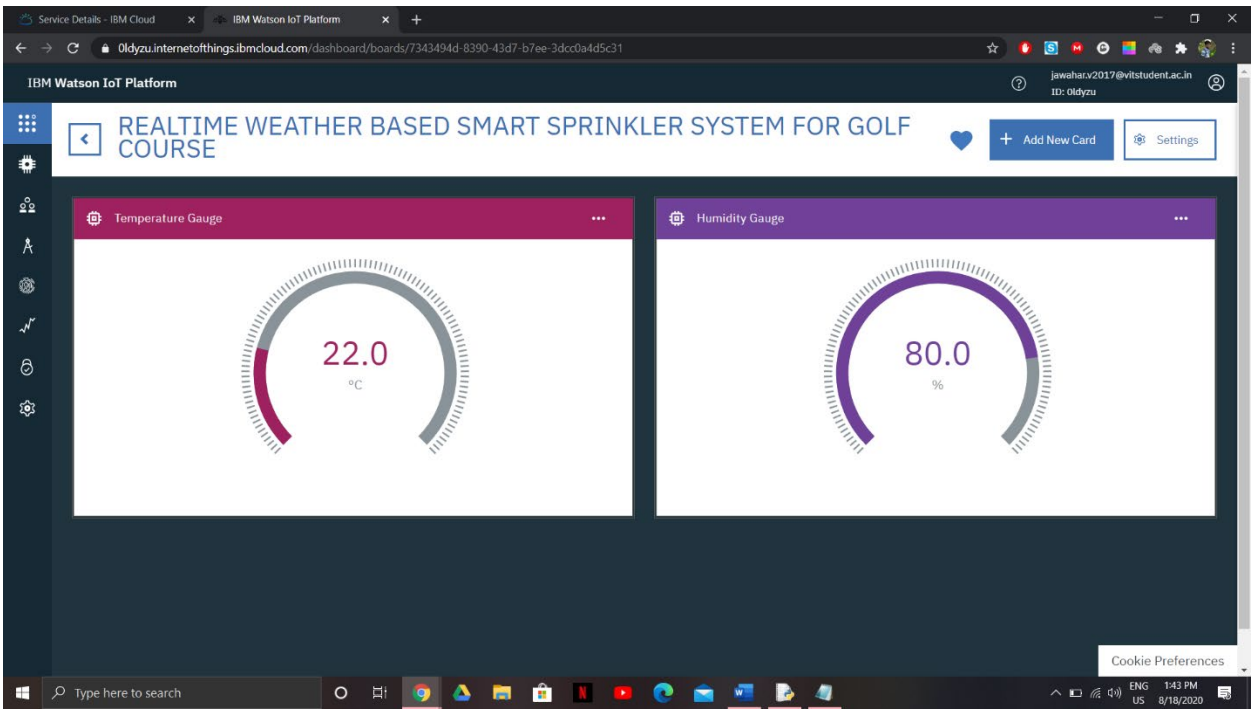
XI. Bibliography:

1. A-real time smart sprinkler irrigation control system
2. Youtube
3. Smartbridge vidoes
4. Smartinternz

XII. Output Screenshots:




Service Details - IBM Cloud
IBM Watson IoT Platform
0ldyzu.internetofthings.ibmcloud.com/dashboard/devices/browse
IBM Watson IoT Platform
jawahar.v2017@vitstudent.ac.in
ID: 0ldyzu
Browse
Action
Device Types
Interfaces
Add Device
Browse Devices
All Devices
Diagnose
This table shows a summary of all devices that have been added. It can be filtered, organized, and searched on using different criteria. To get started, you can add devices by using the Add Device button, or by using API.
Search by Device ID
Device Simulator
Device ID
Status
Device Type
Class ID
Date Added
Descriptive Location
ard123
Connected
arduino
Device
Aug 14, 2020 6:33 PM
Items per page 50
1–1 of 1 item
1 of 1 page
Cookie Preferences
Type here to search
ENG
US
1:42 PM
8/18/2020


Service Details - IBM Cloud
IBM Watson IoT Platform
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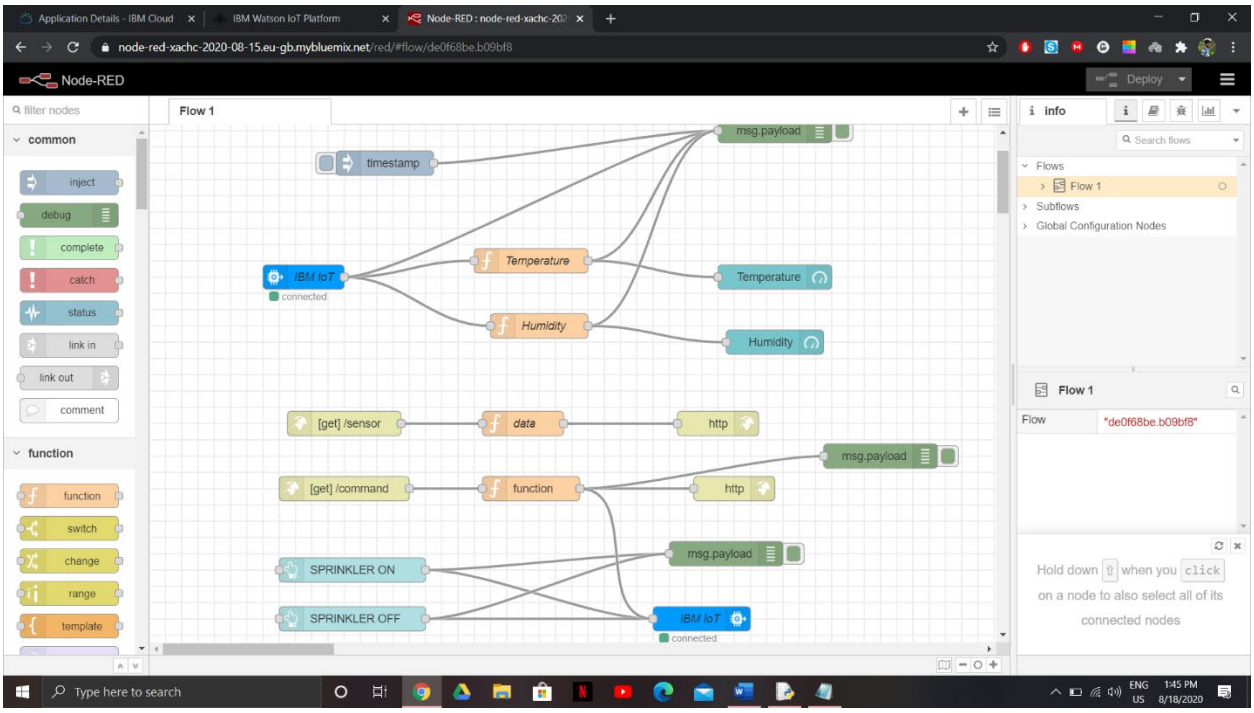
IBM Watson IoT Platform
jawahar.v2017@vitstudent.ac.in
ID: 0ldyzu
REALTIME WEATHER BASED SMART SPRINKLER SYSTEM FOR GOLF COURSE
Add New Card
Settings
Temperature Gauge
22.0
°C
Humidity Gauge
80.0
%
Cookie Preferences
Type here to search
ENG
US
1:43 PM
8/18/2020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IBM Watson IoT Platform
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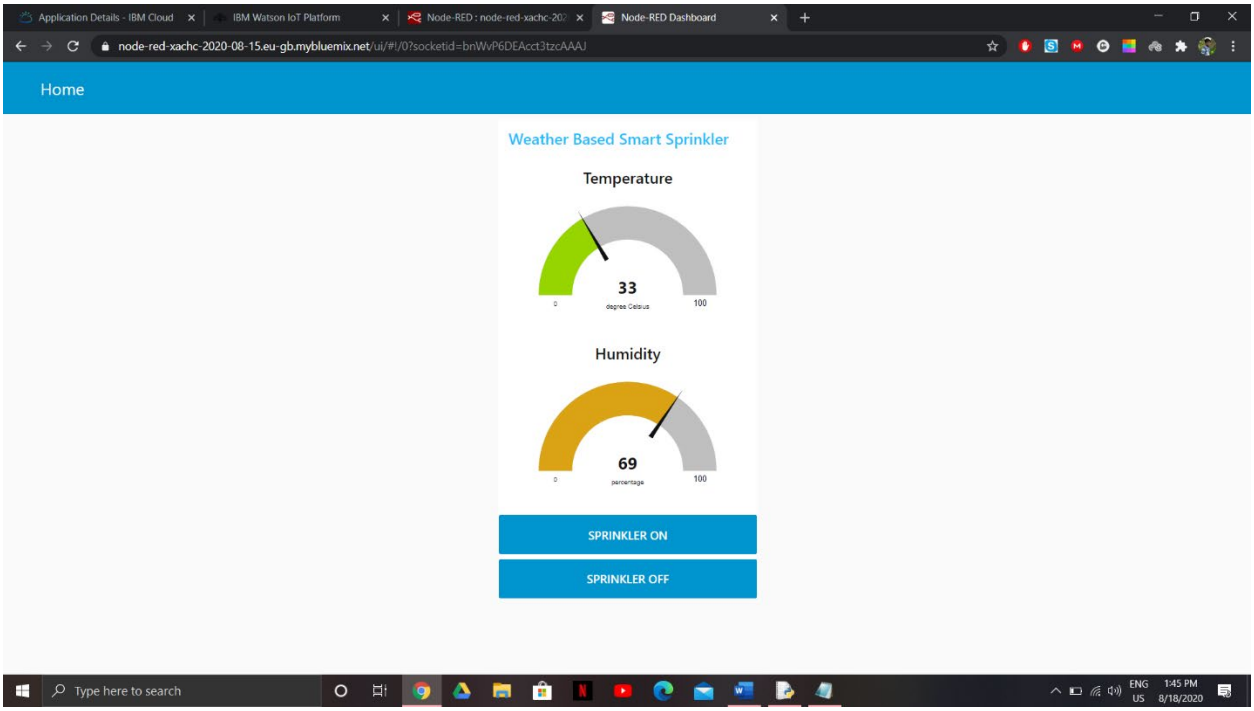
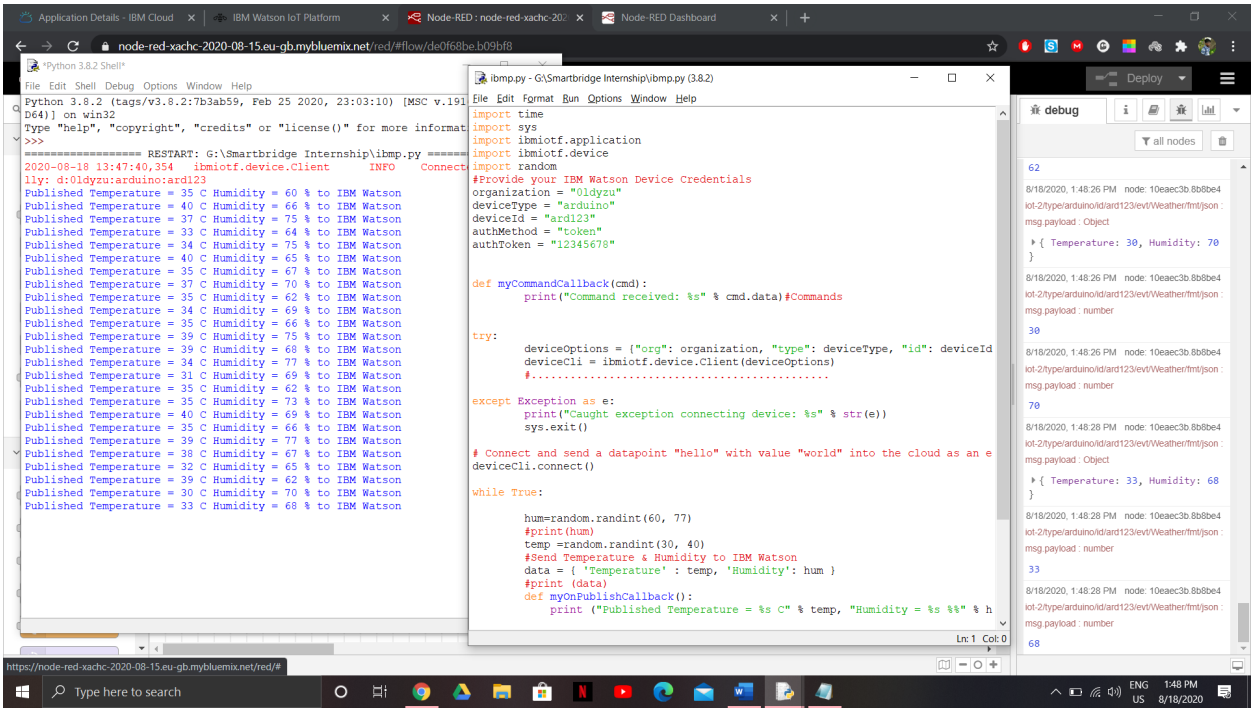
Node-RED
Deploy
filter nodes
Flow 1
common
inject
debug
complete
catch
status
link in
link out
comment
function
function
switch
change
range
template
timestamp
msg.payload
IBM IoT
connected
Temperature
Humidity
Temperature
Humidity
[get] /sensor
data
http
[get] /command
function
http
msg.payload
SPRINKLER ON
SPRINKLER OFF
msg.payload
IBM IoT
connected
info
Search flows
Flows
Flow 1
Subflows
Global Configuration Nodes
Flow 1
Flow
"de0f68be.b09bf8"
Hold down ⇧ when you click on a node to also select all of its connected nodes
Type here to search
ENG US
1:45 PM 8/18/2020


Application Details - IBM Cloud
IBM Watson IoT Platform
Node-RED : node-red-xachc-202
Node-RED Dashboard
node-red-xachc-2020-08-15.eu-gb.mybluemix.net/ui/#!/0?socketid=bnWvP6DEAcct3tzcAAAJ
Home
Weather Based Smart Sprinkler
Temperature
33
degree Celsius
0
100
Humidity
69
percentage
0
100
SPRINKLER ON
SPRINKLER OFF
Type here to search
ENG US
1:45 PM 8/18/2020


Application Details - IBM Cloud
IBM Watson IoT Platform
Node-RED : node-red-xachc-20
Node-RED Dashboard
node-red-xachc-2020-08-15.eu-gb.mybluemix.net/red/#flow/de0f68be.b09bf8
Deploy
debug
all nodes
Python 3.8.2 Shell
File Edit Shell Debug Options Window Help
Python 3.8.2 (tags/v3.8.2:7b3ab59, Feb 25 2020, 23:03:10) [MSC v.191
D64)] on win32
Type "help", "copyright", "credits" or "license()" for more informat
>>>
========== RESTART: G:\Smartbridge Internship\ibmp.py ==========
2020-08-18 13:47:40,354 ibmiotf.device.Client INFO Connect
lly: d:0ldyzu:arduino:ard123
Published Temperature = 35 C Humidity = 60 % to IBM Watson
Published Temperature = 40 C Humidity = 66 % to IBM Watson
Published Temperature = 37 C Humidity = 75 % to IBM Watson
Published Temperature = 33 C Humidity = 64 % to IBM Watson
Published Temperature = 34 C Humidity = 75 % to IBM Watson
Published Temperature = 40 C Humidity = 65 % to IBM Watson
Published Temperature = 35 C Humidity = 67 % to IBM Watson
Published Temperature = 37 C Humidity = 70 % to IBM Watson
Published Temperature = 35 C Humidity = 62 % to IBM Watson
Published Temperature = 34 C Humidity = 69 % to IBM Watson
Published Temperature = 35 C Humidity = 66 % to IBM Watson
Published Temperature = 39 C Humidity = 75 % to IBM Watson
Published Temperature = 39 C Humidity = 68 % to IBM Watson
Published Temperature = 34 C Humidity = 77 % to IBM Watson
Published Temperature = 31 C Humidity = 69 % to IBM Watson
Published Temperature = 35 C Humidity = 62 % to IBM Watson
Published Temperature = 35 C Humidity = 73 % to IBM Watson
Published Temperature = 40 C Humidity = 69 % to IBM Watson
Published Temperature = 35 C Humidity = 66 % to IBM Watson
Published Temperature = 39 C Humidity = 77 % to IBM Watson
Published Temperature = 38 C Humidity = 67 % to IBM Watson
Published Temperature = 32 C Humidity = 65 % to IBM Watson
Published Temperature = 39 C Humidity = 62 % to IBM Watson
Published Temperature = 30 C Humidity = 70 % to IBM Watson
Published Temperature = 33 C Humidity = 68 % to IBM Watson
ibmp.py - G:\Smartbridge Internship\ibmp.py (3.8.2)
File Edit Format Run Options Window Help
import time
import sys
import ibmiotf.application
import ibmiotf.device
import random
#Provide your IBM Watson Device Credentials
organization = "0ldyzu"
deviceType = "arduino"
deviceId = "ard123"
authMethod = "token"
authToken = "12345678"
def myCommandCallback(cmd):
print("Command received: %s" % cmd.data)#Commands
try:
deviceOptions = {"org": organization, "type": deviceType, "id": deviceId
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 e
deviceCli.connect()
while True:
hum=random.randint(60, 77)
#print(hum)
temp =random.randint(30, 40)
#Send Temperature & Humidity to IBM Watson
data = { 'Temperature' : temp, 'Humidity': hum }
#print (data)
def myOnPublishCallback():
print ("Published Temperature = %s C" % temp, "Humidity = %s %%" % h
Ln: 1 Col: 0
62
8/18/2020, 1:48:26 PM node: 10eaec3b.8b8be4
iot-2/type/arduino/id/ard123/evt/Weather/fmt/json :
msg.payload : Object
{ Temperature: 30, Humidity: 70 }
8/18/2020, 1:48:26 PM node: 10eaec3b.8b8be4
iot-2/type/arduino/id/ard123/evt/Weather/fmt/json :
msg.payload : number
30
8/18/2020, 1:48:26 PM node: 10eaec3b.8b8be4
iot-2/type/arduino/id/ard123/evt/Weather/fmt/json :
msg.payload : number
70
8/18/2020, 1:48:28 PM node: 10eaec3b.8b8be4
iot-2/type/arduino/id/ard123/evt/Weather/fmt/json :
msg.payload : Object
{ Temperature: 33, Humidity: 68 }
8/18/2020, 1:48:28 PM node: 10eaec3b.8b8be4
iot-2/type/arduino/id/ard123/evt/Weather/fmt/json :
msg.payload : number
33
8/18/2020, 1:48:28 PM node: 10eaec3b.8b8be4
iot-2/type/arduino/id/ard123/evt/Weather/fmt/json :
msg.payload : number
68
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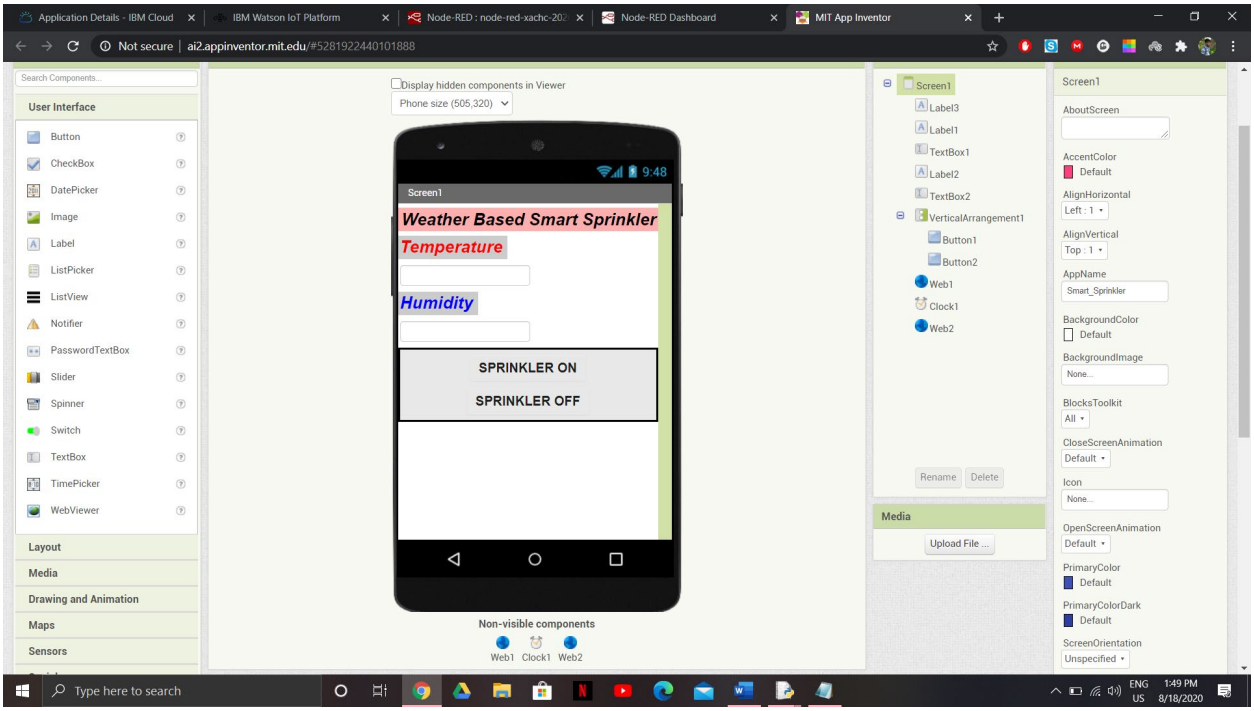
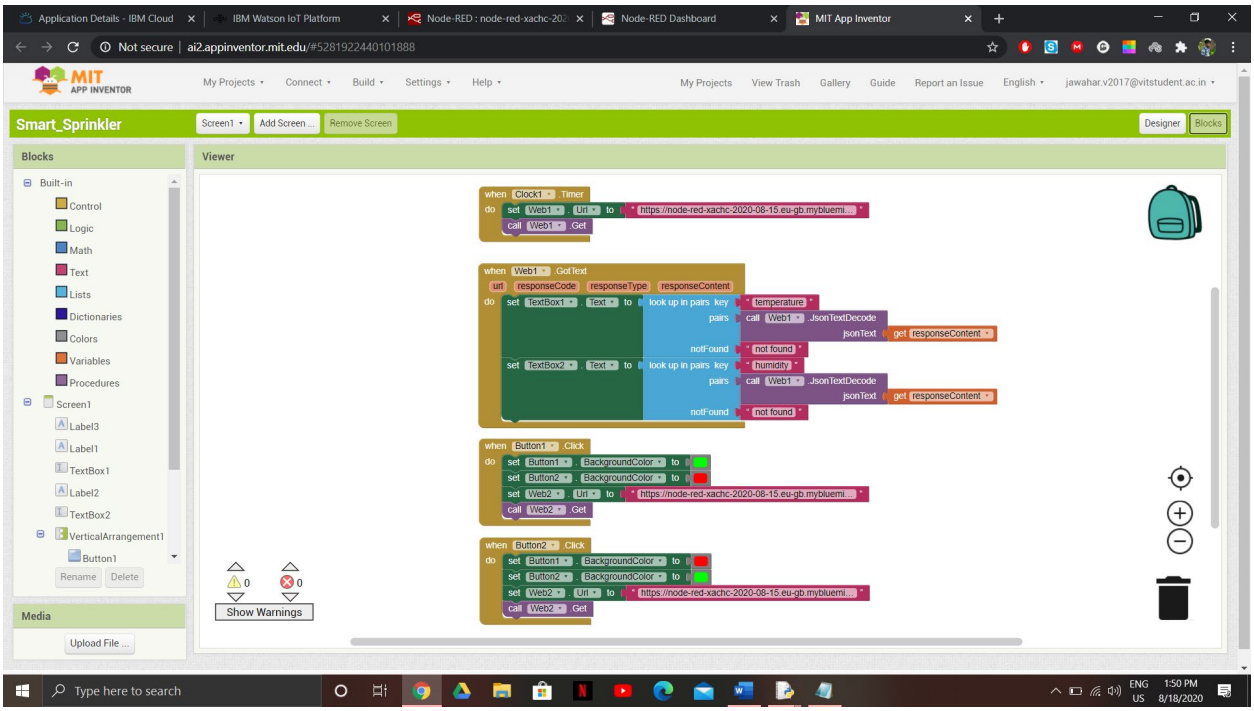
Type here to search
ENG US
1:48 PM 8/18/2020


Application Details - IBM Cloud
IBM Watson IoT Platform
Node-RED : node-red-xachc-20
Node-RED Dashboard
MIT App Inventor
Not secure | ai2.appinventor.mit.edu/#5281922440101888
Search Components...
User Interface
Button
CheckBox
DatePicker
Image
Label
ListPicker
ListView
Notifier
PasswordTextBox
Slider
Spinner
Switch
TextBox
TimePicker
WebViewer
Layout
Media
Drawing and Animation
Maps
Sensors
Display hidden components in Viewer
Phone size (505,320)
9:48
Screen1
Weather Based Smart Sprinkler
Temperature
Humidity
SPRINKLER ON
SPRINKLER OFF
Non-visible components
Web1 Clock1 Web2
Screen1
Label3
Label1
TextBox1
Label2
TextBox2
VerticalArrangement1
Button1
Button2
Web1
Clock1
Web2
Rename
Delete
Media
Upload File ...
Screen1
AboutScreen
AccentColor
Default
AlignHorizontal
Left : 1
AlignVertical
Top : 1
AppName
Smart_Sprinkler
BackgroundColor
Default
BackgroundImage
None...
BlocksToolkit
All
CloseScreenAnimation
Default
Icon
None...
OpenScreenAnimation
Default
PrimaryColor
Default
PrimaryColorDark
Default
ScreenOrientation
Unspecified
Type here to search
ENG US
1:49 PM 8/18/2020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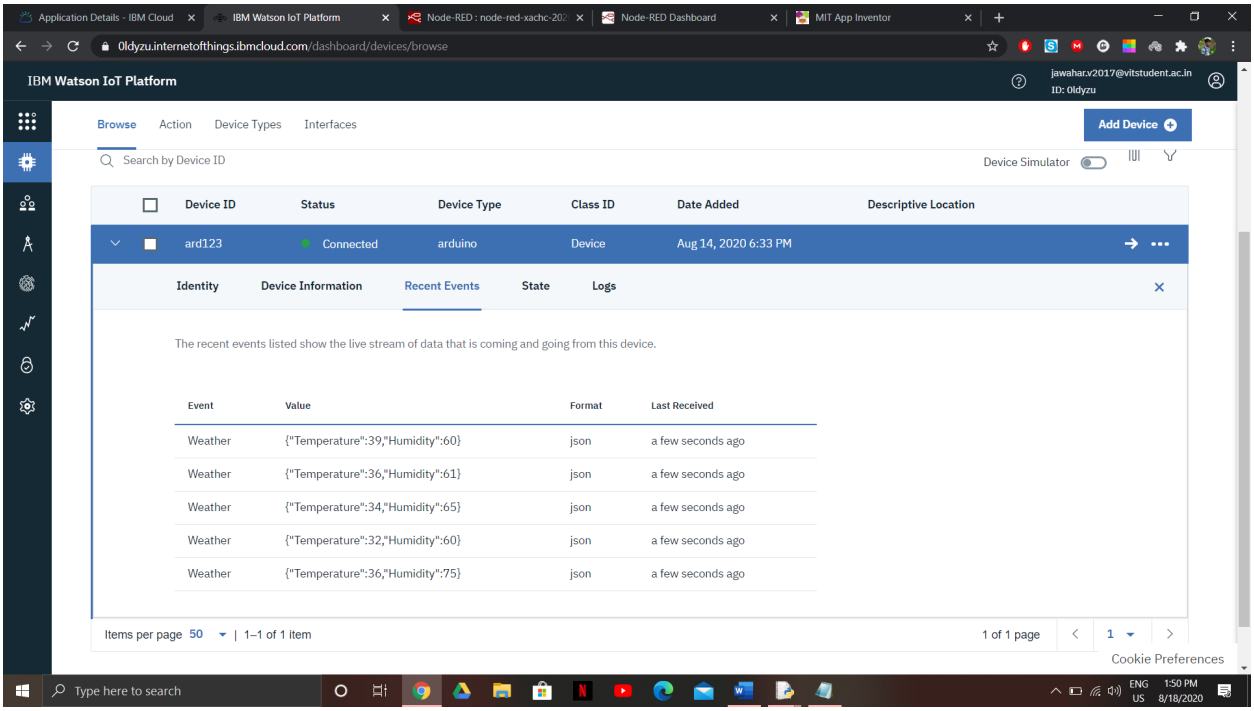
Node-RED Dashboard
MIT App Inventor
Not secure | ai2.appinventor.mit.edu/#5281922440101888
MIT APP INVENTOR
My Projects
Connect
Build
Settings
Help
My Projects
View Trash
Gallery
Guide
Report an Issue
English
jawahar.v2017@vitstudent.ac.in
Smart_Sprinkler
Screen1
Add Screen ...
Remove Screen
Designer
Blocks
Blocks
Built-in
Control
Logic
Math
Text
Lists
Dictionaries
Colors
Variables
Procedures
Screen1
Label3
Label1
TextBox1
Label2
TextBox2
VerticalArrangement1
Button1
Rename
Delete
Media
Upload File ...
Viewer
when Clock1 .Timer
do set Web1 Url to https://node-red-xachc-2020-08-15.eu-gb.mybluemi...
call Web1 .Get
when Web1 .GotText
url responseCode responseType responseContent
do set TextBox1 Text to look up in pairs key temperature
pairs call Web1 .JsonTextDecode
jsonText get responseContent
notFound not found
set TextBox2 Text to look up in pairs key humidity
pairs call Web1 .JsonTextDecode
jsonText get responseContent
notFound not found
when Button1 .Click
do set Button1 BackgroundColor to
set Button2 BackgroundColor to
set Web2 Url to https://node-red-xachc-2020-08-15.eu-gb.mybluemi...
call Web2 .Get
when Button2 .Click
do set Button1 BackgroundColor to
set Button2 BackgroundColor to
set Web2 Url to https://node-red-xachc-2020-08-15.eu-gb.mybluemi...
call Web2 .Get
0
0
Show Warnings
Type here to search
ENG US
1:50 PM 8/18/2020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Node-RED Dashboard
MIT App Inventor
0ldyzu.internetofthings.ibmcloud.com/dashboard/devices/browse
IBM Watson IoT Platform
jawahar.v2017@vitstudent.ac.in
ID: 0ldyzu
Browse
Action
Device Types
Interfaces
Add Device
Search by Device ID
Device Simulator
Device ID
Status
Device Type
Class ID
Date Added
Descriptive Location
ard123
Connected
arduino
Device
Aug 14, 2020 6:33 PM
Identity
Device Information
Recent Events
State
Logs
The recent events listed show the live stream of data that is coming and going from this device.
Event
Value
Format
Last Received
Weather
{"Temperature":39,"Humidity":60}
json
a few seconds ago
Weather
{"Temperature":36,"Humidity":61}
json
a few seconds ago
Weather
{"Temperature":34,"Humidity":65}
json
a few seconds ago
Weather
{"Temperature":32,"Humidity":60}
json
a few seconds ago
Weather
{"Temperature":36,"Humidity":75}
json
a few seconds ago
Items per page 50
1–1 of 1 item
1 of 1 page
1
Cookie Preferences
Type here to search
ENG US
1:50 PM 8/18/2020