

# SENDING DATA FROM RASPBERRY-PI TO IBM WATSON

Date	7 <sup>th</sup> November 2022
Team ID	PNT2022TMID21627
Project Name	Smart Waste Management Using IOT in Metropolitan cities

## AIM:

To send sensor data (or any dummy data) from Raspberry –Pi to IBM Watson .In our case it is DHT sensors Data.

## REQUIREMENTS:

### HARDWARE:

- RASPBERRY-PI (3B)(WITH ETHERNET CABLE OR WIFI CONNECTED)
- USB MOUSE
- USB KEYBOARD
- VGA TO HDMI CABLE
- A MONITOR
- RASPBERRY’S POWER SUPPLY
- DHT-11 Sensor
- Connecting Wires

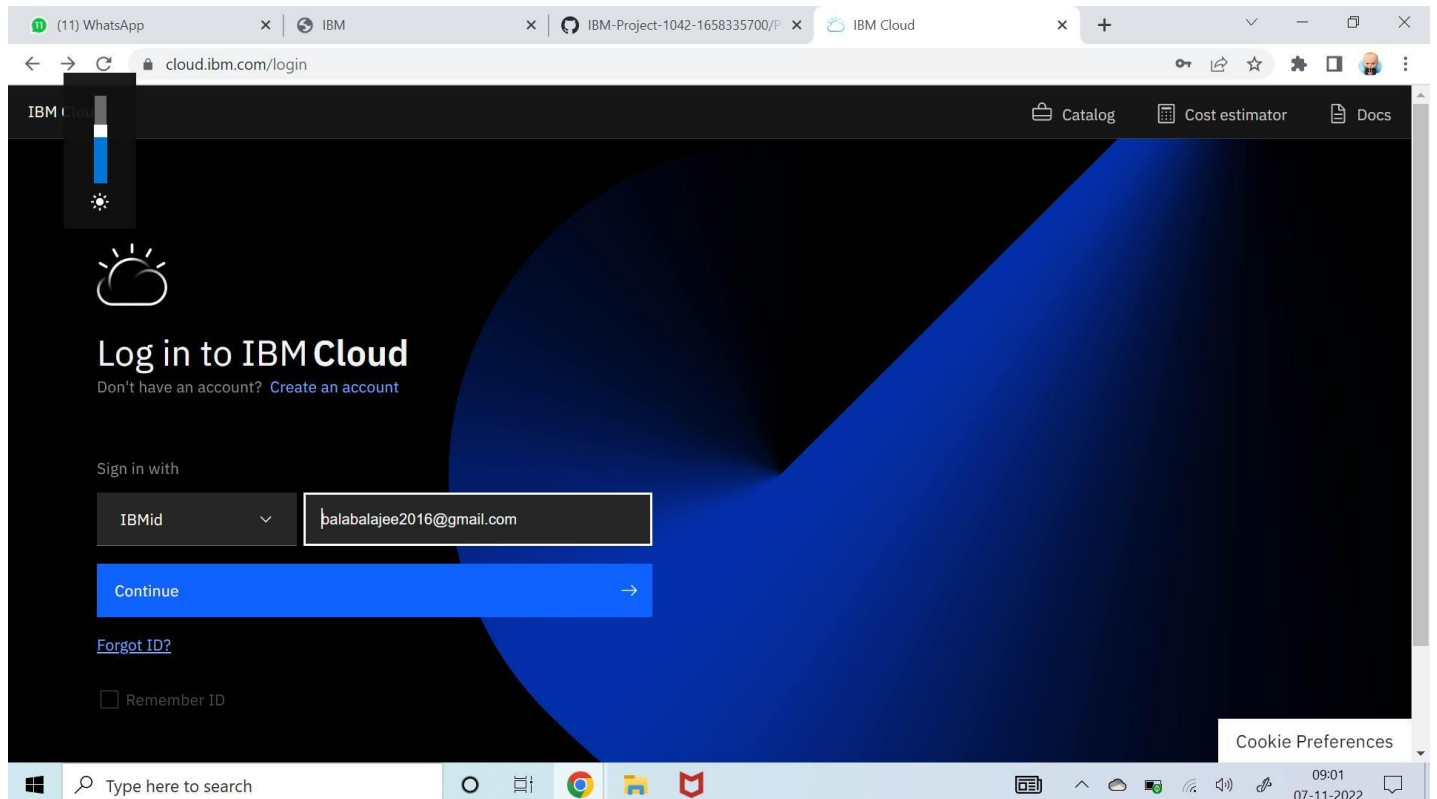
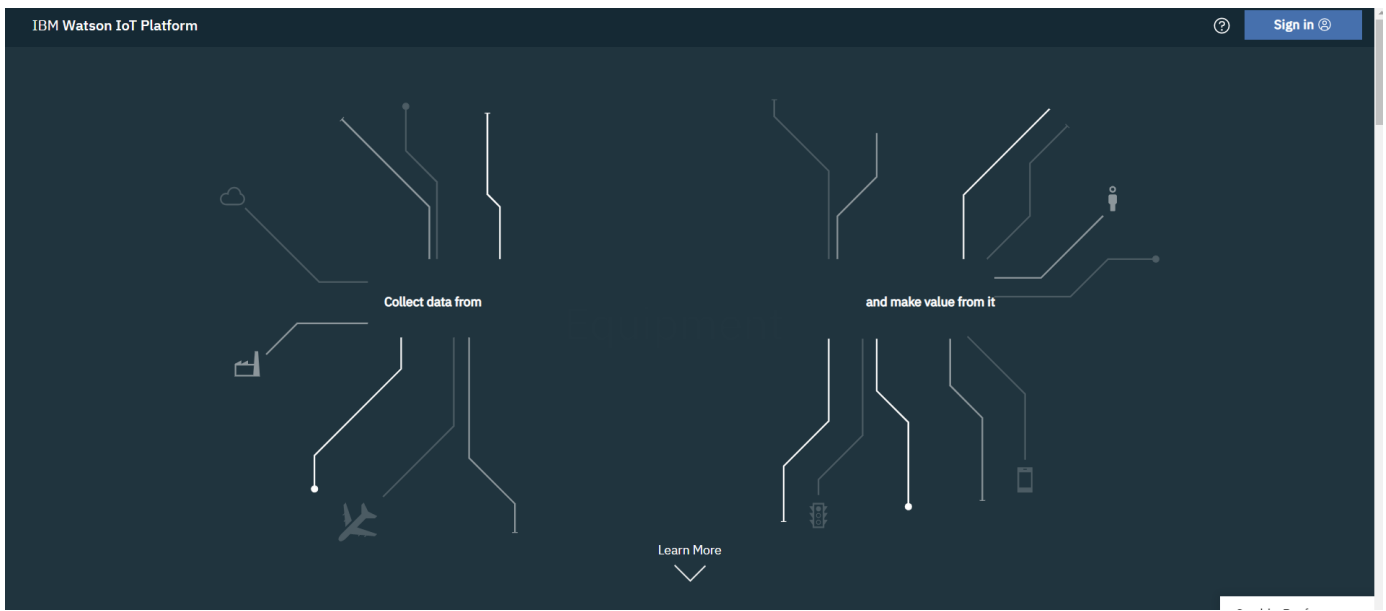
### SOFTWARE:

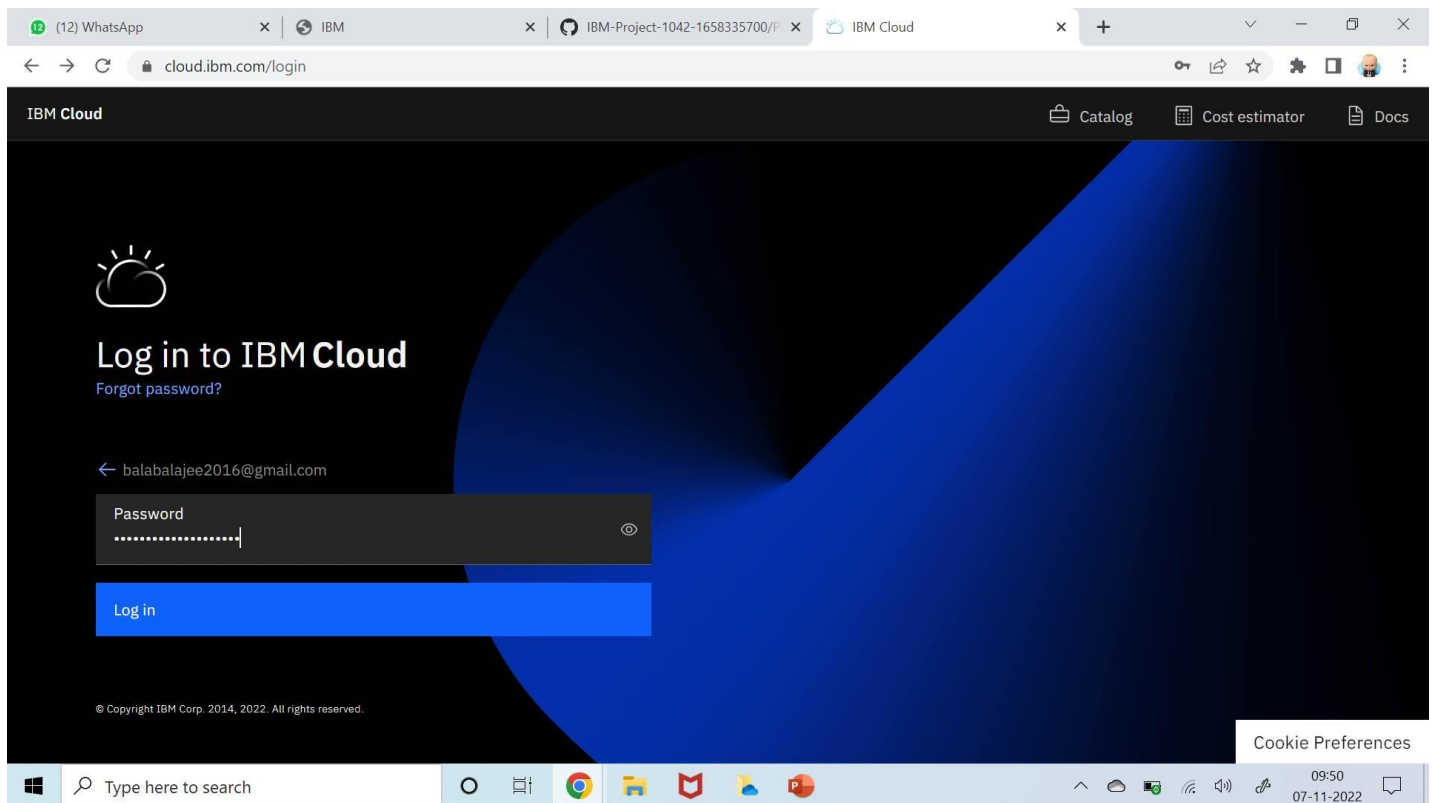
- IBM BLUEMIX ACCOUNT

## STEPS TO BE FOLLOWED

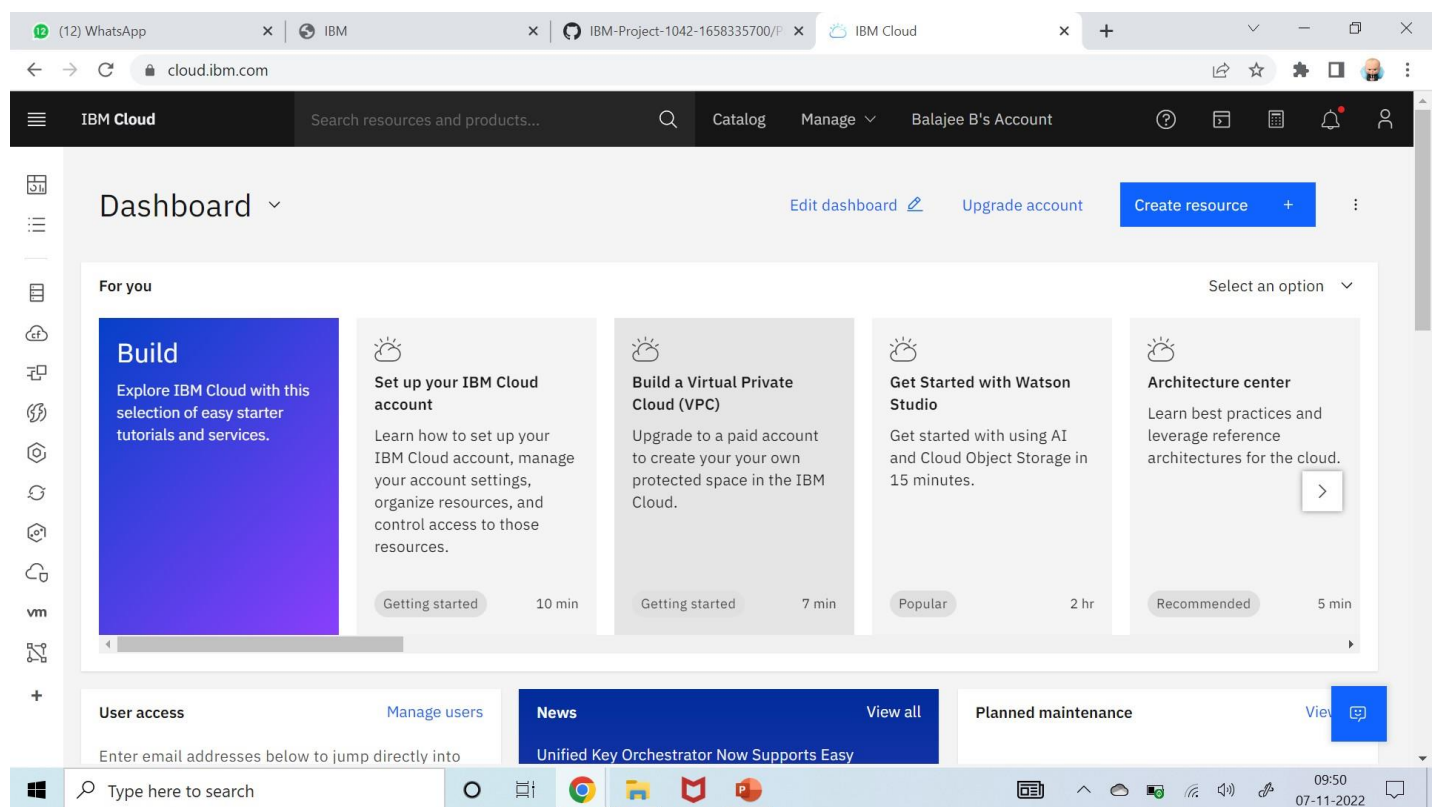
### Step-1: Create a device in IBM Watson:

- Firstly, login into your IBM-Bluemix account with your e-mail ID and Password.





➤ Click on catalog on your dashboard screen, then under platform go IoT.



- Check all details and click on create.

IBM Cloud Catalog / Internet of Things Platform

This service is the hub of all things IBM IoT, it is where you can set up and manage your connected devices so that your apps can access their live and historical data.

**Create** About

Type Service

Provider IBM

Last updated 08/15/2022

Category Internet of Things

Compliance IAM-enabled

Location

Select a location

Frankfurt (eu-de)

Select a pricing plan

Displayed prices do not include tax. Monthly prices shown are for country or location: [United States](#)

Plan	Features	Pricing
Lite	Includes up to 500 registered devices, and a maximum of 200 MB of each data metric Maximum of 500 registered devices	Free

**Summary**

**Internet of Things Platform** Free

Location: Frankfurt  
Plan: Lite  
Service name: Internet of Things Platform-og  
Resource group: Default

☒ I have read and agree to the following license agreements:  
[Terms](#)

Create

Add to estimate

IBM Cloud Service Details - IBM Cloud

Resource list / Internet of Things Platform-og Active Add tags

**Manage**

Plan

Connections

Let's get started with IBM Watson IoT Platform

Securely connect, control, and manage devices. Quickly build IoT applications that analyze data from the physical world.

Launch Docs

Ready for the next level?

IBM Watson IoT Platform Journey

☒ Lite ☐ Non-Production

- click on Launch

- Dashboard of IBM Watson IoT platform,
- Click on Add device

The screenshot shows the IBM Watson IoT Platform interface. The top navigation bar includes 'Browse', 'Action', 'Device Types', and 'Interfaces'. A sidebar on the left contains various icons. The main content area is titled 'BROWSE DEVICES' and features a table with columns: Device ID, Status, Device Type, Class ID, and Date Added. A search bar labeled 'Search by Device ID' is positioned above the table. A 'Device Simulator' toggle is visible on the right. A 'Show all' button is located at the bottom right of the table area.

- After click on Add device this page will open

The screenshot shows the 'Add Device' page in the IBM Watson IoT Platform. The page has a progress bar with four steps: Identity, Device Information, Security, and Summary. The 'Identity' step is currently active. Below the progress bar, there is a form with two fields: 'Device Type' (with a dropdown menu) and 'Device ID' (with a text input). At the bottom right, there are 'Cancel' and 'Next' buttons. The page is titled 'Add Device' and includes a close button in the top right corner.

➤ Go to device type and fill the details.

IBM Watson IoT Platform

balabalajee2016@gmail.com  
ID: qqu4hk

Browse Action **Device Types** Interfaces

## Add Type

Identity Device Information

Device types group devices that have similar characteristics, such as model number, firmware version, or location. Give the device type a unique name and a description that identifies characteristics that are shared by devices of this type.

Type ☒ Device Or ☐ Gateway

Name

The device type name is used to identify the device type uniquely and uses a restricted set of characters to make it suitable for API use.

Description

Develop The Web....pdf Dashboard Nodes....pdf Show all

Type here to search

10:13 07-11-2022

➤ Click on Finish

IBM Watson IoT Platform

balabalajee2016@gmail.com  
ID: qqu4hk

Browse Action **Device Types** Interfaces

## Add Type

Identity Device Information

Device types group devices that have similar characteristics, such as model number, firmware version, or location. Give the device type a unique name and a description that identifies characteristics that are shared by devices of this type.

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Description

Develop The Web....pdf Dashboard Nodes....pdf Show all

Type here to search

10:13 07-11-2022

➤ Click on Register Device.

The screenshot shows the IBM Watson IoT Platform interface. The browser address bar displays the URL: `qqu4hk.internetofthings.ibmcloud.com/dashboard/devices/types/add`. The page title is "Register Devices, Define Interfaces". Below the title, a message states: "Now that you added a device type, you can register and connect devices for this type." A blue button labeled "Register Devices" is visible. To the right of the text is a large light blue area with a dark blue gear icon. At the bottom right of the main content area are "Cancel" and "Next" buttons. The left sidebar contains various icons, and the top right shows the user's email and ID. The Windows taskbar at the bottom includes a search bar and several application icons.

➤ Choose the device and give device ID and then click on next.

The screenshot shows the IBM Watson IoT Platform interface. The browser address bar displays the URL: `qqu4hk.internetofthings.ibmcloud.com/dashboard/devices/browse/add?type=Fantastic-4`. The page title is "Browse Devices". Below the title, there are "All Devices" and "Diagnose" buttons. A modal form is displayed in the center, titled "Select a device type for the device that you are adding and give the device a unique ID." The form contains two input fields: "Device Type" with the value "Fantastic-4" and "Device ID" with the value "12345". At the bottom right of the modal are "Cancel" and "Next" buttons. The left sidebar contains various icons, and the top right shows the user's email and ID. The Windows taskbar at the bottom includes a search bar and several application icons.



## ➤ Click on Next

The screenshot shows the 'Add Metadata' form in the IBM Watson IoT Platform. The form is titled 'You can modify the default device information and enter more information about the device for identification purposes.' It contains two columns of input fields. The left column includes 'Serial Number', 'Model', 'Description', and 'Hardware Version'. The right column includes 'Manufacturer', 'Device Class', 'Firmware Version', and 'Descriptive Location'. Each field has a placeholder text 'Enter [Field Name]'. Below the left column is an 'Add Metadata +' button. At the bottom right of the form are 'Back' and 'Next' buttons. The browser's address bar shows the URL 'qqu4hk.internetofthings.ibmcloud.com/dashboard/devices/browse/add?type=Fantastic-4'. The user's email 'balabalajee2016@gmail.com' and ID 'qqu4hk' are visible in the top right corner. The Windows taskbar at the bottom shows the search bar and several open applications.

IBM Watson IoT Platform

balabalajee2016@gmail.com  
ID: qqu4hk

Browse Action Device Types Interfaces

You can modify the default device information and enter more information about the device for identification purposes.

Serial Number Enter Serial Number

Model Enter Model

Description Enter Description

Hardware Version Enter Hardware Version

Manufacturer Enter Manufacturer

Device Class Enter Device Class

Firmware Version Enter Firmware Version

Descriptive Location Enter Descriptive Location

Add Metadata +

Back Next

Develop The Web....pdf Dashboard Nodes....pdf Show all

Type here to search

10:14 07-11-2022

## ➤ Click on Next

The screenshot shows the 'Authentication Token' selection screen in the IBM Watson IoT Platform. The screen is titled 'There are two options for selecting a device authentication token.' It presents two options: 'Auto-generated authentication token (default)' and 'Self-provided authentication token'. The 'Auto-generated' option explains that the service will generate an 18-character alphanumeric token. The 'Self-provided' option explains that the user must provide their own token, which must be between 8 and 36 characters and contain a mix of lowercase and uppercase letters, numbers, and symbols. Below the options is an 'Authentication Token' input field with a placeholder 'Enter an optional token' and an information icon. A note below the field states: 'Make a note of the generated token. Lost authentication tokens cannot be recovered. Tokens are encrypted before being stored. Authentication token are encrypted before we store them.' The browser's address bar shows the same URL as the previous screenshot. The user's email and ID are visible in the top right corner. The Windows taskbar at the bottom shows the search bar and several open applications.

IBM Watson IoT Platform

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ID: qqu4hk

Browse Action Device Types Interfaces

There are two options for selecting a device authentication token.

**Auto-generated authentication token (default)**

Allow the service to generate an authentication token for you. Tokens are 18 characters and contain a mix of alphanumeric characters and symbols. The token is returned to you at the end of the device registration process.

**Self-provided authentication token**

Provide your own authentication token for this device. The token must be between 8 and 36 characters and contain a mix of lowercase and uppercase letters, numbers, and symbols, which can include hyphens, underscores, and periods. Do not use repeated characters, dictionary words, user names, or other predefined sequences.

Authentication Token Enter an optional token ⓘ

Make a note of the generated token. Lost authentication tokens cannot be recovered. Tokens are encrypted before being stored.

Authentication token are encrypted before we store them.

Develop The Web....pdf Dashboard Nodes....pdf Show all

Type here to search

10:14 07-11-2022



## ➤ Click on Finish

IBM Watson IoT Platform

balabalajee2016@gmail.com  
ID: qqu4hk

Browse Action Device Types Interfaces

Verify that the following information is correct then select Finish

Device Type  
Fantastic-4

Device ID  
12345

View Metadata

Security Token  
To be generated

Back Finish

Browse Devices

Develop The Web....pdf Dashboard Nodes....pdf Show all

Type here to search

10:15  
07-11-2022

## ➤ Device is created

IBM Watson IoT Platform

balabalajee2016@gmail.com  
ID: qqu4hk

Browse Action Device Types Interfaces

Add Device +

12345 Disconnected Fantastic-4 Device Nov 7, 2022 10:15 AM

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
event_1	{"type":"Buffer","data":[]}	json	a few seconds ago
event_1	{"#IBM Watson IOT Platform":"#pip install wiot..."}	json	5 minutes ago
event_1	{"randomNumber":24}	json	5 minutes ago

1 Simulation running

ibm.csv Show all

Type here to search

11:34  
07-11-2022

## STEP-2: INSTALLING NECESSARY PACKAGES ON YOUR PI:

- Now we are going to install necessary packages on your pi.
- Open your terminal in your pi and type the following commands
- `curl -LO https://github.com/ibm-messaging/iot-raspberrypi/releases/download/1.0.2.1/iot_1.0-2_armhf.deb`
- `sudo dpkg -i iot_1.0-2_armhf.deb`
- `service iot status`

Following are the images as to what appears on your pi's terminal when u type these commands

```
File Edit Tabs Help
--2017-10-23 06:55:22-- http://ftp.nl.debian.org/debian/pool/main/o/openssl/libssl1.0.0_1.0.1t-1-deb8u6_armhf.deb
Resolving ftp.nl.debian.org (ftp.nl.debian.org)... 130.89.149.21, 2001:67c:2564:a120::21
Connecting to ftp.nl.debian.org (ftp.nl.debian.org)[130.89.149.21]:80... connect
ed.
HTTP request sent, awaiting response... 200 OK
Length: 867950 (848K) [application/x-debian-package]
Saving to: 'libssl1.0.0_1.0.1t-1-deb8u6_armhf.deb'

libssl1.0.0_1.0.1t- 100%[=====] 847.61K  358KB/s   in 2.4s

2017-10-23 06:55:25 (358 KB/s) - 'libssl1.0.0_1.0.1t-1-deb8u6_armhf.deb' saved [
867950/867950]

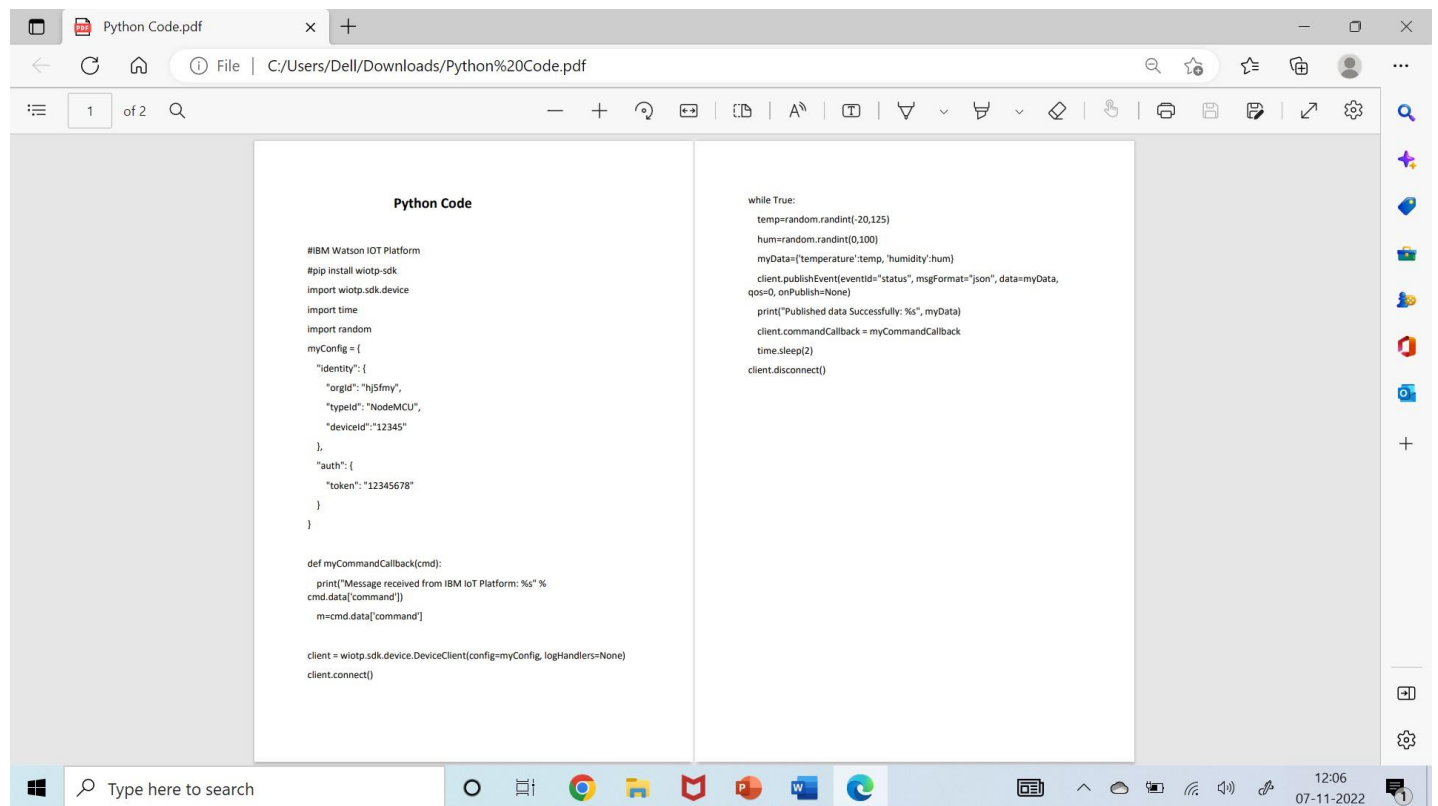
pi@raspberrypi:~$ sudo dpkg -i libssl1.0.0_1.0.1t-1-deb8u6_armhf.deb
Selecting previously unselected package libssl1.0.0:armhf.
(Reading database ... 115608 files and directories currently installed.)
Preparing to unpack libssl1.0.0_1.0.1t-1-deb8u6_armhf.deb ...
Unpacking libssl1.0.0:armhf (1.0.1t-1-deb8u6) ...
Setting up libssl1.0.0:armhf (1.0.1t-1-deb8u6) ...
pi@raspberrypi:~$ curl -LO https://github.com/ibm-messaging/iot-raspberrypi/rel
eases/download/1.0.2.1/iot_1.0-2_armhf.deb
% Total    % Received % Xferd  Average Speed   Time    Time     Time  Current
           Dload  Upload   Total   Spent    Left  Speed
100 164 0 164 0 0 157 0 --:--:-- 0:00:01 --:--:-- 157
100 609 0 609 0 0 457 0 --:--:-- 0:00:01 --:--:-- 457
100 110k 100 110k 0 0 29117 0 0:00:03 0:00:03 --:--:-- 48190
pi@raspberrypi:~$ sudo dpkg -i iot_1.0-2_armhf.deb
(Reading database ... 115626 files and directories currently installed.)
Preparing to unpack iot_1.0-2_armhf.deb ...
Unpacking iot (1.0-1) over (1.0-1) ...
Setting up iot (1.0-1) ...
Processing triggers for systemd (232-25-deb9u1) ...
pi@raspberrypi:~$ service iot status
* iot.service - LSB: iot service
   Loaded: loaded (/etc/init.d/iot; generated; vendor preset: enabled)
   Active: active (running) since Mon 2017-10-23 06:56:25 UTC; 17s ago
   Docs: man:systemd-sysv-generator(8)
   CGroup: /system.slice/iot.service
           └─662 /opt/iot/iot /dev/null

Oct 23 06:56:24 raspberrypi systemd[1]: Starting LSB: iot service...
Oct 23 06:56:24 raspberrypi iot[2567]: Starting the iot program
Oct 23 06:56:25 raspberrypi iot[2562]: **** IoT Raspberry Pi Sample has started ****
Oct 23 06:56:25 raspberrypi iot[2562]: Config file not found. Going to Quickstart mode
Oct 23 06:56:25 raspberrypi iot[2562]: Running in Quickstart mode
Oct 23 06:56:25 raspberrypi systemd[1]: Started LSB: iot service
```

- Then open your terminal and type `pip install ibmiotf`

```
File Edit Tabs Help
pi@raspberrypi:~$ pip install ibmiotf
Collecting ibmiotf
  Downloading ibmiotf-0.3.0.tar.gz (59kB)
    100% |#####| 61kB 510kB/s
Collecting dicttoxml<1.7.4 (from ibmiotf)
  Downloading dicttoxml-1.7.4.tar.gz
Collecting iso8601<0.1.10 (from ibmiotf)
  Downloading iso8601-0.1.12-py2.py3-none-any.whl
Collecting paho-mqtt>1.2 (from ibmiotf)
  Downloading paho-mqtt-1.3.1.tar.gz (80kB)
    100% |#####| 81kB 916kB/s
Collecting pytz>=2014.7 (from ibmiotf)
  Using cached pytz-2017.2-py2.py3-none-any.whl
Collecting requests>=2.5.0 (from ibmiotf)
  Downloading requests-2.18.4-py2.py3-none-any.whl (88kB)
    100% |#####| 92kB 1.6MB/s
Collecting requests-toolbelt>=0.7.0 (from ibmiotf)
  Downloading requests-toolbelt-0.8.0-py2.py3-none-any.whl (54kB)
    100% |#####| 61kB 1.6MB/s
Collecting xmldict<=0.18.2 (from ibmiotf)
  Downloading xmldict-0.11.0-py2.py3-none-any.whl
Collecting urllib3<1.23,>=1.21.1 (from requests>=2.5.0->ibmiotf)
  Downloading urllib3-1.22-py2.py3-none-any.whl (132kB)
    100% |#####| 133kB 1.4MB/s
Collecting idna<2.7,>=2.5 (from requests>=2.5.0->ibmiotf)
  Downloading idna-2.6-py2.py3-none-any.whl (56kB)
    100% |#####| 61kB 1.7MB/s
Collecting chardet<3.1.0,>=3.0.2 (from requests>=2.5.0->ibmiotf)
  Downloading chardet-3.0.4-py2.py3-none-any.whl (133kB)
    100% |#####| 143kB 1.9MB/s
Collecting certifi<2017.4.17 (from requests>=2.5.0->ibmiotf)
  Using cached certifi-2017.7.27-py2.py3-none-any.whl
Building wheels for collected packages: ibmiotf, dicttoxml, paho-mqtt
Running setup.py bdist_wheel for ibmiotf
Stored in directory: /home/pi/.cache/pip/wheels/7e/f9/45/bbc33ad957e02f7b71ba80e316d65a83d9d735a6d12e0c0418
Running setup.py bdist_wheel for dicttoxml
Stored in directory: /home/pi/.cache/pip/wheels/45/62/59/96910b33ec6a7b2ae66a13765491b50def5468024078e12cce
Running setup.py bdist_wheel for paho-mqtt
Stored in directory: /home/pi/.cache/pip/wheels/28/d8/0d/acdc8f289011b7be7de71deebef6642fb3be9313dfff0493
Successfully built ibmiotf dicttoxml paho-mqtt
Installing collected packages: dicttoxml, iso8601, paho-mqtt, pytz, urllib3, idna, chardet, certifi, requests, requests-toolbelt, xmldict, ibmiotf
Successfully installed certifi-2017.7.27.1 chardet-3.0.4 dicttoxml-1.7.4 ibmiotf-0.3.0 idna-2.6 iso8601-0.1.12 paho-mqtt-1.3.1 pytz-2017.2 requests-2.18.4 requests-toolbelt-0.8.0 urllib3-1.22 xmldict-0.11.0
pi@raspberrypi:~$
```

- I have sent DHT-11 Sensors data to ibm bluemix .To get the code u need to login into IOT GYAN.
- Then I get the image as follows in my pi's shell:



### Step-3: checking your data sent on IBM Bluemix:

- After you have sent your sensors data you can check whether it is received at your iot platform Just look at the image below and if u see the same wifi kind of symbol on your created device then your dta is being received.

(11) WhatsAppIBM-Project-40308IBMIBM-Project-1042-Service Details - IBIBM Watson IoT Pl

qqu4hk.internetofthings.ibmcloud.com/dashboard/devices/browse

balabalajee2016@gmail.comID: qqu4hk

IBM Watson IoT Platform

BrowseActionDevice TypesInterfaces

Add Device

12345DisconnectedFantastic-4DeviceNov 7, 2022 10:15 AM

IdentityDevice InformationRecent EventsStateLogs

The recent events listed show the live stream of data that is coming and going from this device.

Event	Value	Format	Last Received
event_1	{"type":"Buffer","data":{}}	json	a few seconds ago
event_1	{"#IBM Watson IOT Platform":"#pip install wiot..."}	json	5 minutes ago
event_1	{"randomNumber":24}	json	5 minutes ago

1 Simulation running

ibm.csvShow all

Type here to search

Google

File Explorer

Microsoft Edge

PowerPoint

Task View

Network

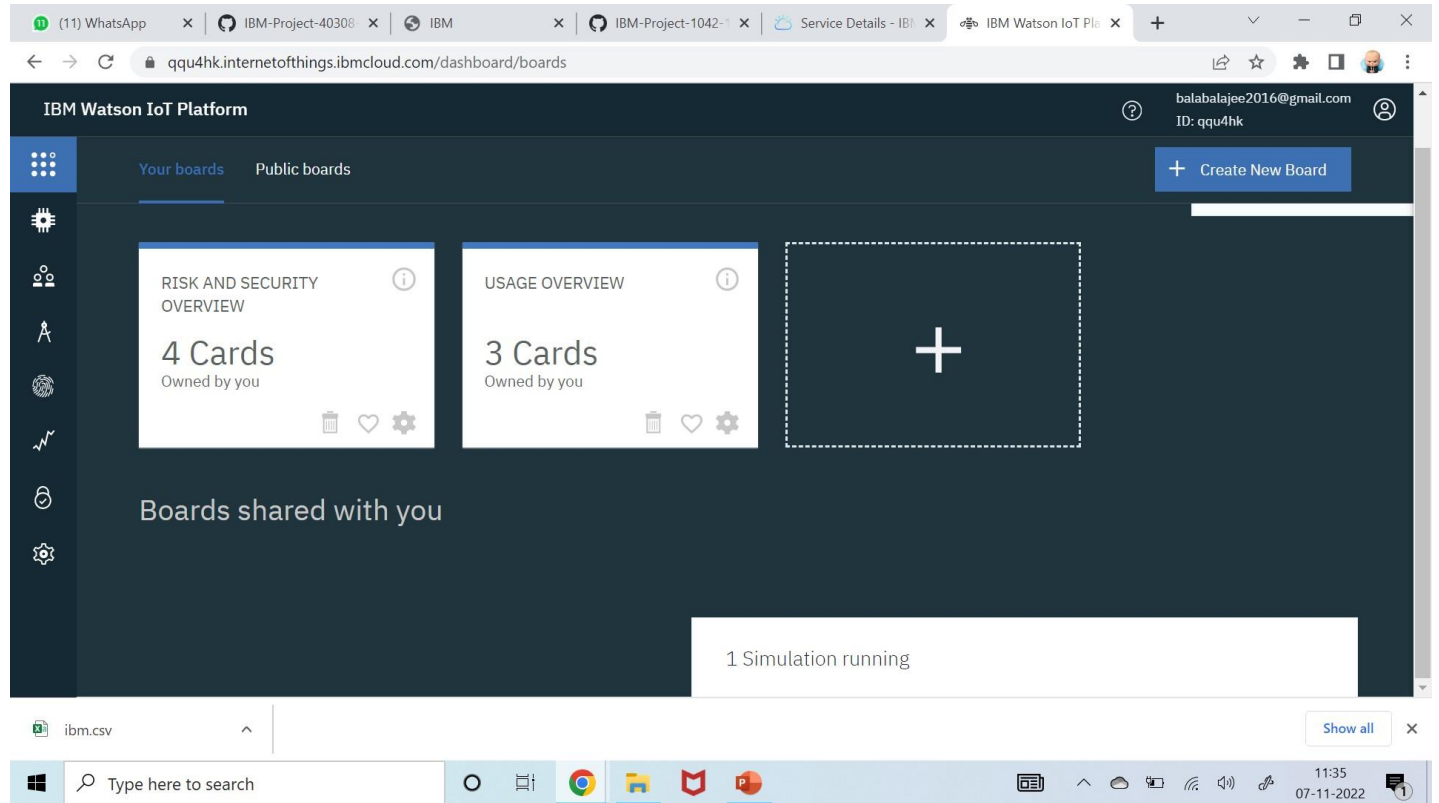
Volume

11:3407-11-2022

- After double clicking on your created device you can see the received data as shown in image

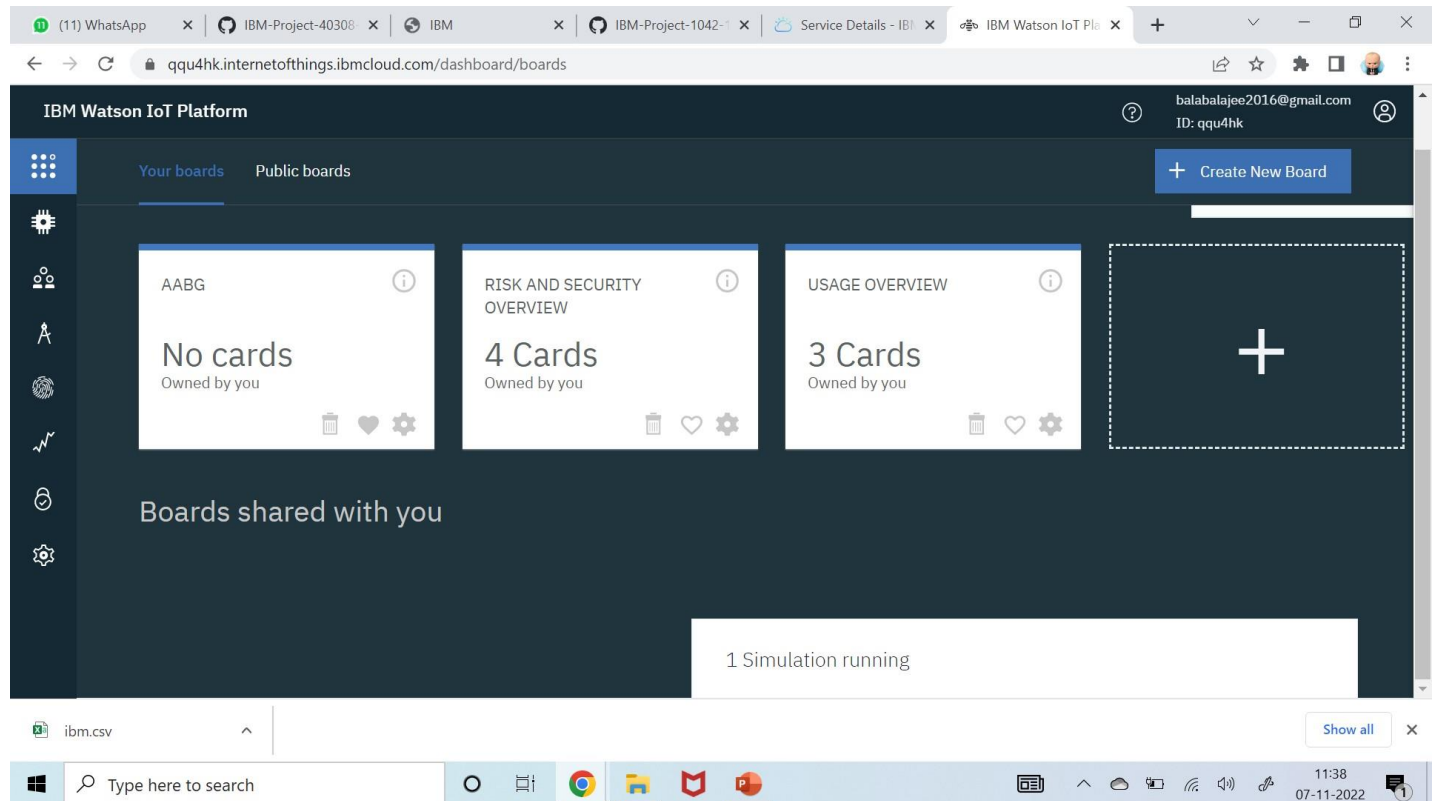
#### Step-4: Creating boards and cards for visualization of data:

- In your Watson platform you have an option called board .Click on it and you get the following window on your screen

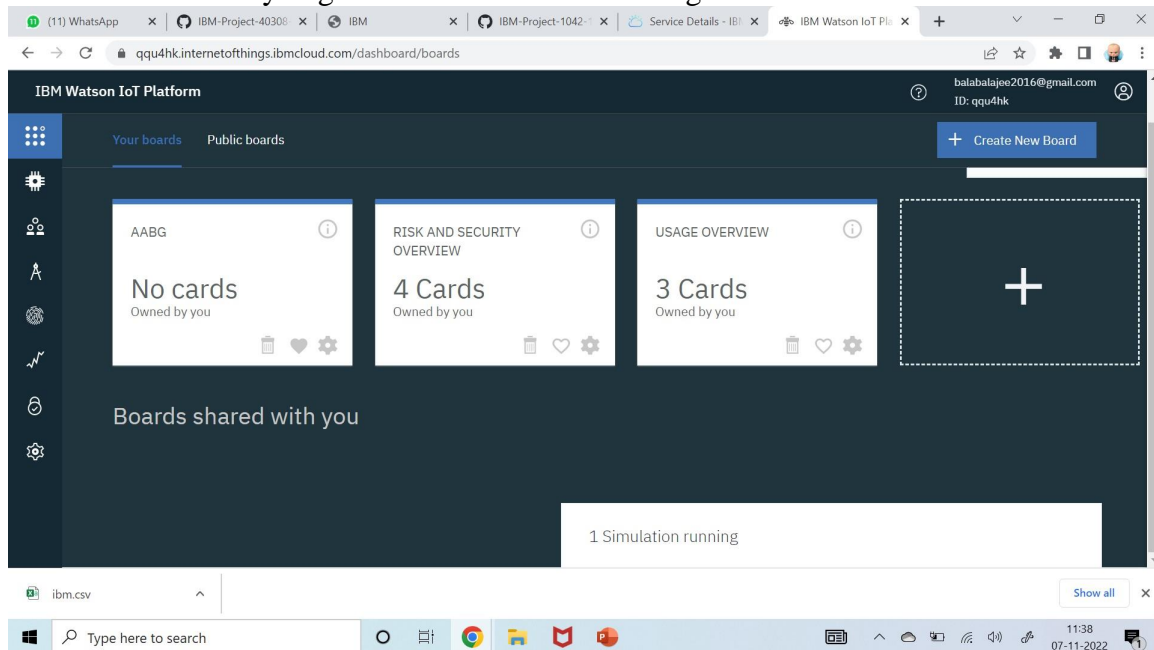


- Click on Create a new board to create a board .

The given below window appears give a name and description to your board as shown in the window below.



- Then click on Next you get the below window then again click on Sub



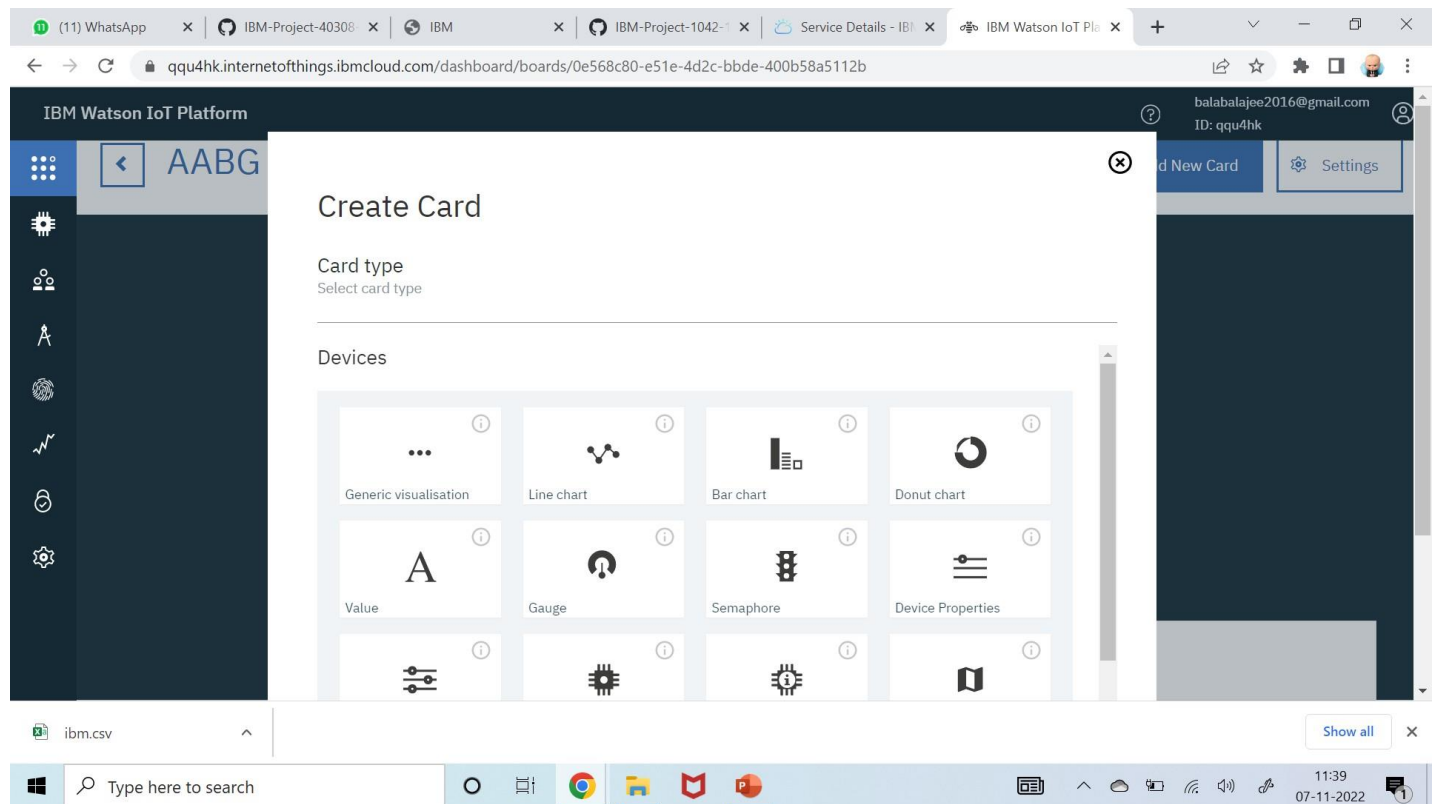
Then double click on your boards name which you have created.

➤ Click on Add New Card

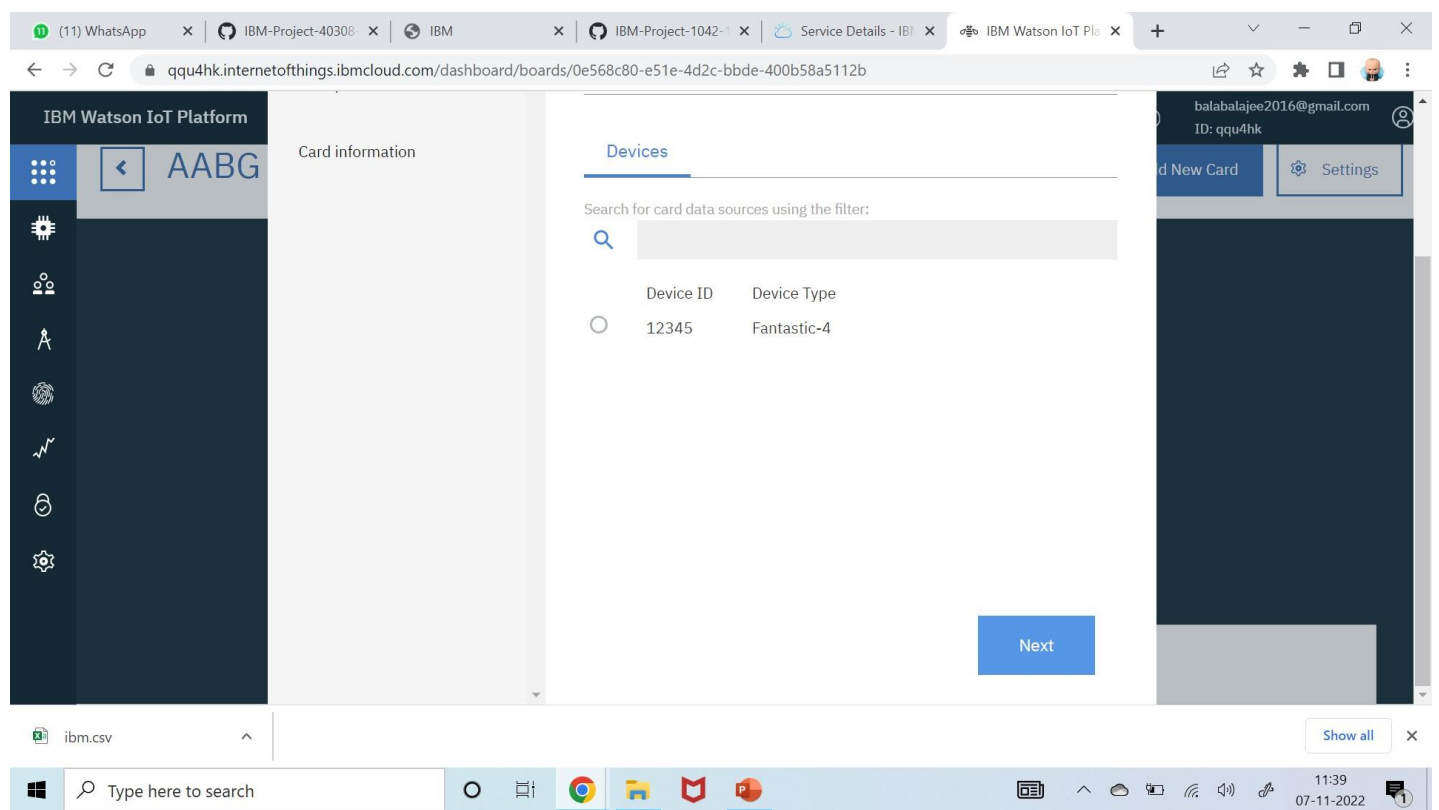
The screenshot displays the IBM Watson IoT Platform dashboard. The browser's address bar shows the URL: `qqu4hk.internetofthings.ibmcloud.com/dashboard/boards/0e568c80-e51e-4d2c-bbde-400b58a5112b`. The dashboard header includes the text "IBM Watson IoT Platform" and a user profile for "balabalajee2016@gmail.com" with ID "qqu4hk". A navigation bar contains a back arrow, the board name "AABG", a heart icon, and buttons for "Add New Card" and "Settings". The main content area features a dark blue background with a bee icon and the text "You currently have an empty board". Below this text is a blue button labeled "Add New Card". A white box at the bottom right of the main area indicates "1 Simulation running". The Windows taskbar at the bottom shows the search bar, task view, and several open applications including Chrome, File Explorer, and PowerPoint. The system clock displays the time "11:38" and date "07-11-2022".



➤ Select the type of Graph u want accordingly and click next

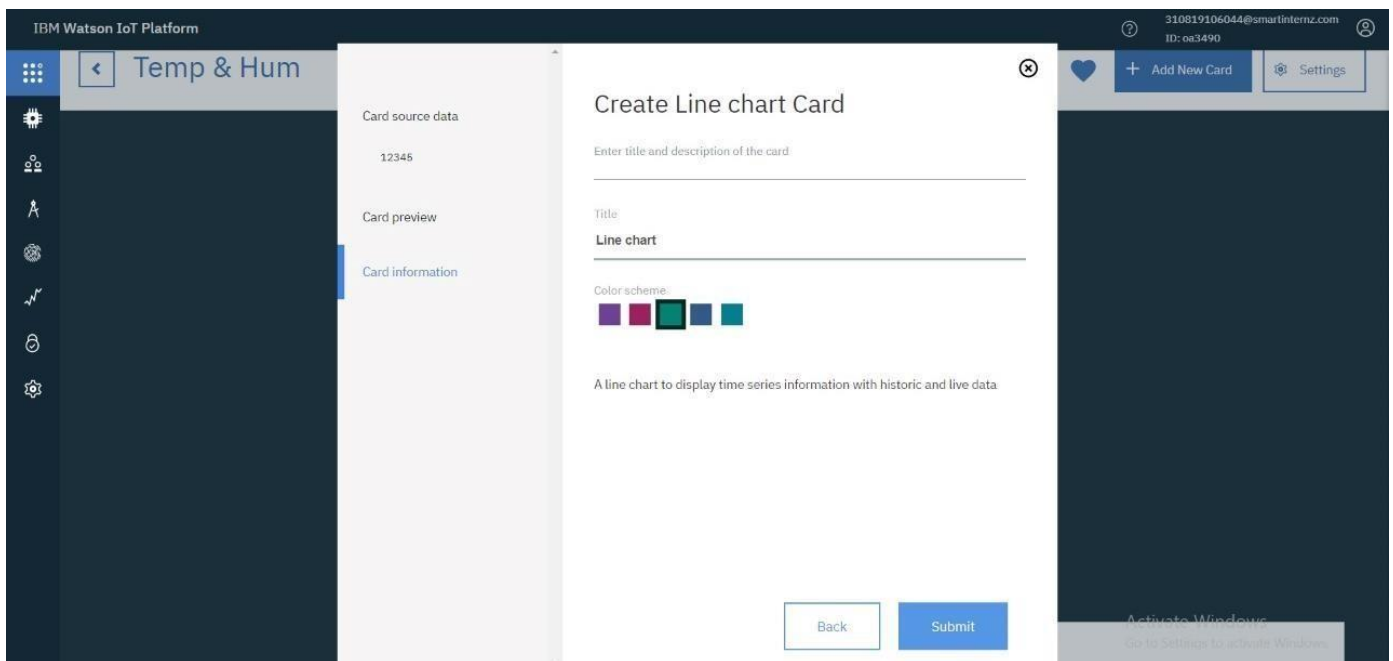


➤ You get the below window, choose the Device and click on Next.

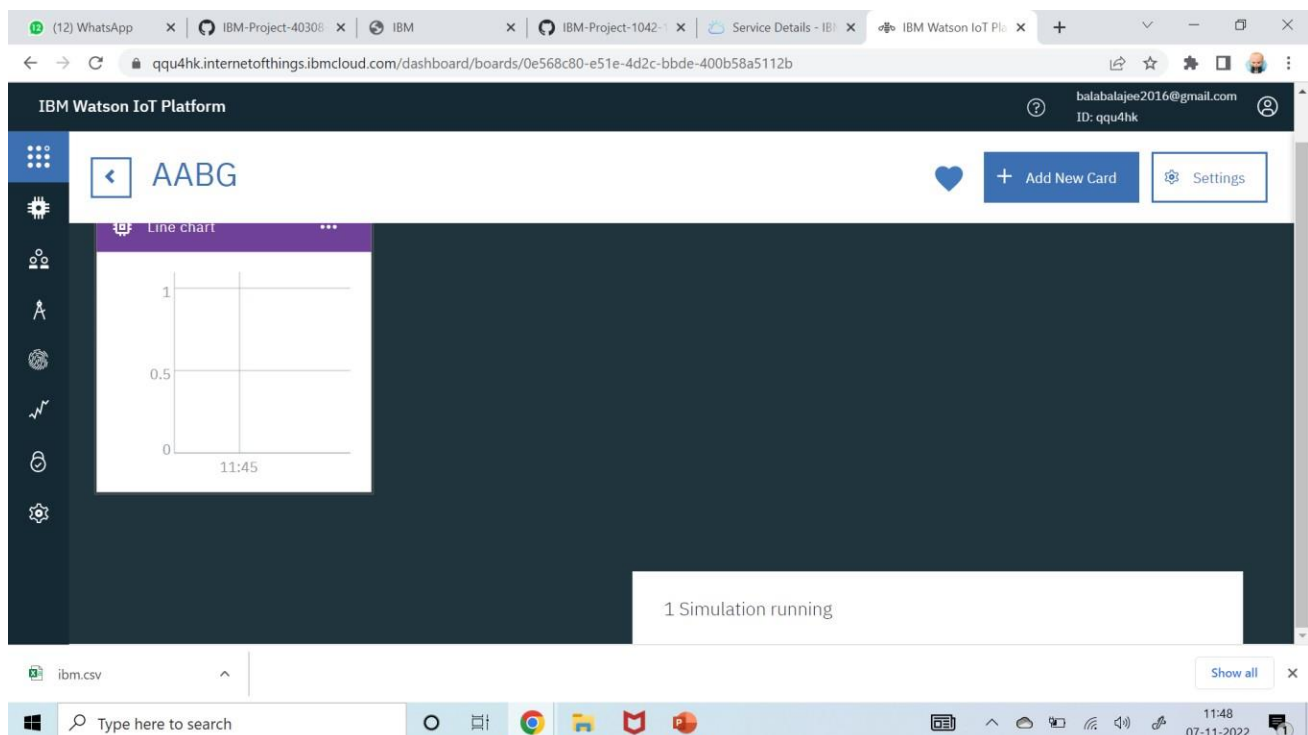


➤ Select the event, properly to be visualized on your graph and click next. In my case it is humidity

➤ Then select the size of the graph and color of the graph board you want and click next



➤ Here is the graph



- Repeat the process to get different graphs.

**RESULT:**

Hence, we were able to send data from our pi to IBM Watson and visualize it on a graph.