

SENDING DATA FROM RASPBERRY-PI TO IBM WATSON

Date	18 NOVEMBER 2022
Team ID	PNT2022TMID17427
Project Name	GAS LEAKAGE MONITORING AND ALERTING SYSTEM FOR INDUSTRIES

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

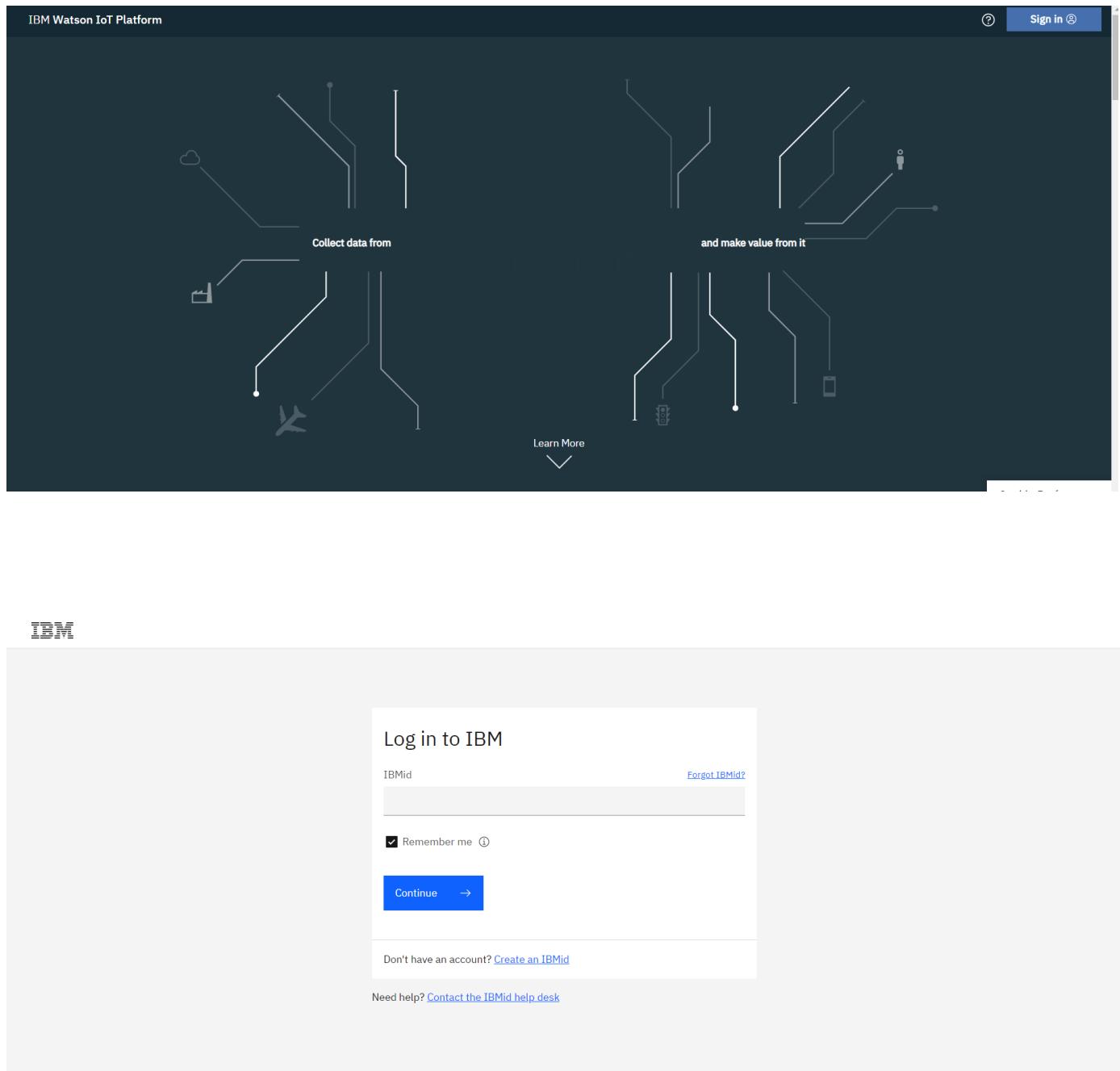
SOFTWARE:

- IBM BLUEMIX ACCOUNT

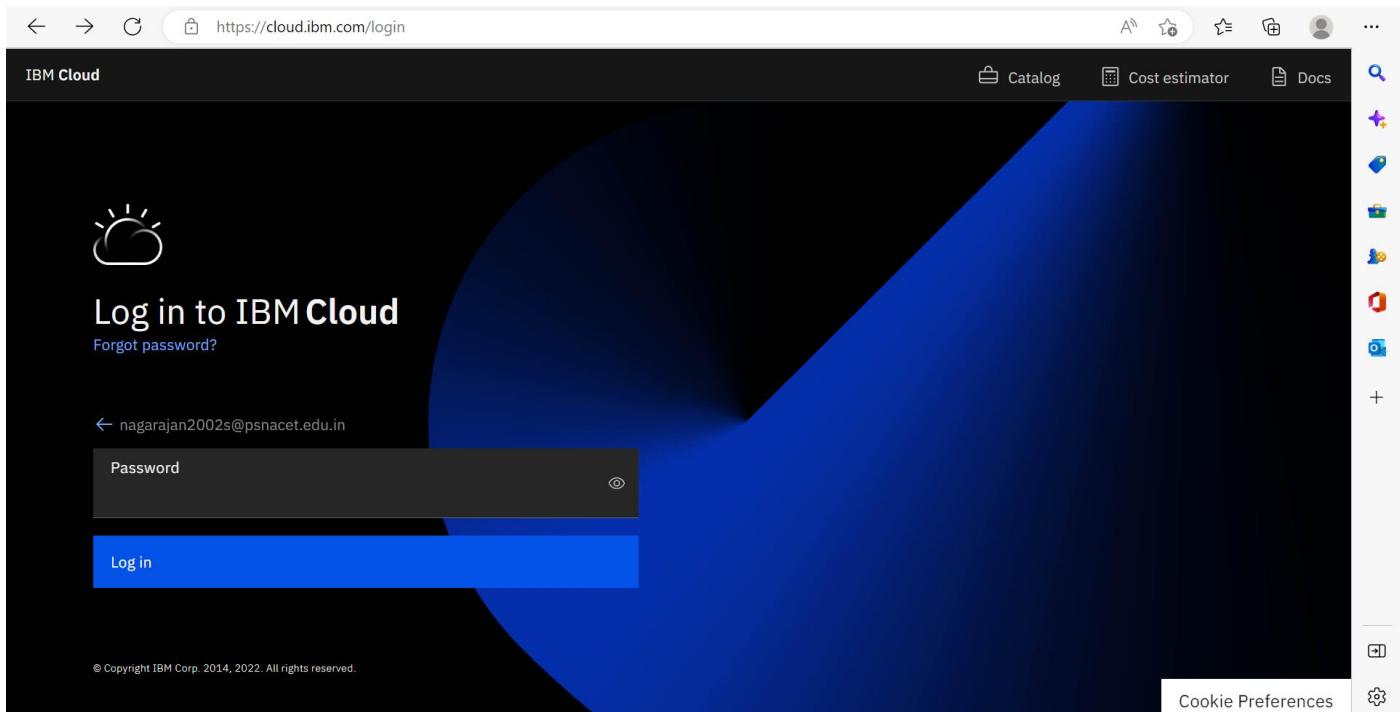
STEPS TO BE FOLLOWED

Step-1: Create a device in IBM Watson:

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



The image shows two screenshots of the IBM Watson IoT Platform. The top screenshot is the landing page with a dark background featuring a network of lines and nodes. It includes a cloud icon, a sensor icon, and a gear icon. Text on the page reads "Collect data from", "and make value from it", and "Learn More". The bottom screenshot is the "Log in to IBM" page, which has a light gray background. It features a "IBMid" input field, a "Forgot IBMid?" link, a "Remember me" checkbox, and a "Continue" button with a right-pointing arrow. Below the login form, there is a "Create an IBMid" link and a "Contact the IBMid help desk" link.



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

A screenshot of the IBM Cloud Catalog. At the top, there's a search bar with placeholder text 'Search the catalog...'. To the right are buttons for 'Sell on IBM Cloud' and 'Catalog settings'. On the far right, there's a vertical sidebar with icons for different services. The main area shows a grid of service cards. The first card on the left is 'Compute' with sub-categories: Containers (9), Networking (30), Storage (20), AI / Machine Learning (17), Analytics (10), Blockchain (1), Databases (28), Developer tools (25), Logging and monitoring (3), Migration (8), Integration (12), and Internet of Things (1). The 'Internet of Things' category is highlighted with a grey background. The other cards in the grid are 'Analytics Engine' (By IBM), 'AnonTech ViziVault Platform' (By Anon Technology, Inc.), 'API Connect' (By IBM), and 'App Configuration' (By IBM). Each card has a brief description and a list of features like 'Lite', 'Free', 'HIPAA Enabled', 'IAM-enabled', etc.

- Check all details and click on create.

The screenshot shows the IBM Cloud Catalog interface. On the left, there's a sidebar with service details: Type: Service, Provider: IBM, Last updated: 08/15/2022, Category: Internet of Things, Compliance: IAM-enabled, and Location: Frankfurt. The main area displays the "Internet of Things Platform" service. It has tabs for "Create" (which is active) and "About". Below the tabs, it says "Select a location" with "Frankfurt (eu-de)" selected. A pricing plan table shows the "Lite" plan, which includes up to 500 registered devices and a maximum of 200 MB of each data metric, and is Free. To the right, a "Summary" panel shows the service is "Free", located in Frankfurt, Plan: Lite, Service name: Internet of Things Platform-0g, and Resource group: Default. There's also a checkbox for accepting license agreements and a "Create" button. The bottom of the screen shows a Windows taskbar with various icons and a system tray indicating 26°C Cloudy weather, ENG language, and 06:43 PM.

- click on Launch

The screenshot shows the "Internet of Things Platform-0g" resource page. The left sidebar has "Manage" selected, with options for "Plan" and "Connections". The main area features a central graphic of a device connected to a network. Below it, a section titled "Let's get started with IBM Watson IoT Platform" encourages users to "Securely connect, control, and manage devices. Quickly build IoT applications that analyze data from the physical world." It includes a "Launch" button and a "Docs" link. At the bottom, a "Ready for the next level?" section shows the "IBM Watson IoT Platform Journey" with a progress bar from "Lite" to "Non-Production". The bottom of the screen shows a Windows taskbar with various icons and a system tray indicating 26°C Cloudy weather, ENG language, and 06:44 PM.

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

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.

<input type="checkbox"/>	Device ID	Status	Device Type	Class ID	Date Added
You don't have any devices.					

Create a device.

- After click on Add device this page will open

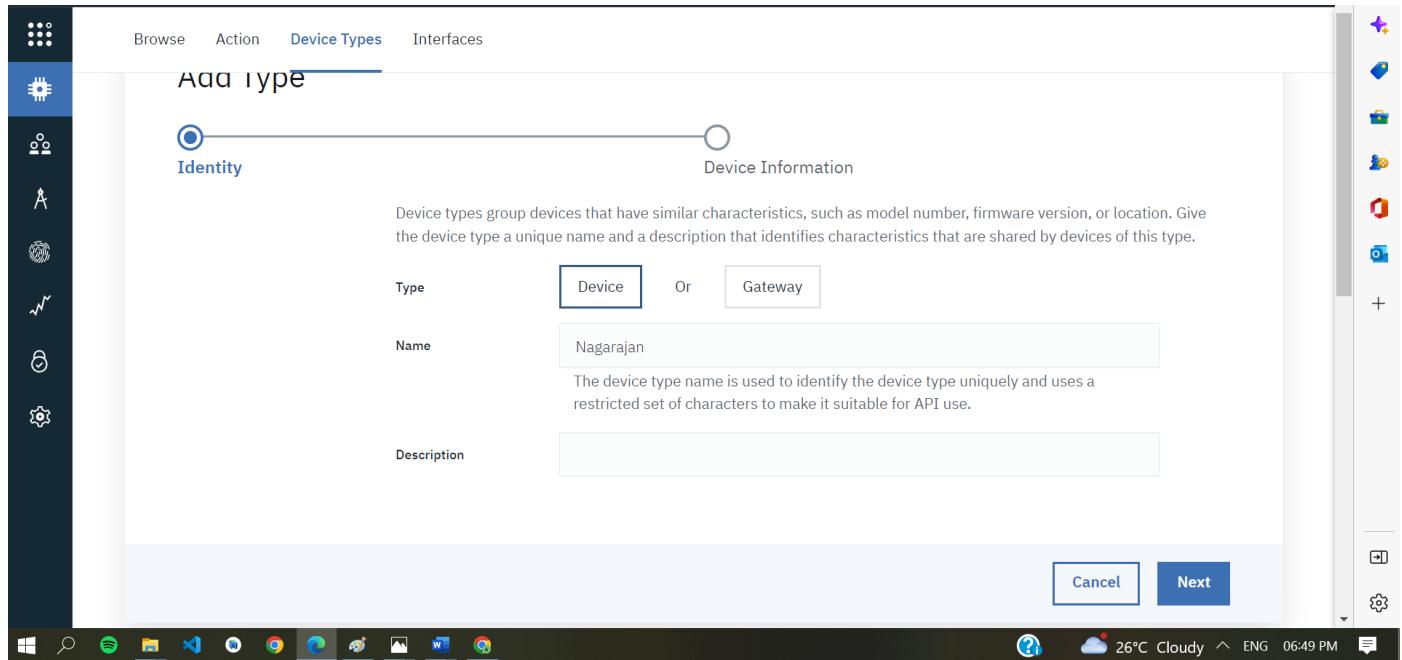
Select a device type for the device that you are adding and give the device a unique ID.

Device Type	Select or create a device type...
Device ID	Enter Device ID

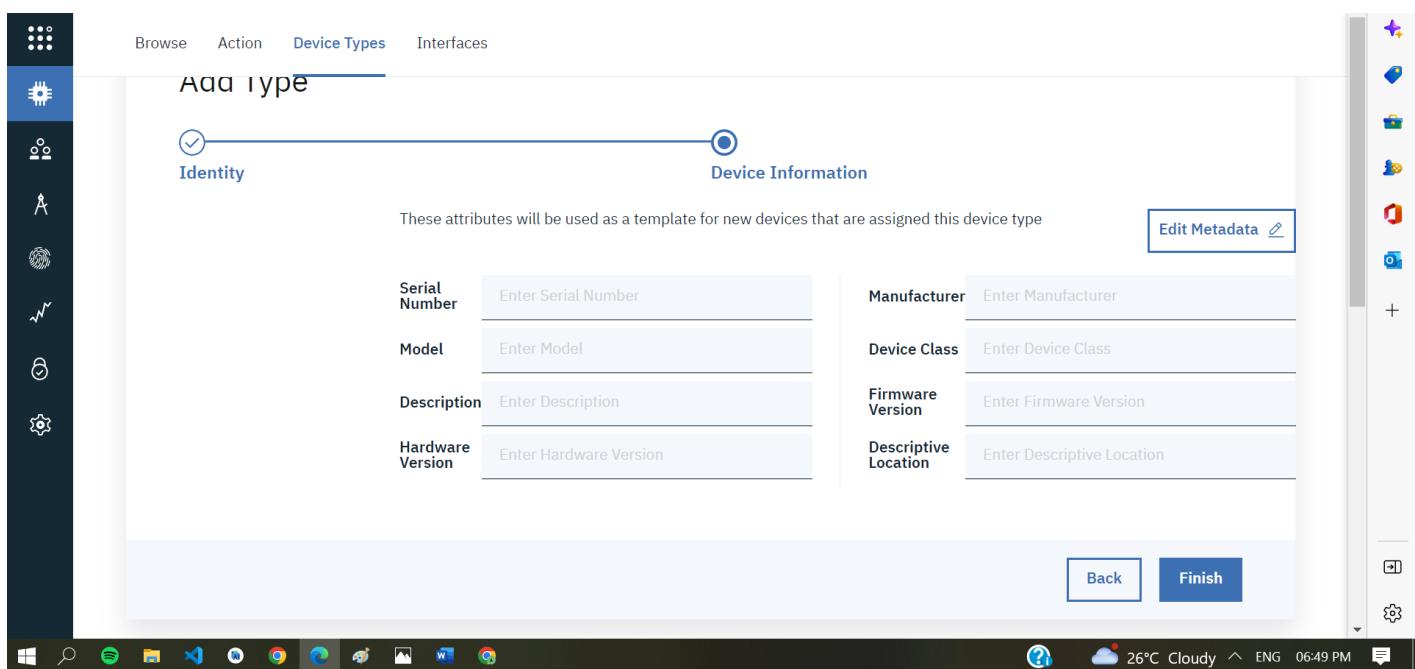
Cancel **Next**

Browse Devices

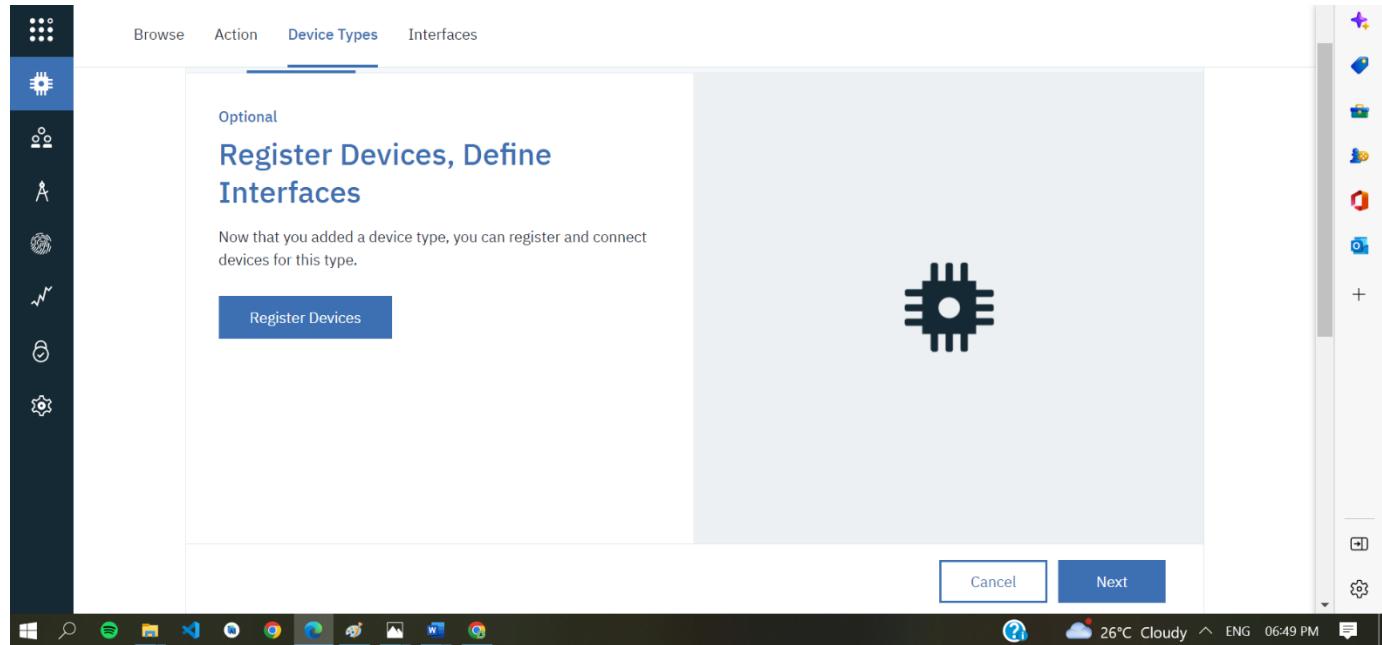
- Go to device type and fill the details.



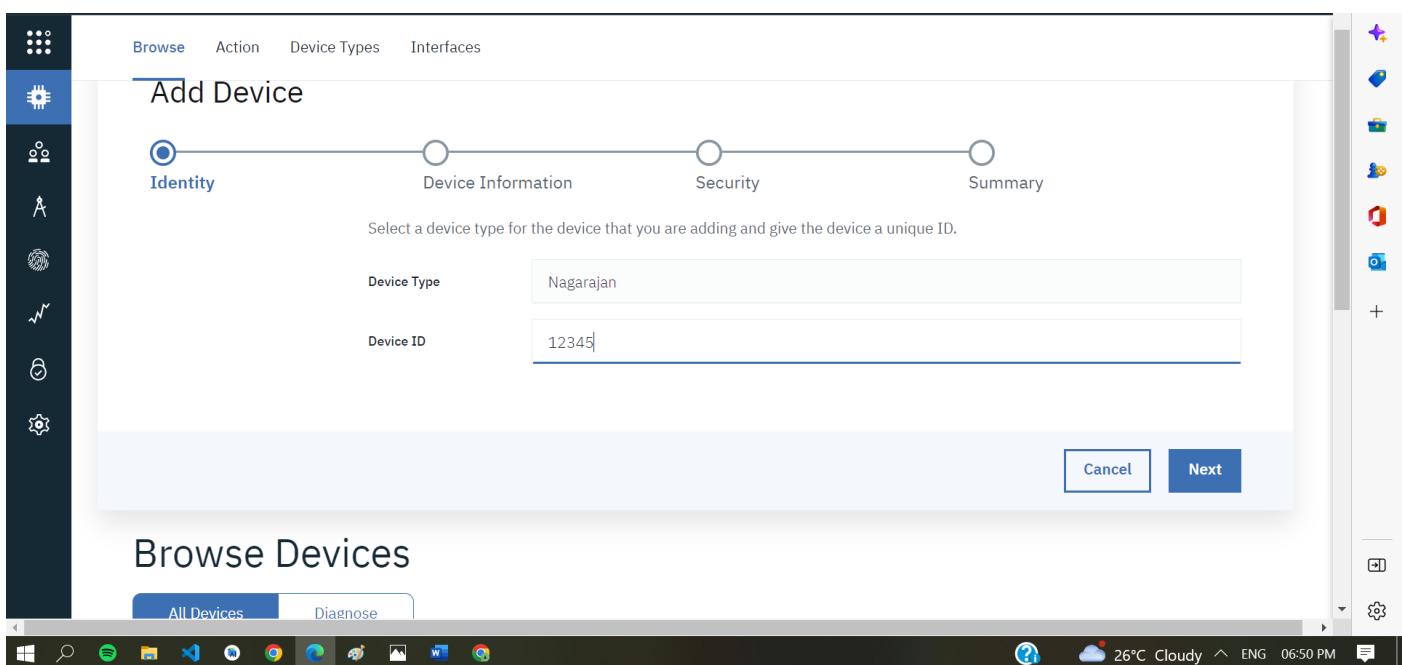
- Click on Finish



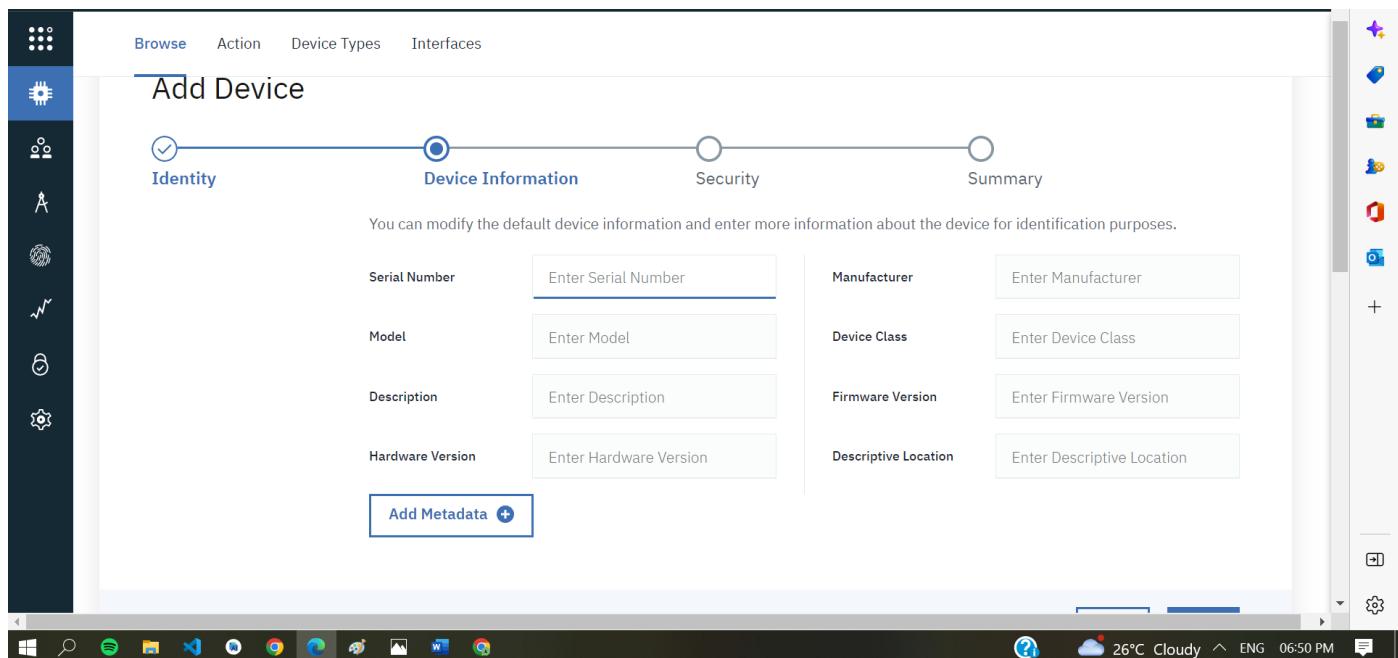
- Click on Register Device.



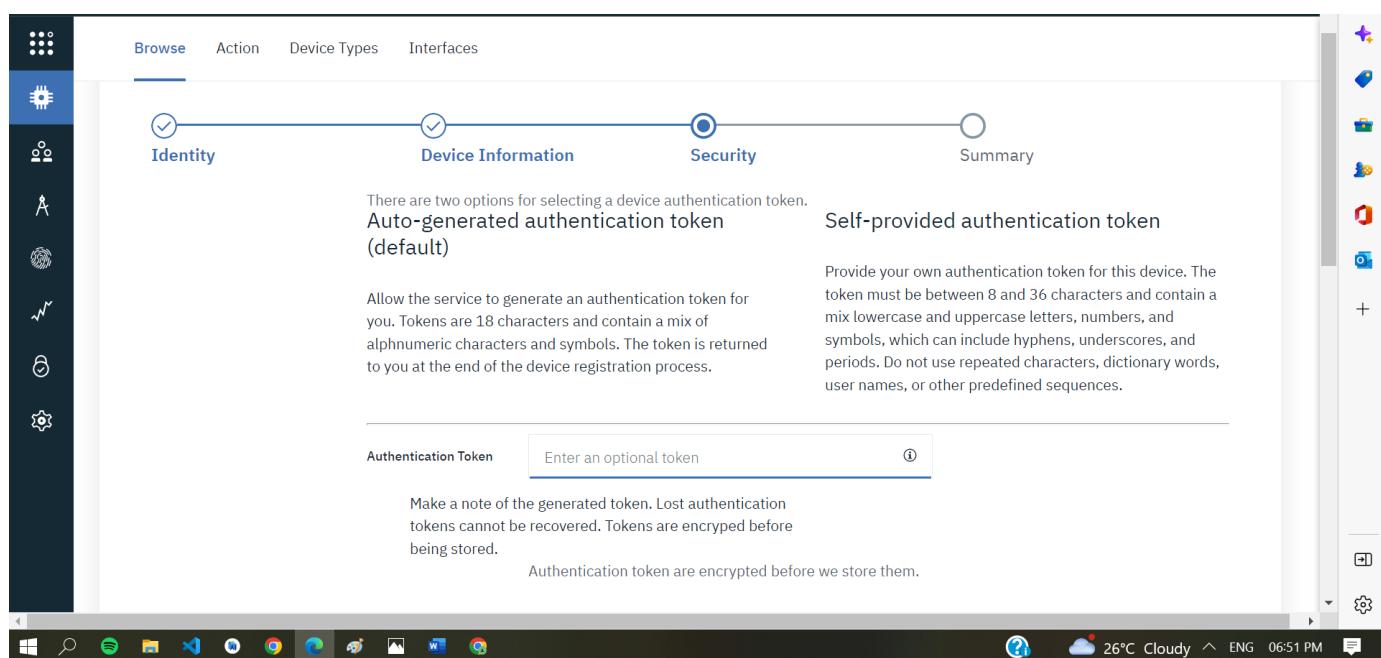
- Choose the device and give device ID and then click on next.



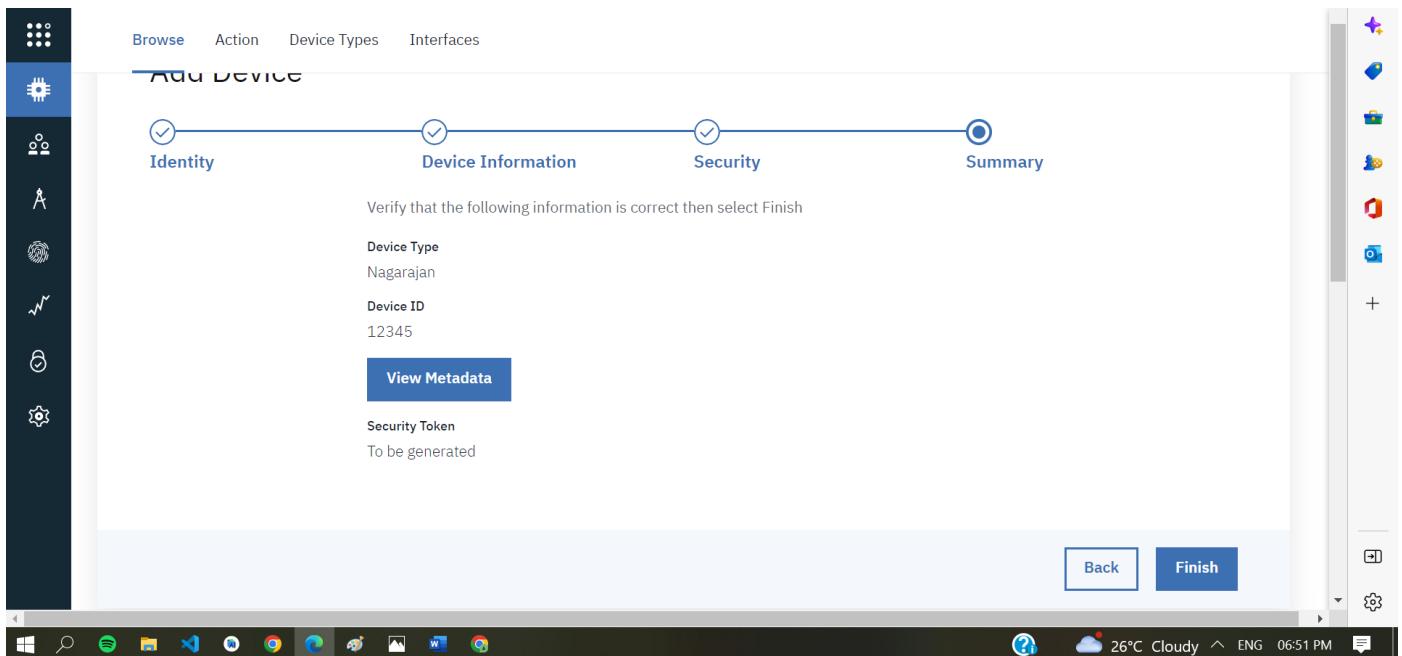
➤ Click on Next



➤ Click on Next



- Click on Finish



- Device is created

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.

	Device ID	Status	Device Type	Class ID	Date Added	Descriptive Location
>	12345	Disconnected	Nagarajan	Device	Oct 31, 2022 11:38 AM	

Items per page 50 | 1–1 of 1 item

1 of 1 page < 1 >

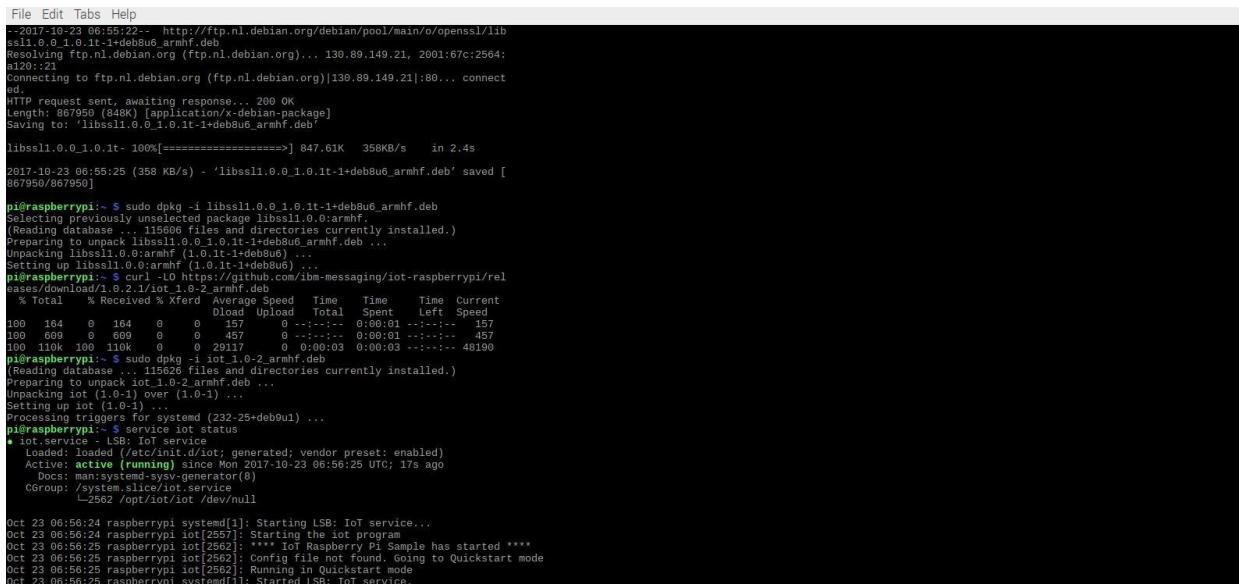
Activate Windows
Go to Settings to activate Windows.

1 Simulation running

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



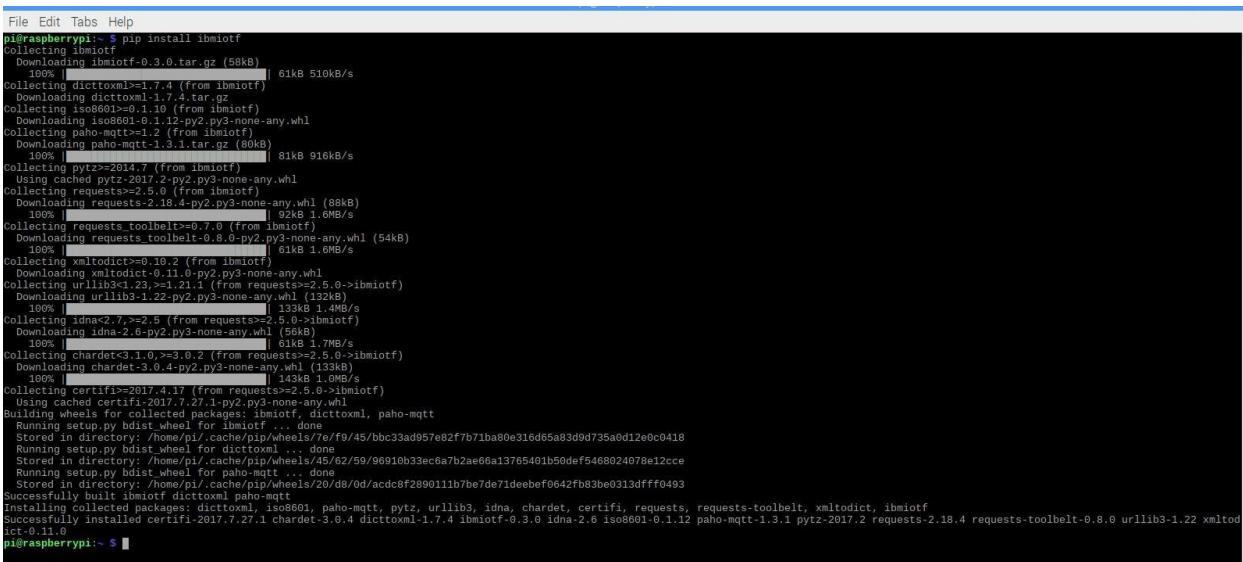
```
File Edit Tabs Help
--2017-10-23 06:55:22- http://ftp.nl.debian.org/debian/pool/main/o/openssl/libssl1.0.0.1.0.1t-1+deb8u6.armhf.deb
Resolving ftp.nl.debian.org (ftp.nl.debian.org)... 130.89.149.21, 2001:67c:2564:
Connecting to ftp.nl.debian.org (ftp.nl.debian.org)|130.89.149.21|:80... connect
ed
HTTP request sent, awaiting response... 200 OK
Length: 667950 (648K) [application/x-debian-package]
Saving to: "libssl1.0.0.1.0.1t-1+deb8u6.armhf.deb"

[  0%] 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 [667950/667950]

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 ... 115606 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: $ sudo dpkg -i https://github.com/ibm-messaging/iot-raspberrypi/releases/download/1.0.2.1/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)
   Group: :system.slice/iot.service
      ▾ ZE62 /opt/iot/iot /dev/null

Oct 23 06:56:24 raspberrypi systemd[1]: Starting LSB: IoT service...
Oct 23 06:56:24 raspberrypi iot[2557]: 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 (58kB)
    100% |████████████████████████████████| 58kB 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==1.3.1 (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% |████████████████████████████████| 88kB 1.6MB/s
Collecting requests_toolbelt>0.7.0 (from ibmiotf)
  Downloading requests_toolbelt-0.8.0-py2.py3-none-any.whl (54kB)
    100% |████████████████████████████████| 54kB 1.6MB/s
Collecting xmltodict>=0.10.2 (from ibmiotf)
  Downloading xmltodict-0.11.0-py2.py3-none-any.whl
Collecting urllib3<1.23.0,>=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% |████████████████████████████████| 56kB 7.7MB/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 1.0MB/s
Collecting certifi>=2017.4.17 (from requests>=2.5.0->ibmiotf)
  Using cached certifi-2017.7.27.1-py2.py3-none-any.whl
Building wheels for collected packages: ibmiotf, dicttoxml, paho-mqtt
  Running setup.py bdist_wheel for ibmiotf ... done
  Stored in directory: /home/pi/.cache/pip/wheels/7ef045bbc3ad057e82fb71ba80e316d65a83d9d735a0d12e0c0418
  Running setup.py bdist_wheel for dicttoxml ... done
  Stored in directory: /home/pi/.cache/pip/wheels/45d62f59/96010b3e6a702ae66a13765401b50def5468024078e1cce
  Running setup.py bdist_wheel for paho-mqtt ... done
  Stored in directory: /home/pi/.cache/pip/wheels/20d80d/acdc8f289011b7be7de71deebebf0642fb83be0313dff0493
Successfully built ibmiotf dicttoxml paho-mqtt
Installing collected packages: dicttoxml, iso8601, paho-mqtt, pytz, urllib3, idna, chardet, certifi, requests, requests-toolbelt, xmltodict, 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-toolbelt-0.8.0 urllib3-1.22 xmltod
oct-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:

```

File Edit Shell Debug Options Window Help
Python 2.7.13 (default, Jan 19 2017, 14:48:08)
[GCC 6.3.0 20170124] on linux
Type "copyright", "credits" or "license()" for more information.
>>>
=====
RESTART: /home/pi/Downloads/dht11tobluemix.py =====
2017-10-23 07:10:37,768 ibmiotf.device.Client     INFO Connected successfully: d:gegtl4:mydevice:mydevice
SensorData Invalid
Published Temperature = 28 C Humidity = 50 % to IBM Watson
SensorData Invalid
Published Temperature = 28 C Humidity = 50 % to IBM Watson
SensorData Invalid
Published Temperature = 28 C Humidity = 50 % to IBM Watson
Published Temperature = 29 C Humidity = 50 % to IBM Watson
Published Temperature = 29 C Humidity = 50 % to IBM Watson
|
```

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 data is being received.

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.

<input type="checkbox"/>	Device ID	Status	Device Type	Class ID	Date Added	Descriptive Location
> <input type="checkbox"/>	12345	Disconnected	Nagarajan	Device	Oct 31, 2022 11:38 AM	

Items per page: 50 | 1–1 of 1 item

1 Simulation running

Activate Windows
Go to Settings to activate Windows.

Type here to search

Cloudy 26°C 31-10-2022 2025 ENG

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

The screenshot shows the Watson Device Platform interface. On the left is a sidebar with various icons. The main area has a header with tabs: 'Browse' (selected), 'Action', 'Device Types', and 'Interfaces'. A blue button 'Add Device +' is in the top right. Below the header is a table with columns: 'Device ID' (12345), 'Status' (Disconnected), 'Device Type' (Nagarajan), 'Class ID' (Device), 'Date Added' (Oct 31, 2022 11:38 AM), and 'Descriptive Location'. Underneath the table is a sub-menu with tabs: 'Identity' (selected), 'Device Information', 'Recent Events', 'State', and 'Logs'. A message says 'The recent events listed show the live stream of data that is coming and going from this device.' Below this is a table with columns: 'Event', 'Value', 'Format', and 'Last Received'. The table lists five rows of event data. At the bottom right, there's a message 'Activate Windows Go to Settings to activate Windows.' and a note '1 Simulation running'.

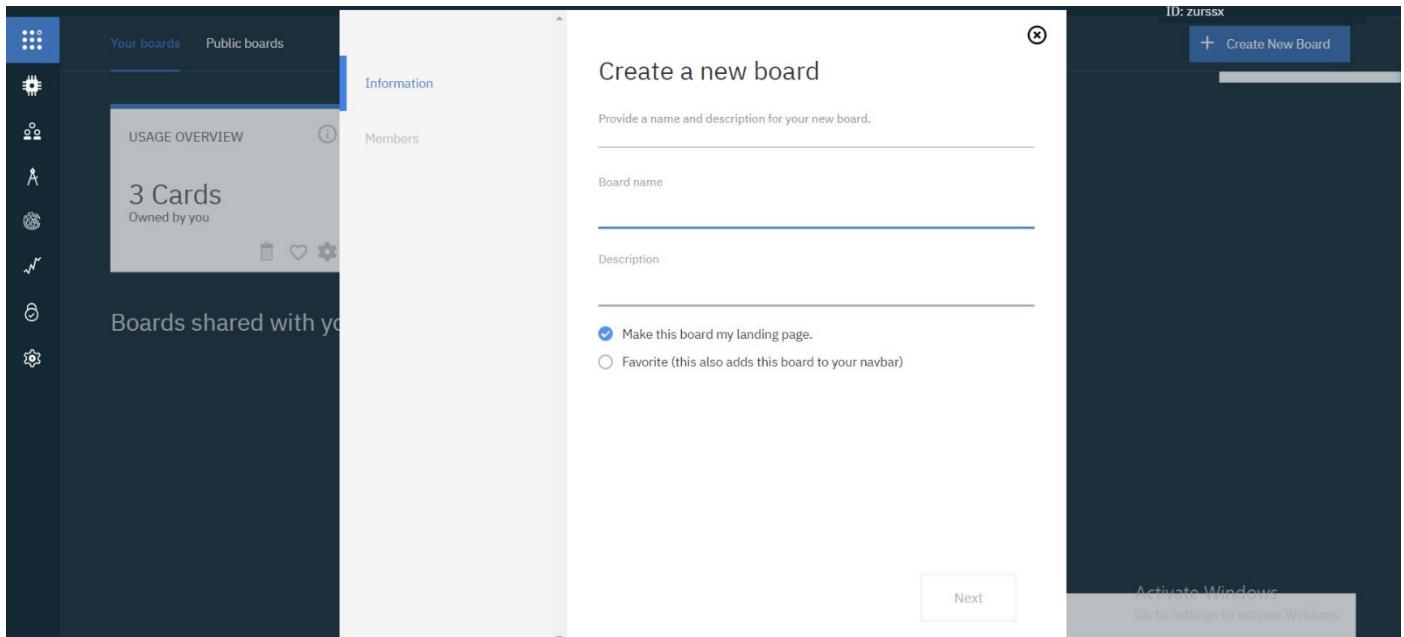
Step-4: Creating boards and cards for visualization of data:

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

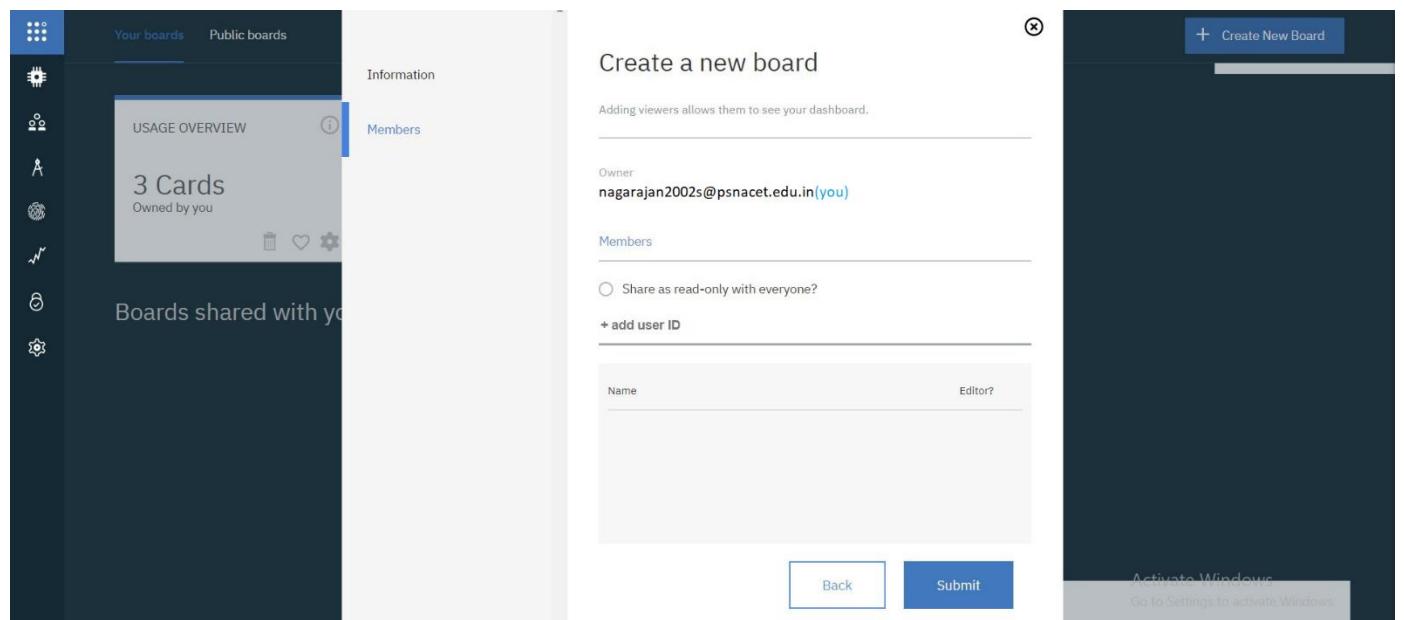
The screenshot shows the Watson Boards interface. On the left is a sidebar with various icons. The main area has tabs 'Your boards' (selected) and 'Public boards'. A blue button '+ Create New Board' is in the top right. Below the tabs are two cards: 'USAGE OVERVIEW' (3 Cards, Owned by you) and 'RISK AND SECURITY OVERVIEW' (4 Cards, Owned by you). To the right is a large dashed box with a plus sign, indicating where new boards can be created. At the bottom right, there's a message 'Activate Windows Go to Settings to activate Windows.' and a note '1 Simulation running'.

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

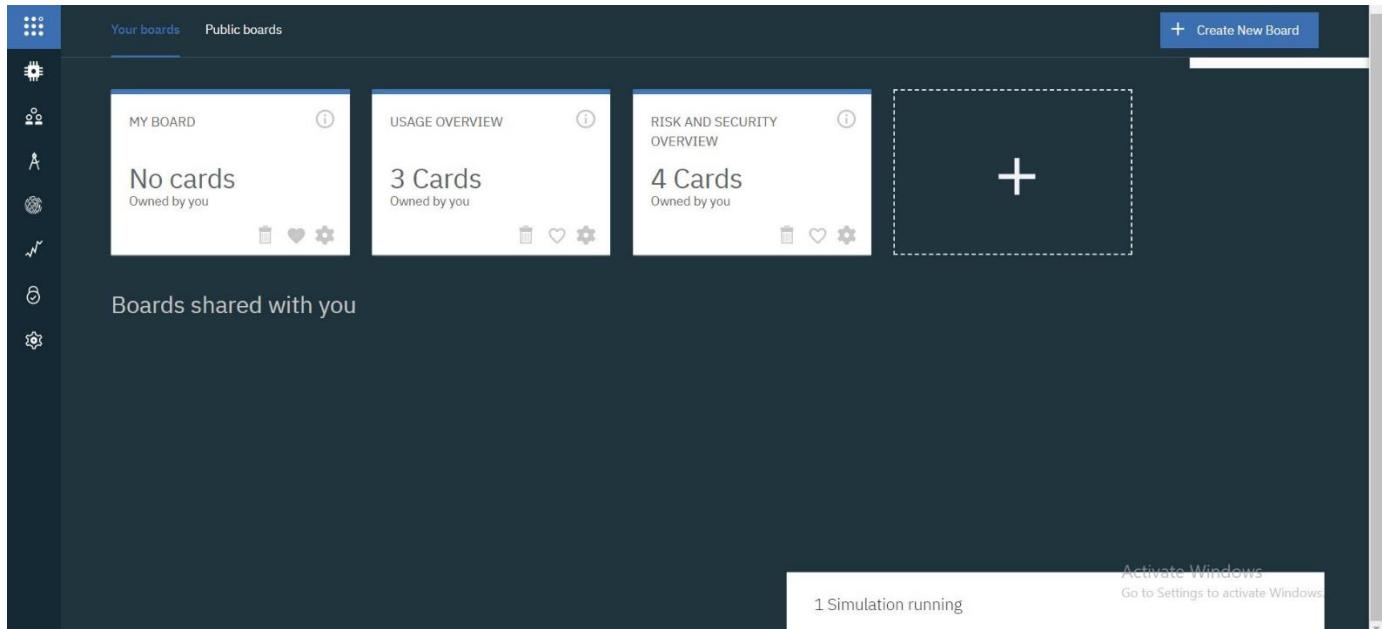
The given below window appears give a name and description to your board as shown in the window below.



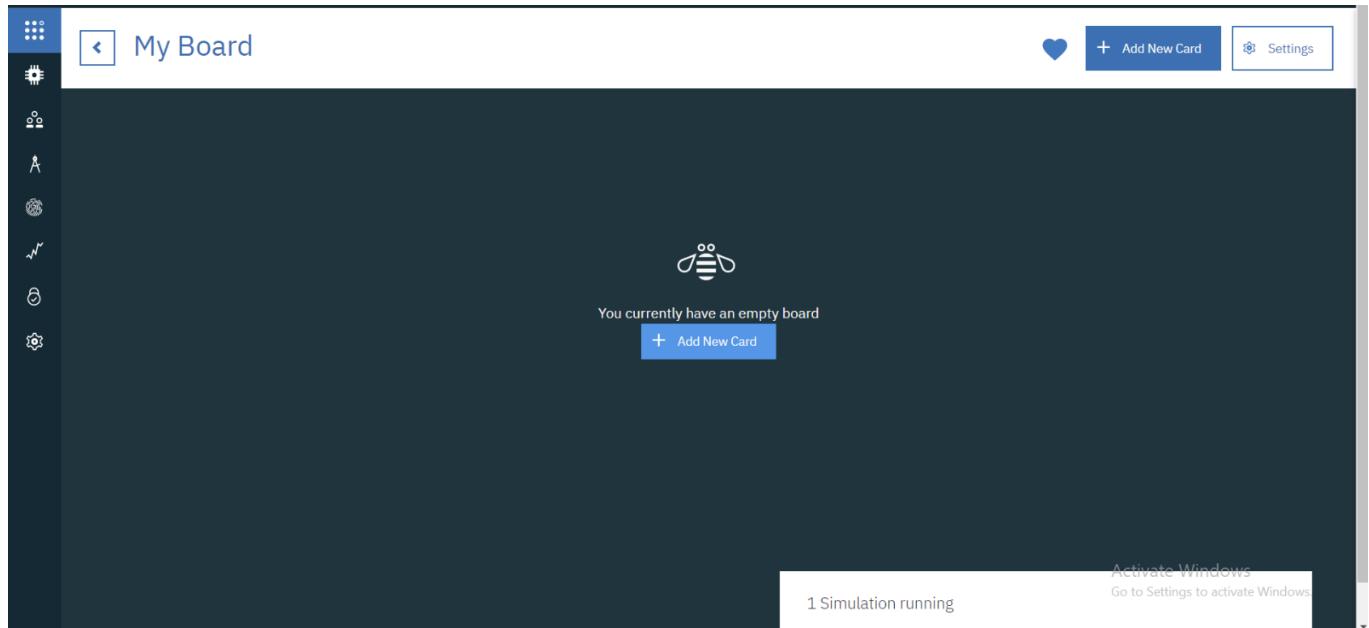
- Then click on Next you get the below window then again click on Submit



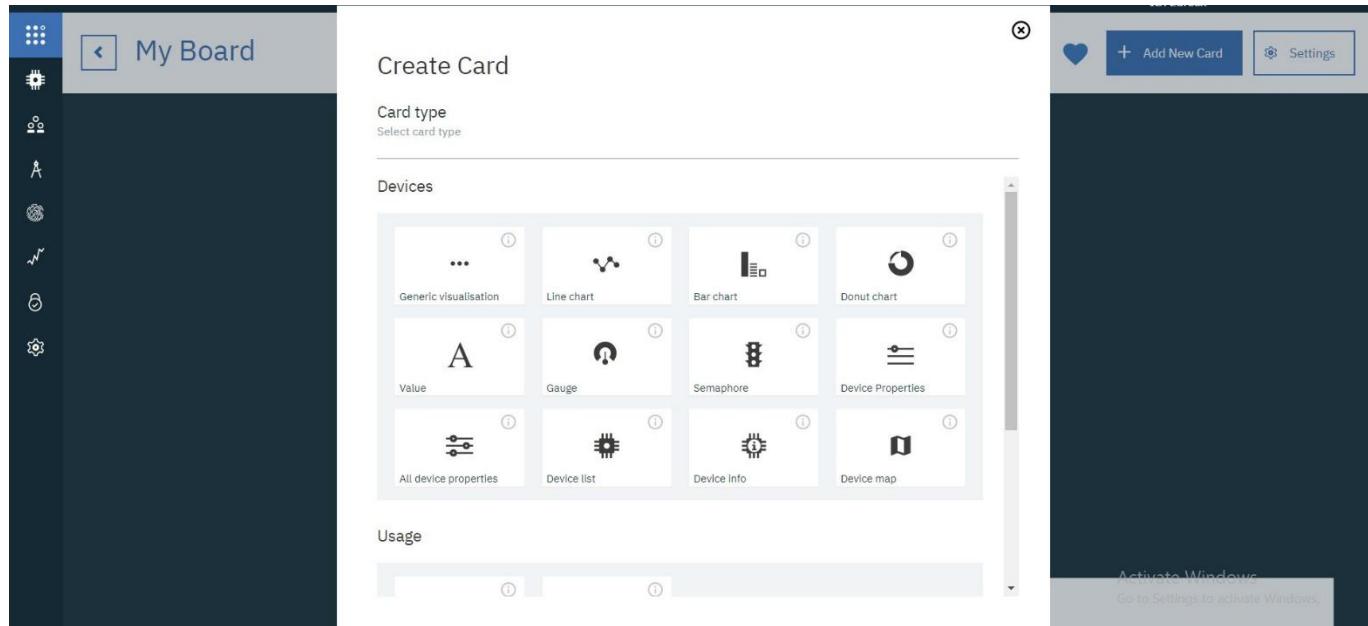
- Then double click on your boards name which you have created.



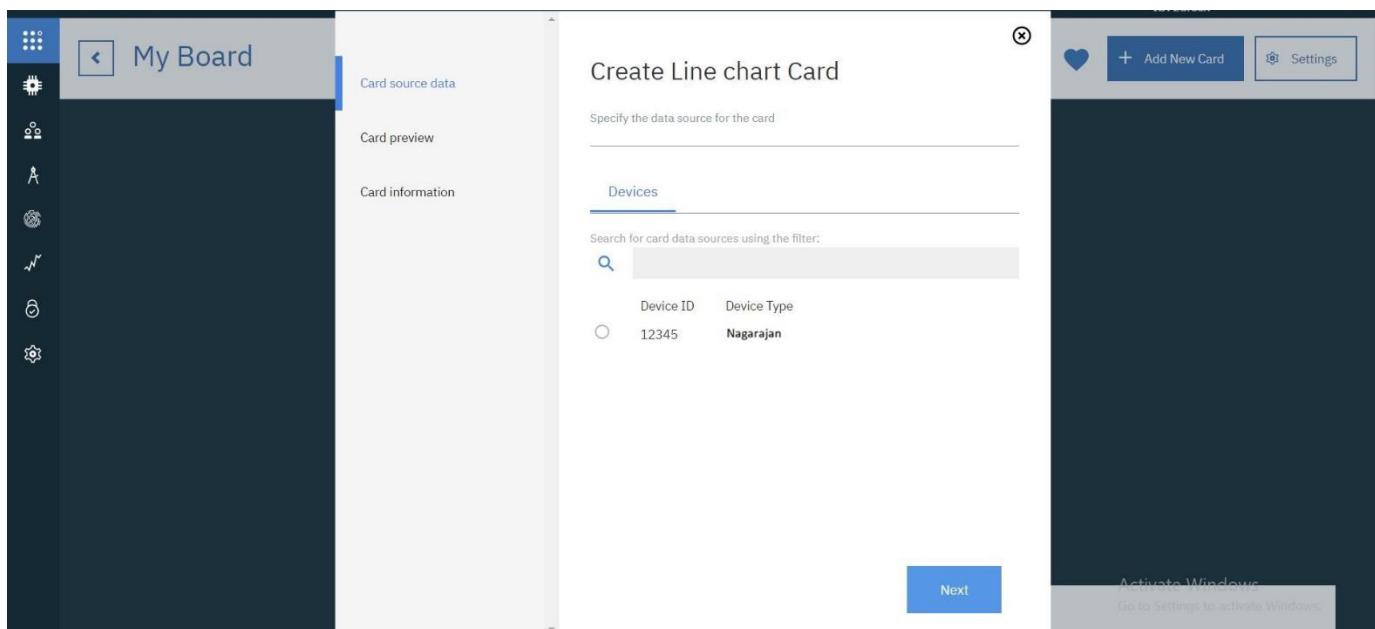
- Click on Add New Card



- 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

Card source data
12345

Card preview

Card information

Create Line chart Card

Connect data set

Temperature

Event
event_1

Property
Temperature

Name
Temperature

Type
Number

Unit
Max
100

Back Next

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

Card source data
12345

Card preview

Card information

Create Line chart Card

Enter title and description of the card

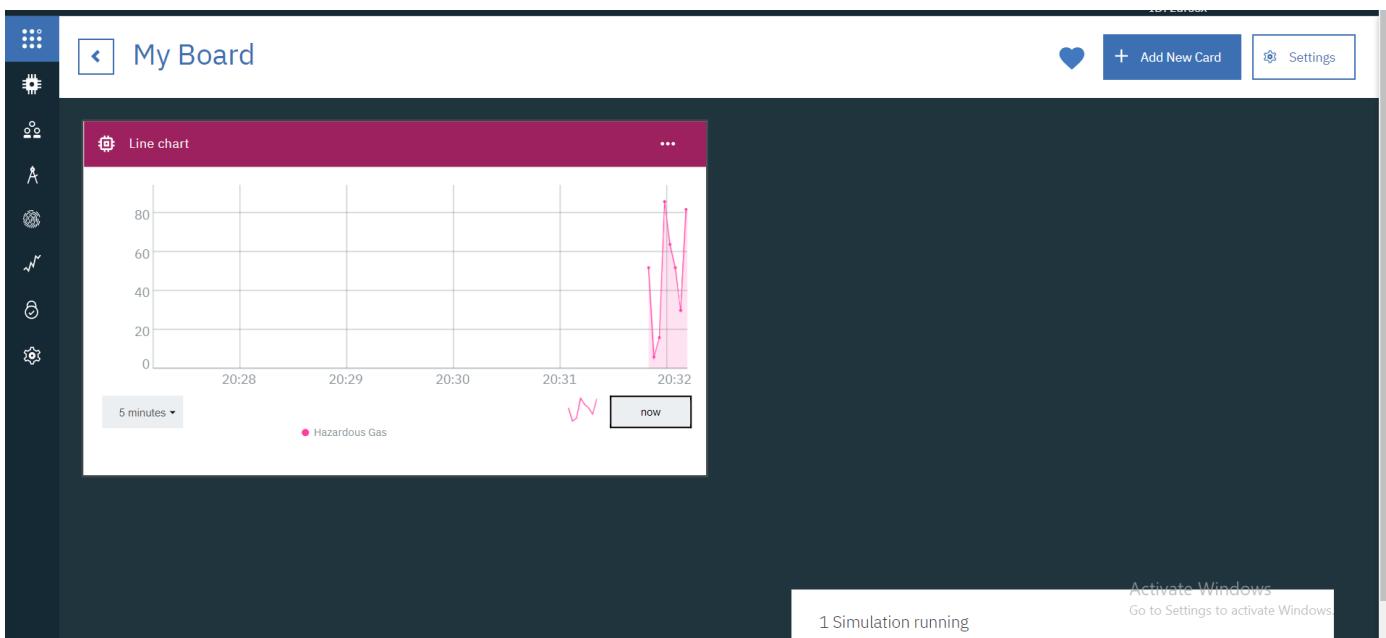
Title
Line chart

Color scheme

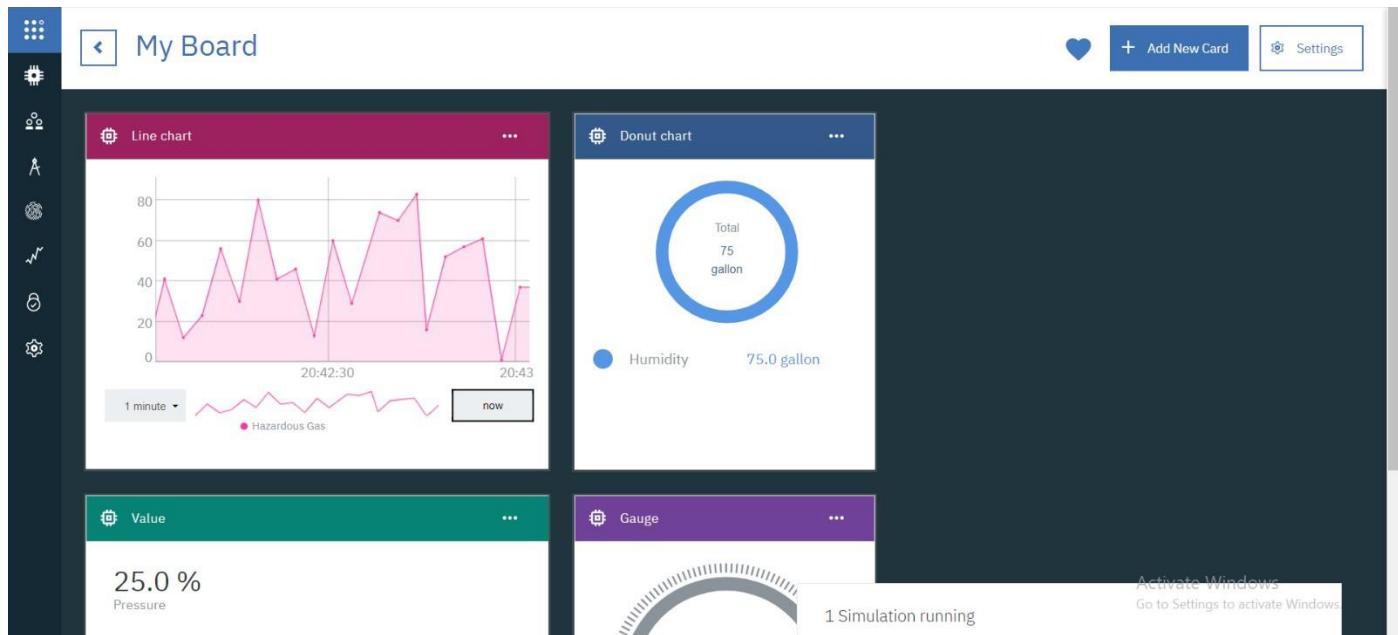
A line chart to display time series information with historic and live data

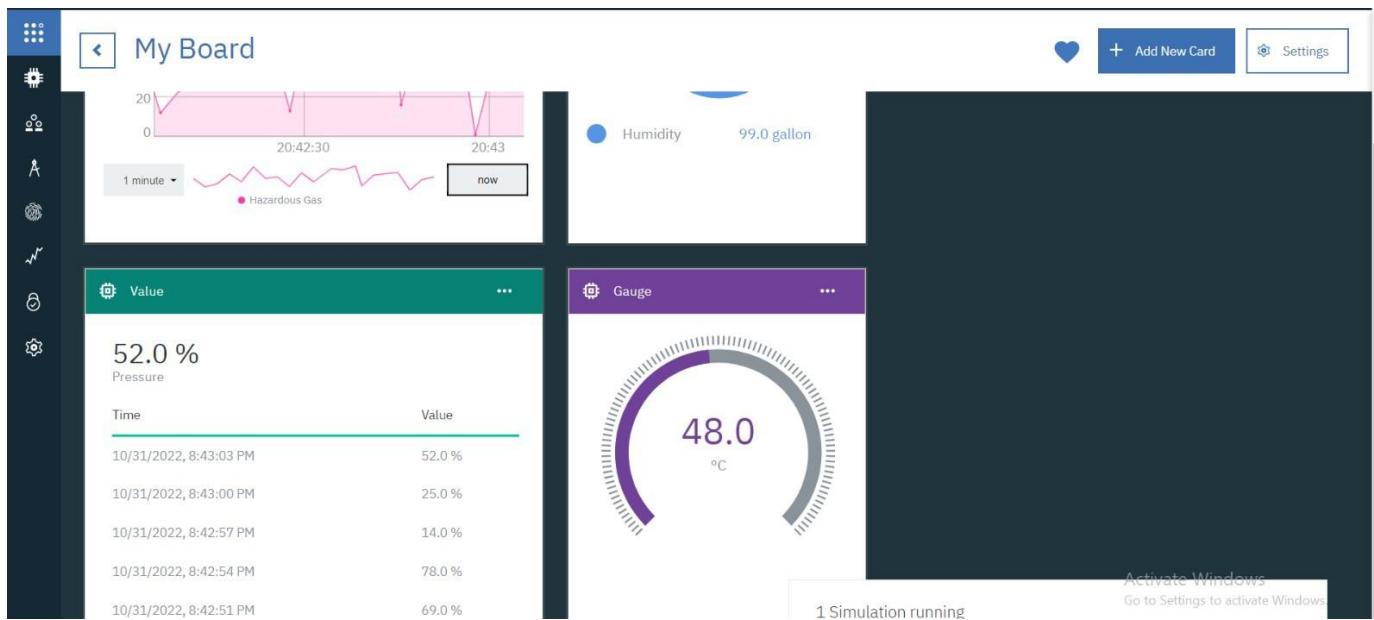
Back Submit

- 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.