PROJECT DEVELOPMENT PHASE

Sprint 4

Date	11 November 2022
Team ID	PNT2022TMID47383
Project Name	Project - Real-Time River Water Quality Monitoring and Control System

In this sprint 4 we have done the connection to the nodes to the Watson IOT and debug and showing it to the dashboard. Also, in this we are creating an app and then collaborating it to the node red and web UI. Then running it in the mobile and accessing it.

Code:

```
import random
import ibmiotf.application
import ibmiotf.device
from time import sleep
import sys
 #IBM Watson Device Credentials.
organization = "39hari"
deviceType = "NodeMCU"
deviceId = "ESP32"
authMethod = "token"
authToken = "6369702210"
def myCommandCallback(cmd):
    print("Command received: %s" % cmd.data['command'])
    status = cmd.data['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()
#Connecting to IBM watson.
    deviceCli.connect()
while True:
 temp_sensor = round( random.uniform(0,80),2)
 PH_sensor = round(random.uniform(1,14),3)
 Turbidity_sensor =round(random.uniform(0,1000),2)
 OPTOD_sensor = round(random.uniform(0,10),1)
 TOC_sensor = round(random.uniform(0,3000),4)
 water_rate = round(random.uniform(0,500),3)

#storing the sensor data to send in json format to cloud.

 temp_data = { 'Temperature' : temp_sensor }
 PH_data = { 'PHLevel' : PH_sensor }
 Turbidity_data = {'Turbidity Level' : Turbidity_sensor}
 OPTOD_data = { 'Oxygen Level' : OPTOD_sensor}
 TOC_data = { 'Water Level' : TOC_sensor}
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 water_data = { 'Water rate' : water_rate}

# publishing Sensor data to IBM Watson for every 5-10 seconds.
 success = deviceCli.publishEvent("Temperature sensor", "json", temp_data, qos=0)
 sleep(1)
 if success:
    print (" ..... .....publis h ok..... ")
    print ("Published Temperature = %s C" % temp_sensor, "to IBM Watson")
 success = deviceCli.publishEvent("PH sensor", "json", PH_data, qos=0)
 sleep(1)
 if success:
    print ("Published PHLevel = %s" % PH_sensor, "to IBM Watson")
 success = deviceCli.publishEvent("Turbidity sensor", "json", Turbidity_data, qos=0)
 sleep(1)
 if success:
    print ("Published Turbidity Level %s " % Turbidity_sensor, "to IBM Watson")
 success = deviceCli.publishEvent("optod sensor", "json", OPTOD_data, qos=0)
 sleep(1)
 if success:
    print ("Published Flame %s " % OPTOD_sensor, "to IBM Watson")
 success = deviceCli.publishEvent("Moisture sensor", "json", TOC_data, qos=0)
 sleep(1)
 if success:
    print ("Published Moisture Level = %s " % TOC_sensor, "to IBM Watson")
 success = deviceCli.publishEvent("Water sensor", "json", water_data, qos=0)
 sleep(1)
 if success:
    print ("Published Water rate = %s cm" % water_rate, "to IBM Watson")
    print ("")

#Automation to RO plants and water treatment plants by present temperature an to send alert message to IBM Watson.
 if (temp_sensor > 35):

    print("Intake to Filteration is Closed")
 success = deviceCli.publishEvent("Alert1", "json",{ 'alert1' : "Temperature(%s) is high, Intake is plant is closed "
%temp_sensor } , qos=0)
 sleep(1)
 if success:
    print( 'Published alert1 : ', "Temperature(%s) is high, Intake to plant is closed" %temp_sensor,"to IBM Watson")
    print("")
 else:
    print("Intake to plant is resumed ")
    print("")

#To send alert message if the ph is more acidic or basic to the local water board authorities.
 if (PH_sensor > 7.5 or PH_sensor < 5.5):
    success = deviceCli.publishEvent("Alert2", "json",{ 'alert2' : "Water is highly acidic/basis alert is sent to
authorities" %PH_sensor } , qos=0)
    sleep(1)
 if success:
    print('Published alert2 : ' , "Harmfull for human consumption" %PH_sensor,"to IBM Watson")
    print("")
 else:
    print('Published alert2 : ' , "Ph neutral safe for consumption" %PH_sensor,"to IBM Watson")
    print("")
#To send alert message depending upon the impurity level.
```
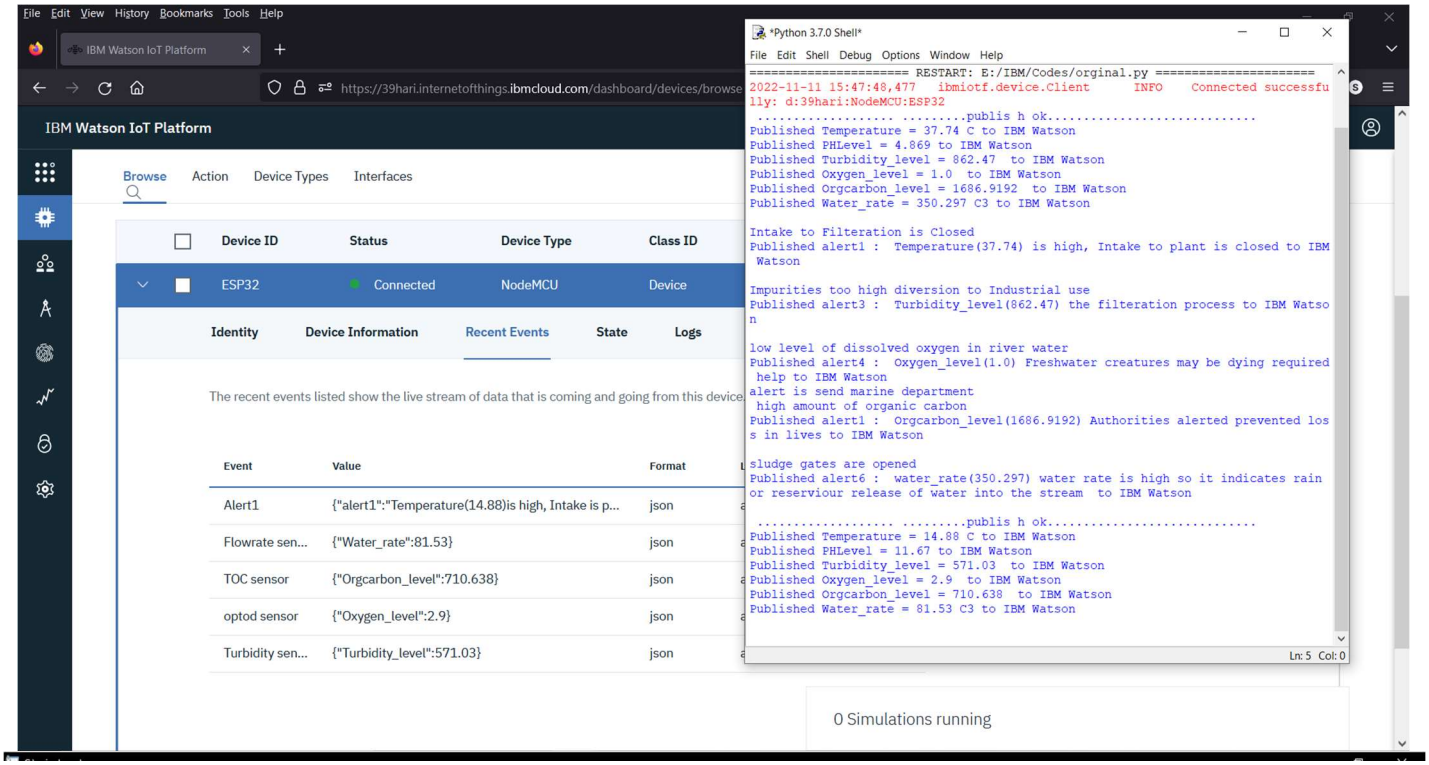
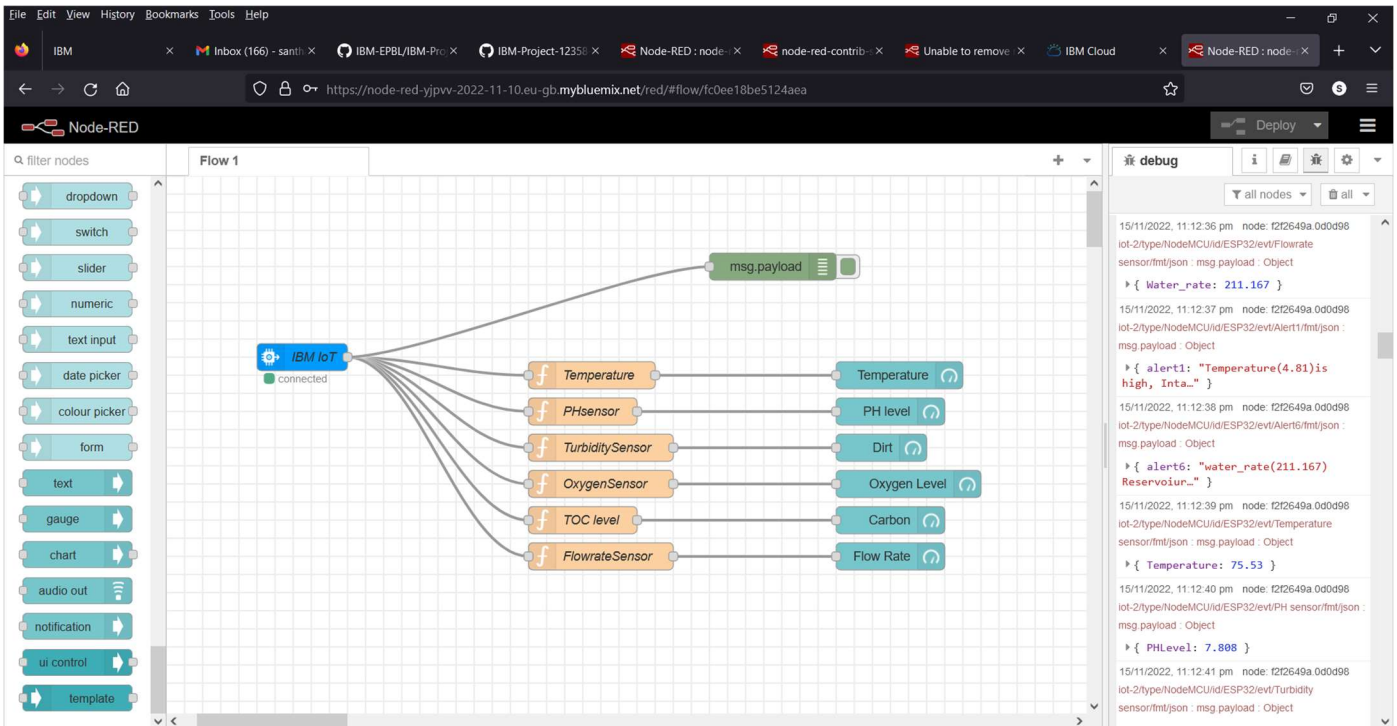

```
if (Turbidity_sensor > 500):
   print("Impurities too high diversion to Industrial use")
   success = deviceCli.publishEvent("Alert3", "json", { 'alert3' : "Water is in taken for the industrial use " }, qos=0)
   sleep(1)
if success:
   print( 'Published alert3 : ' , "Impurities is high amount can't be used for human consumption or for the filteration
process","to IBM Watson")
   print("")
else:
   if (Turbidity_sensor < 20):
      print("Admissable level can be used for human consumption")
      success = deviceCli.publishEvent("Alert3", "json", { 'alert3' : "instructs the public to utilize the water" }, qos=0)
      sleep(1)
      if success:
         print( 'Published alert3 : ' , "Directly used without filteration for basic needs","to IBM Watson")
         print("")
      else:
         print("Switched to Ro and sedemantation process")
         print("")
#To send alert message depending upon the oxygen content present in water.

if (OPTOD_sensor < 2):
   print("low level of dissolved oxygen in river water")
   success = deviceCli.publishEvent("Alert3", "json", { 'alert4' : "Crital level of dissolved oxygen content in water  " },
qos=0)
   sleep(1)
if success:
   print( 'Published alert4 : ' , "Freshwater creatures may be dying required help","to IBM Watson")
   print("alert is send marine department")
else:
   if (OPTOD_sensor > 8):
      print("High oxygen content present")
      success = deviceCli.publishEvent("Alert4", "json", { 'alert3' : "no action is to be taken:indicates hoe fresh is
water" }, qos=0)
      sleep(1)
      if success:
         print( 'Published alert4 : ' , "good to consume since it is fresh","to IBM Watson")
         print("")
      else:
         print("Permissible level to sustain minimum no of creatures in water")
         print("")
#Automation to detect the amount of organic carbon an to send alert message to IBM Watson.
if (TOC_sensor > 900):
   print(" high amount of organic carbon")
   success = deviceCli.publishEvent("Alert1", "json",{ 'alert1' : "Water needs immediate treatment"} , qos=0)
   sleep(1)
if success:
   print( 'Published alert1 : ', "Authorities alerted prevented loss in lives","to IBM Watson")
   print("")
else:
   print("Water consumption is stoped")
   print("")
if (water_rate > 180):
   print("sludge gates are opened")
```

```
    success = deviceCli.publishEvent("Alert6", "json", { 'alert6' : "WReservoiur authorites are alerted and NDRF is informed to be in stand_by " %water_rate }, qos=0)
    sleep(1)
if success:
    print('Published alert6 : ' , "water rate is high so it indicates rain or reserviour release of water into the stream " %water_rate,"to IBM Watson" )
    print("")
else:
    print("Sludge is opened")
    print("")
deviceCli.commandCallback = myCommandCallback
# Disconnect the device and application from the cloud
deviceCli.disconnect()
```

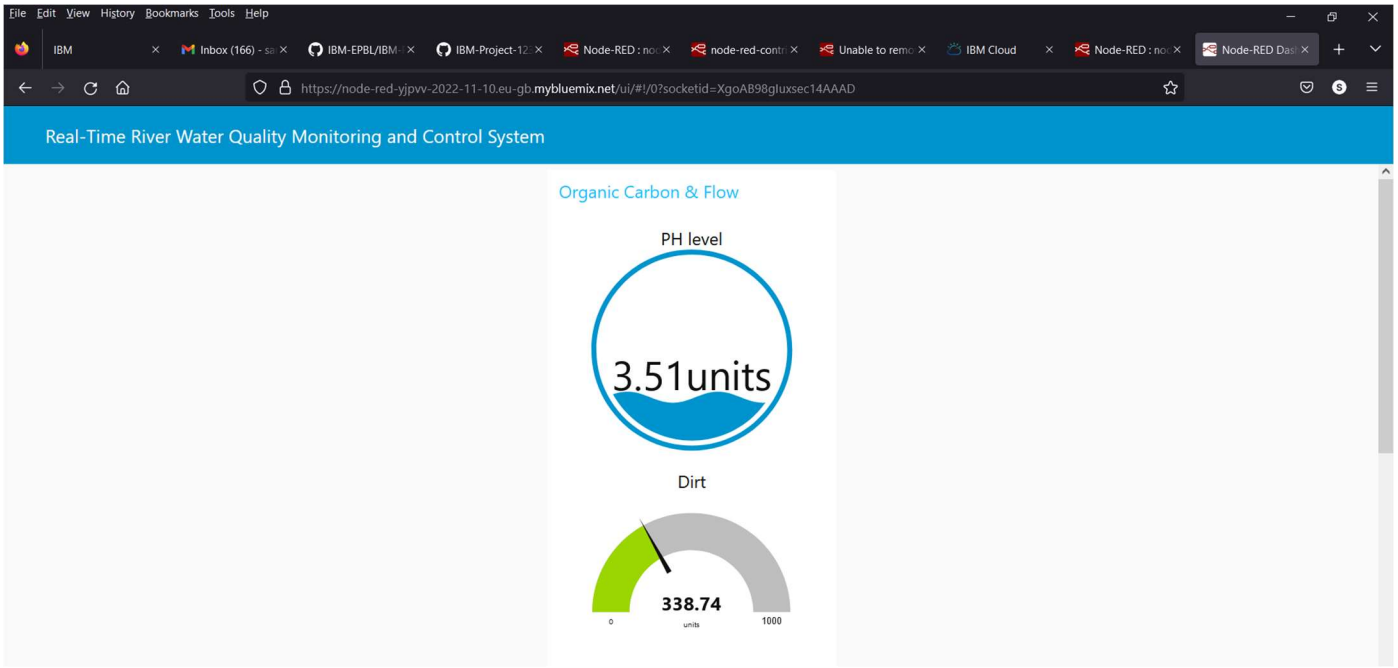
IBM Watson is receiving data from the python script

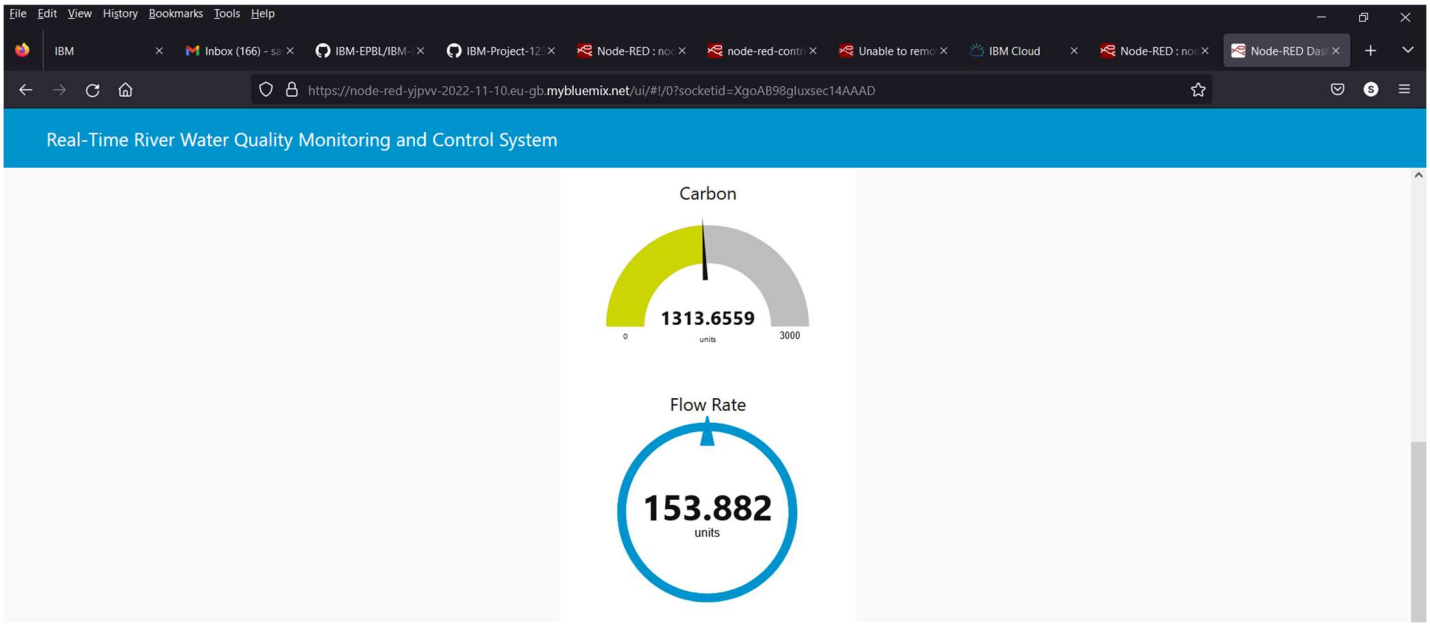


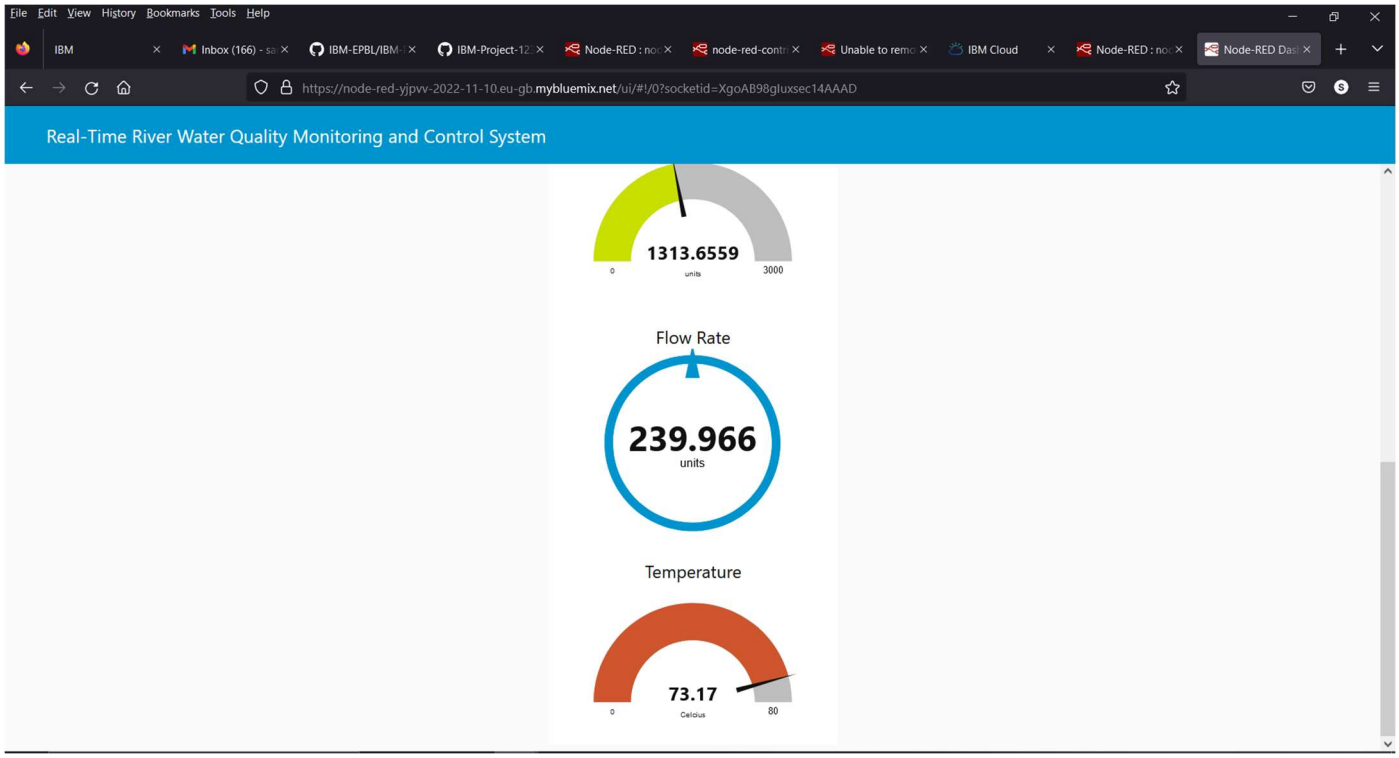
The below is the node red in which the nodes are placed according to the coding we have done in the project

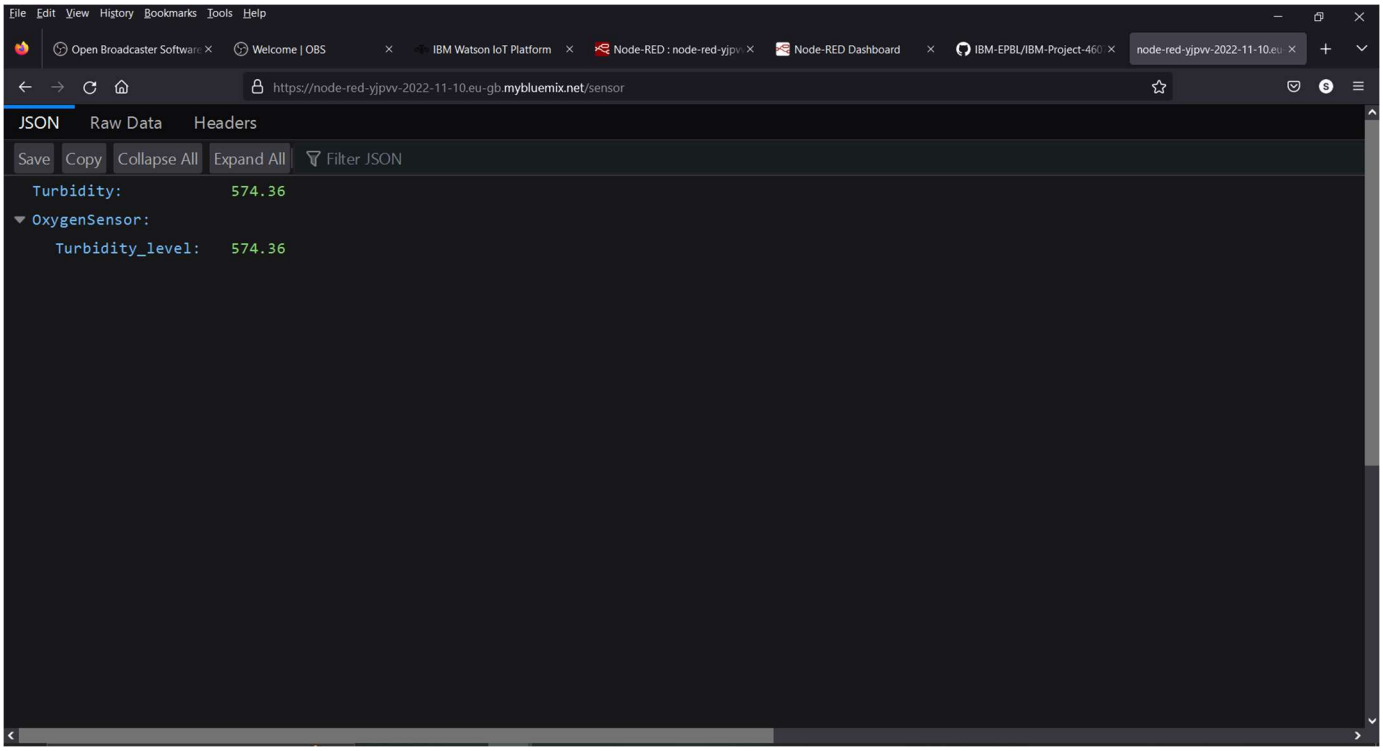


The below is the dashboard which shows the sensed values





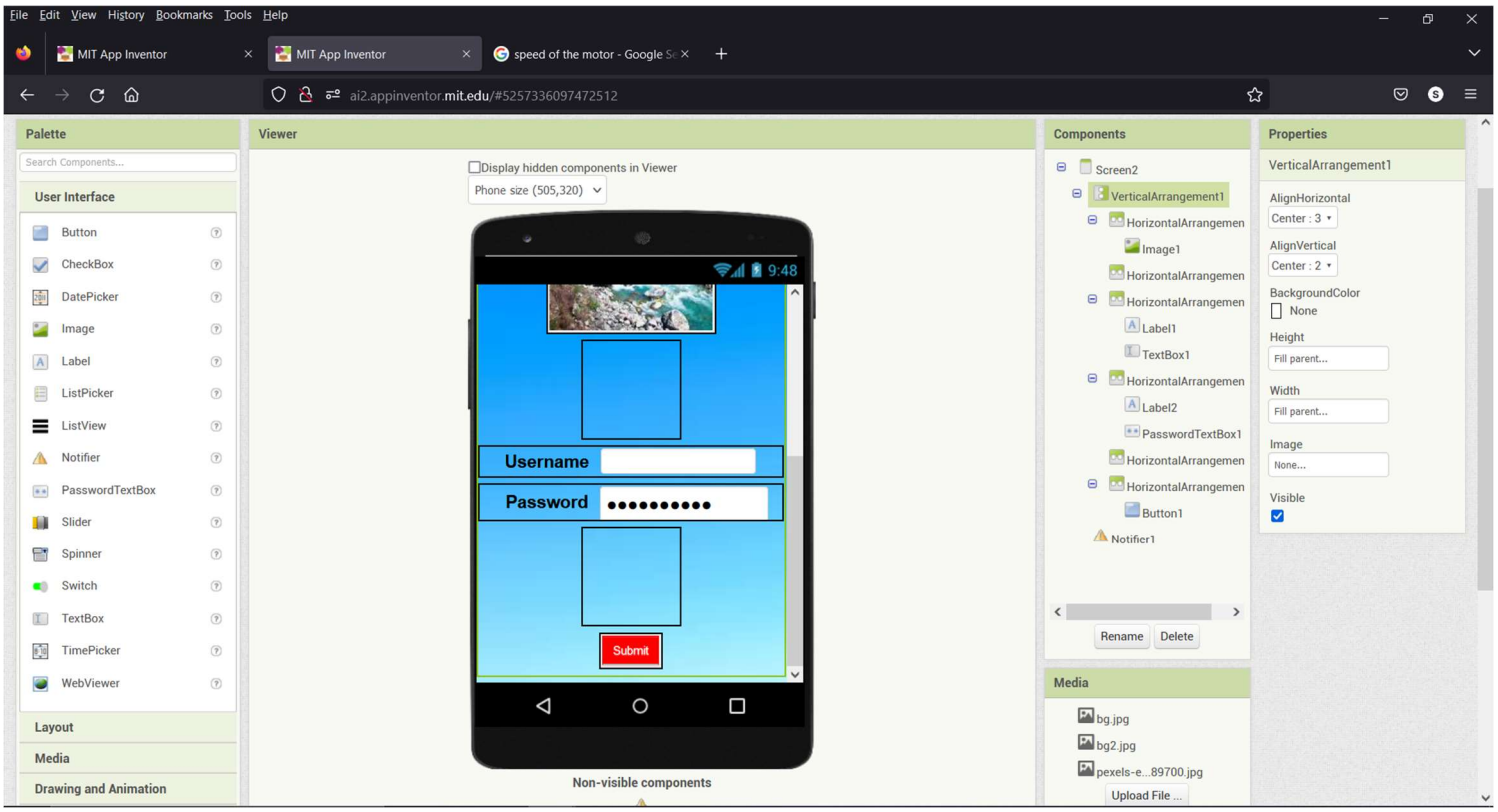




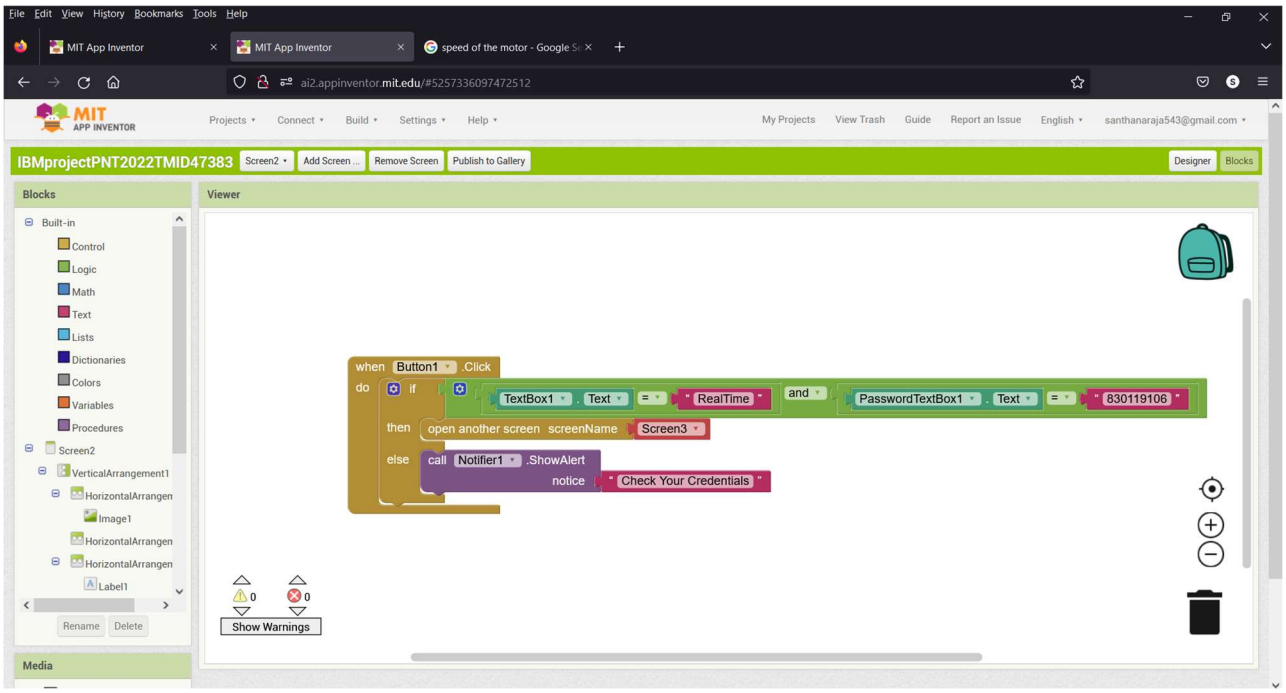
This pic is the server shows the parameter value.

Next we are creating an App.

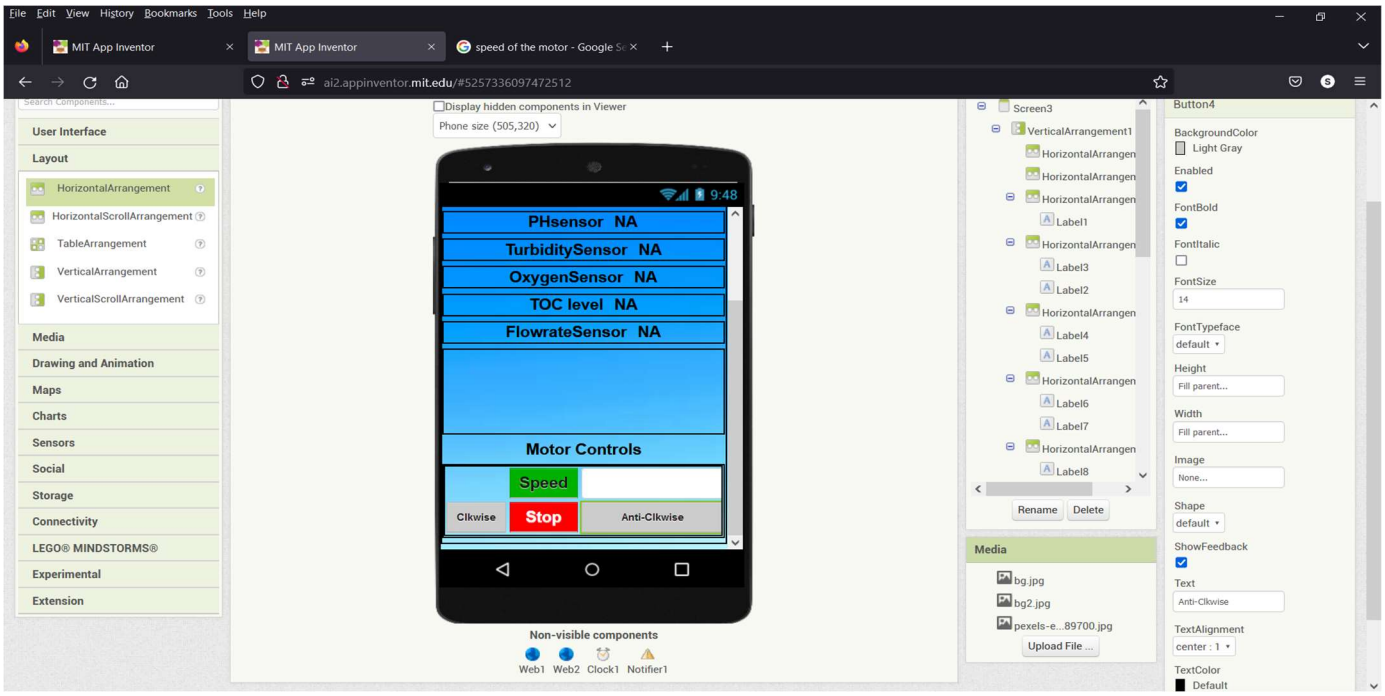
Application Creation



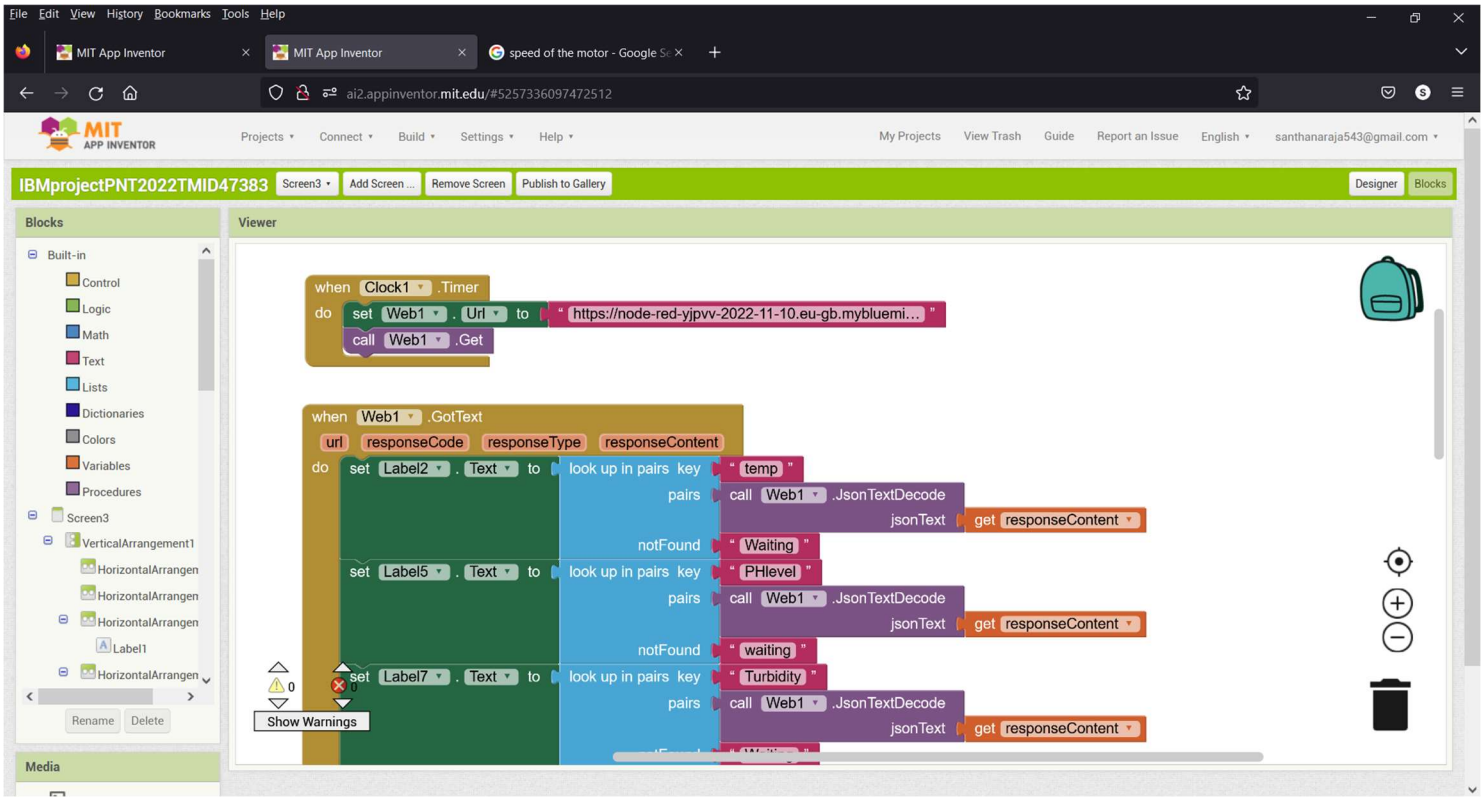
The above is the front-end design of the user credentials for using the application in case of misuse



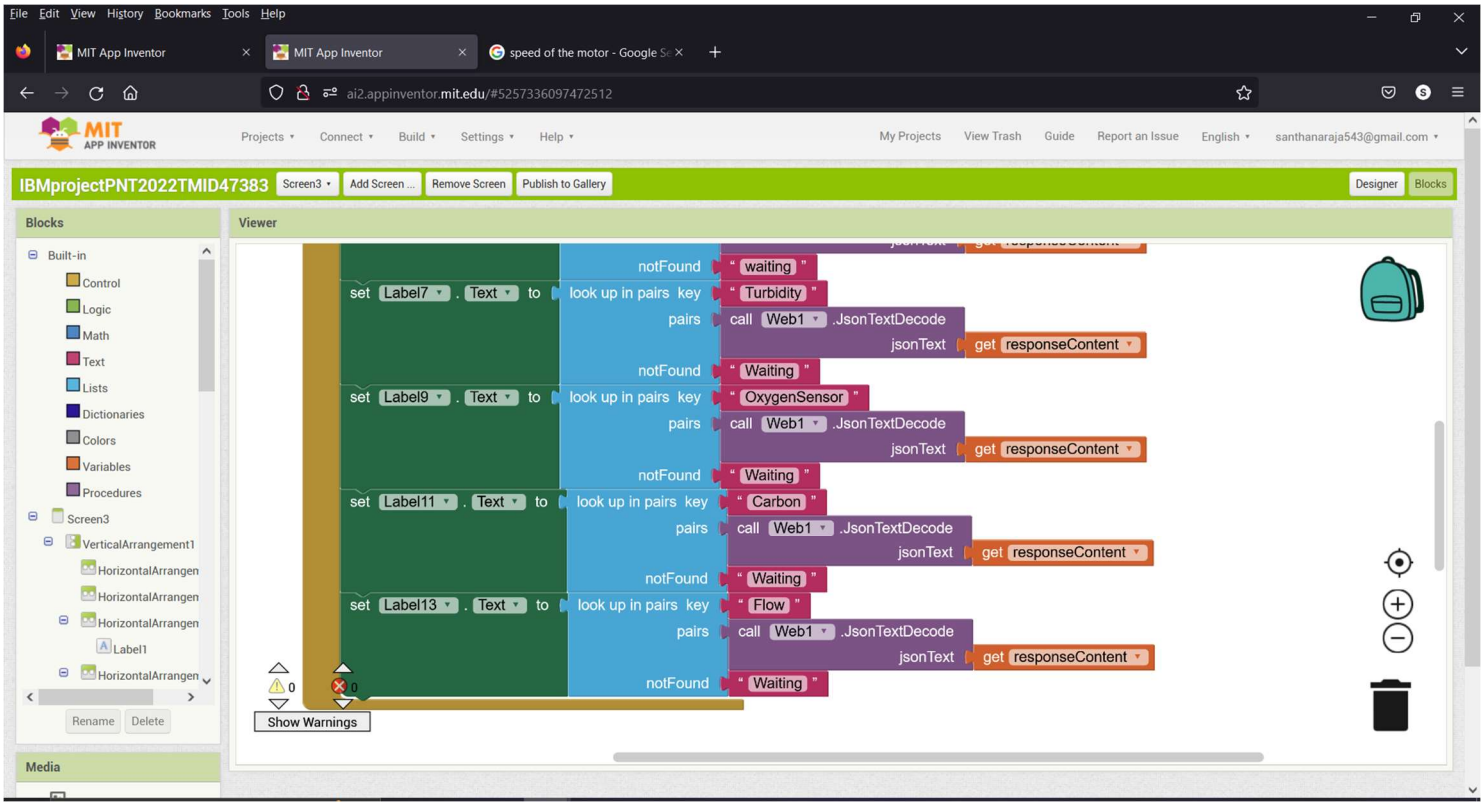
The above is the Back-end design of the user credentials for the application



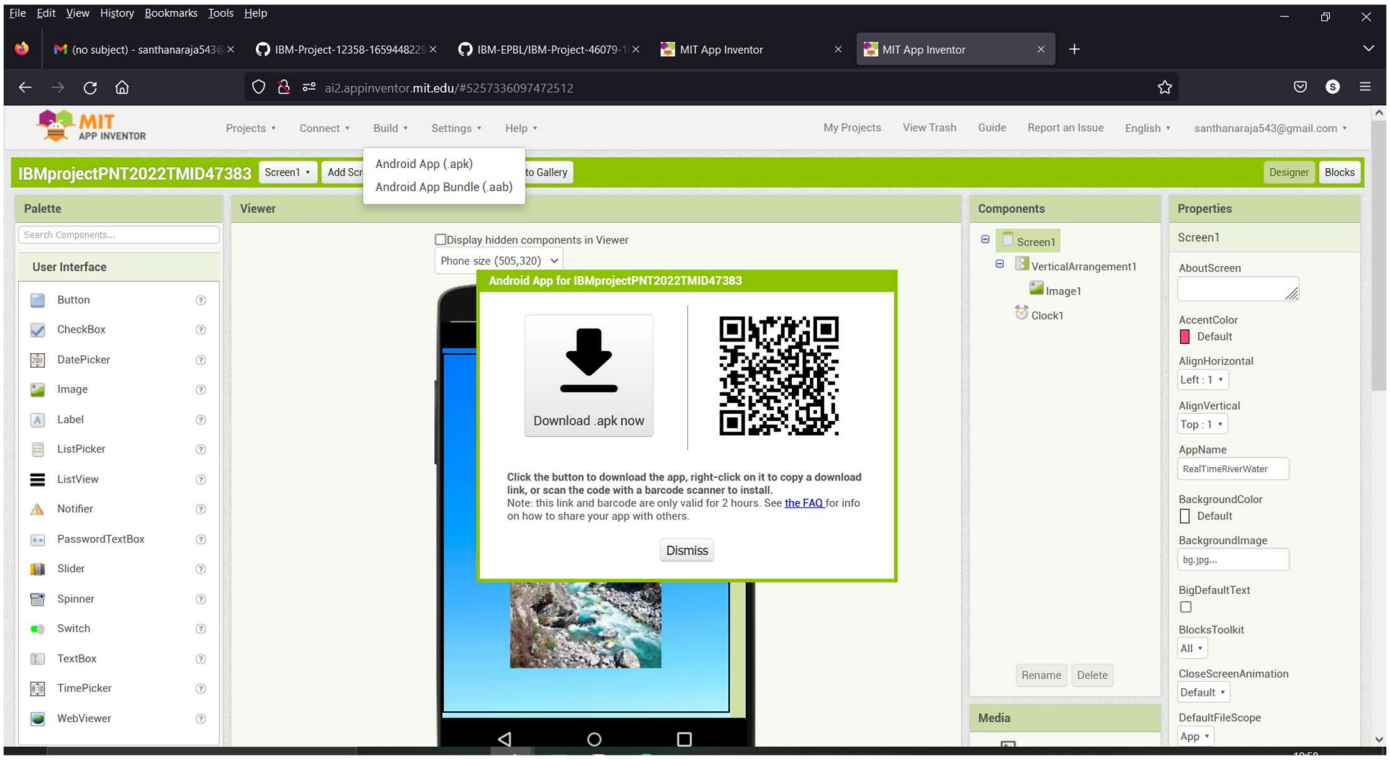
The above is the Front-end design to display the Turbidity and many other parameters for the application



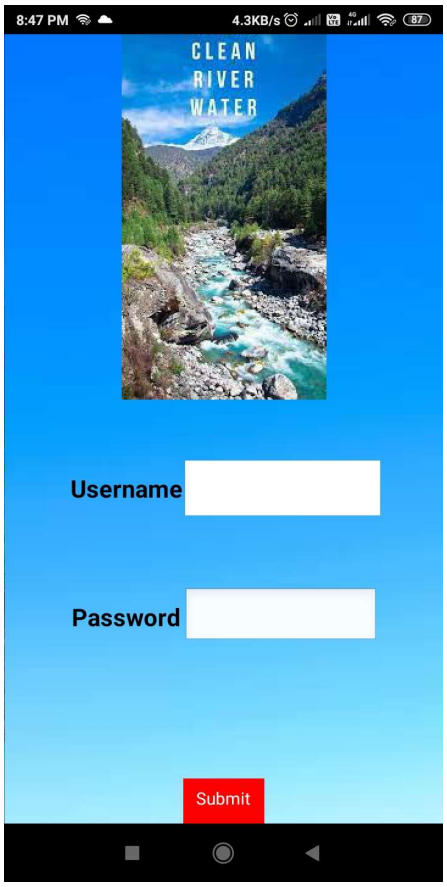
The above is the back-end design to display the Turbidity and many other parameters for the application in a perfect way



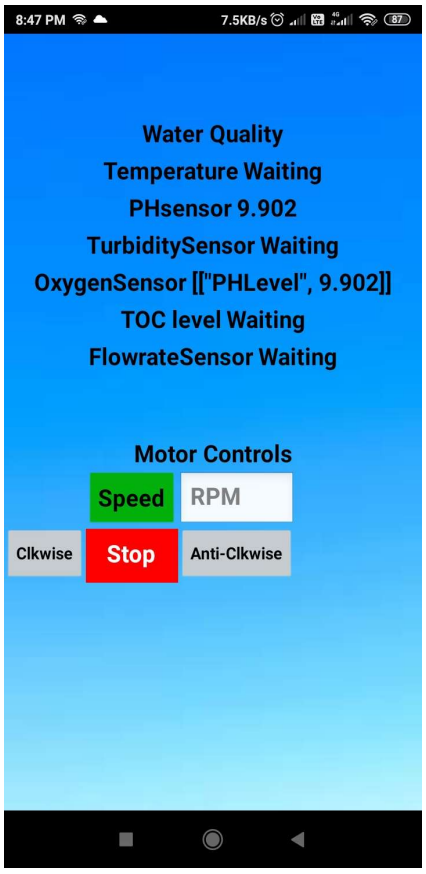
The above is the back-end design to display the Turbidity and many other parameters for the application in a perfect way.

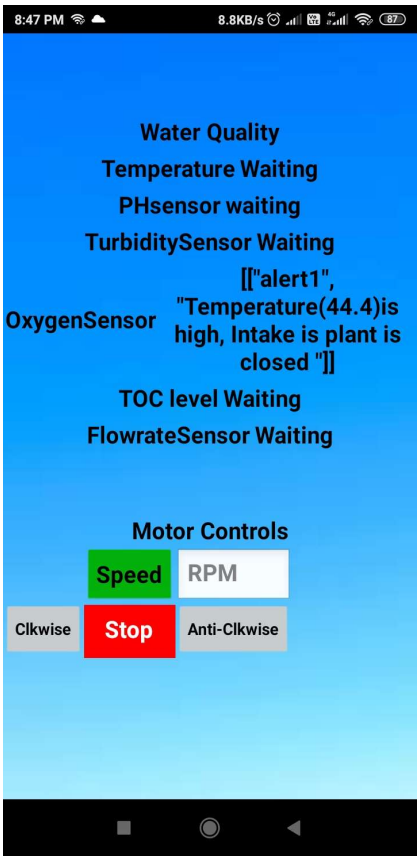


Then scan the code to download the app in your smartphone.

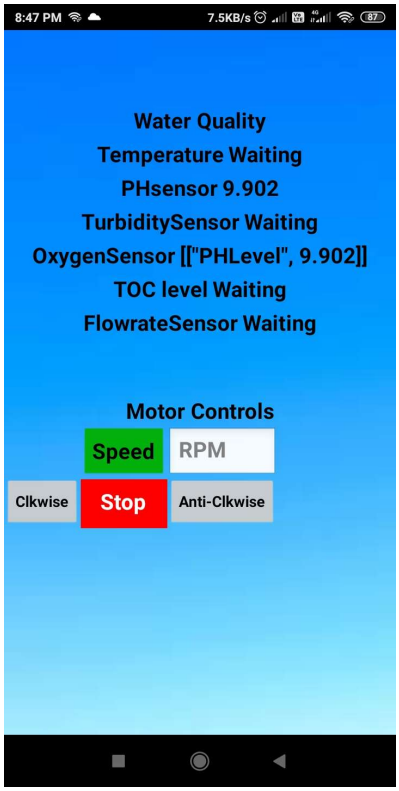


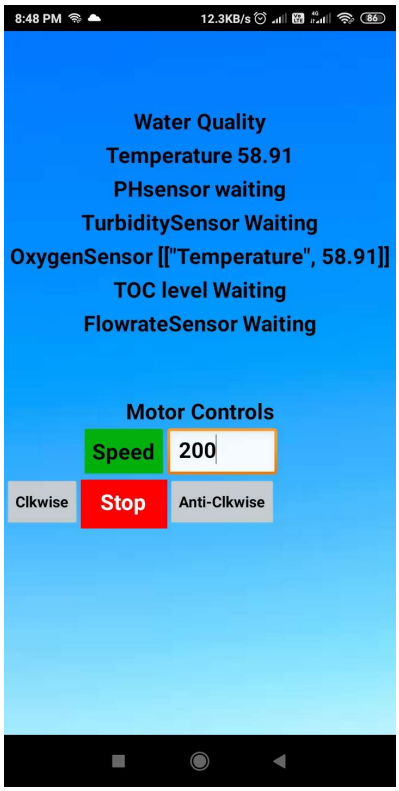
This is the user credential page where we username and password

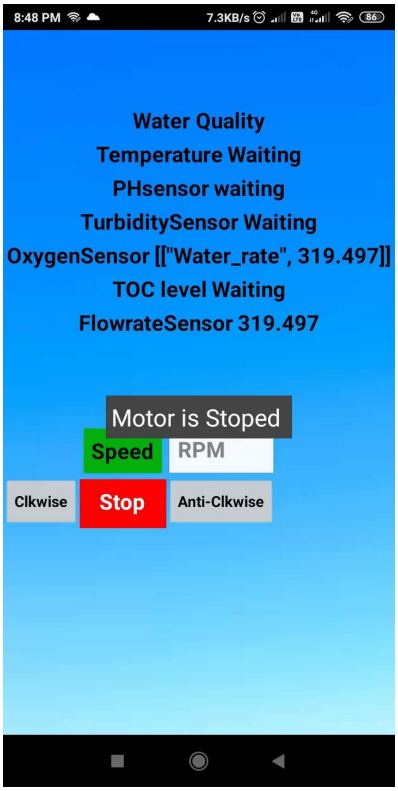




The above two pics shows the values which are transferred from the cloud and seen in real time through app.







The above two pics shows the Motor control and the RPM value at which it runs and Stepper motors are used to access the shutter gates

In this case the Stop button is pressed which in stops the motor in case of impurity detected.