SPRINT – 2 DEVELOPMENT OF PYTHON SCRIPT

Date	8 November 2022
Team ID	PNT2022TMID35844
Project Name	IoT Based Smart Crop Protection System for Agriculture

DESCRIPTION :

The random sensor data's are generated and automation has been implemented through the python code to implement IoT based crop protection system. And the code gives the response to the IoT Device in IBM Watson Platform.

PYTHON CODE :

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

#IBM Watson Device Credentials.
organization = "oalgwg"
deviceType = "IoT"
deviceId = "321"
authMethod = "token"
authToken = "2019504526"

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

#print(cmd)
try:
  devOptions = {"org": organization, "type": deviceType, "id": deviceId, "auth-method": authMethod, "auth-
token": authToken}
  devCli = ibmiotf.device.Client(devOptions)
except Exception as e:
    print("Caught exception connecting device: %s" % str(e))
    sys.exit()

#Connecting to IBM watson.
devCli.port = 443
devCli.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)
```

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    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 = { 'Temperature' : temp_sensor }
    PH_data = { 'PH Level' : 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 data to IBM Watson for every 5-10 seconds.
    success = devCli.publishEvent("Temperature sensor", "json", temp_data, qos=0)
    sleep(1)
    if success:
      print ("*********publish ok*********")
      print ("Published Temperature = %s C" % temp_sensor, "to IBM Watson")
      success = devCli.publishEvent("PH sensor", "json", PH_data, qos=0)
      sleep(1)
    if success:
      print ("Published PH Level = %s" % PH_sensor, "to IBM Watson")
      success = devCli.publishEvent("camera", "json", camera_data, qos=0)
      sleep(1)
    if success:
      print ("Published Animal attack %s " % camera_reading, "to IBM Watson")
      success = devCli.publishEvent("Flame sensor", "json", flame_data, qos=0)
      sleep(1)
    if success:
      print ("Published Flame %s " % flame_reading, "to IBM Watson")
      success = devCli.publishEvent("Moisture sensor", "json", moist_data, qos=0)
      sleep(1)
    if success:
      print ("Published Moisture Level = %s " % moist_level, "to IBM Watson")
      success = devCli.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 = devCli.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 = devCli.publishEvent("Alert2", "json",{ 'alert2' : "Fertilizer PH level(%s) is not safe,use other fertil
izer" %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 W
atson")
        print("")

#To send alert message to farmer that animal attack on crops.
    if (camera_reading == "Detected"):
      success = devCli.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("")

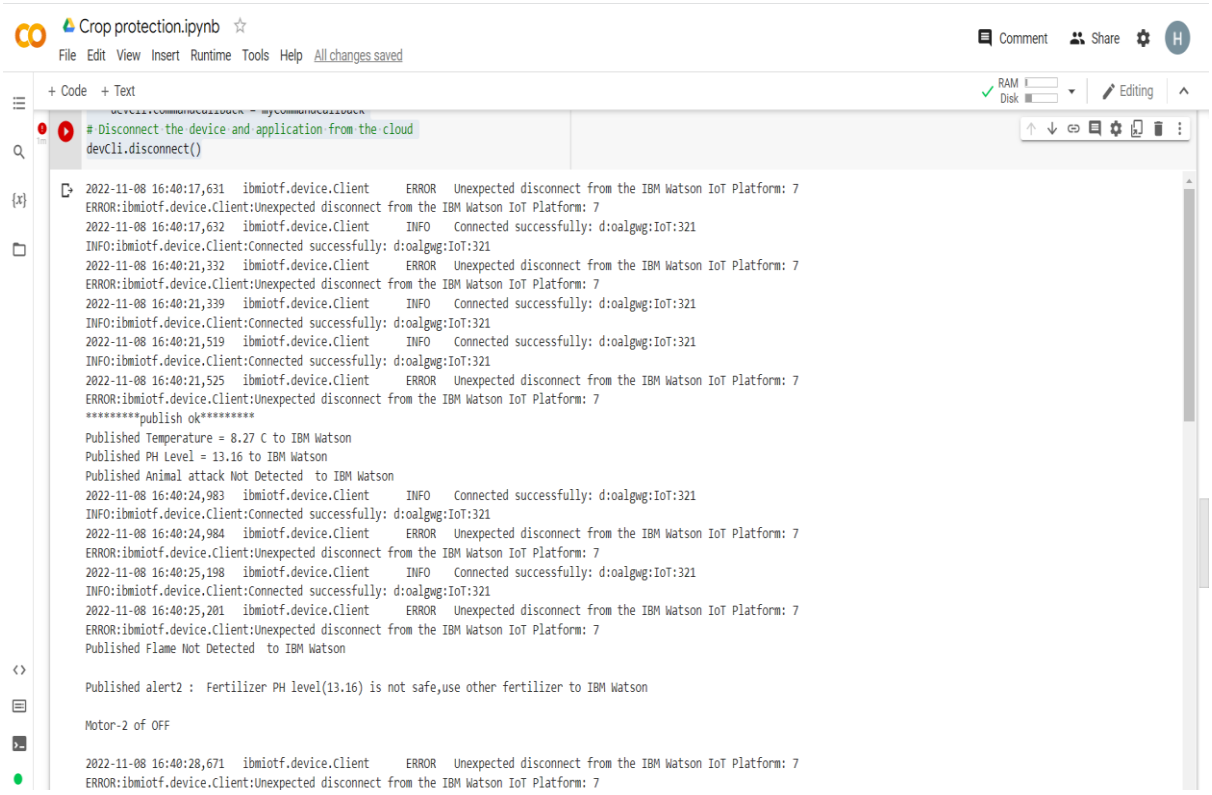
#To send alert message if flame detected on crop land and turn ON the splinkers to take immediate action.
    if (flame_reading == "Detected"):
      print("sprinkler-2 is ON")
      success = devCli.publishEvent("Alert4", "json", { 'alert4' : "Flame is detected crops are in danger,sprinklers t
urned 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("")

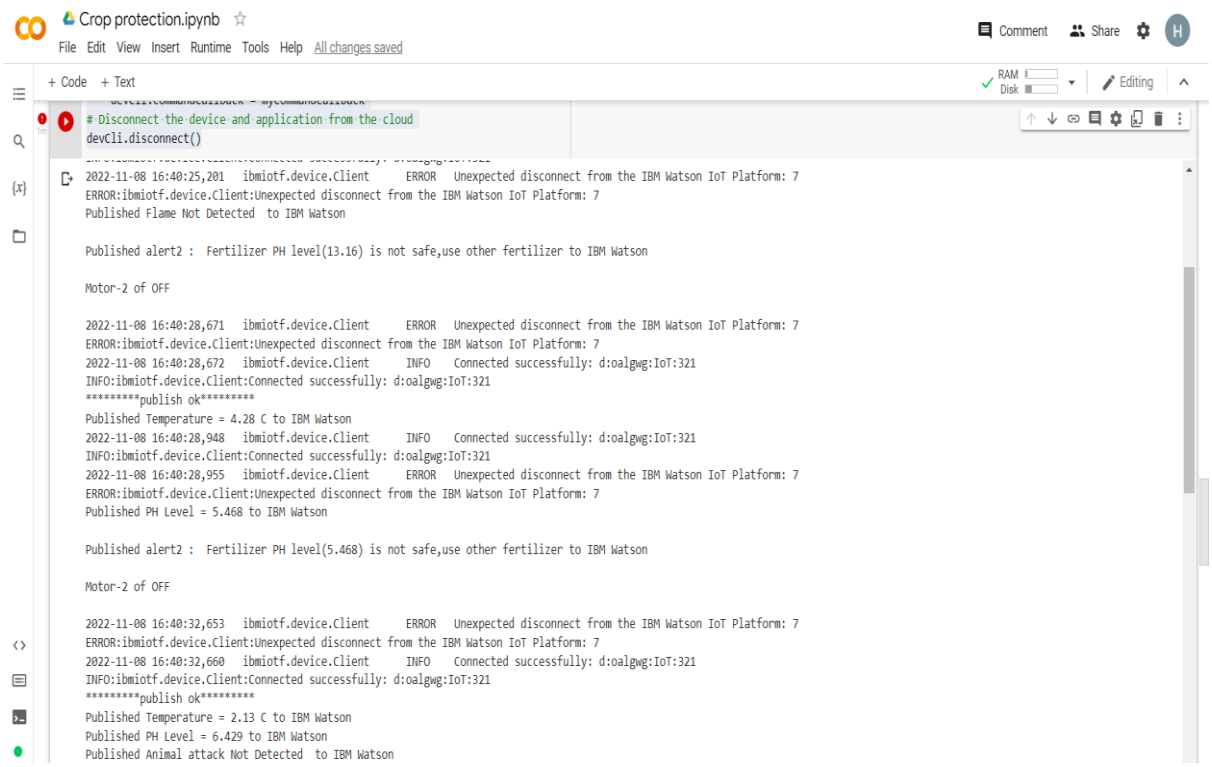
#To send alert message if Moisture level is LOW and to Turn ON Motor-1 for irrigation.
    if (moist_level < 20):
      print("Motor-1 is ON")
      success = devCli.publishEvent("Alert5", "json", { 'alert5' : "Moisture level(%s) is low, Irrigation started" %
moist_level }, qos=0)
      sleep(1)
      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("")

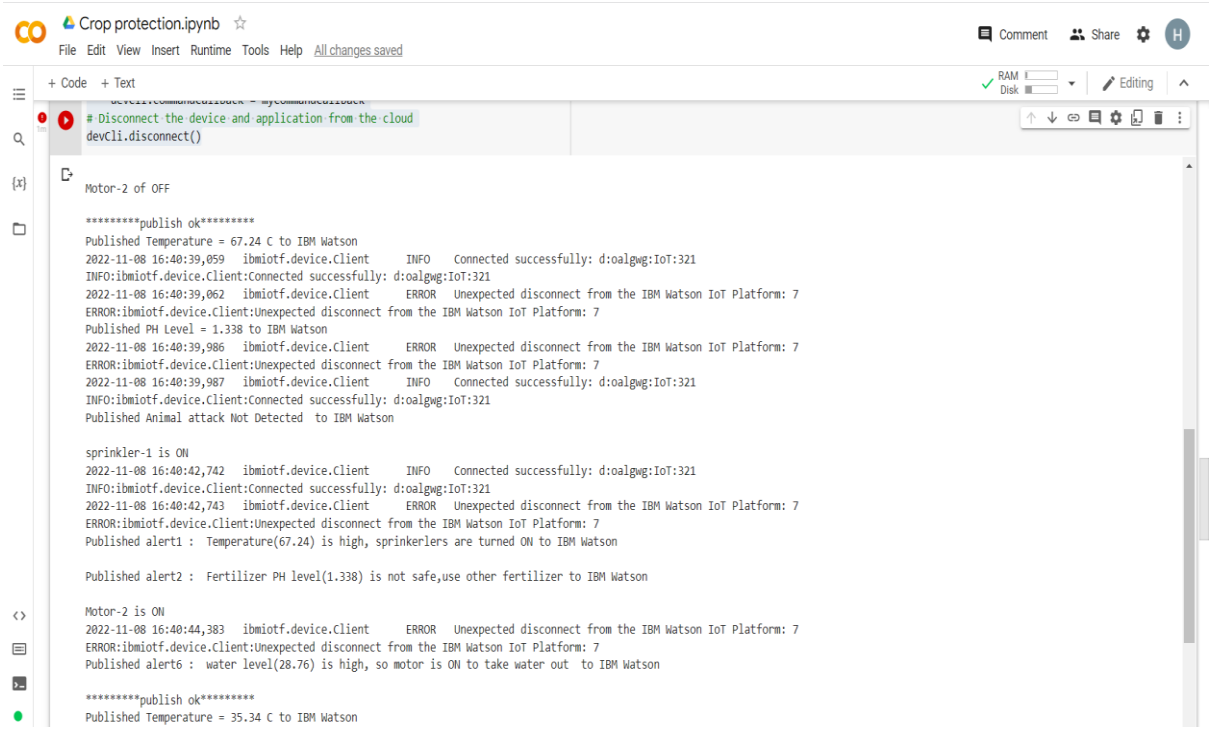
#To send alert message if Water level is HIGH and to Turn ON Motor-2 to take water out.
    if (water_level > 20):
      print("Motor-2 is ON")
      success = devCli.publishEvent("Alert6", "json", { 'alert6' : "Water level(%s) is high, so motor is ON to take
water out " %water_level }, qos=0)
      sleep(1)
      if success:
        print('Published alert6 : ' , "water level(%s) is high, so motor is ON to take water out " %water_level,"to IB
M Watson" )
        print("")
    else:
      print("Motor-2 of OFF")
      print("")

#command recived by farmer
    devCli.commandCallback = myCommandCallback
# Disconnect the device and application from the cloud
devCli.disconnect()
```

OUTPUT :


Crop protection.ipynb
File Edit View Insert Runtime Tools Help All changes saved
Comment
Share
+ Code + Text
RAM
Disk
Editing
# Disconnect the device and application from the cloud
devCli.disconnect()
2022-11-08 16:40:17,631 ibmiotf.device.Client ERROR Unexpected disconnect from the IBM Watson IoT Platform: 7
ERROR:ibmiotf.device.Client:Unexpected disconnect from the IBM Watson IoT Platform: 7
2022-11-08 16:40:17,632 ibmiotf.device.Client INFO Connected successfully: d:oalgwg:IoT:321
INFO:ibmiotf.device.Client:Connected successfully: d:oalgwg:IoT:321
2022-11-08 16:40:21,332 ibmiotf.device.Client ERROR Unexpected disconnect from the IBM Watson IoT Platform: 7
ERROR:ibmiotf.device.Client:Unexpected disconnect from the IBM Watson IoT Platform: 7
2022-11-08 16:40:21,339 ibmiotf.device.Client INFO Connected successfully: d:oalgwg:IoT:321
INFO:ibmiotf.device.Client:Connected successfully: d:oalgwg:IoT:321
2022-11-08 16:40:21,519 ibmiotf.device.Client INFO Connected successfully: d:oalgwg:IoT:321
INFO:ibmiotf.device.Client:Connected successfully: d:oalgwg:IoT:321
2022-11-08 16:40:21,525 ibmiotf.device.Client ERROR Unexpected disconnect from the IBM Watson IoT Platform: 7
ERROR:ibmiotf.device.Client:Unexpected disconnect from the IBM Watson IoT Platform: 7
*********publish ok*********
Published Temperature = 8.27 C to IBM Watson
Published PH Level = 13.16 to IBM Watson
Published Animal attack Not Detected to IBM Watson
2022-11-08 16:40:24,983 ibmiotf.device.Client INFO Connected successfully: d:oalgwg:IoT:321
INFO:ibmiotf.device.Client:Connected successfully: d:oalgwg:IoT:321
2022-11-08 16:40:24,984 ibmiotf.device.Client ERROR Unexpected disconnect from the IBM Watson IoT Platform: 7
ERROR:ibmiotf.device.Client:Unexpected disconnect from the IBM Watson IoT Platform: 7
2022-11-08 16:40:25,198 ibmiotf.device.Client INFO Connected successfully: d:oalgwg:IoT:321
INFO:ibmiotf.device.Client:Connected successfully: d:oalgwg:IoT:321
2022-11-08 16:40:25,201 ibmiotf.device.Client ERROR Unexpected disconnect from the IBM Watson IoT Platform: 7
ERROR:ibmiotf.device.Client:Unexpected disconnect from the IBM Watson IoT Platform: 7
Published Flame Not Detected to IBM Watson
Published alert2 : Fertilizer PH level(13.16) is not safe,use other fertilizer to IBM Watson
Motor-2 of OFF
2022-11-08 16:40:28,671 ibmiotf.device.Client ERROR Unexpected disconnect from the IBM Watson IoT Platform: 7
ERROR:ibmiotf.device.Client:Unexpected disconnect from the IBM Watson IoT Platform: 7


Crop protection.ipynb
File Edit View Insert Runtime Tools Help All changes saved
Comment
Share
+ Code + Text
RAM
Disk
Editing
# Disconnect the device and application from the cloud
devCli.disconnect()
2022-11-08 16:40:25,201 ibmiotf.device.Client ERROR Unexpected disconnect from the IBM Watson IoT Platform: 7
ERROR:ibmiotf.device.Client:Unexpected disconnect from the IBM Watson IoT Platform: 7
Published Flame Not Detected to IBM Watson
Published alert2 : Fertilizer PH level(13.16) is not safe,use other fertilizer to IBM Watson
Motor-2 of OFF
2022-11-08 16:40:28,671 ibmiotf.device.Client ERROR Unexpected disconnect from the IBM Watson IoT Platform: 7
ERROR:ibmiotf.device.Client:Unexpected disconnect from the IBM Watson IoT Platform: 7
2022-11-08 16:40:28,672 ibmiotf.device.Client INFO Connected successfully: d:oalgwg:IoT:321
INFO:ibmiotf.device.Client:Connected successfully: d:oalgwg:IoT:321
*********publish ok*********
Published Temperature = 4.28 C to IBM Watson
2022-11-08 16:40:28,948 ibmiotf.device.Client INFO Connected successfully: d:oalgwg:IoT:321
INFO:ibmiotf.device.Client:Connected successfully: d:oalgwg:IoT:321
2022-11-08 16:40:28,955 ibmiotf.device.Client ERROR Unexpected disconnect from the IBM Watson IoT Platform: 7
ERROR:ibmiotf.device.Client:Unexpected disconnect from the IBM Watson IoT Platform: 7
Published PH Level = 5.468 to IBM Watson
Published alert2 : Fertilizer PH level(5.468) is not safe,use other fertilizer to IBM Watson
Motor-2 of OFF
2022-11-08 16:40:32,653 ibmiotf.device.Client ERROR Unexpected disconnect from the IBM Watson IoT Platform: 7
ERROR:ibmiotf.device.Client:Unexpected disconnect from the IBM Watson IoT Platform: 7
2022-11-08 16:40:32,660 ibmiotf.device.Client INFO Connected successfully: d:oalgwg:IoT:321
INFO:ibmiotf.device.Client:Connected successfully: d:oalgwg:IoT:321
*********publish ok*********
Published Temperature = 2.13 C to IBM Watson
Published PH Level = 6.429 to IBM Watson
Published Animal attack Not Detected to IBM Watson



OUTPUT IN IBM WATSON IoT PLATFORM