

# SENDING DATA FROM RASPBERRY-PI TO IBM WATSON

<b>Date</b>	13 NOVEMBER 2022
<b>Team ID</b>	PNT2022TMID04007
<b>Project Name</b>	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

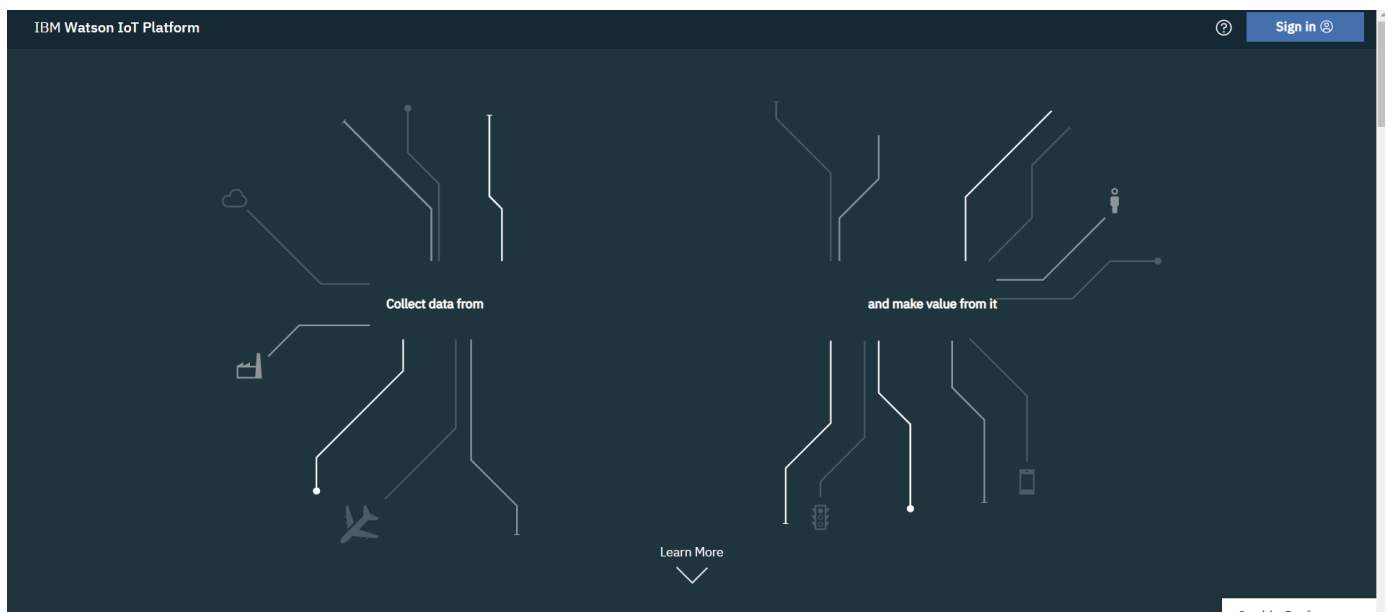
### SOFTWARE:

- 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

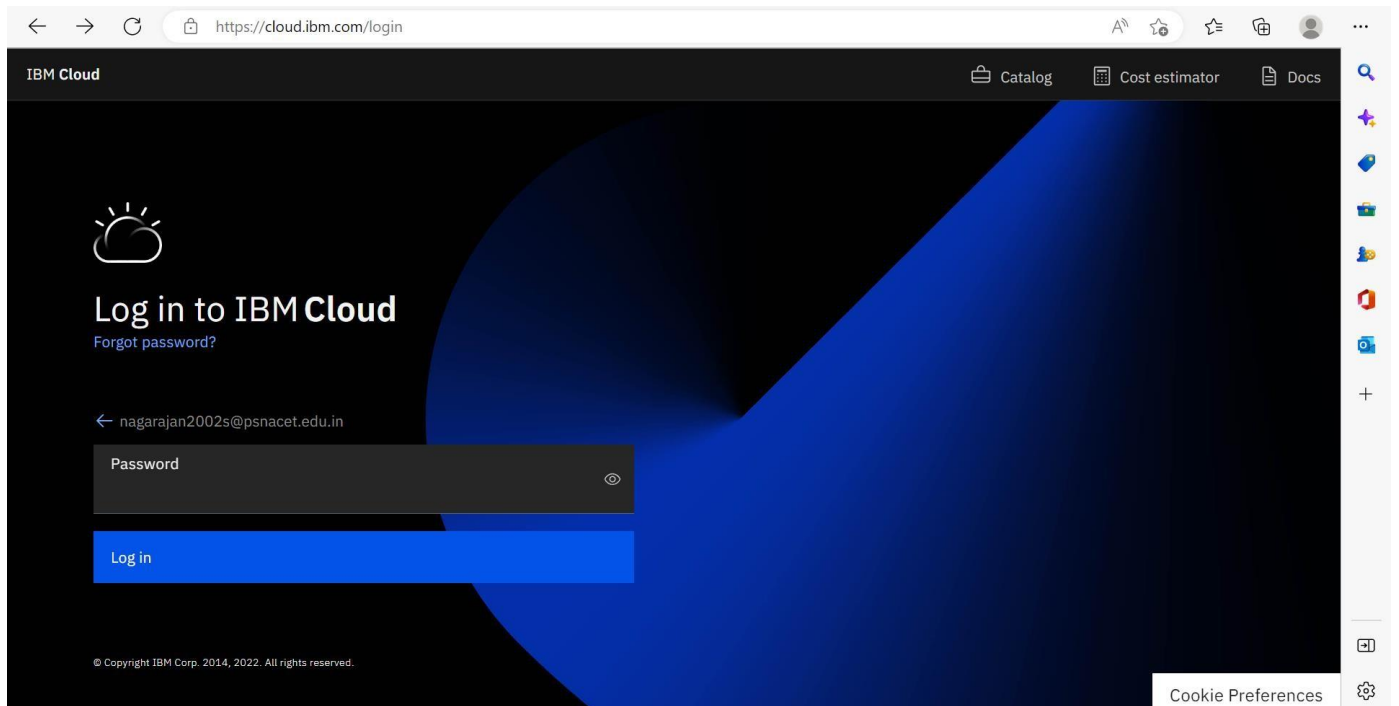
IBMid [Forgot IBMId?](#)

☒ Remember me ⓘ

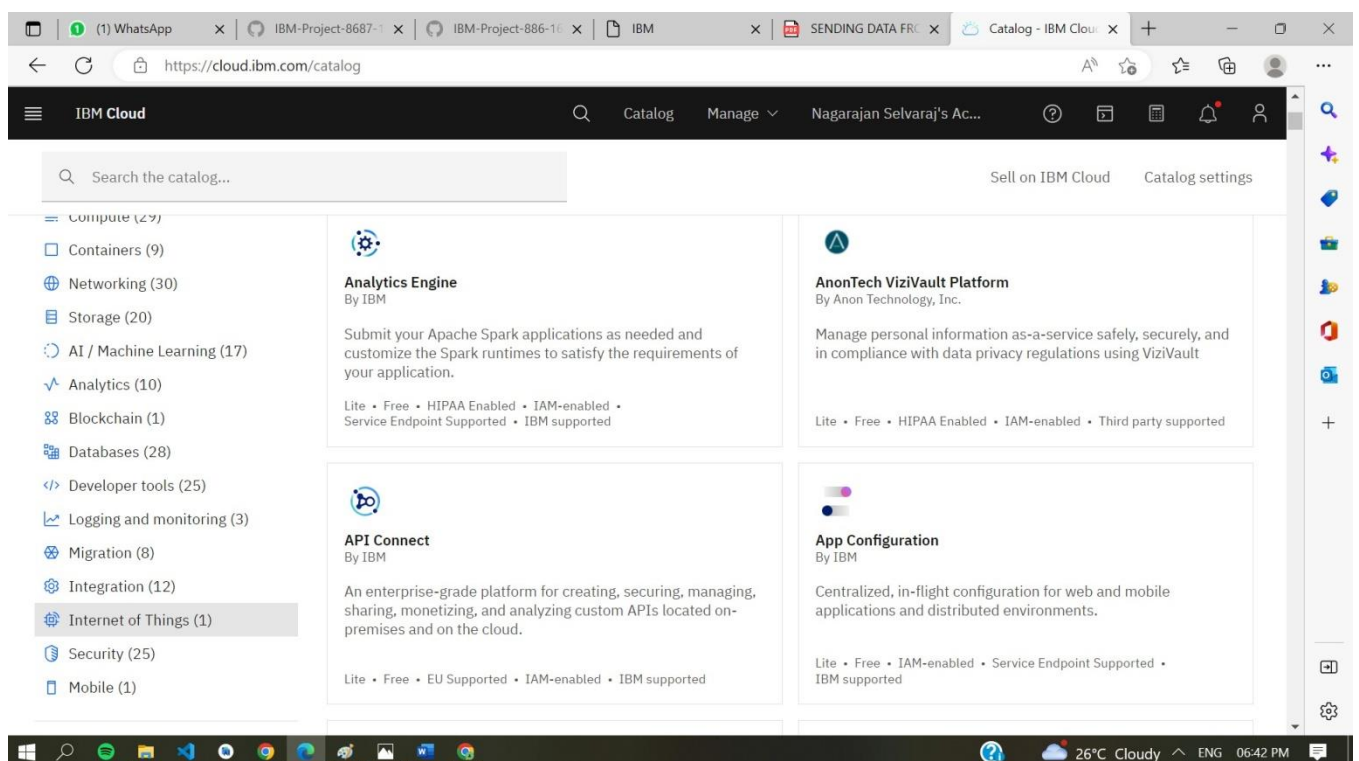
[Continue](#) →

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.



- Check all details and click on create.

The screenshot shows the IBM Cloud 'Internet of Things Platform' creation page. The browser tabs include '(2) WhatsApp', 'IBM-Project-8687-1', 'IBM-Project-886-1', 'IBM', 'SENDING DATA FR...', and 'Internet of Things'. The URL is 'https://cloud.ibm.com/catalog/services/internet-of-things-platform'. The page has a dark header with 'IBM Cloud' and navigation links. The main content area is divided into a left sidebar, a central form, and a right summary panel.

**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 IBM Cloud 'Internet of Things Platform-0g' 'Launch' page. The browser tabs include '(2) WhatsApp', 'IBM-Project-8687-1', 'IBM-Project-886-1', 'IBM', 'SENDING DATA FR...', and 'Service Details - IBM'. The URL is 'https://cloud.ibm.com/services/iotf-service/crn%3Av1%3Abluemix%3Apublic%3Aiotf-service%3Aeu-de%3Aa%2Fa8810efb63084268995a6...'. The page has a dark header with 'IBM Cloud' and navigation links. The main content area is divided into a left sidebar, a central graphic, and a right text area.

**Internet of Things Platform-0g** Active [Add tags](#) [Details](#) [Actions...](#)

**Manage**  
Plan  
Connections

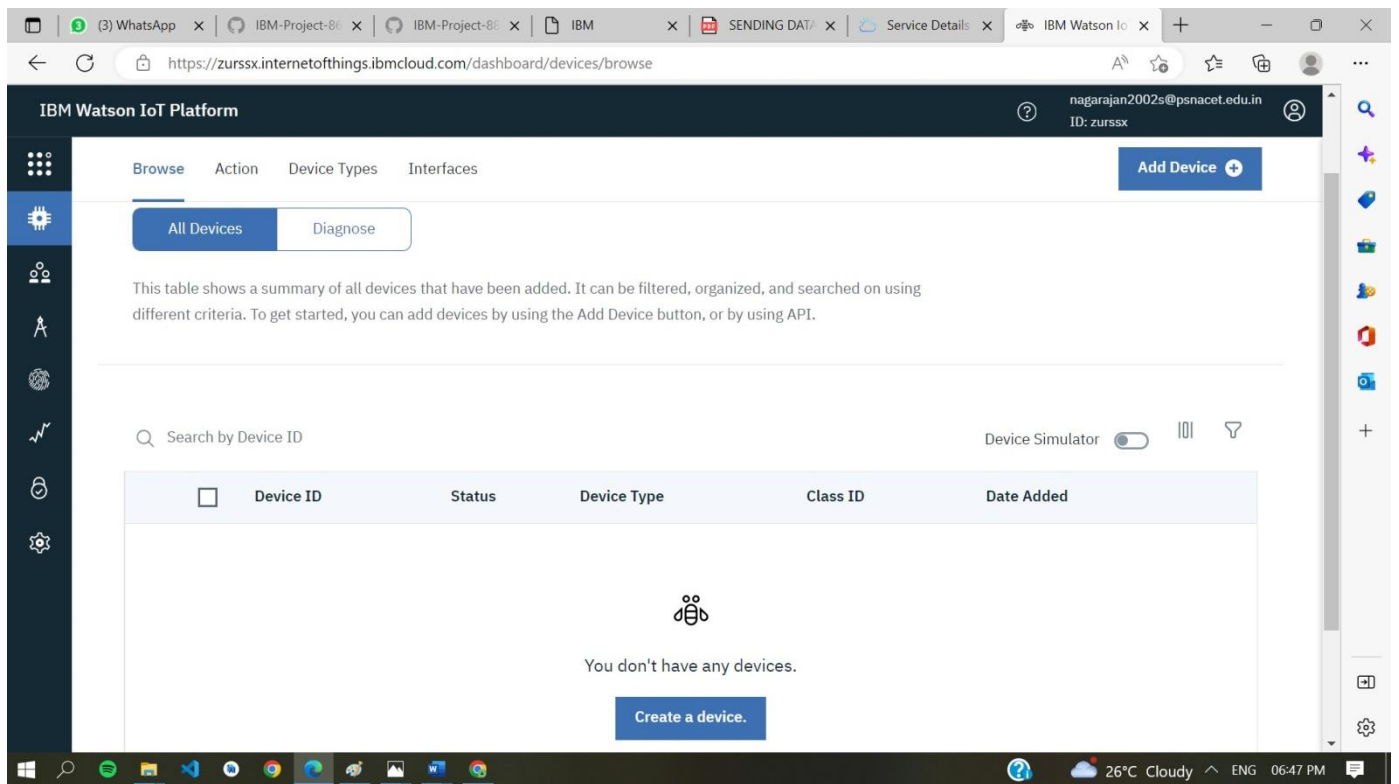
**Let's get started with IBM Watson IoT Platform**  
Securely connect, control, and manage devices. Quickly build IoT applications that analyze data from the physical world.

**Launch** **Docs**

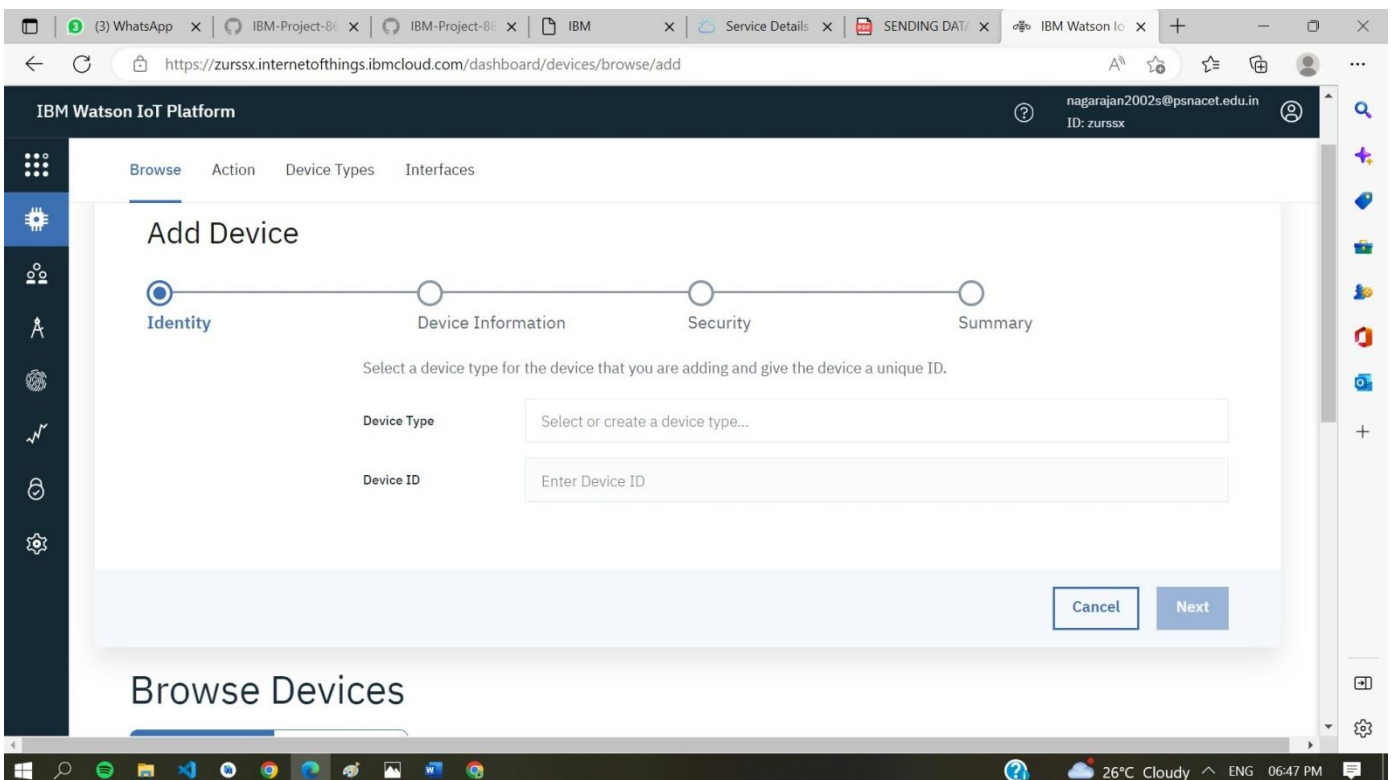
**Ready for the next level?**  
**IBM Watson IoT Platform Journey**

☒ 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.

The screenshot shows the 'Add type' form in the IBM Watson IoT Platform. The form is titled 'Add type' and has two steps: 'Identity' (selected) and 'Device Information'. The 'Identity' step contains the following fields:

- Type:** A dropdown menu with 'Device' selected and 'Gateway' as an option.
- Name:** A text input field containing 'Nagarajan'. Below the field, a note states: '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:** A text input field.

At the bottom right of the form, there are 'Cancel' and 'Next' buttons. The top of the page shows the user's profile 'nagarajan2002s@psnacet.edu.in' and the ID 'zurssx'.

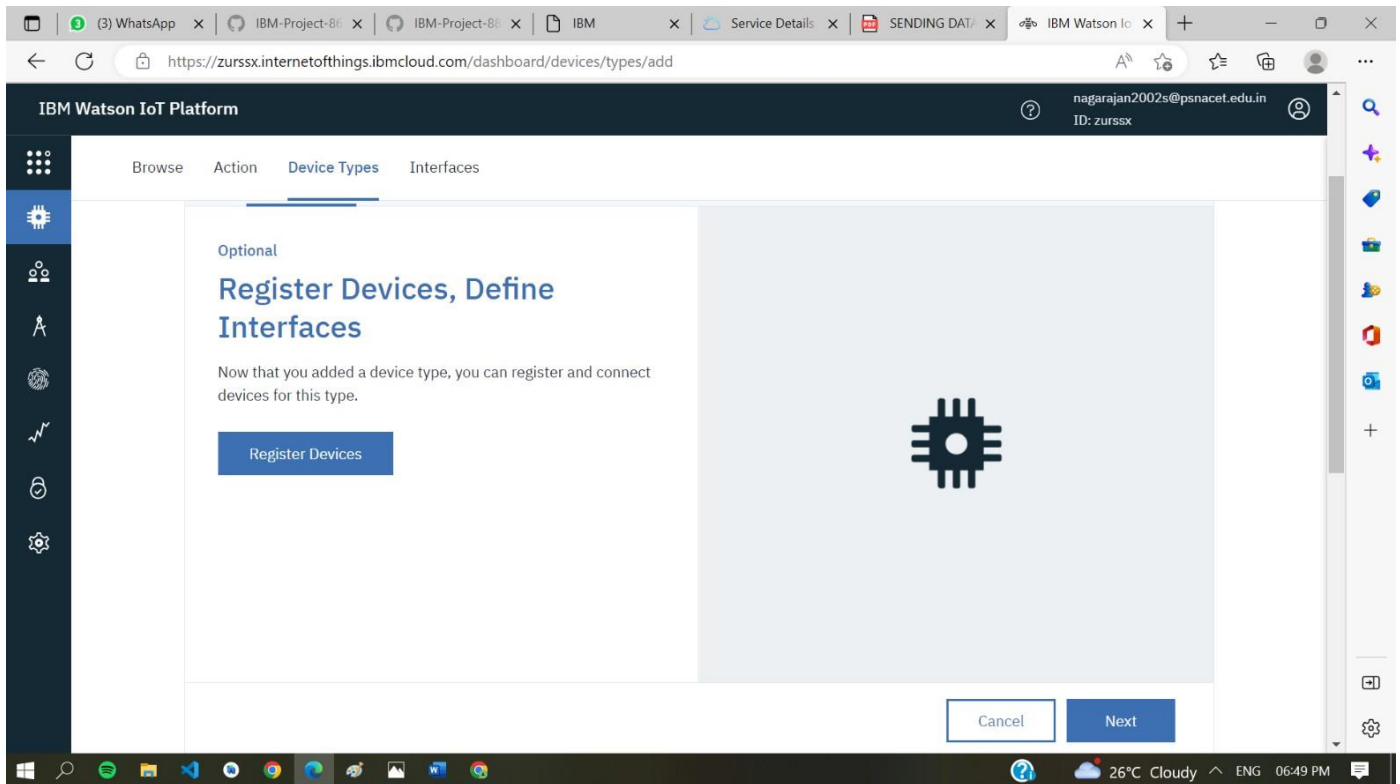
- Click on Finish

The screenshot shows the 'Add type' form in the IBM Watson IoT Platform, now at the 'Device Information' step. The 'Identity' step is marked as complete with a checkmark. The 'Device Information' step contains the following fields:

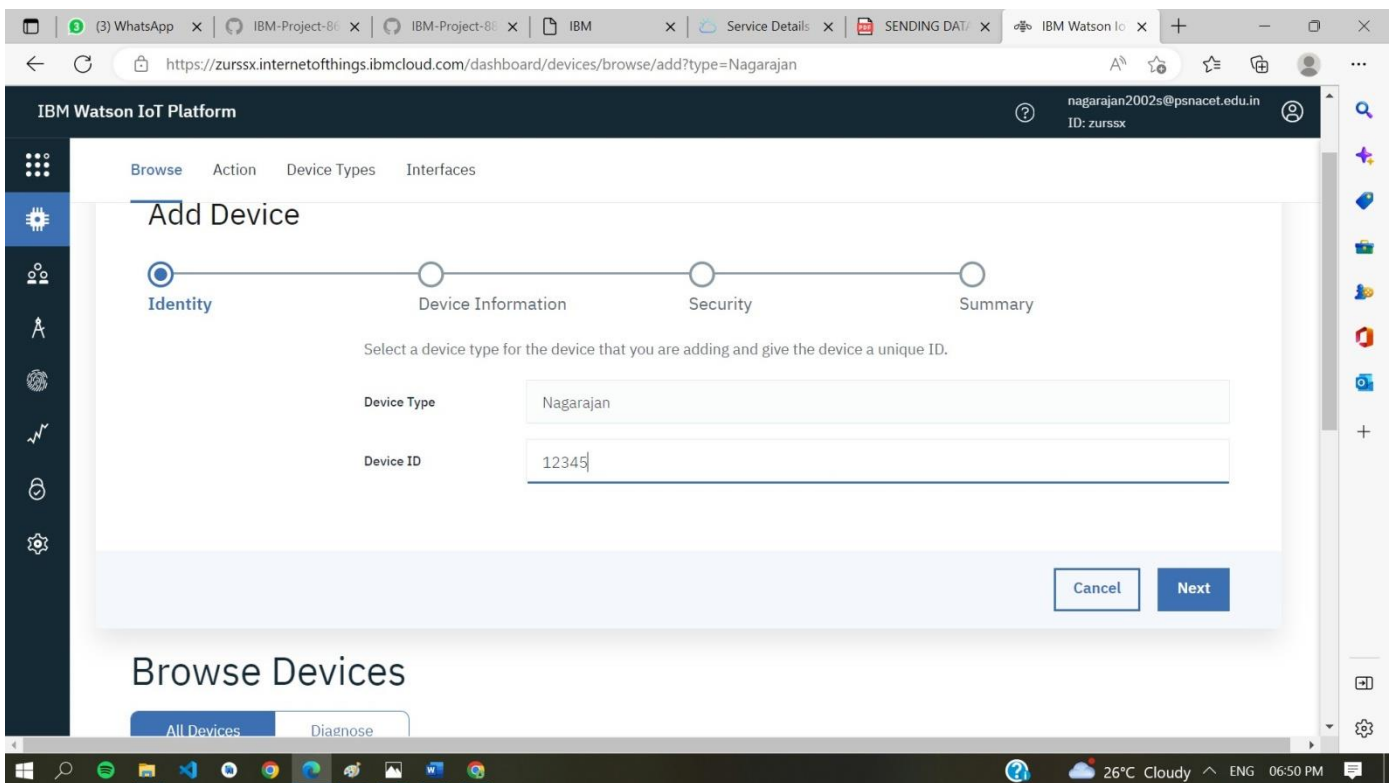
- Serial Number:** A text input field with the placeholder 'Enter Serial Number'.
- Model:** A text input field with the placeholder 'Enter Model'.
- Description:** A text input field with the placeholder 'Enter Description'.
- Hardware Version:** A text input field with the placeholder 'Enter Hardware Version'.
- Manufacturer:** A text input field with the placeholder 'Enter Manufacturer'.
- Device Class:** A text input field with the placeholder 'Enter Device Class'.
- Firmware Version:** A text input field with the placeholder 'Enter Firmware Version'.
- Descriptive Location:** A text input field with the placeholder 'Enter Descriptive Location'.

At the bottom right of the form, there are 'Back' and 'Finish' buttons. An 'Edit Metadata' link is also visible in the top right corner of the form area. The top of the page shows the user's profile 'nagarajan2002s@psnacet.edu.in' and the ID 'zurssx'.

- Click on Register Device.



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





➤ Click on Next

The screenshot shows the 'Add Device' page in the IBM Watson IoT Platform. The progress bar indicates that the 'Identity' step is complete, and the 'Device Information' step is currently active. The page contains two columns of input fields for device metadata.

Field	Input
Serial Number	Enter Serial Number
Manufacturer	Enter Manufacturer
Model	Enter Model
Device Class	Enter Device Class
Description	Enter Description
Firmware Version	Enter Firmware Version
Hardware Version	Enter Hardware Version
Descriptive Location	Enter Descriptive Location

At the bottom of the form, there is a button labeled 'Add Metadata +'. The top navigation bar shows the user is logged in as 'nagarajan2002s@psnacet.edu.in' with ID 'zurssx'.

➤ Click on Next

The screenshot shows the 'Security' step of the 'Add Device' process. The progress bar shows 'Identity' and 'Device Information' as completed steps. The page presents 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.

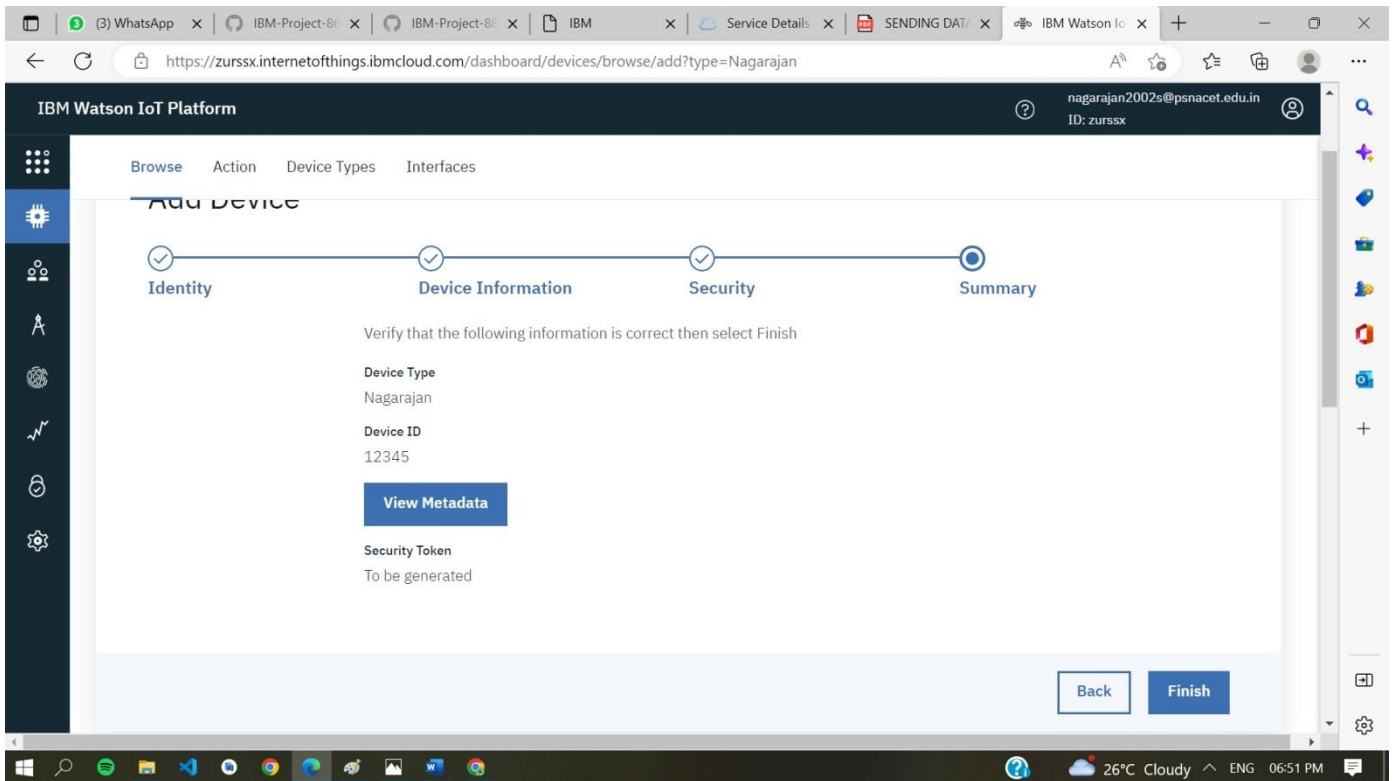
**Self-provided authentication token**

Provide your own authentication token for this device. The token must be between 8 and 36 characters and contain a mix 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.

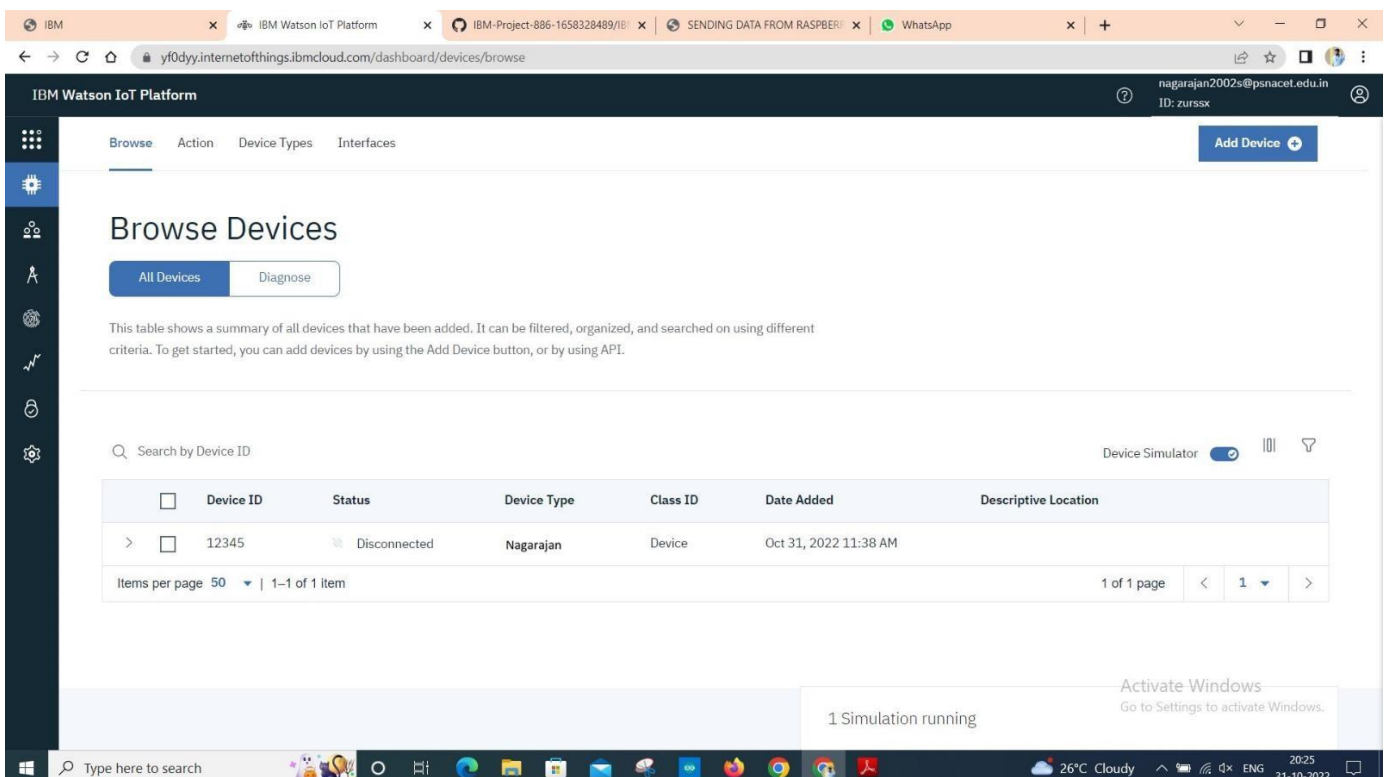
Below the options, there is an input field for the 'Authentication Token' with the placeholder text 'Enter an optional token'. A note below the field states: 'Make a note of the generated token. Lost authentication tokens cannot be recovered. Tokens are encrypted before being stored.' and 'Authentication token are encrypted before we store them.'



## ➤ Click on 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_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 ... 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:~$ 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
           └─2662 /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`

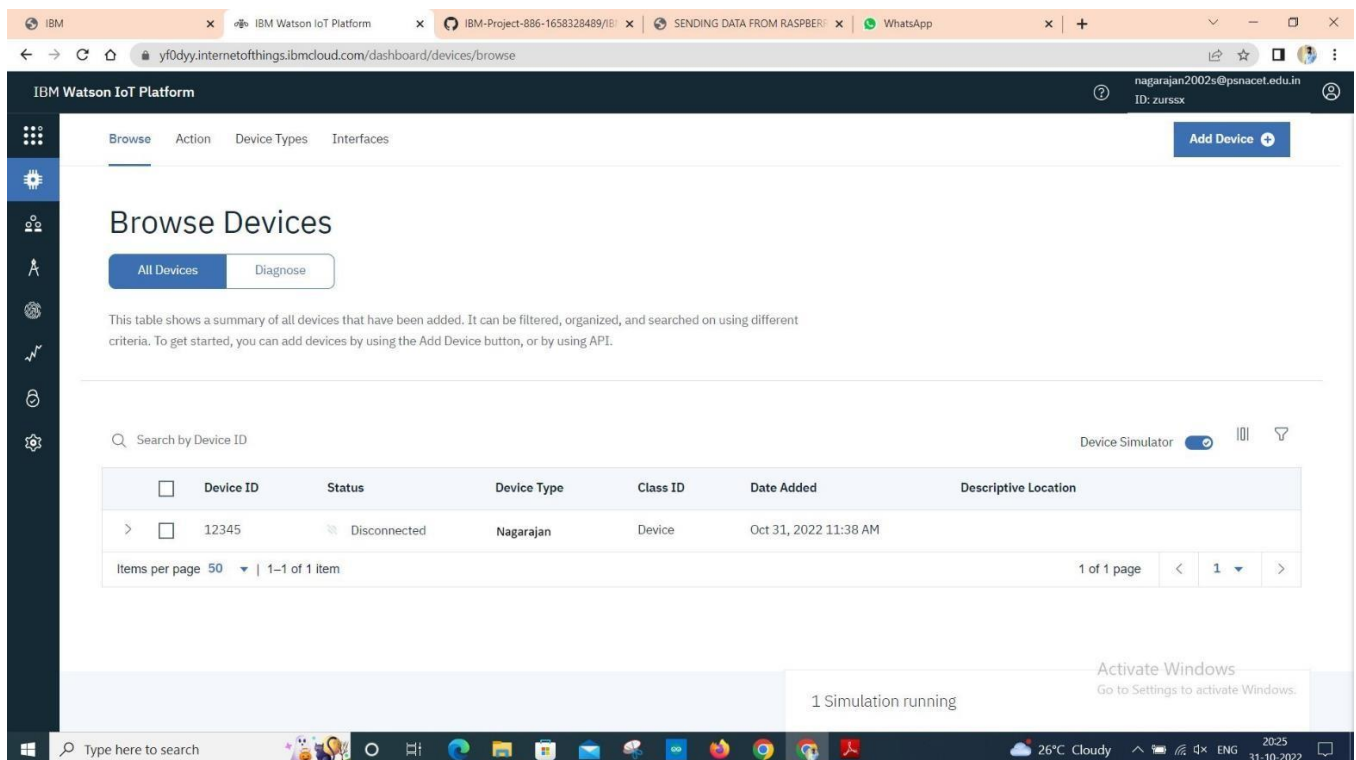
```
File Edit Tabs Help
pi@raspberrypi:~$ pip install ibmiotf
Collecting ibmiotf
  Downloading ibmiotf-0.3.0.tar.gz (59kB)
    100% |#####| 61kB 510kB/s
Collecting dicttoxml>=1.7.4 (from ibmiotf)
  Downloading dicttoxml-1.7.4.tar.gz
Collecting iso8601>=1.10 (from ibmiotf)
  Downloading iso8601-0.1.12-py2.py3-none-any.whl
Collecting paho-mqtt>=1.2 (from ibmiotf)
  Downloading paho-mqtt-1.3.1.tar.gz (80kB)
    100% |#####| 81kB 816kB/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 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% |#####| 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 ... done
Stored in directory: /home/pi/.cache/pip/wheels/7e/f0/45/bbc33ad957e82f7b71ba89e316d65a83d9d735ad12e0c0418
Running setup.py bdist_wheel for dicttoxml ... done
Stored in directory: /home/pi/.cache/pip/wheels/45/62/59/98910b33ec6a7b2ae66a137654b1b50def5468024078e12c0e
Running setup.py bdist_wheel for paho-mqtt ... done
Stored in directory: /home/pi/.cache/pip/wheels/20/d8/0d/acdc8f289011b7be7de71deebef0642fb3be0313dfff0493
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 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:gegtl4: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 = 28 C Humidity = 50 % to IBM Watson
Published Temperature = 28 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 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 shows a table of devices with columns: Device ID, Status, Device Type, Class ID, Date Added, and Descriptive Location. The first device, ID 12345, is highlighted. Below the table, a modal window titled 'Recent Events' is open, showing a list of events with columns: Event, Value, Format, and Last Received. The events are JSON strings containing sensor data like 'Hazardous Gas', 'Temperature', and 'Humidity'. A status bar at the bottom indicates '1 Simulation running'.

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

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 shows the 'Your boards' section of the IBM Watson IoT Platform. The top navigation bar includes 'Your boards' and 'Public boards'. A sidebar on the left contains various icons. The main content area displays two boards: 'USAGE OVERVIEW' (3 Cards) and 'RISK AND SECURITY OVERVIEW' (4 Cards). Both boards are owned by the user. A large dashed box with a plus sign indicates where to click to create a new board. Below the boards, there is a section for 'Boards shared with you'. A status bar at the bottom indicates '1 Simulation running'.

Boards shared with you

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

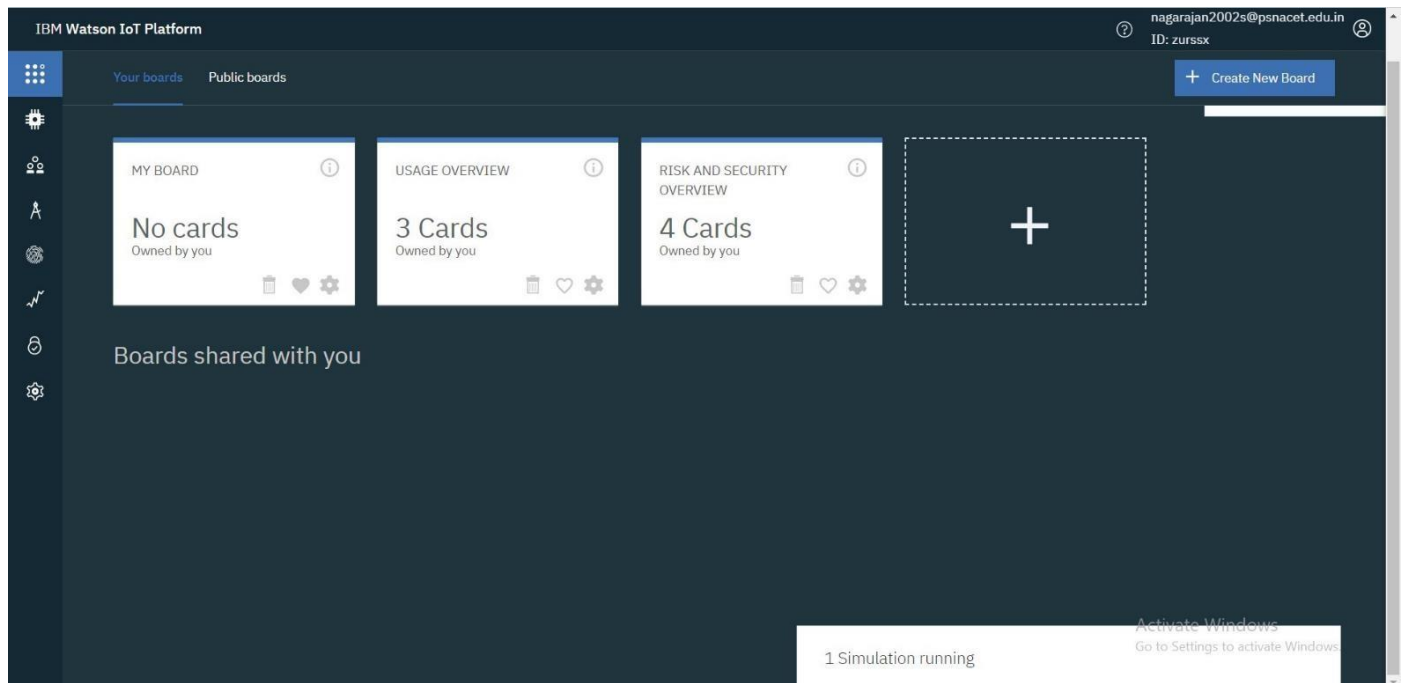
The given below window appears give a name and description to your board as shown in the window below.

The screenshot shows the IBM Watson IoT Platform interface. On the left, a sidebar contains navigation icons. The main area displays a 'Create a new board' dialog box. The dialog has a title bar with a close button. Below the title, it says 'Provide a name and description for your new board.' There are two input fields: 'Board name' and 'Description'. Below these fields are two radio buttons: 'Make this board my landing page.' (which is selected) and 'Favorite (this also adds this board to your navbar)'. At the bottom right of the dialog is a 'Next' button. In the background, the platform's dashboard is visible, showing 'Your boards' and 'Public boards' tabs, and a '3 Cards' overview section.

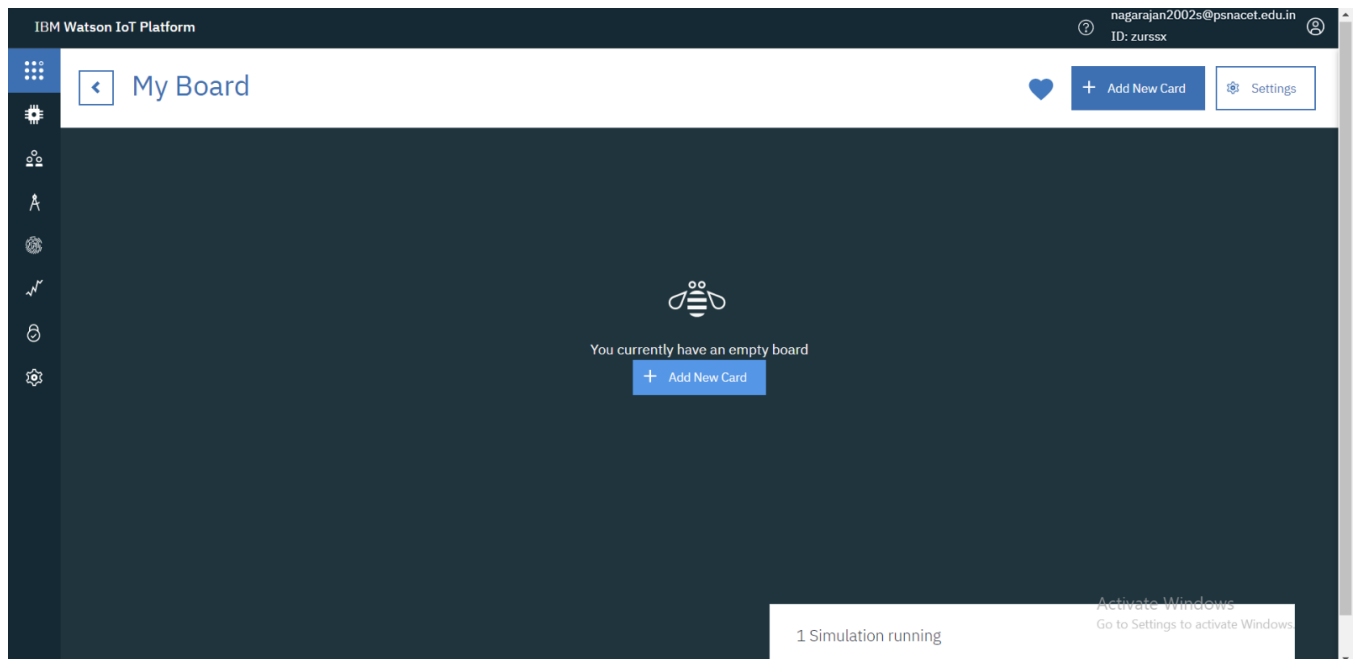
- Then click on Next you get the below window then again click on Submit

The screenshot shows the same IBM Watson IoT Platform interface, but the 'Create a new board' dialog box has advanced to the next step. The title bar remains the same. Below the title, it says 'Adding viewers allows them to see your dashboard.' The 'Owner' field is populated with 'nagarajan2002s@psnacet.edu.in(you)'. There is a 'Members' input field. Below it is a radio button labeled 'Share as read-only with everyone?'. At the bottom left of the dialog is a '+ add user ID' link. Below this link is a table with two columns: 'Name' and 'Editor?'. At the bottom right of the dialog are 'Back' and 'Submit' buttons. The background dashboard is the same as in the previous screenshot.

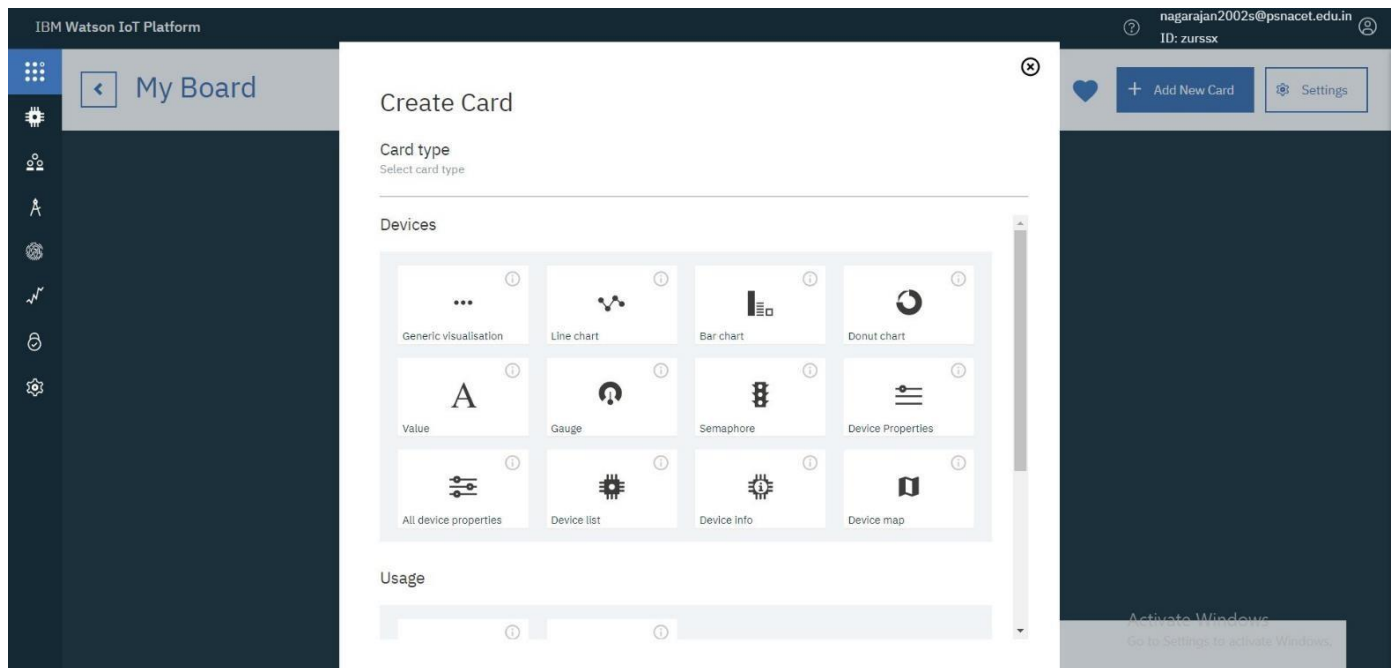
- Then double click on your boards name which you have created.



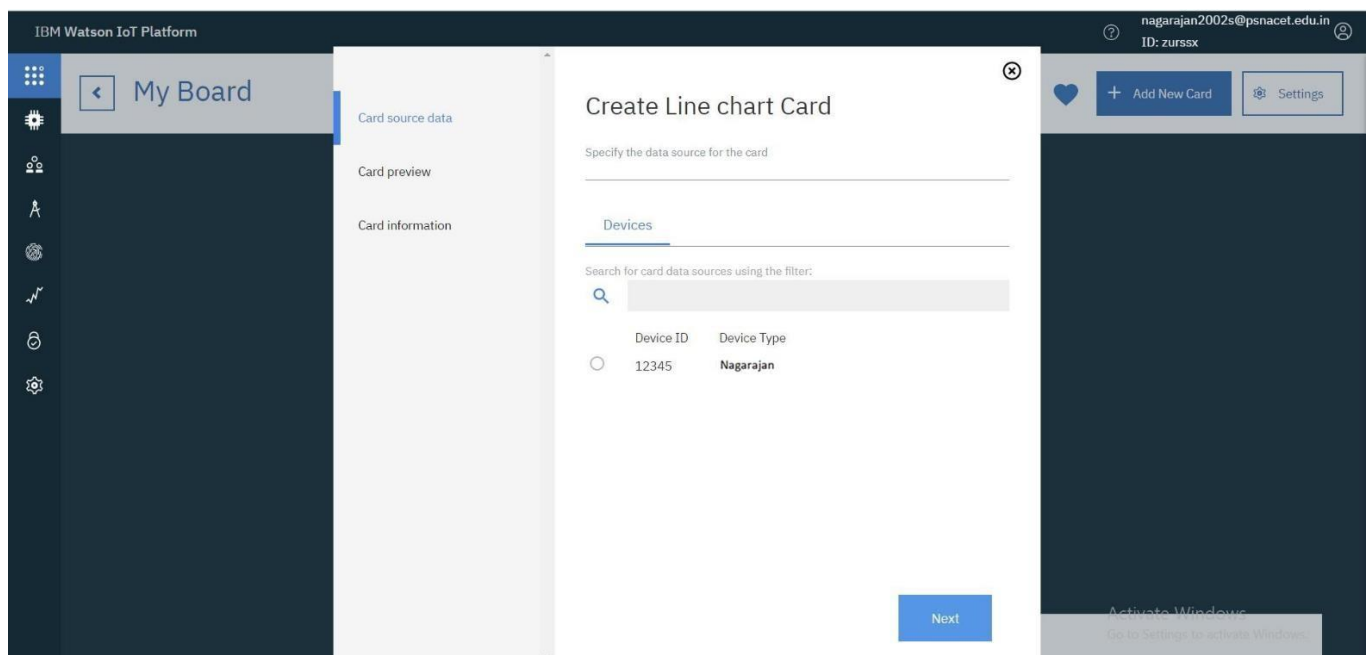
- Click on Add New Card



- 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

IBM Watson IoT Platform

Temp & Hum

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 (selected)

Unit

Max: 100

Back Next

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

IBM Watson IoT Platform

Temp & Hum

Card source data  
12345

Card preview

Card information

### Create Line chart Card

Enter title and description of the card

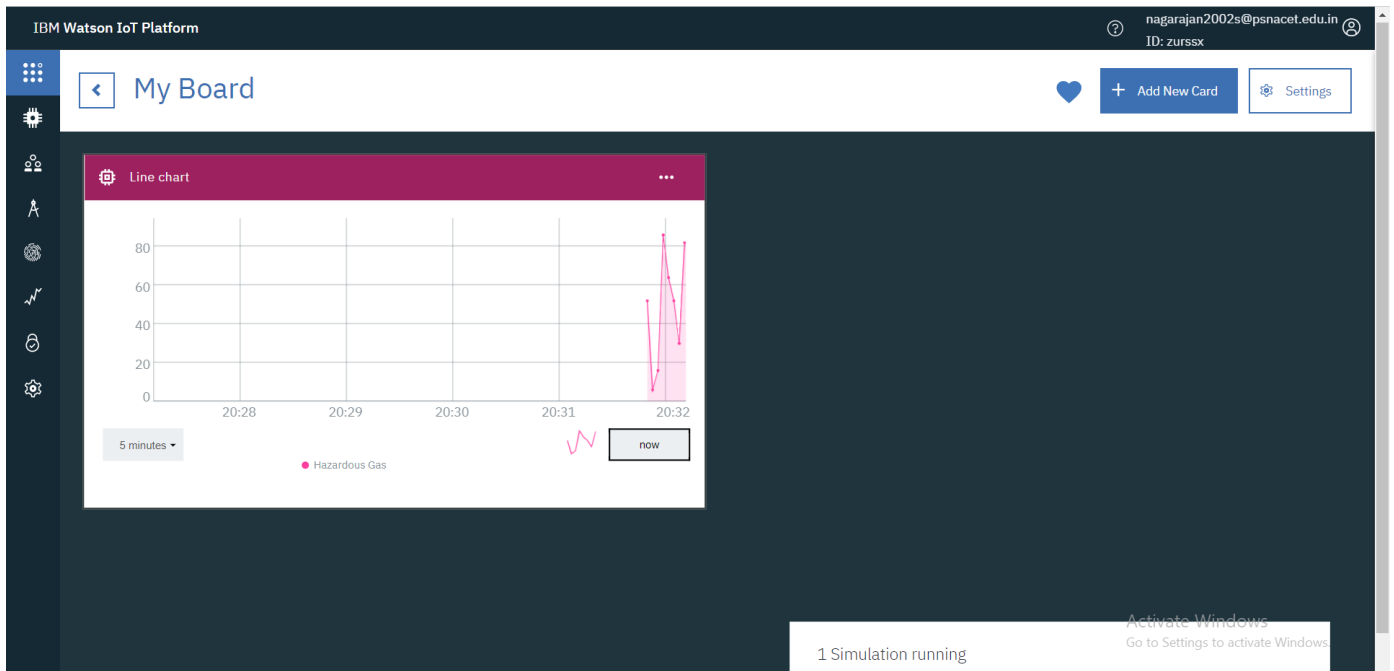
Title  
Line chart

Colorscheme:  
[Purple] [Pink] [Green] [Blue] [Teal]

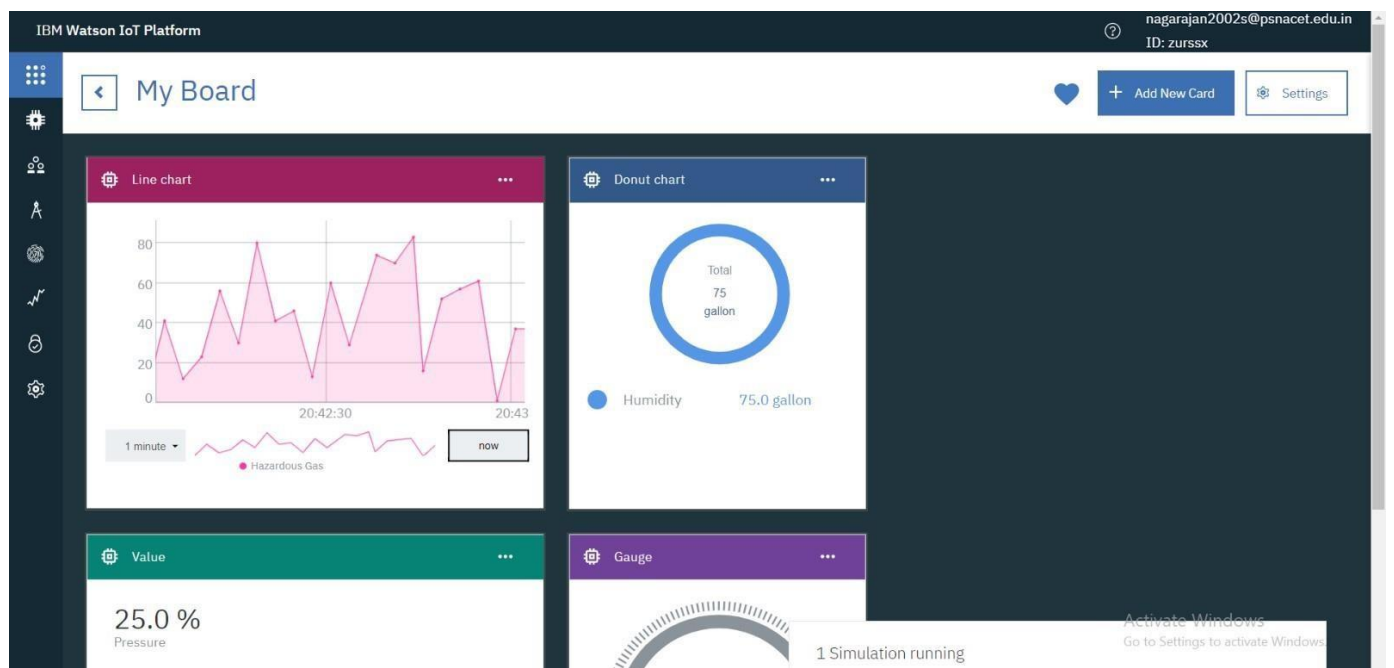
A line chart to display time series information with historic and live data.

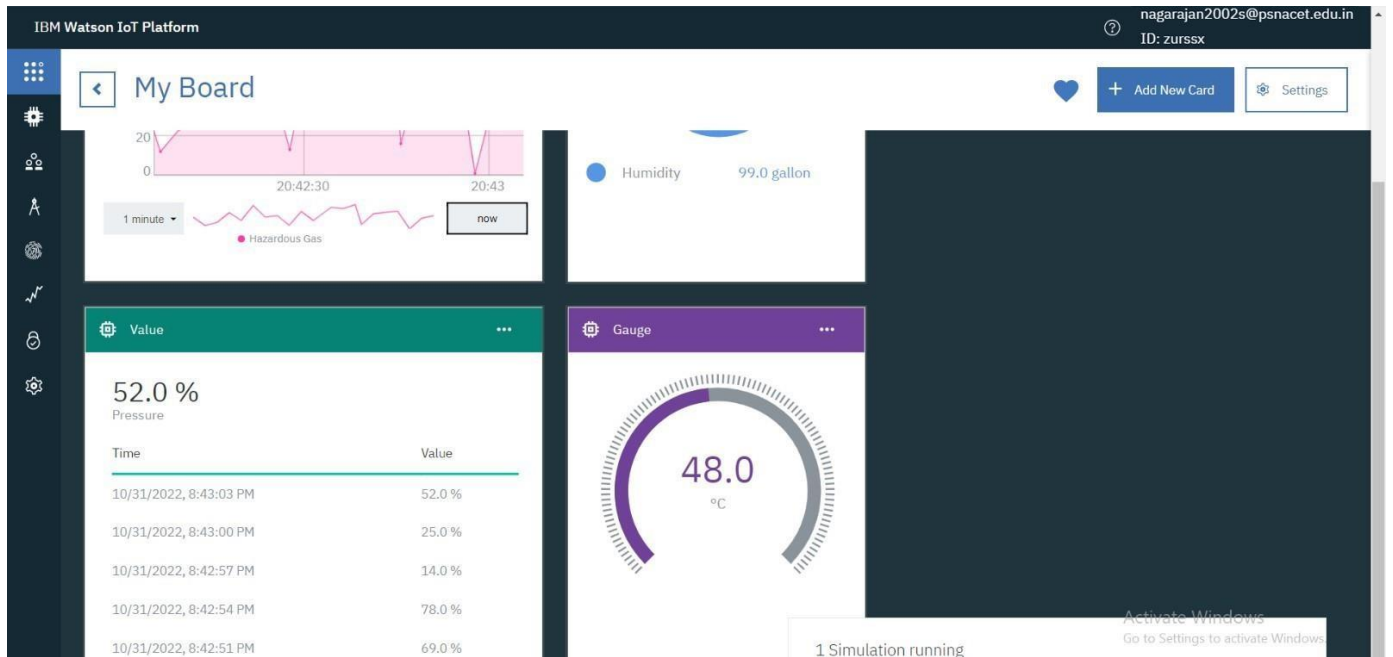
Back Submit

➤ 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.