Project Development Phase
Sprint-1

Python Script

Date	18 November 2022
Team ID	PNT2022TMID11029
Project Name	IOT BASED CROP PROTECTION SYSTEM FOR AGRICULTURE

Description:

Instead of generating sensor values from the hardware circuits, we are using random module to generate sensor data and to automate IOT based crop protection system through the python code. The data generated from the python code are being stored in the IBM cloud.

Python Code:

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

#IBM Watson Device Credentials...
organization = "tw9ckq"
deviceType = "jade"
deviceId = "7010"
authMethod = "token"
authToken = "9944893843"

def myCommandCallback(cmd):
   print("Command received: %s" % cmd.data['command'])
   status=cmd.data['command']
   if status=="sprinkler_on":
      print ("sprinkler is turning ON")
   else :
      print ("sprinkler is turning OFF")

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

except Exception as e:
   print("Exception detected in connecting device: %s" % str(e))
   sys.exit()

#Connecting to IBM watson...
deviceCli.connect()

while True:
   #Getting values from sensors...
   temp_sensor = round( random.uniform(0,80),2)
   PH_sensor = round(random.uniform(1,14),3)
   camera = ["Detected","Not Detected","Not Detected","Not Detected","Not Detected","Not Detected",]
   camera_reading = random.choice(camera)
   flame = ["Detected","Not Detected","Not Detected","Not Detected","Not Detected","Not Detected",]
   flame_reading = random.choice(flame)
   moist_level = round(random.uniform(0,100),2)
   water_level = round(random.uniform(0,30),2)

   #storing the sensor data to send in json format to cloud...
   temp_data = { 'Temp' : temp_sensor }
   PH_data = { 'PH value' : PH_sensor }
   camera_data = { 'Animal attack' : camera_reading}
   flame_data = { 'Flame' : flame_reading }
   moist_data = { 'Moisture level' : moist_level}
   water_data = { 'Water level' : water_level}

   # publishing Sensor datas to IBM Watson for every 5-10 seconds...
   success = deviceCli.publishEvent("Temperature sensor", "json", temp_data, qos=0)
   sleep(1)

   if success:
      print ("... ...publish ok.........")
      print ("Published Temp = %s C" % temp_sensor, "to IBM Watson")
      success = deviceCli.publishEvent("PH sensor", "json", PH_data, qos=0)
      sleep(1)

   if success:
      print ("Published PH value = %s" % PH_sensor, "to IBM Watson")
      success = deviceCli.publishEvent("camera", "json", camera_data, qos=0)
      sleep(1)

   if success:
      print ("Published Animal attack %s " % camera_reading, "to IBM Watson")
      success = deviceCli.publishEvent("Flame sensor", "json", flame_data, qos=0)
      sleep(1)
   if success:
      print ("Published Flame %s " % flame_reading,  "to IBM Watson")
      success = deviceCli.publishEvent("Moisture sensor", "json", moist_data, qos=0)
      sleep(1)

   if success:
      print ("Published Moisture level = %s " % moist_level, "to IBM Watson")
      success = deviceCli.publishEvent("Water sensor", "json", water_data, qos=0)
      sleep(1)

   if success:
      print ("Published Water level = %s cm" % water_level,  "to IBM Watson")
      print ("")

   #Automation to control sprinklers by present temperature an to send alert message to IBM Watson...
   if (temp_sensor > 35):
      print("sprinkler-1 is ON")
      success = deviceCli.publishEvent("Alert1", "json",{ 'alert1' : "Temperature(%s) is high, sprinkerlers are
turned ON" %temp_sensor }, qos=0)
      sleep(1)

   if success:
      print( 'Published Alert1 : ',  "Temperature(%s) is high, sprinkerlers are turned ON" %temp_sensor,"to IBM
Watson")
      print("")
   else:
      print("sprinkler-1 is OFF")
      print("")

   #To send alert message if farmer uses the unsafe fertilizer to crops...

   if (PH_sensor > 7.5 or PH_sensor < 5.5):
      success = deviceCli.publishEvent("Alert2", "json",{ 'alert2' : "Fertilizer PH level(%s) is not safe,use other
fertilizer" %PH_sensor } , qos=0)
      sleep(1)

   if success:
      print('Published Alert2 : ' , "Fertilizer PH level(%s) is not safe,use other fertilizer" %PH_sensor,"to IBM
Watson")
      print("")

   #To send alert message to farmer that animal attack on crops...
   if (camera_reading == "Detected"):
      success = deviceCli.publishEvent("Alert3", "json", { 'alert3' : "Animal attack on crops detected" }, qos=0)
      sleep(1)
```

```
  if success:
    print('Published Alert3 : ' , "Animal attack on crops detected","to IBM Watson","to IBM Watson")
    print("")
```

#To send alert message if flame detected on crop land and turn ON the splinkers to take immediate action...

```
  if (flame_reading == "Detected"):
    print("sprinkler-2 is ON")
    success = deviceCli.publishEvent("Alert4", "json", { 'alert4' : "Flame is detected crops are in
danger,sprinklers turned ON" }, qos=0)
    sleep(1)

  if success:
    print( 'Published Alert4 : ' , "Flame is detected crops are in danger,sprinklers turned ON","to IBM Watson")
    print("")

  else:
    print("sprinkler-2 is OFF")
    print("")
```

#To send alert message if Moisture level is LOW and to Turn ON Motor-1 for irrigation...

```
  if (moist_level < 20):
    print("Motor-1 is ON")
    success = deviceCli.publishEvent("Alert5", "json", { 'alert5' : "Moisture level(%s) is low, Irrigation started"
%moist_level }, qos=0)
    sleep(1)

  if success:
    print('Published Alert5 : ' , "Moisture level(%s) is low, Irrigation started" %moist_level,"to IBM Watson" )
    print("")
  else:
    print("Motor-1 is OFF")
    print("")
```

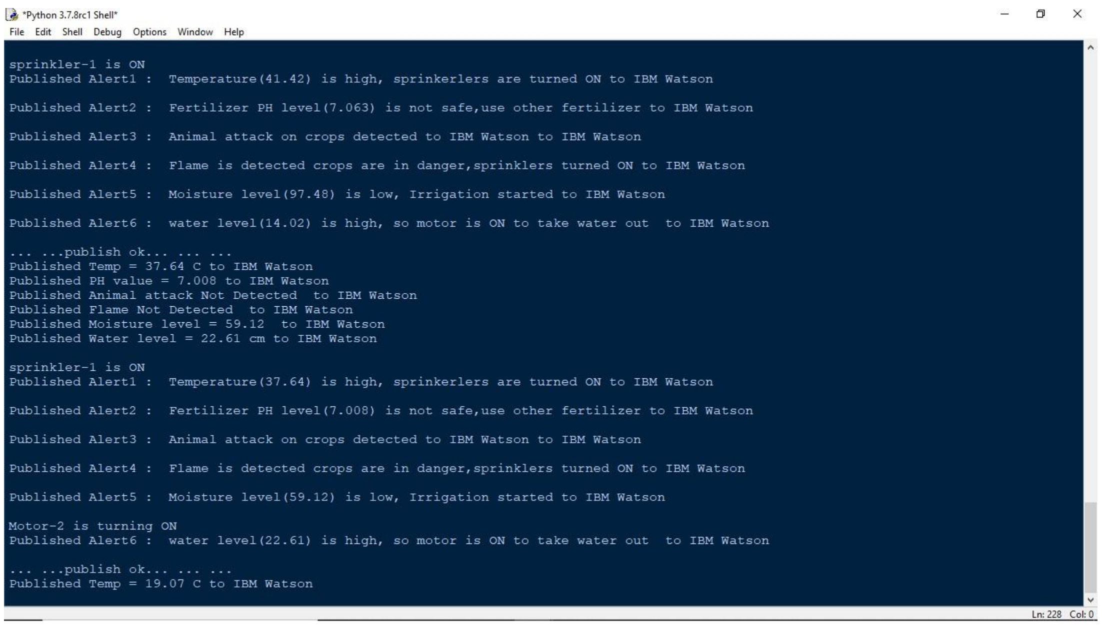
#To send alert message if Water level is HIGH and to Turn ON Motor-2 to take water out...

```
  if (water_level > 20):
    print("Motor-2 is turning ON")
    success = deviceCli.publishEvent("Alert6", "json", { 'alert6' : "Water level(%s) is high, so motor is ON to take
water out "  %water_level }, qos=0)
    sleep(1)

  if success:
    print('Published Alert6 : ' , "water level(%s) is high, so motor is ON to take water out " %water_level,"to
IBM Watson" )
    print("")
  else:
    print("Motor-2 is turning OFF")
    print("")
```

#command recived by farmer
```
deviceCli.commandCallback = myCommandCallback
```

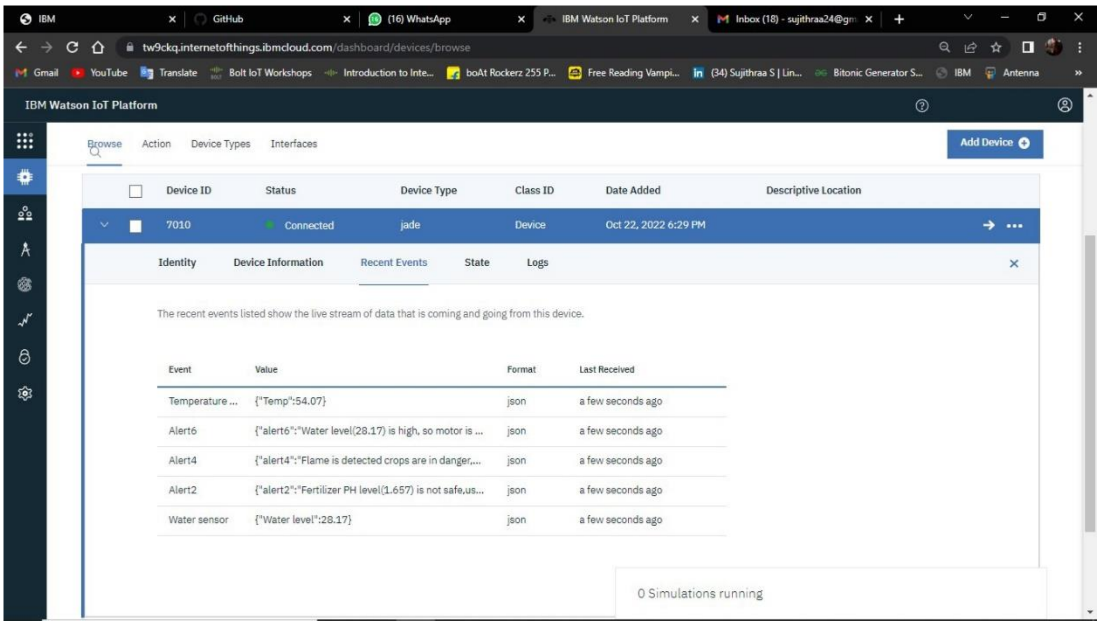
# Disconnect the device and application from the cloud
```
deviceCli.disconnect()
```

Python Script Output:



```
sprinkler-1 is ON
Published Alert1 :  Temperature(41.42) is high, sprinkerlers are turned ON to IBM Watson

Published Alert2 :  Fertilizer PH level(7.063) is not safe,use other fertilizer to IBM Watson

Published Alert3 :  Animal attack on crops detected to IBM Watson to IBM Watson

Published Alert4 :  Flame is detected crops are in danger,sprinklers turned ON to IBM Watson

Published Alert5 :  Moisture level(97.48) is low, Irrigation started to IBM Watson

Published Alert6 :  water level(14.02) is high, so motor is ON to take water out  to IBM Watson

... ...publish ok... ... ...
Published Temp = 37.64 C to IBM Watson
Published PH value = 7.008 to IBM Watson
Published Animal attack Not Detected  to IBM Watson
Published Flame Not Detected  to IBM Watson
Published Moisture level = 59.12  to IBM Watson
Published Water level = 22.61 cm to IBM Watson

sprinkler-1 is ON
Published Alert1 :  Temperature(37.64) is high, sprinkerlers are turned ON to IBM Watson

Published Alert2 :  Fertilizer PH level(7.008) is not safe,use other fertilizer to IBM Watson

Published Alert3 :  Animal attack on crops detected to IBM Watson to IBM Watson

Published Alert4 :  Flame is detected crops are in danger,sprinklers turned ON to IBM Watson

Published Alert5 :  Moisture level(59.12) is low, Irrigation started to IBM Watson

Motor-2 is turning ON
Published Alert6 :  water level(22.61) is high, so motor is ON to take water out  to IBM Watson

... ...publish ok... ... ...
Published Temp = 19.07 C to IBM Watson
```

IBM Watson Output:


tw9ckq.internetofthings.ibmcloud.com/dashboard/devices/browse

IBM Watson IoT Platform

Browse | Action | Device Types | Interfaces | Add Device

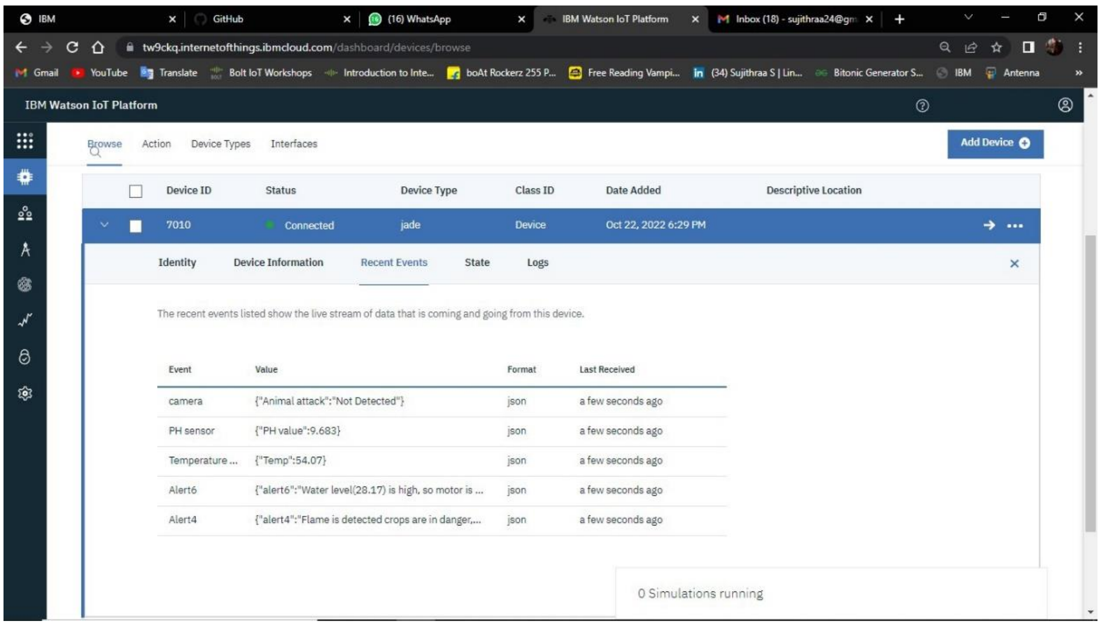
Device ID	Status	Device Type	Class ID	Date Added	Descriptive Location
7010	Connected	jade	Device	Oct 22, 2022 6:29 PM	

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
Temperature ...	{"Temp":54.07}	json	a few seconds ago
Alert6	{"alert6":"Water level(28.17) is high, so motor is ...	json	a few seconds ago
Alert4	{"alert4":"Flame is detected crops are in danger,...	json	a few seconds ago
Alert2	{"alert2":"Fertilizer PH level(1.657) is not safe,us...	json	a few seconds ago
Water sensor	{"Water level":28.17}	json	a few seconds ago

0 Simulations running


tw9ckq.internetofthings.ibmcloud.com/dashboard/devices/browse

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7010	Connected	jade	Device	Oct 22, 2022 6:29 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
camera	{"Animal attack":"Not Detected"}	json	a few seconds ago
PH sensor	{"PH value":9.683}	json	a few seconds ago
Temperature ...	{"Temp":54.07}	json	a few seconds ago
Alert6	{"alert6":"Water level(28.17) is high, so motor is ...	json	a few seconds ago
Alert4	{"alert4":"Flame is detected crops are in danger,...	json	a few seconds ago

0 Simulations running