

SENDING DATA FROM RASPBERRY-PI TO IBM WATSON

Date	12 NOVEMBER 2022
Team ID	PNT2022TMID18315
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

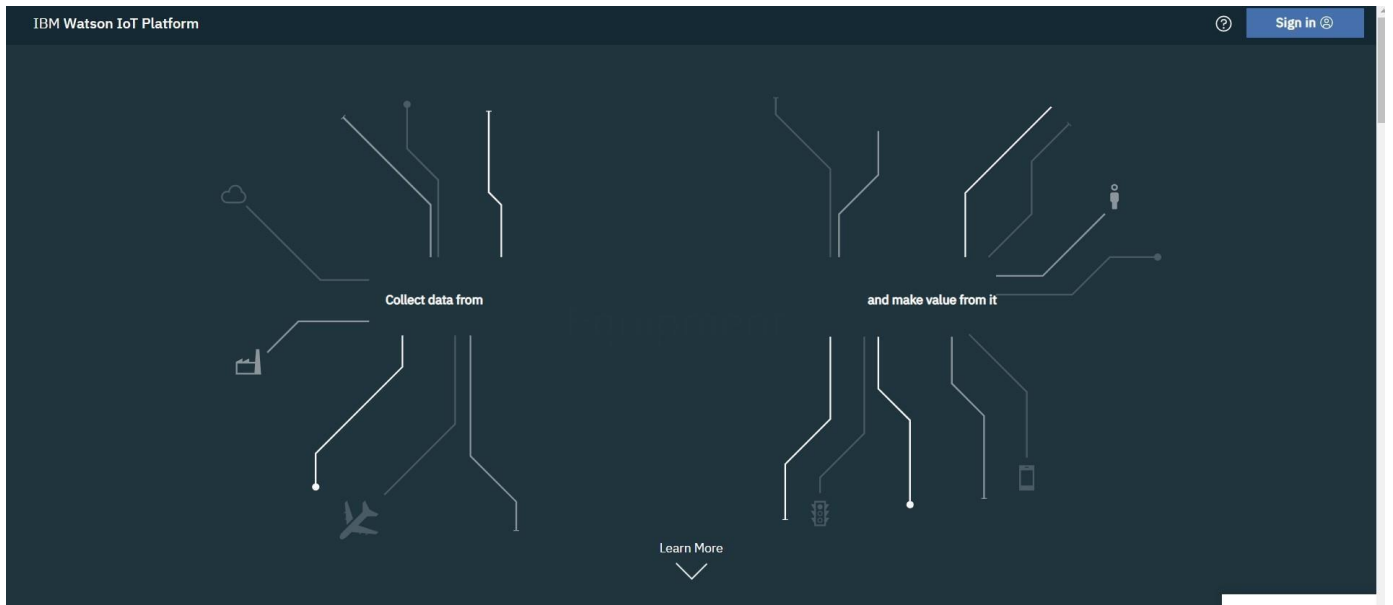
SOFTWARE:

- 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.



IBM

Log in to IBM

IBMid

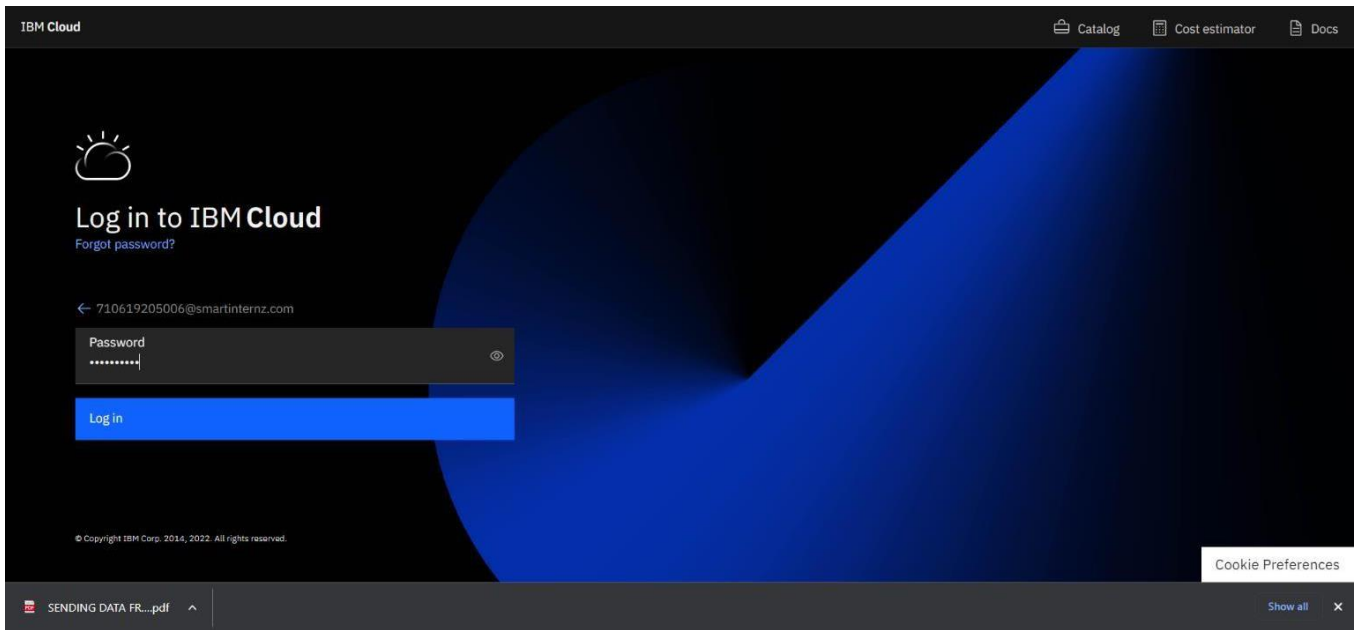
[Forgot IBMid?](#)

☒ Remember me ⓘ

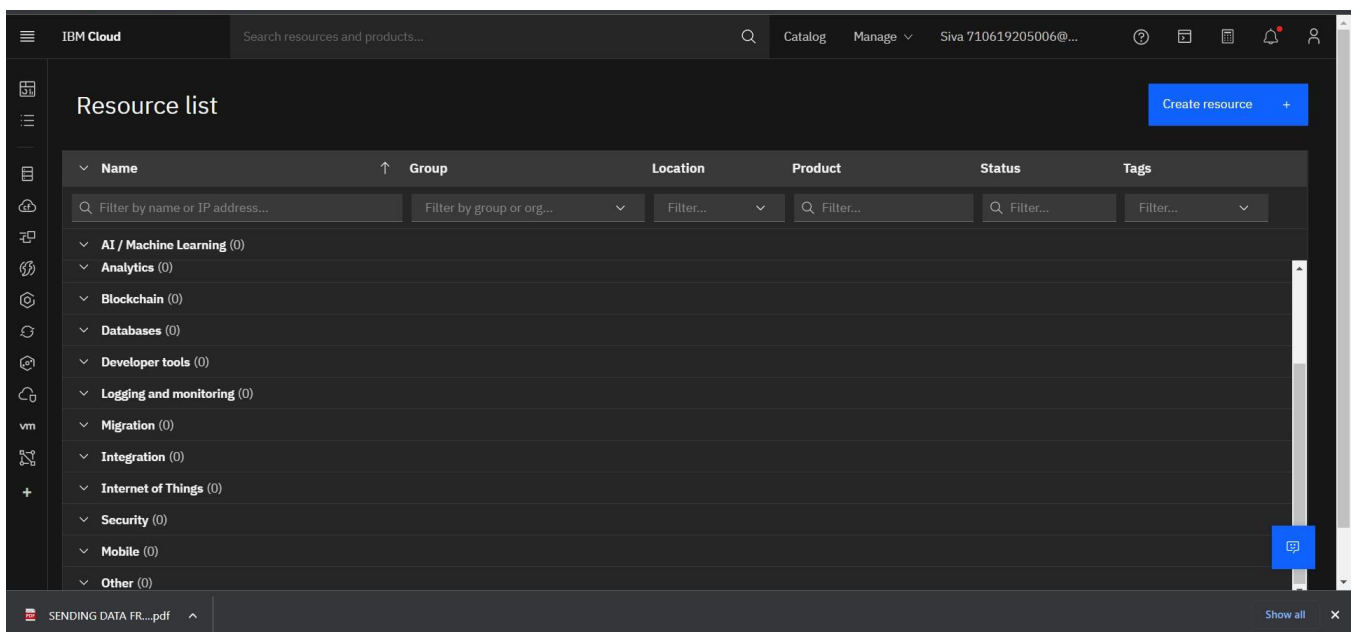
Continue →

Don't have an account? [Create an IBMid](#)

Need help? [Contact the IBMid help desk](#)



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



hj

- Check all details and click on create.

The screenshot shows the 'Internet of Things Platform' creation interface. On the left, a sidebar lists service details: Type (Service), Provider (IBM), Last updated (08/15/2022), Category (Internet of Things), Compliance (IAM-enabled), and Location (Frankfurt). The main area has two tabs: 'Create' (active) and 'About'. Under 'Create', there are sections for 'Select a location' (Frankfurt (eu-de)) and 'Select a pricing plan'. A table lists the 'Lite' plan, which includes up to 500 registered devices and 200 MB of data metric, at a price of 'Free'. On the right, a 'Summary' panel shows the service name, location, plan, and a 'Create' button. Below the summary, there is a checkbox for license agreements and an 'Add to estimate' button.

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
Frankfurt

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-0g
Resource group: Default

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

Create

Add to estimate

- click on Launch

The screenshot shows the 'Internet of Things Platform-0g' dashboard. The top bar includes 'Resource list /', the resource name, status (Active), and an 'Add tags' link. A 'Details' button and an 'Actions...' dropdown are on the right. The left sidebar has 'Manage' (selected), 'Plan', and 'Connections'. The main area features a large IoT icon, a 'Let's get started with IBM Watson IoT Platform' section with a 'Launch' button, and a 'Ready for the next level?' section with a progress bar showing 'Lite' as the current stage and 'Non-Production' as the next.

Resource list /

Internet of Things Platform-0g

Active Add tags

Details Actions...

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

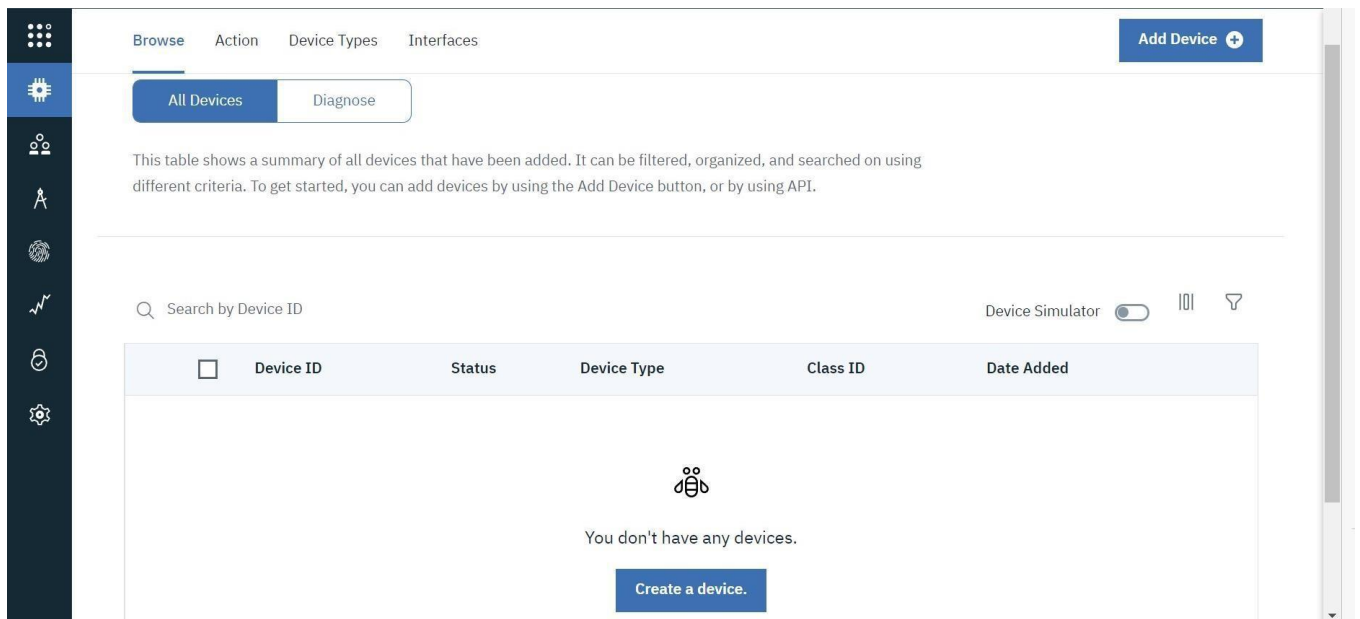
Ready for the next level?

IBM Watson IoT Platform Journey

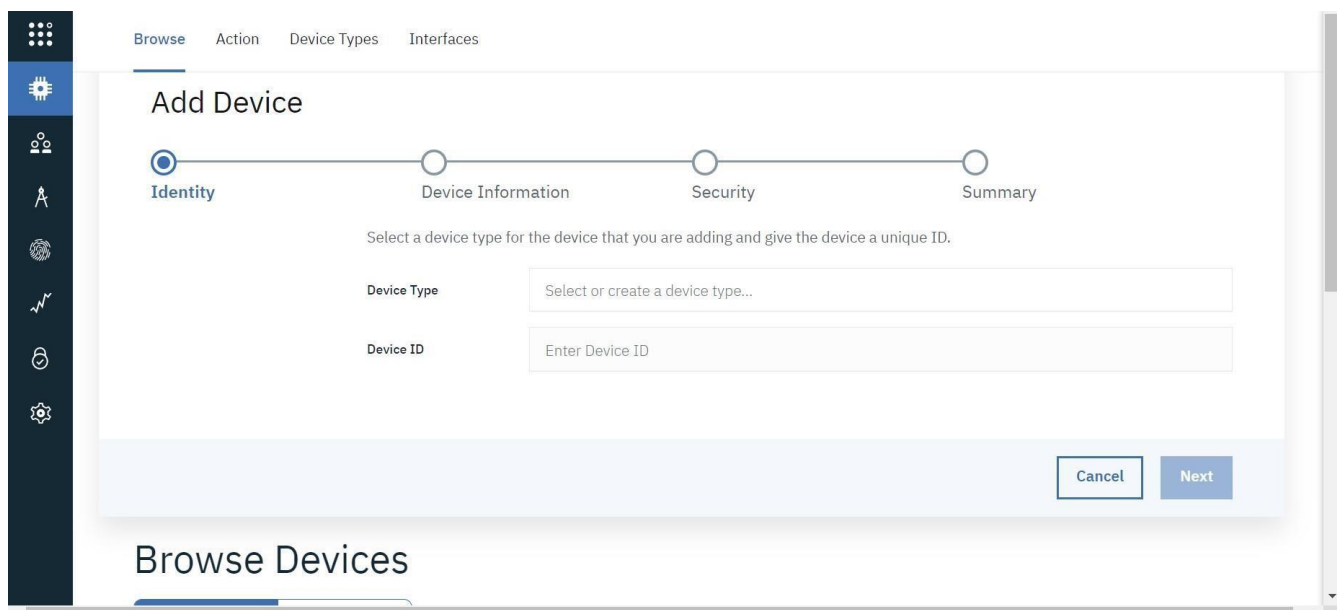
Lite Non-Production

Dashboard of IBM Watson IoT platform,

- Click on Add device



- After click on Add device this page will open



- Go to device type and fill the details.

Register Device.


BrowseActionDevice TypesInterfaces

Optional

Register Devices, Define Interfaces

Now that you added a device type, you can register and connect devices for this type.

Register Devices



Cancel

Next

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

BrowseActionDevice TypesInterfaces

Add Device

Identity

Device Information

Security

Summary

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

Device Type

Nagarajan

Device ID

12345

Cancel

Next

Browse Devices

All Devices

Diaenose

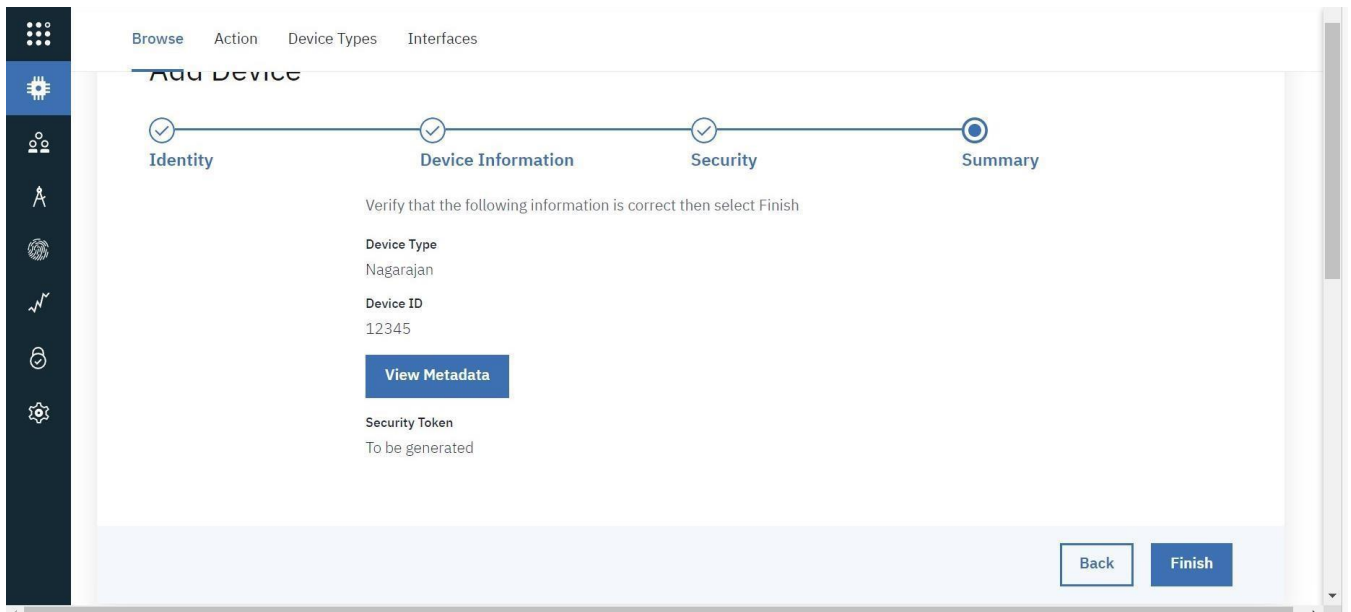
Click on Next

The screenshot shows the 'Add Device' form in the 'Device Information' step. The form has a sidebar with icons for various functions. The main content area has a progress bar with four steps: Identity, Device Information (current), Security, and Summary. Below the progress bar, there is a text box stating: 'You can modify the default device information and enter more information about the device for identification purposes.' The form contains several input fields: 'Serial Number' (with placeholder 'Enter Serial Number'), 'Model' (with placeholder 'Enter Model'), 'Description' (with placeholder 'Enter Description'), 'Hardware Version' (with placeholder 'Enter Hardware Version'), 'Manufacturer' (with placeholder 'Enter Manufacturer'), 'Device Class' (with placeholder 'Enter Device Class'), 'Firmware Version' (with placeholder 'Enter Firmware Version'), and 'Descriptive Location' (with placeholder 'Enter Descriptive Location'). There is also an 'Add Metadata' button with a plus icon.

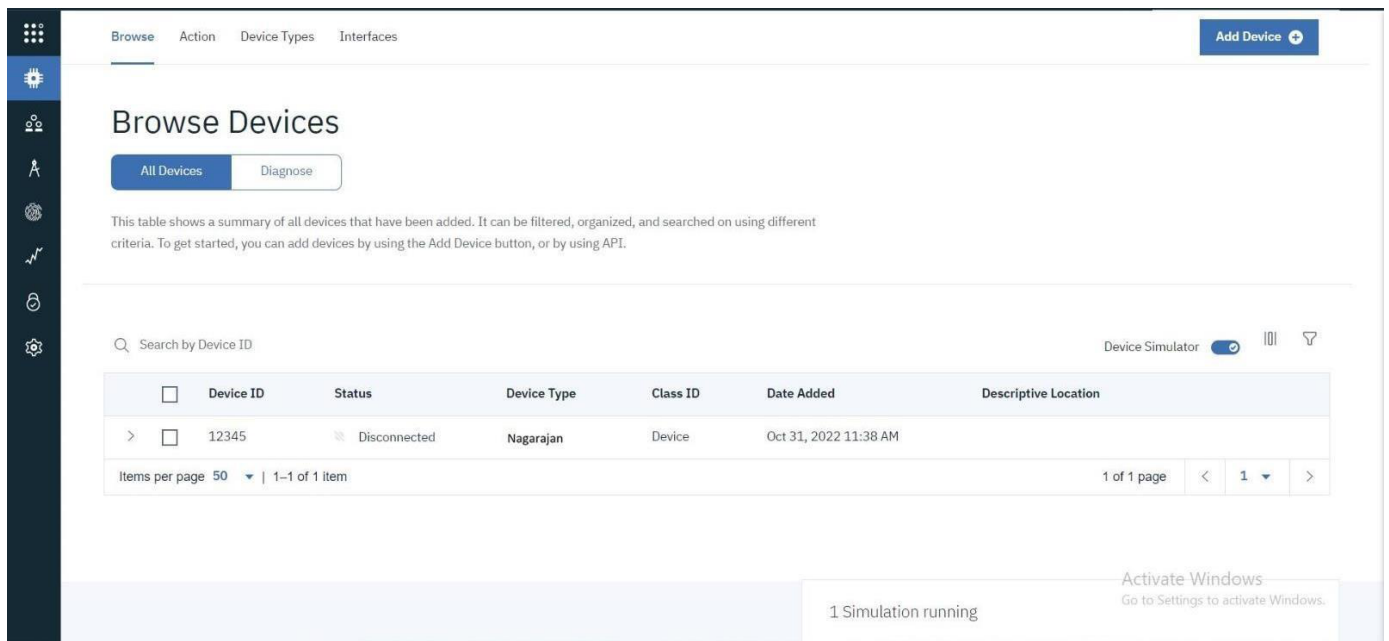
Click on Next

The screenshot shows the 'Add Device' form in the 'Security' step. The form has a sidebar with icons for various functions. The main content area has a progress bar with four steps: Identity, Device Information, Security (current), and Summary. Below the progress bar, there is a text box stating: 'There are two options for selecting a device authentication token.' The form is divided into two columns. The left column is titled 'Auto-generated authentication token (default)' and contains the text: '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.' The right column is titled 'Self-provided authentication token' and contains the text: 'Provide your own authentication token for this device. The token must be between 8 and 36 characters and contain a mix 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.' Below the text boxes, there is an 'Authentication Token' input field with the placeholder 'Enter an optional token' and an information icon. Below the input field, there is a text box stating: 'Make a note of the generated token. Lost authentication tokens cannot be recovered. Tokens are encrypted before being stored.' and a text box stating: 'Authentication token are encrypted before we store them.'

Finish



○ Device is created



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_t1.0-2_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/lib
ssl1.0.0.1.0.1t-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: 807950 (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 06:56:25 (358 KB/s) - 'libssl1.0.0.1.0.1t-1+deb8u6_armhf.deb' saved [
807950/807950]

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 ... 115600 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    157    0 --:--:--  0:00:01 --:--:-- 157
100 609    0 609    0    457    0 --:--:--  0:00:01 --:--:-- 457
100 110k 100 110k    0    2917    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+deb8u1) ...
pi@raspberrypi:~$ service iot status
● iot.service - IBM 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
            └─2562 /opt/iot/iot /dev/null

Oct 23 06:56:24 raspberrypi systemd[1]: Starting LSB: IoT service...
Oct 23 06:56:24 raspberrypi iot[2562]: 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`

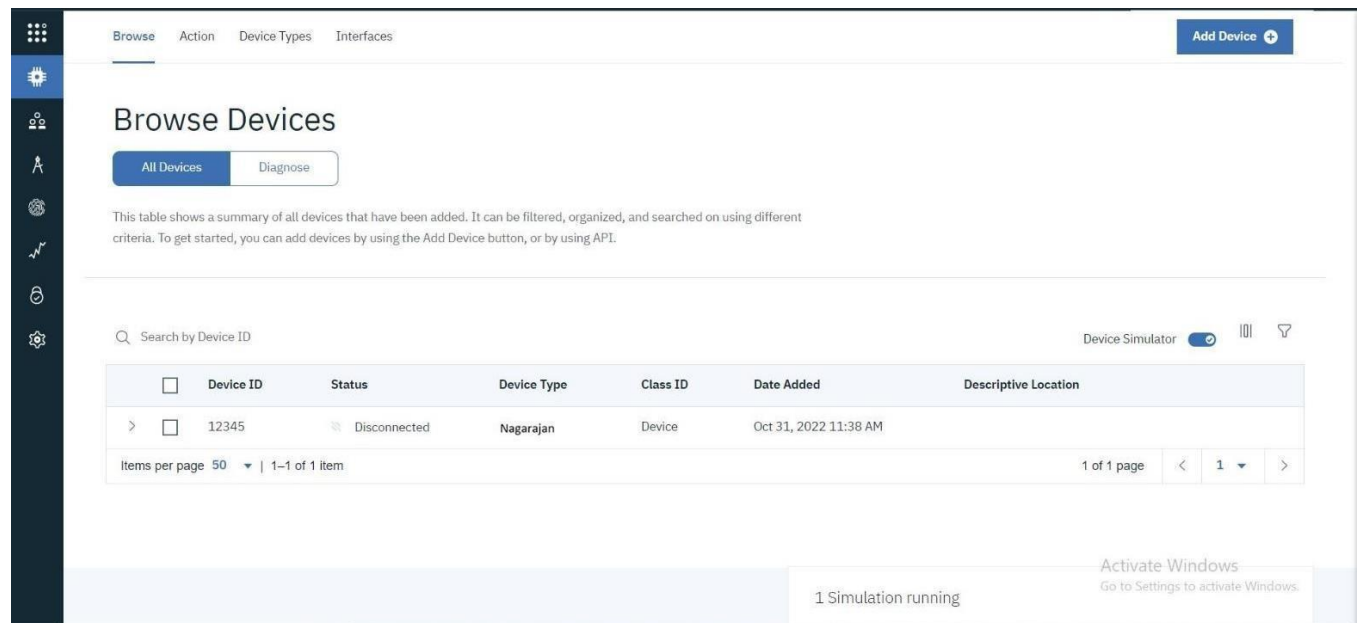
```
File Edit Tabs Help
pi@raspberrypi:~$ pip install ibmiotf
Collecting ibmiotf
  Downloading ibmiotf-0.3.0.tar.gz (58kB)
    100% |#####| 61kB 519kB/s
Collecting dicttoxml==1.7.4 (from ibmiotf)
  Downloading dicttoxml-1.7.4.tar.gz
Collecting iso8601==0.1.10 (from ibmiotf)
  Downloading iso8601-0.1.12-py2.py3-none-any.whl
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==2.9.0 (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 xmltodict==0.10.2 (from ibmiotf)
  Downloading xmltodict-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% |#####| 132kB 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 1.0MB/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/7e/f9/45/bbc33ad957e82f7b71ba80e316d65a83d9d735ad12e0c0418
Running setup.py bdist_wheel for dicttoxml ... done
Stored in directory: /home/pi/.cache/pip/wheels/45/62/59/96918b33ec6a7b2ae6a13765401b59def5468024078e12cce
Running setup.py bdist_wheel for paho-mqtt ... done
Stored in directory: /home/pi/.cache/pip/wheels/20/d8/0d/acdc8f289611b7be7de71deebef0642fb83be9313dfff0493
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-2.18.4 requests-toolbelt-0.8.0 urllib3-1.22 xmltodict-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 linux2
Type "copyright", "credits" or "license()" for more information.
>>>
===== RESTART: /home/pi/Downloads/dht11toibmiot.py =====
2017-10-23 07:10:37,768 ibmiotf.device.Client INFO Connected successfully: d:geg14:mydevice:mydevice
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
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.



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

The screenshot displays the Watson IoT platform interface. At the top, there are tabs for 'Browse', 'Action', 'Device Types', and 'Interfaces'. A sidebar on the left contains various icons for navigation. The main content area shows a device detail view for 'Nagarajan' (Device ID: 12345, Status: Disconnected, Class ID: Device, Date Added: Oct 31, 2022 11:38 AM). Below the device header, there are tabs for 'Identity', 'Device Information', 'Recent Events', 'State', and 'Logs'. The 'Recent Events' tab is selected, showing a table of recent events. The table has columns for 'Event', 'Value', 'Format', and 'Last Received'. The events are listed as 'event_1' with values representing hazardous gas, temperature, and humidity data in JSON format, all received 'a few seconds ago'. At the bottom right, there is a notification '1 Simulation running' and an 'Activate Windows' watermark.

Event	Value	Format	Last Received
event_1	{"Hazardous Gas":61,"Temperature":88,"Humidit...	json	a few seconds ago
event_1	{"Hazardous Gas":20,"Temperature":36,"Humidit...	json	a few seconds ago
event_1	{"Hazardous Gas":79,"Temperature":56,"Humidit...	json	a few seconds ago
event_1	{"Hazardous Gas":52,"Temperature":82,"Humidit...	json	a few seconds ago
event_1	{"Hazardous Gas":26,"Temperature":33,"Humidit...	json	a few seconds ago

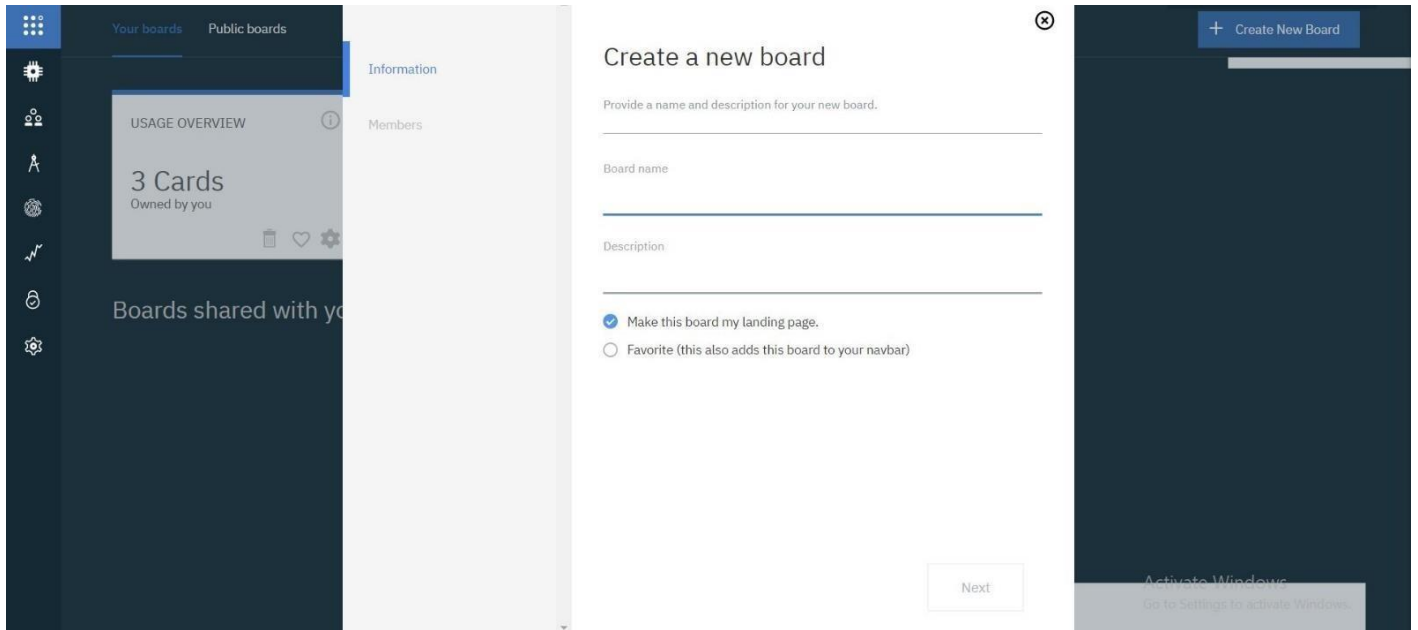
Step-4: Creating boards and cards for visualization of data:

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

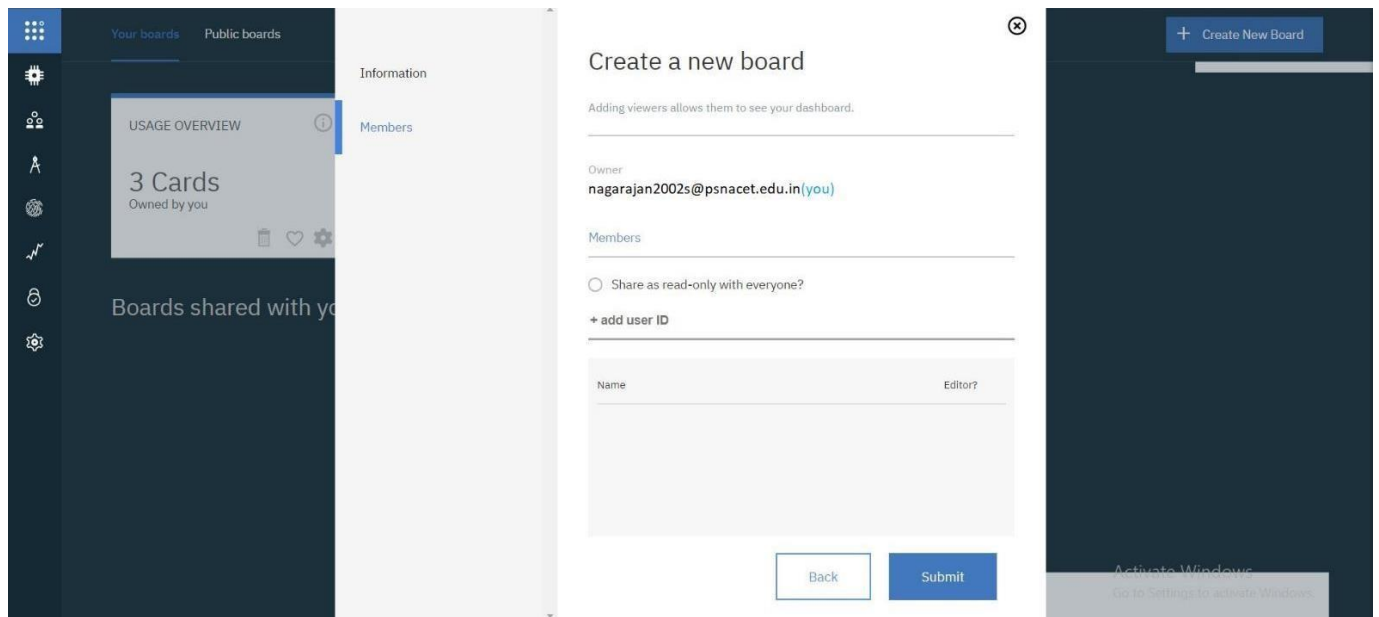
The screenshot displays the 'Your boards' section of the Watson IoT platform. The top navigation bar includes 'Your boards' and 'Public boards' tabs, along with a '+ Create New Board' button. The main content area shows two existing boards: 'USAGE OVERVIEW' (3 Cards, Owned by you) and 'RISK AND SECURITY OVERVIEW' (4 Cards, Owned by you). Each board has a trash icon, a heart icon, and a settings icon. To the right of these boards is a large dashed box with a plus sign, indicating where to click to create a new board. Below the boards, there is a section titled 'Boards shared with you'. At the bottom right, there is a notification '1 Simulation running' and an 'Activate Windows' watermark.

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

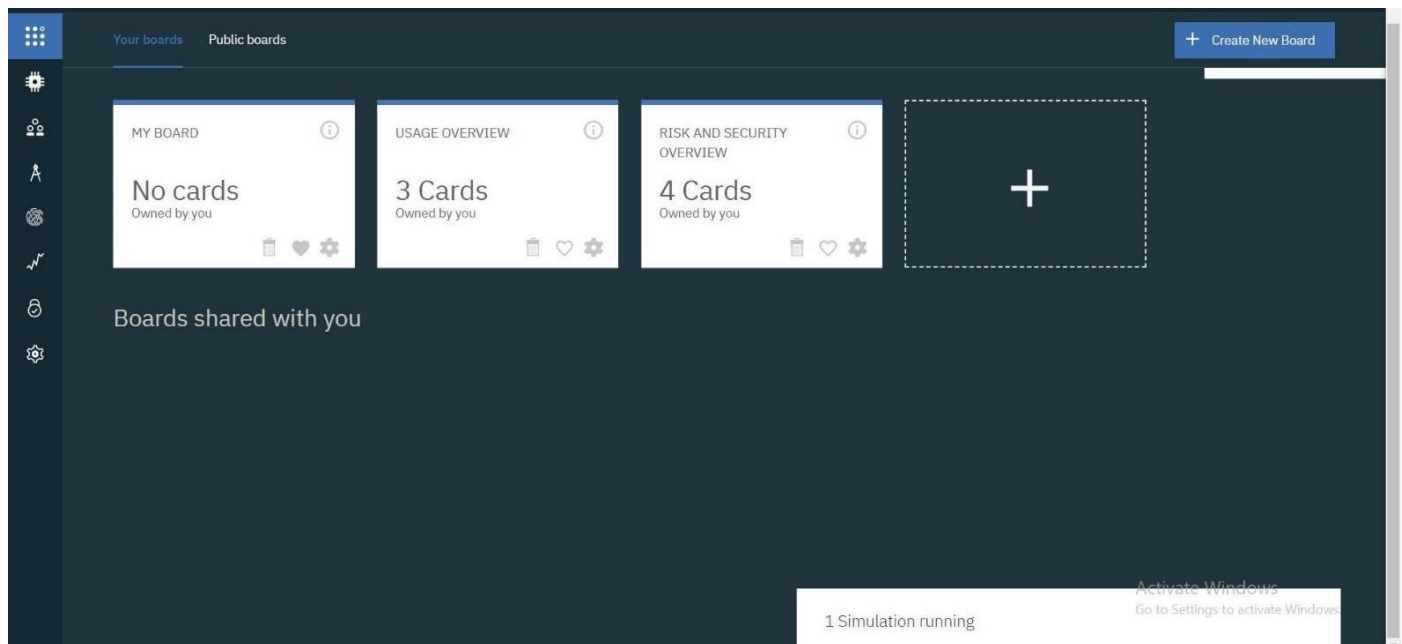
The given below window appears give a name and description to your board as shown in the window below.



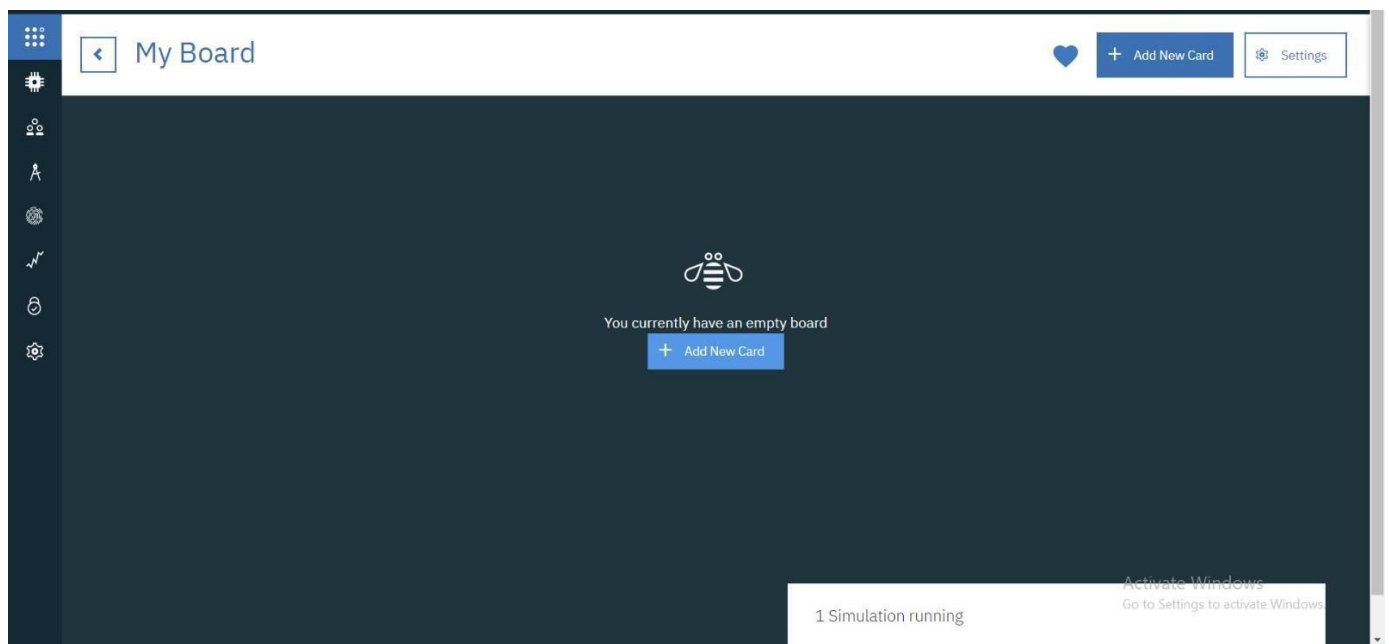
○ Then click on Next you get the below window then again click on Submit



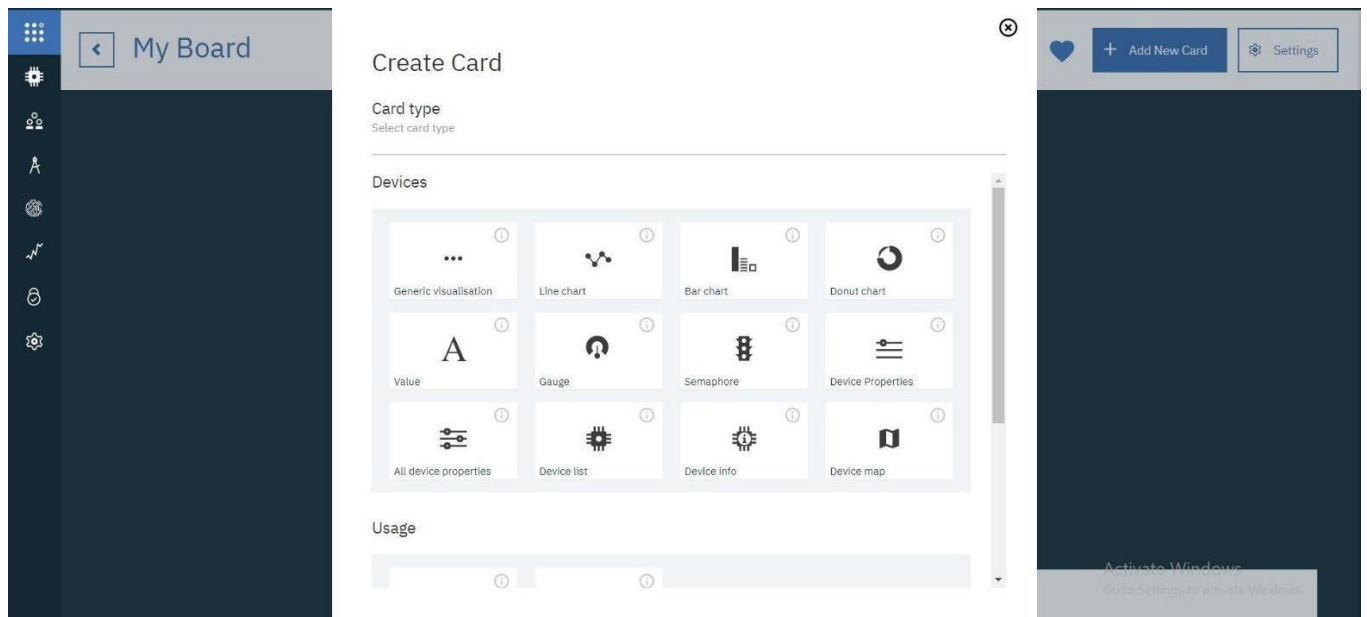
○ Then double click on your boards name which you have created.



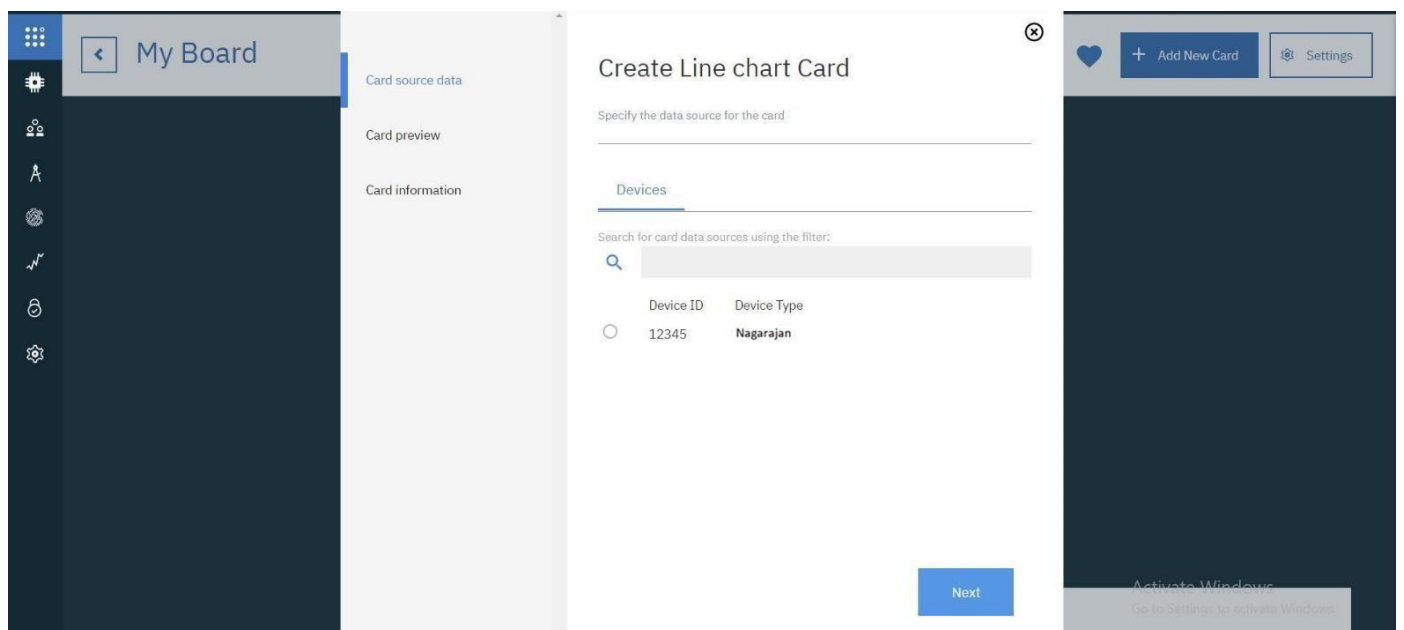
○ Click on Add New Card



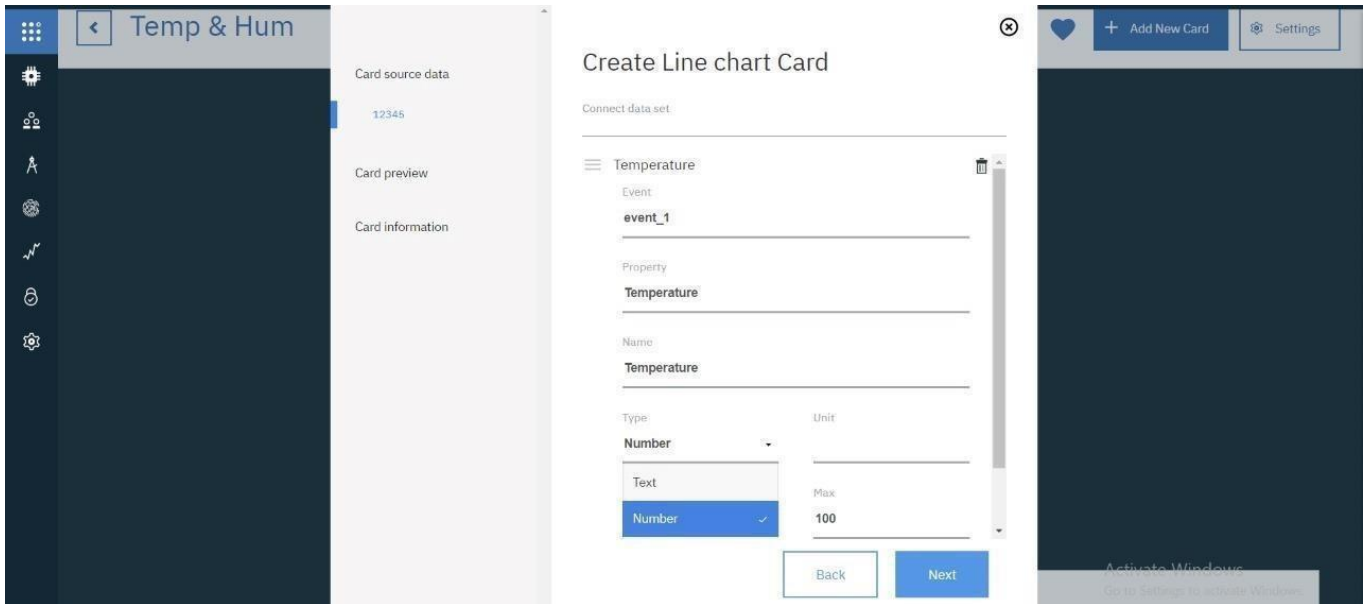
○ Select the type of Graph u want accordingly and click next



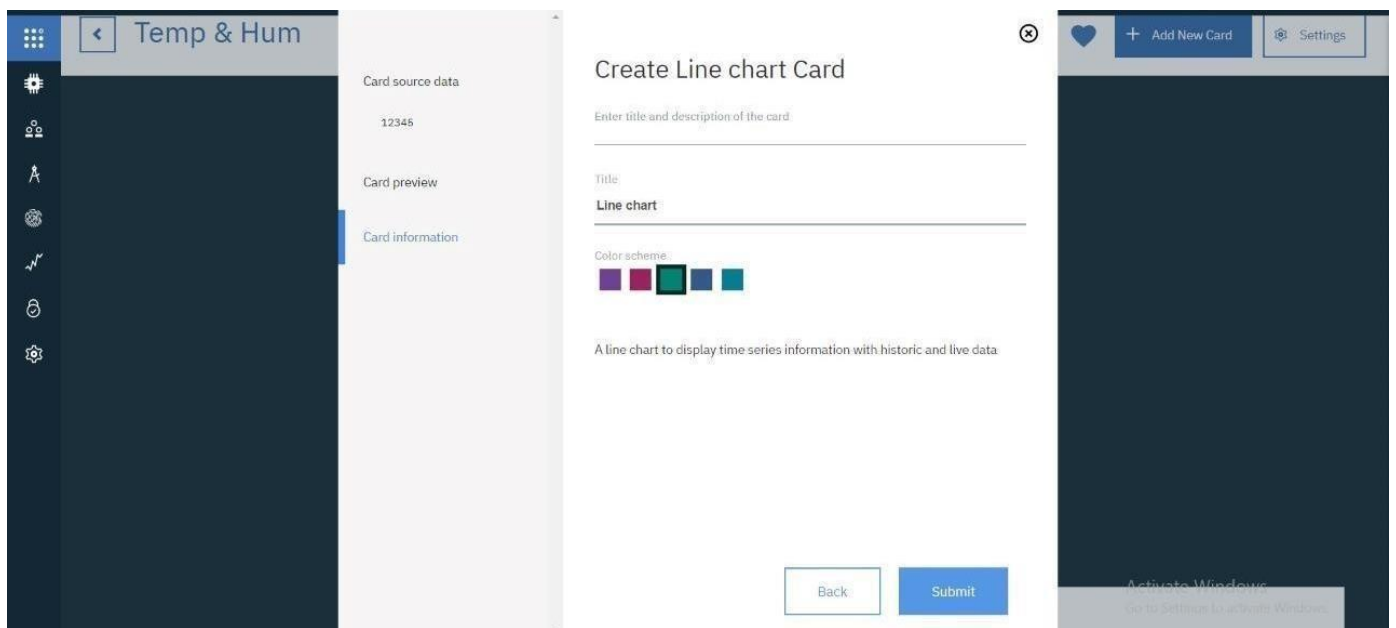
○ You get the below window, choose the Device and click on Next.



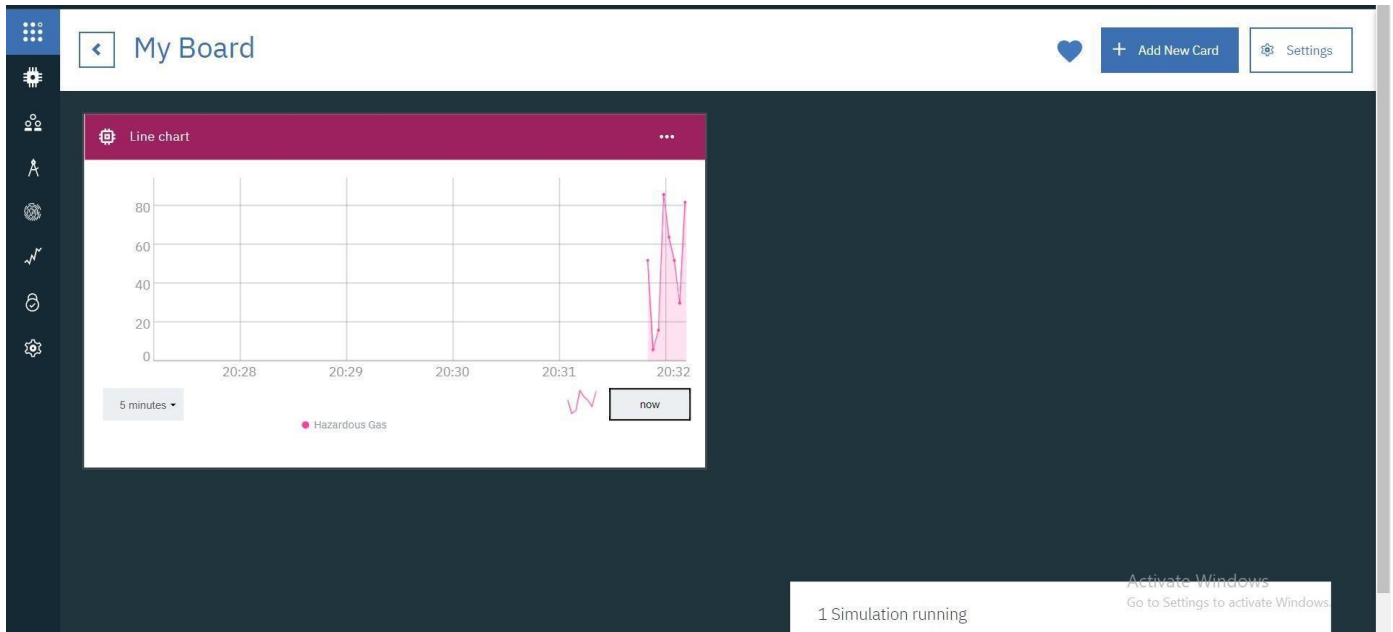
○ Select the event, properly to be visualized on your graph and click next. In my case it is humidity



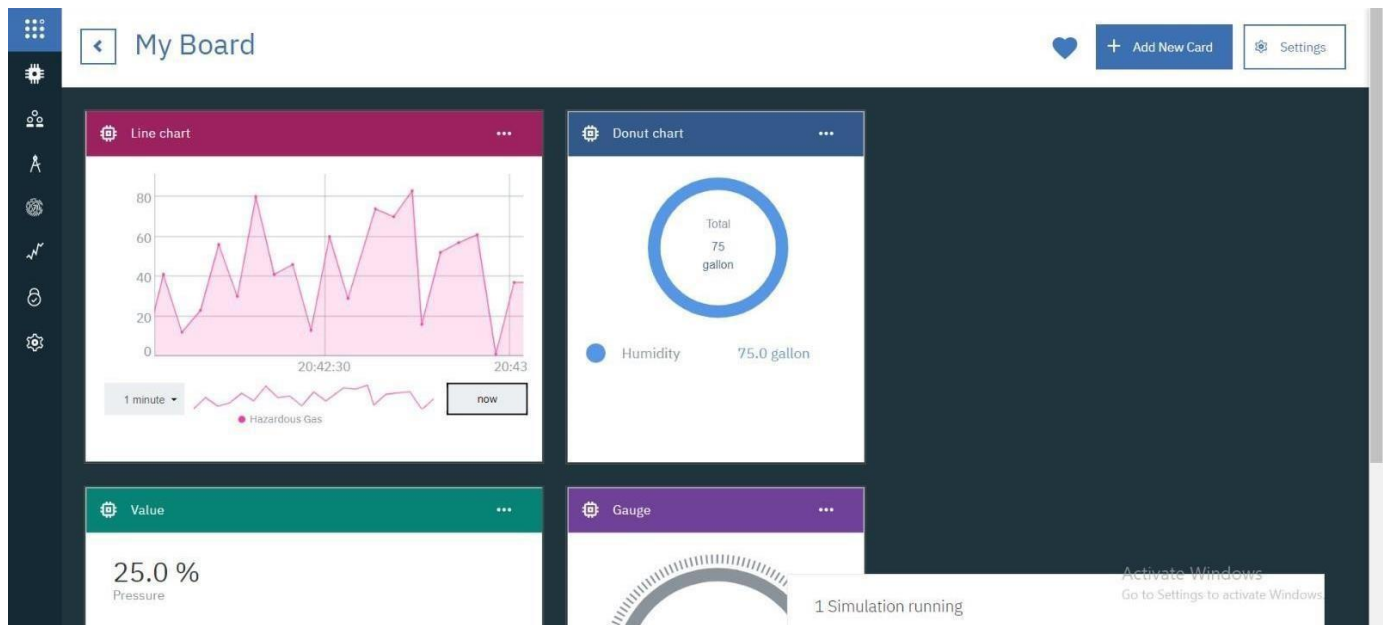
- Then select the size of the graph and color of the graph board you want and click next

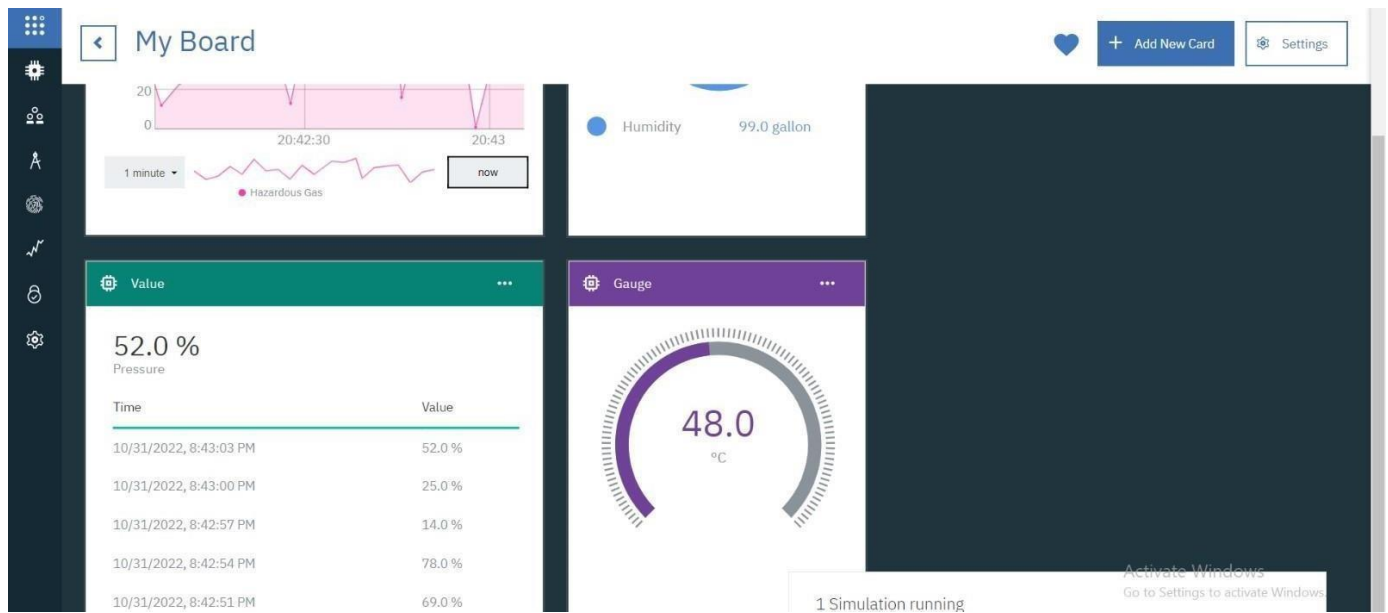


- Here is the graph



○ 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.