

# SENDING DATA FROM RASPBERRY-PI TO IBM WATSON

<b>Date</b>	5 NOVEMBER 2022
<b>Team ID</b>	PNT2022TMID52171
<b>Project Name</b>	SMART SOLUTION FOR RAILWAYS

## 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

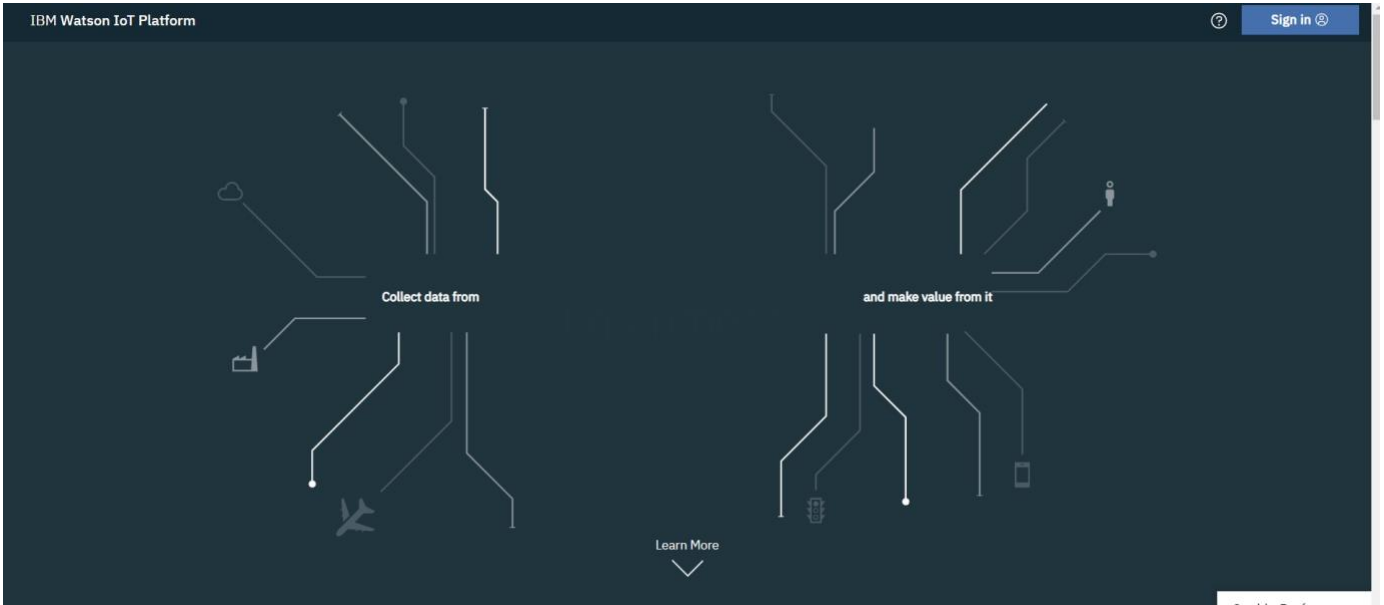
### SOFTWARE:

- 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

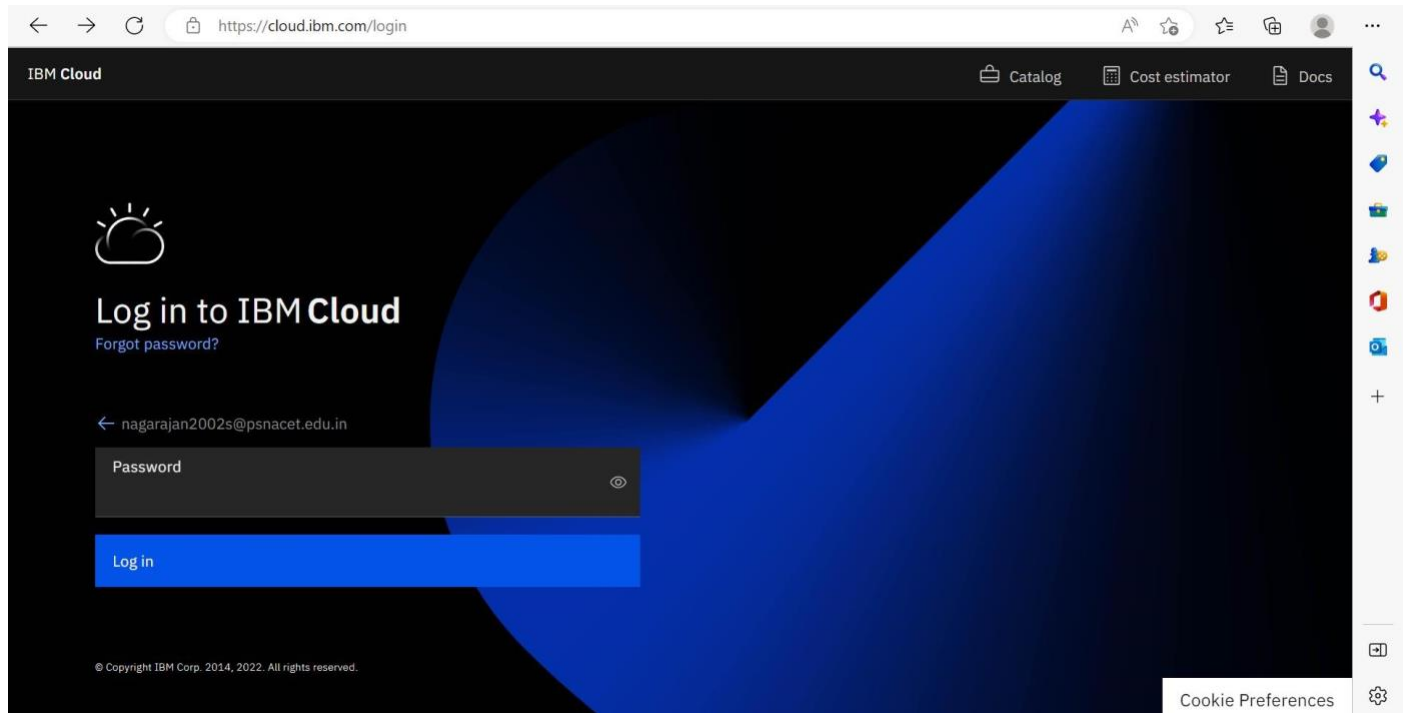
[Forgot IBMid?](#)

☒ 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.

IBM Cloud

Catalog Manage

Nagarajan Selvaraj's Ac...

?

Search the catalog...

Sell on IBM Cloud Catalog settings

Compute (29)

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)

Internet of Things (1)

Security (25)

Mobile (1)

Analytics Engine

By IBM

Submit your Apache Spark applications as needed and customize the Spark runtimes to satisfy the requirements of your application.

Lite • Free • HIPAA Enabled • IAM-enabled • Service Endpoint Supported • IBM supported

API Connect

By IBM

An enterprise-grade platform for creating, securing, managing, sharing, monetizing, and analyzing custom APIs located on-premises and on the cloud.

Lite • Free • EU Supported • IAM-enabled • IBM supported

AnonTech ViziVault Platform

By Anon Technology, Inc.

Manage personal information as-a-service safely, securely, and in compliance with data privacy regulations using ViziVault

Lite • Free • HIPAA Enabled • IAM-enabled • Third party supported

App Configuration

By IBM

Centralized, in-flight configuration for web and mobile applications and distributed environments.

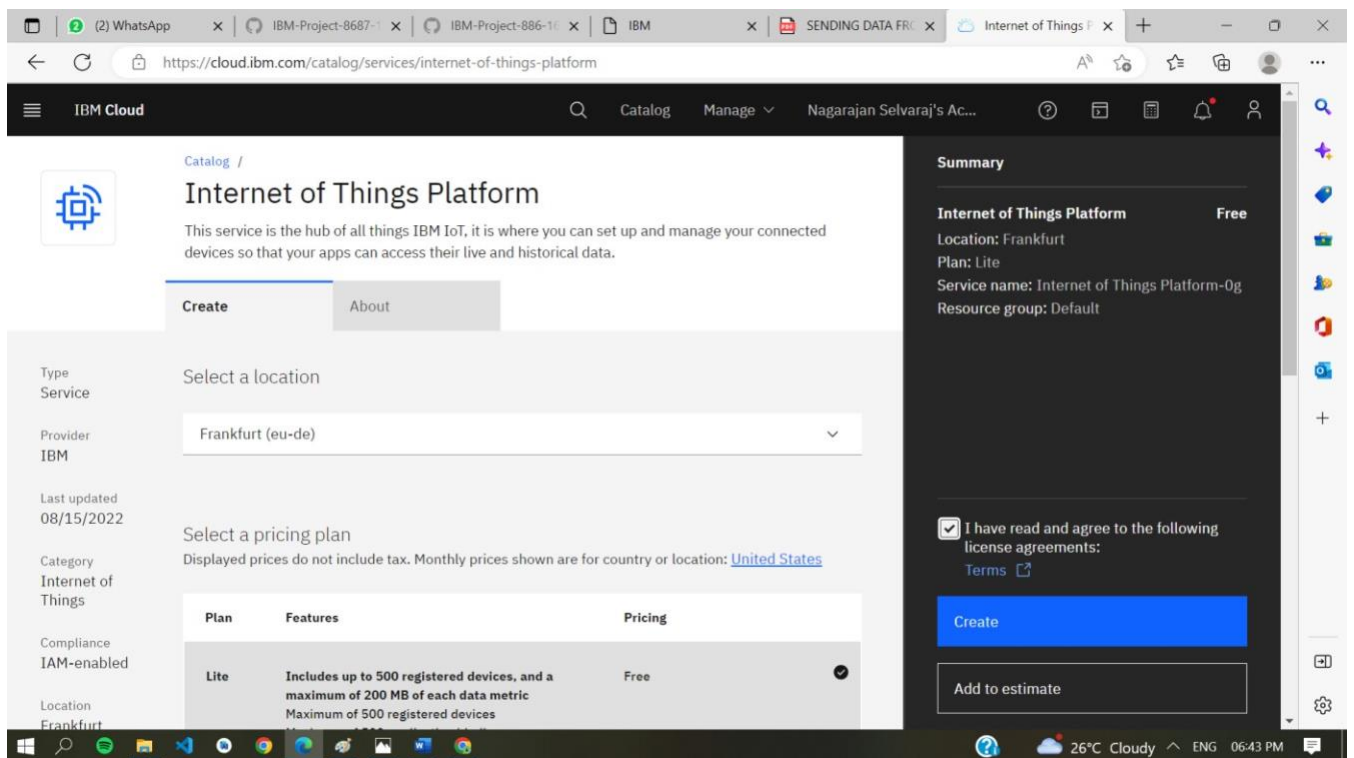
Lite • Free • IAM-enabled • Service Endpoint Supported • IBM supported

26°C Cloudy

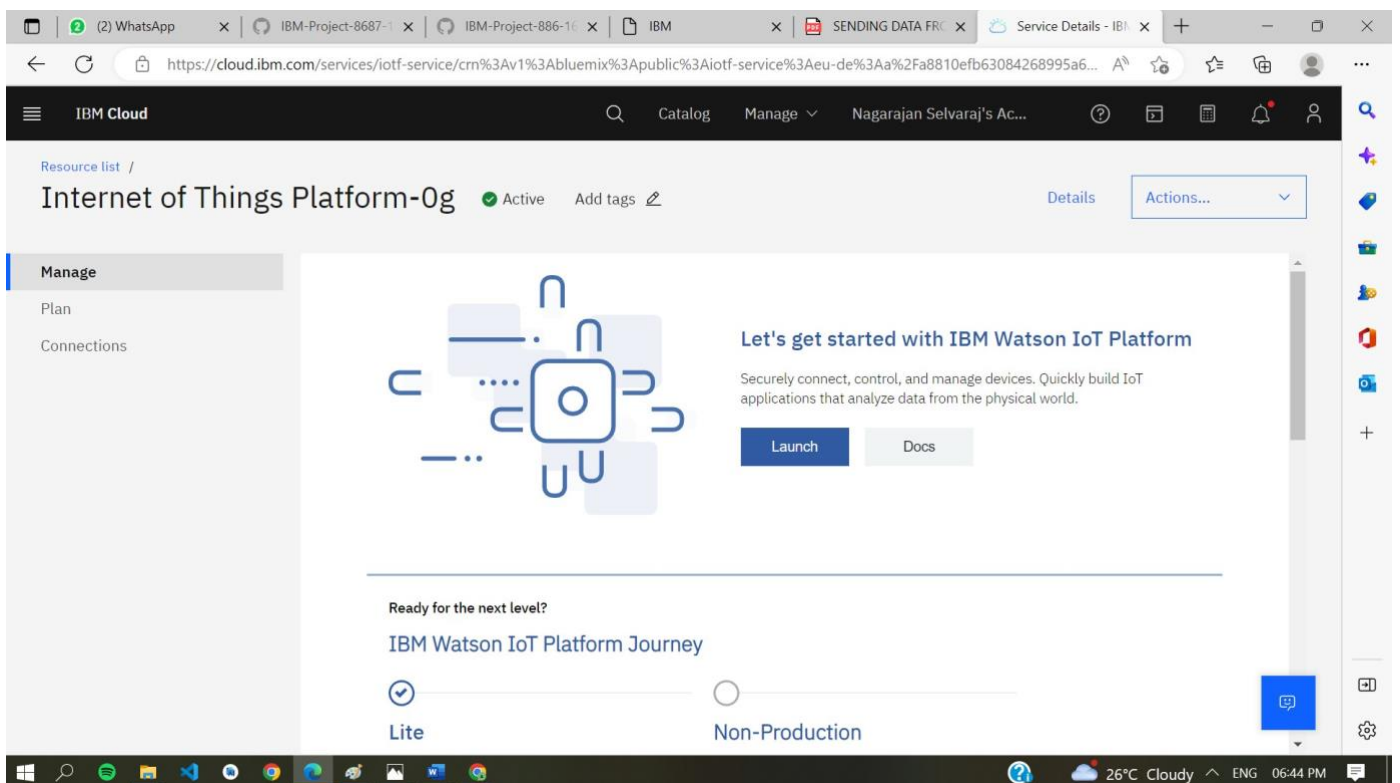
ENG

06:42 PM

Check all details and click on create.

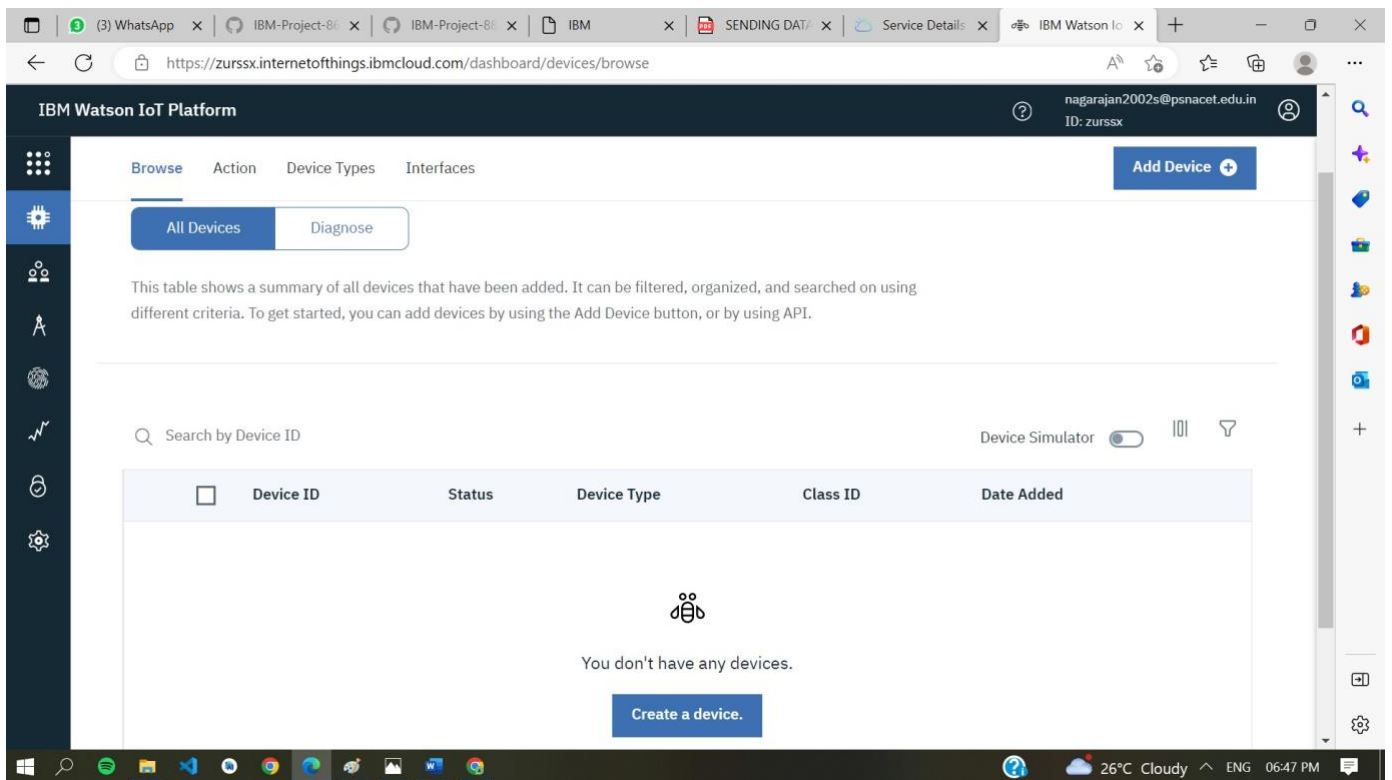


click on Launch

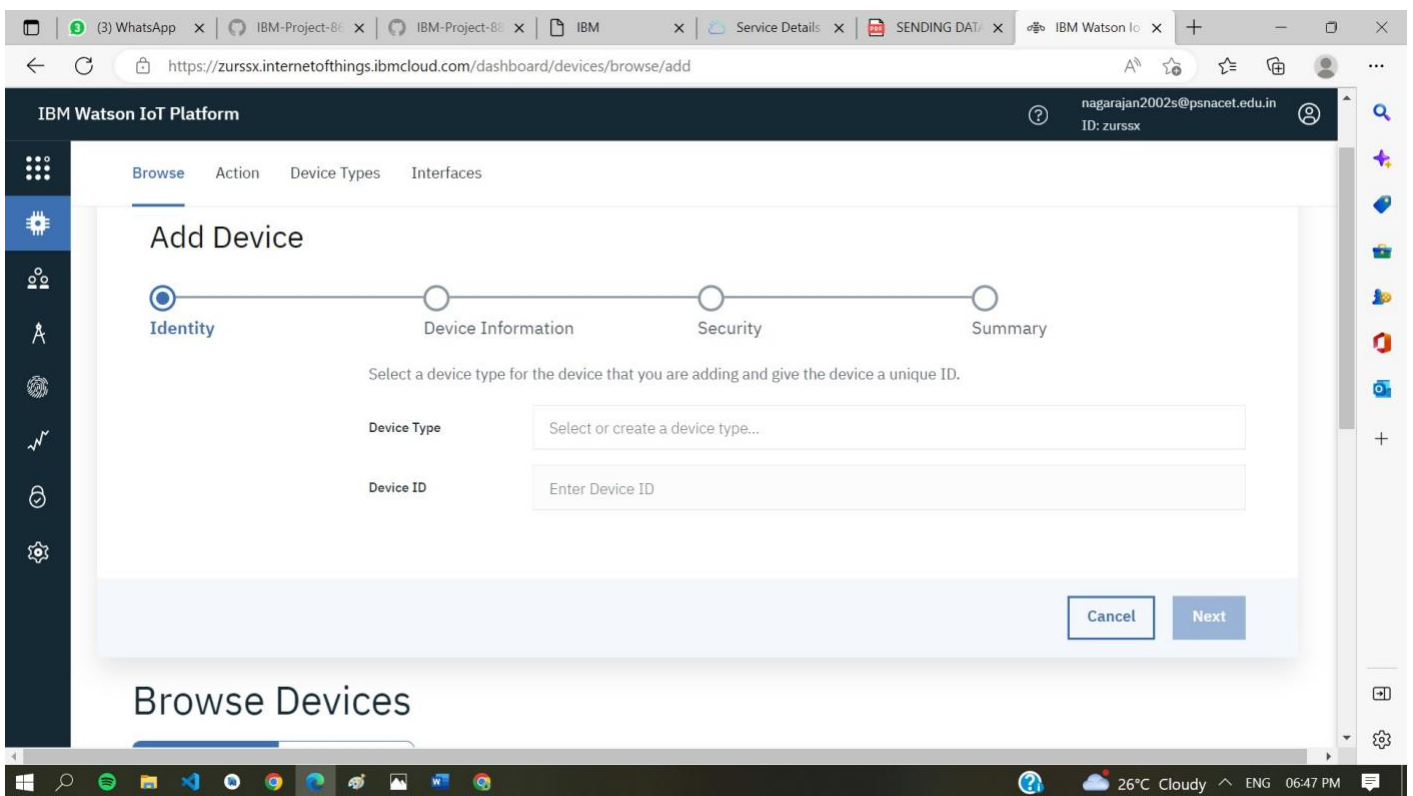


Dashboard of IBM Watson IoT platform,

Click on Add device



○ After click on Add device this page will open



Go to device type and fill the details.

IBM Watson IoT Platform

https://zurssx.internetofthings.ibmcloud.com/dashboard/devices/types/add

nagarajan2002s@psnacet.edu.in  
ID: zurssx

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  Or

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

Click on Finish

IBM Watson IoT Platform

https://zurssx.internetofthings.ibmcloud.com/dashboard/devices/types/add

nagarajan2002s@psnacet.edu.in  
ID: zurssx

Browse Action **Device Types** Interfaces

## Add type

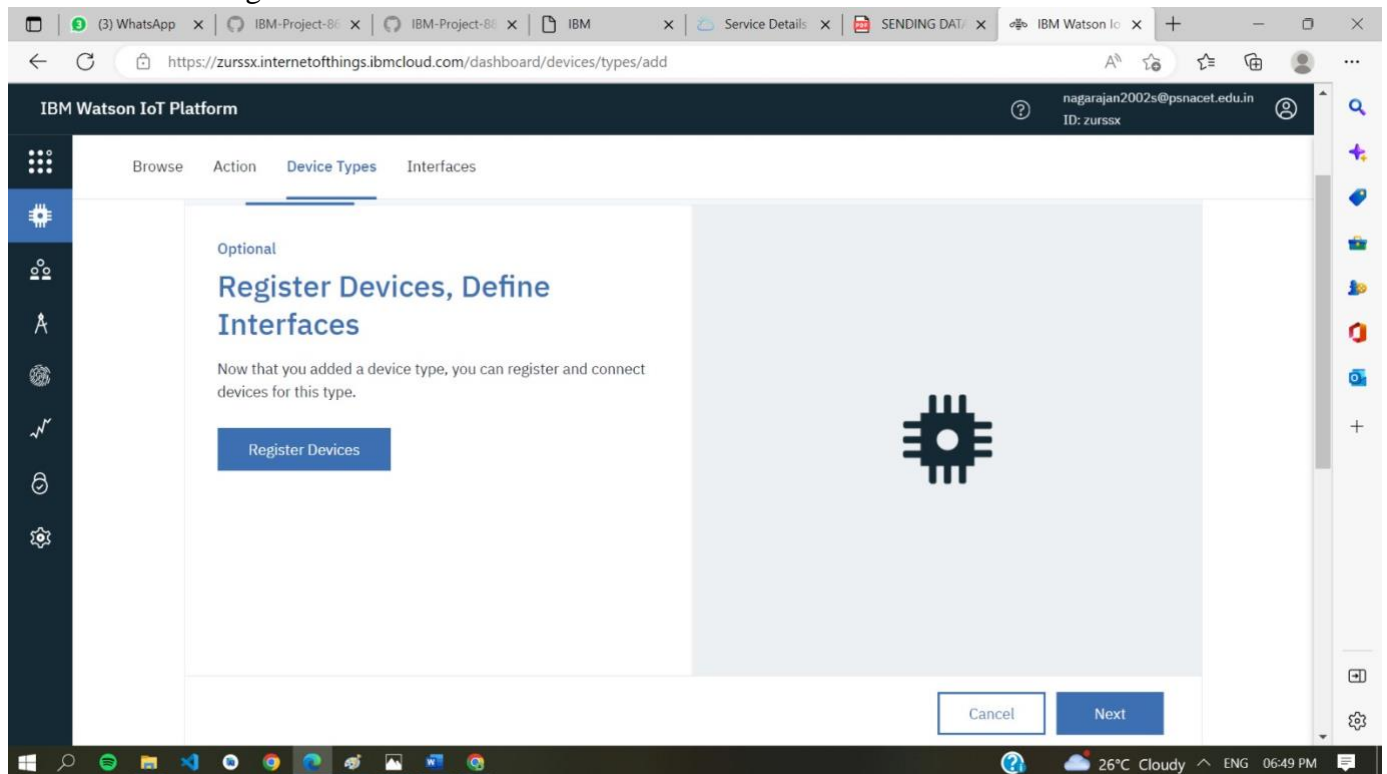
Identity Device Information

These attributes will be used as a template for new devices that are assigned this device type

Serial Number	<input type="text" value="Enter Serial Number"/>	Manufacturer	<input type="text" value="Enter Manufacturer"/>
Model	<input type="text" value="Enter Model"/>	Device Class	<input type="text" value="Enter Device Class"/>
Description	<input type="text" value="Enter Description"/>	Firmware Version	<input type="text" value="Enter Firmware Version"/>
Hardware Version	<input type="text" value="Enter Hardware Version"/>	Descriptive Location	<input type="text" value="Enter Descriptive Location"/>

○ Click on

## Register Device.



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



○ Click on

The screenshot shows the 'Add Device' page in the IBM Watson IoT Platform. The page has a dark blue header with the platform name and user information. A sidebar on the left contains various icons. The main content area has a breadcrumb trail: 'Browse' > 'Action' > 'Device Types' > 'Interfaces'. Below this is a progress bar with four steps: 'Identity' (selected), 'Device Information', 'Security', and 'Summary'. The 'Identity' step is active, showing a form with two fields: 'Device Type' (containing 'Nagarajan') and 'Device ID' (containing '12345'). Below the form are 'Cancel' and 'Next' buttons. The page title is 'Add Device'.

IBM Watson IoT Platform

nagarajan2002s@psnacet.edu.in  
ID: zurssx

Browse Action Device Types Interfaces

## 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 Diagnose

Next

The screenshot shows the 'Add Device' page in the IBM Watson IoT Platform, now at the 'Device Information' step. The progress bar shows 'Identity' as completed and 'Device Information' as the current step. The 'Device Information' step is active, showing a form with eight fields: 'Serial Number', 'Model', 'Description', 'Hardware Version', 'Manufacturer', 'Device Class', 'Firmware Version', and 'Descriptive Location'. Each field has a placeholder text 'Enter [field name]'. Below the form is an 'Add Metadata' button with a plus icon. The page title is 'Add Device'.

IBM Watson IoT Platform

nagarajan2002s@psnacet.edu.in  
ID: zurssx

Browse Action Device Types Interfaces

## Add Device

Identity Device Information Security Summary

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 +

○ Click on Next

○ Click on

The screenshot shows the 'Add Device' page in the IBM Watson IoT Platform. The user is at the 'Security' step of a four-step process: Identity, Device Information, Security, and Summary. The 'Security' step offers two options for selecting a device authentication token: 'Auto-generated authentication token (default)' and 'Self-provided authentication token'. The 'Auto-generated' option is selected. Below the options, there is a text input field for an 'Authentication Token' with a placeholder 'Enter an optional token'. A note states: 'Make a note of the generated token. Lost authentication tokens cannot be recovered. Tokens are encrypted before being stored.' Another note at the bottom says: 'Authentication token are encrypted before we store them.'

Finish

The screenshot shows the 'Add Device' page in the IBM Watson IoT Platform, now at the 'Summary' step. The progress bar shows all four steps (Identity, Device Information, Security, Summary) completed. The 'Summary' step displays the following information: 'Device Type: Nagarajan', 'Device ID: 12345', and 'Security Token: To be generated'. There is a 'View Metadata' button next to the Device ID. At the bottom right, there are 'Back' and 'Finish' buttons.

○ Click on

○ Device is created

IBM Watson IoT Platform

Browse Action Device Types Interfaces

Add Device

## 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.

Search by Device ID

Device Simulator

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 Simulation running

Activate Windows  
Go to Settings to activate Windows.

## 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/rele
ases/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
            └─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[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 (58kB)
    100% |#####| 61kB 510KB/s
    Downloading 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 (122kB)
    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 1.0MB/s
    Collecting requests-toolbelt>=0.7.0 (from ibmiotf)
    Downloading requests-toolbelt-0.8.0-py2.py3-none-any.whl (54kB)
    100% |#####| 61kB 1.0MB/s
    Collecting xmldict>=0.10.2 (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 (122kB)
    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 1.0MB/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/f9/45/bbc33ad957e82f7b71ba80e316d65a83d9d735ad12e0c0418
Running setup.py bdist_wheel for dicttoxml ... done
Stored in directory: /home/pi/.cache/pip/wheels/45/62/59/96910b33ec6a7b2ae66a13765401b50def5468024078e12cce
Running setup.py bdist_wheel for paho-mqtt ... done
Stored in directory: /home/pi/.cache/pip/wheels/28/08/6d/acdc8f2890111b7be7de71deebef6642fb83be0313dfff0493
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:

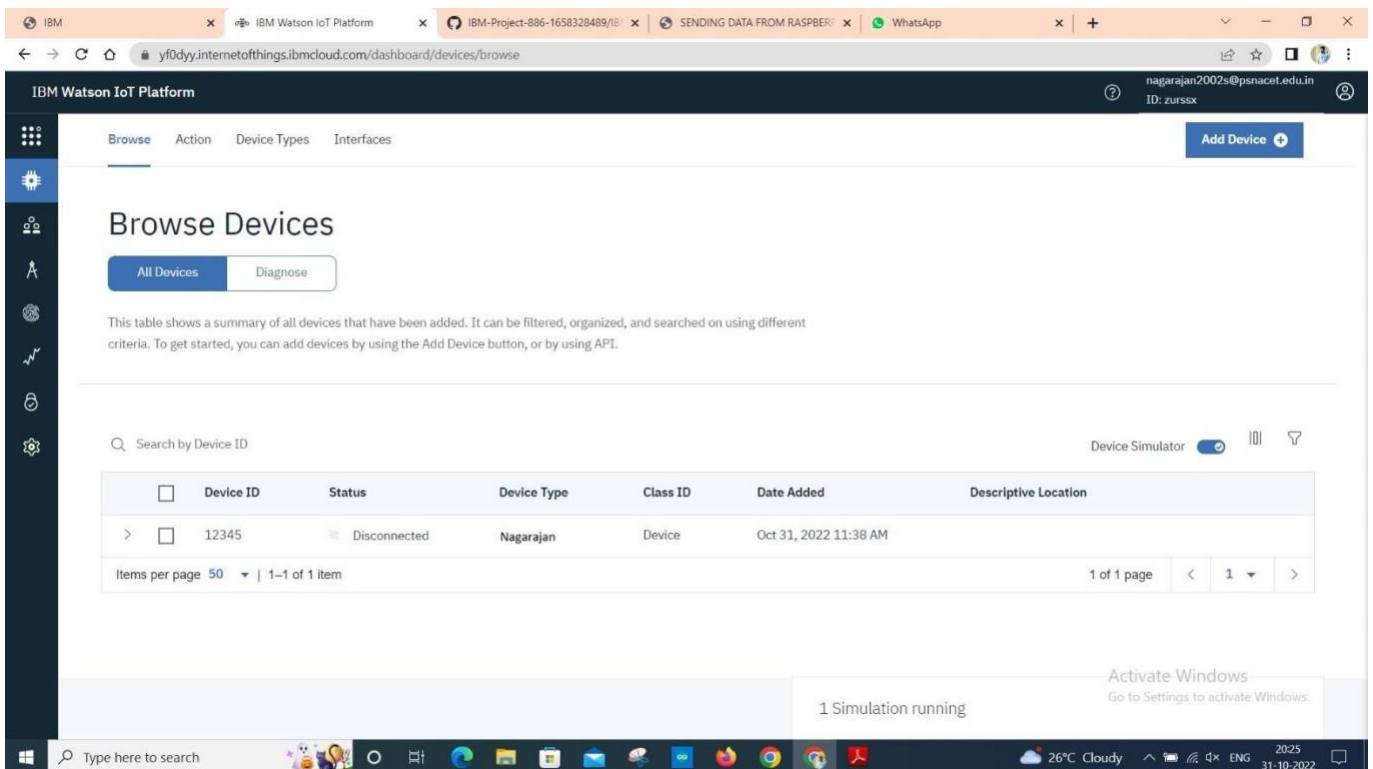
```

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 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. A device with ID 12345 is selected, showing its status as 'Disconnected' and type as 'Nagarajan'. Below this, a 'Recent Events' tab is active, displaying a table of events with columns: Event, Value, Format, and Last Received. The events are listed as 'event\_1' with values like '{\"Hazardous Gas\":61,\"Temperature\":88,\"Humidit...}' and a format of 'json', received 'a few seconds ago'. A '1 Simulation running' status bar is at the bottom.

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:

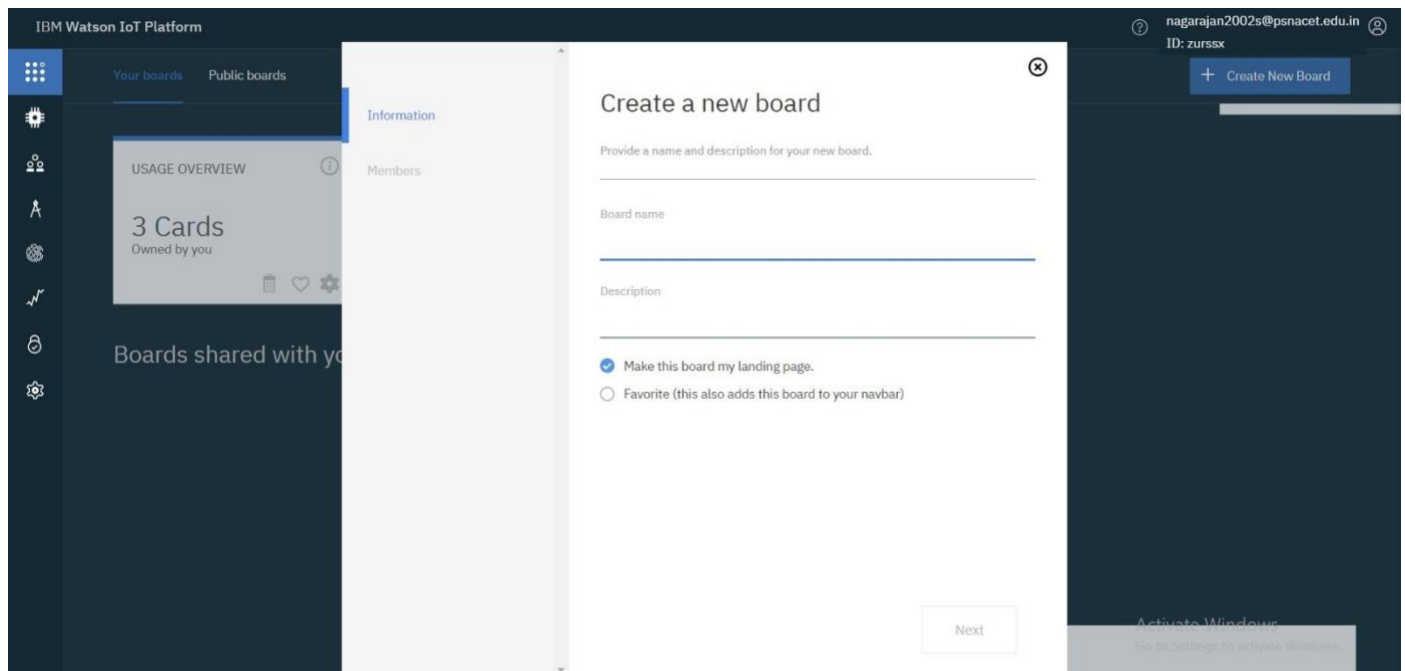
- In your Watson platform you have an option called board .Click on it and you get the following window on your screen

The screenshot shows the 'Your boards' section of the IBM Watson IoT Platform. It features two existing boards: 'USAGE OVERVIEW' with 3 cards and 'RISK AND SECURITY OVERVIEW' with 4 cards. A large dashed box with a plus sign indicates where to click to create a new board. Below these, a section titled 'Boards shared with you' is visible. A '1 Simulation running' status bar is at the bottom.

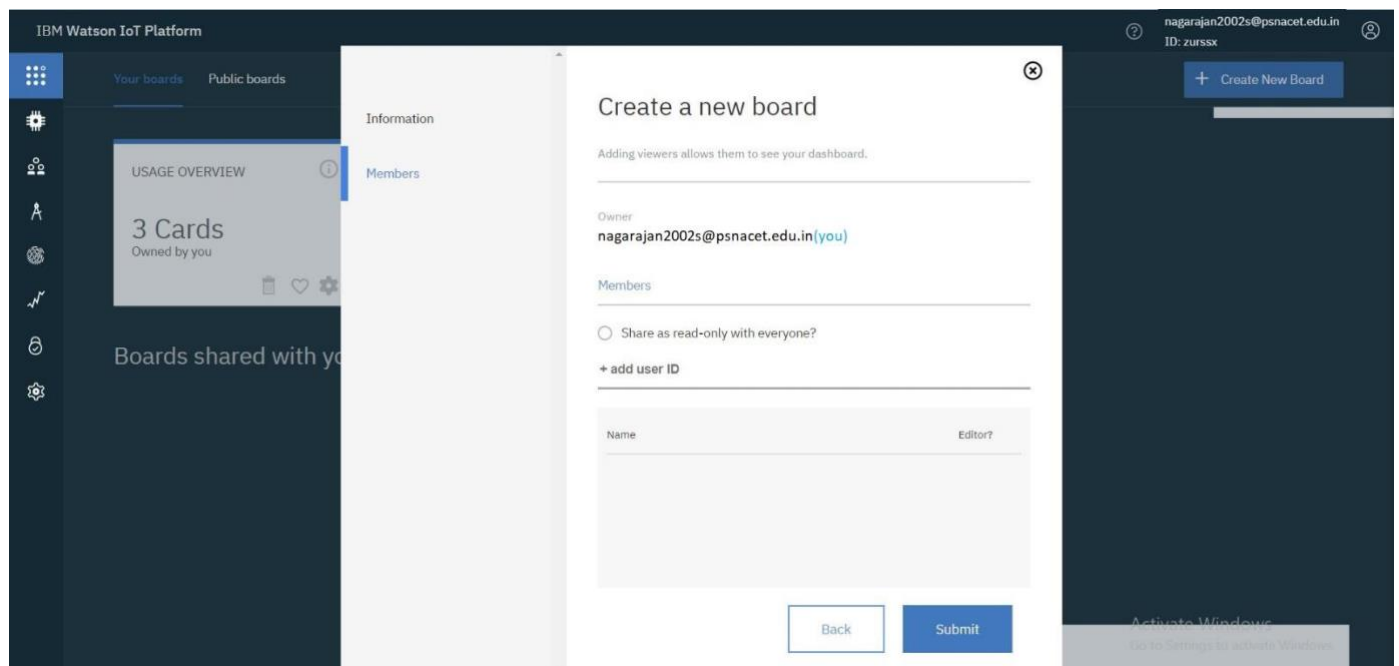
- Click on Create a new board to create a board .

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

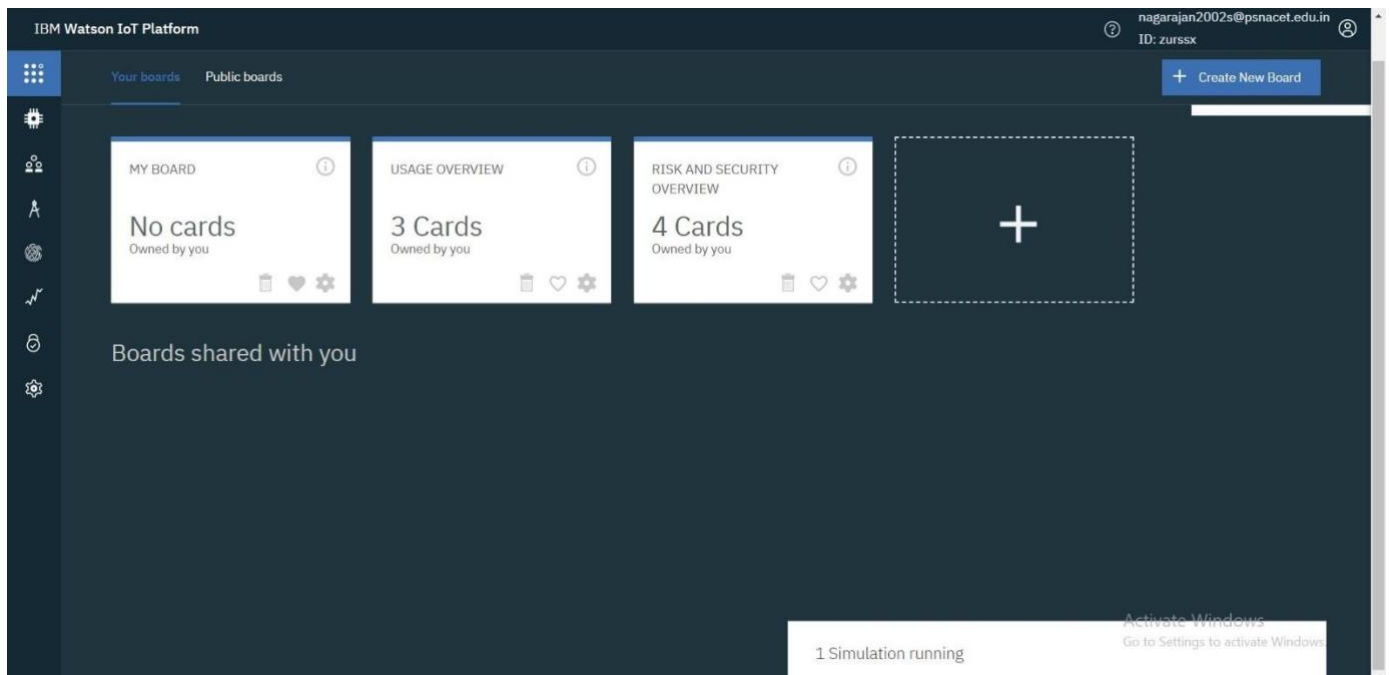




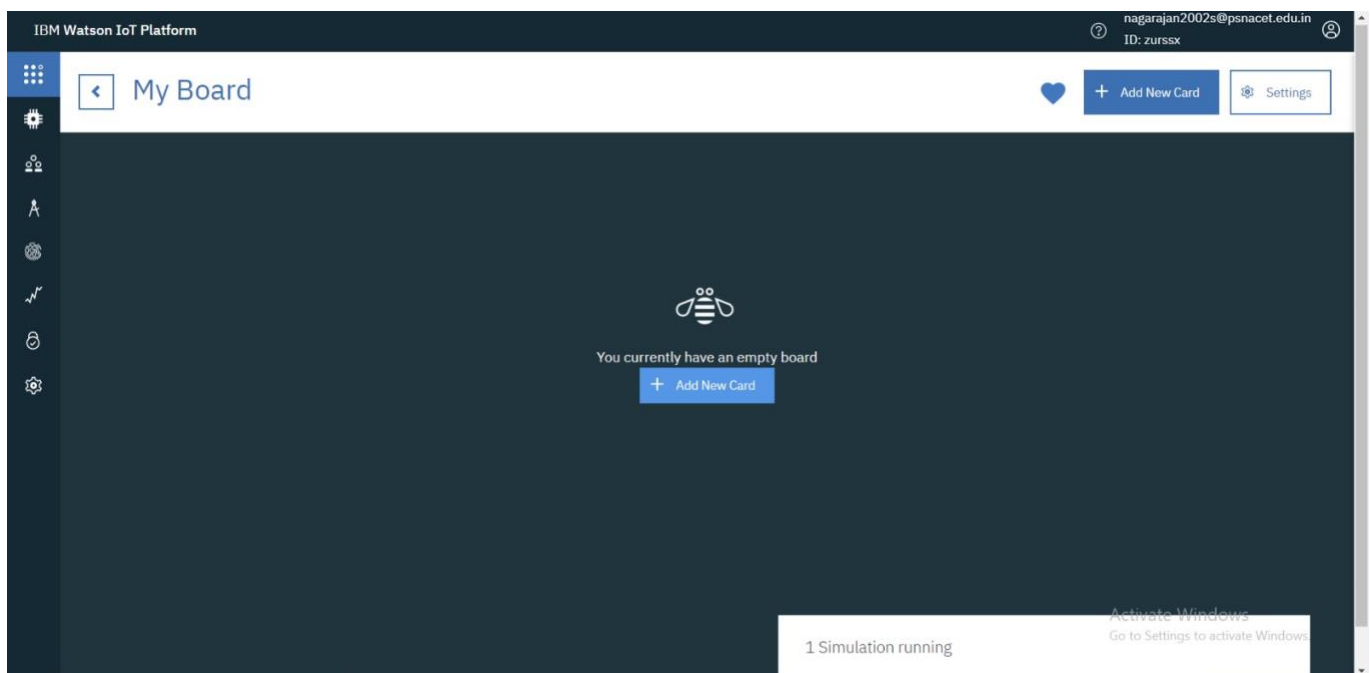
- Then click on Next you get the below window then again click on Submit



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

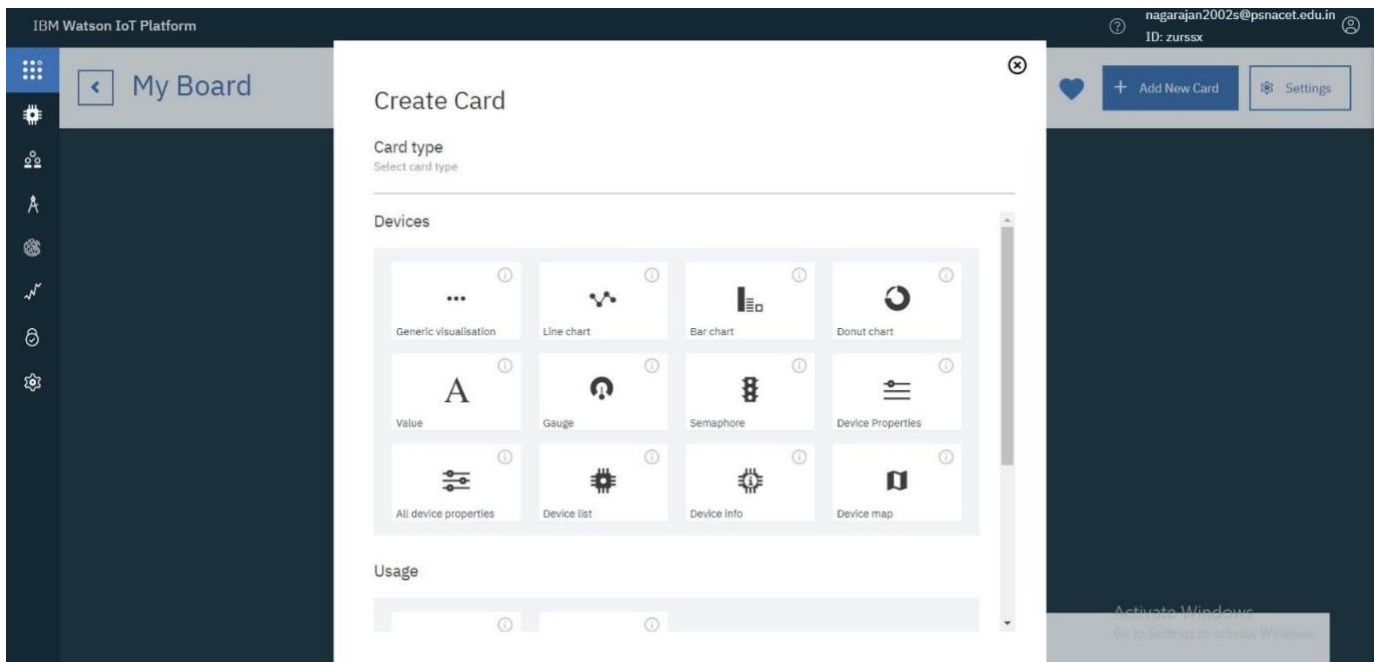


- Click on Add New Card

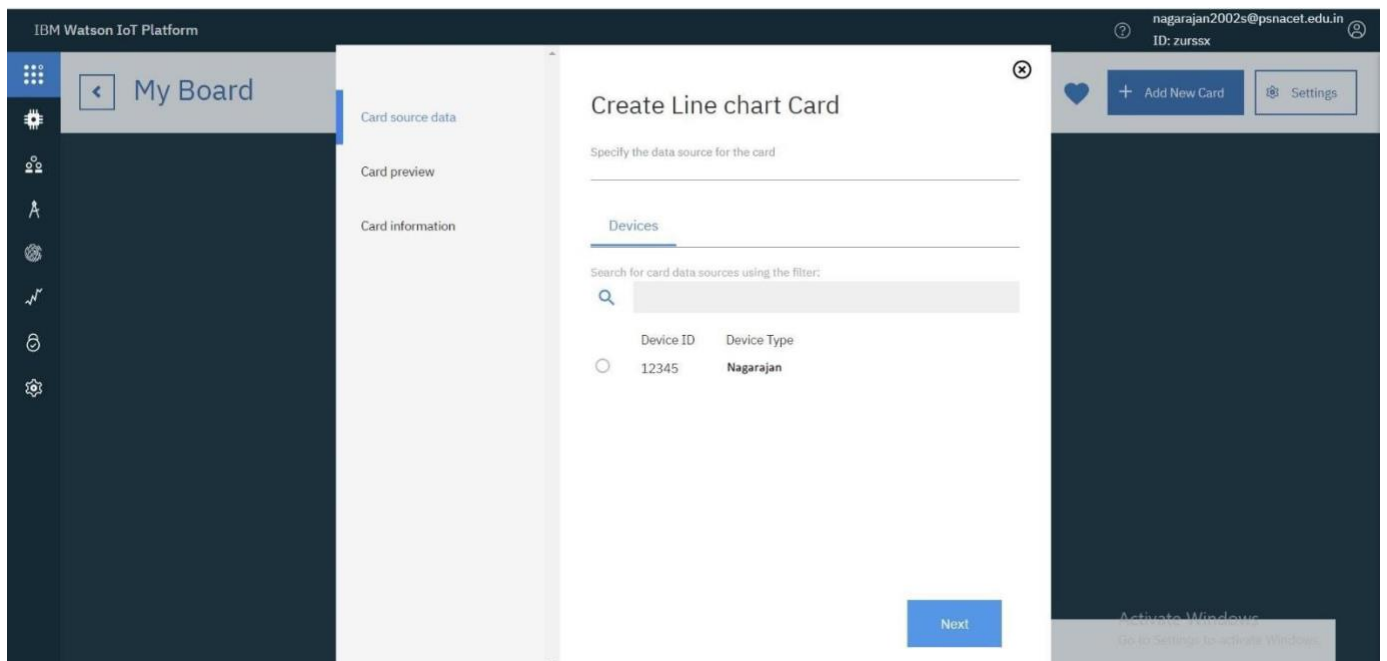


- Select the type of Graph u want accordingly and click next

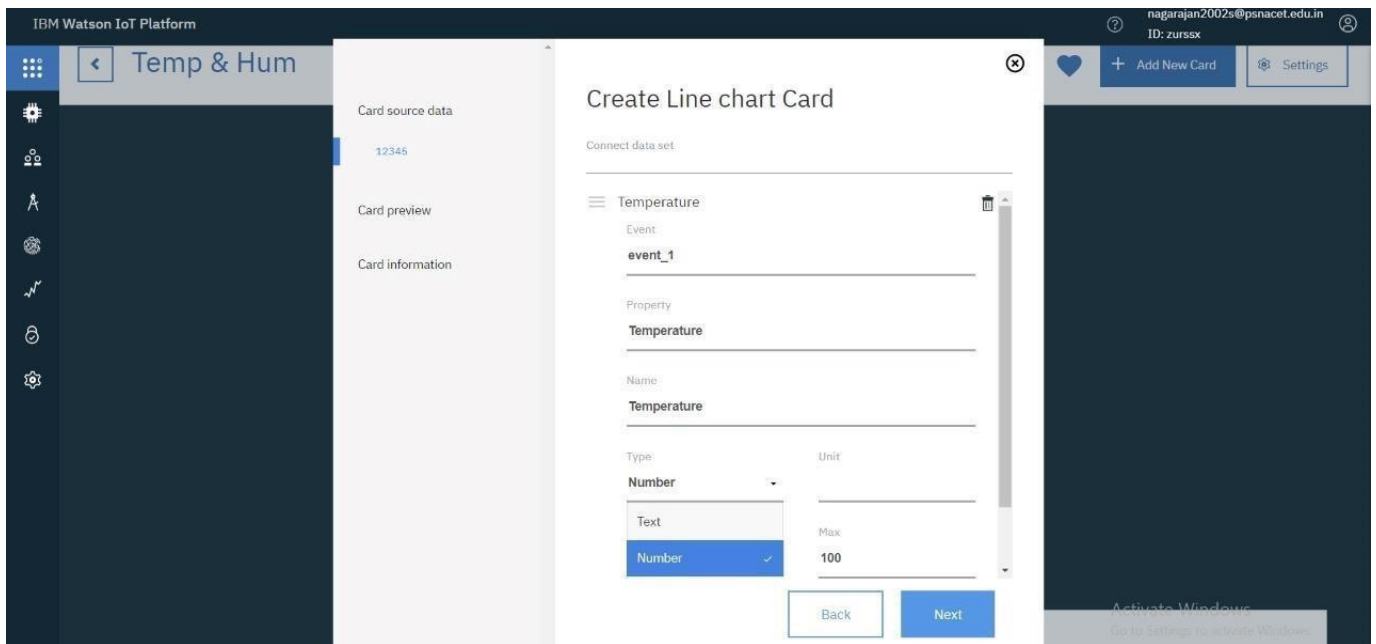




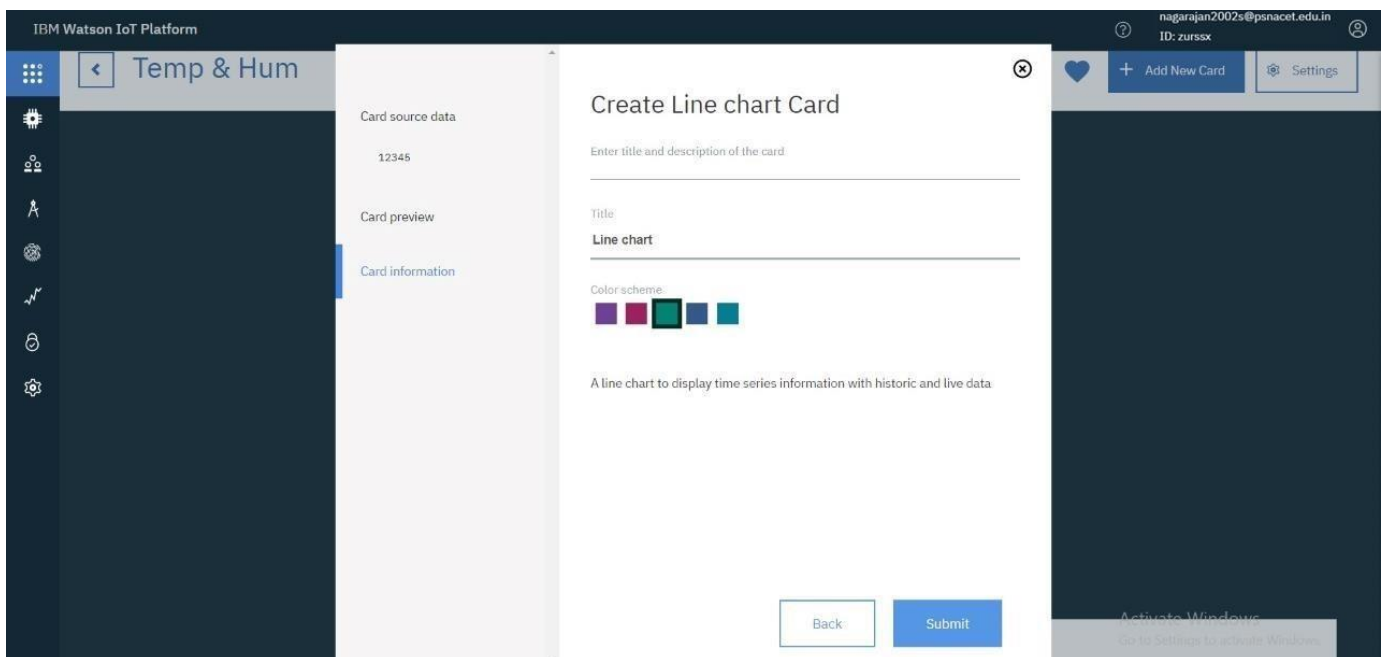
- You get the below window, choose the Device and click on Next.



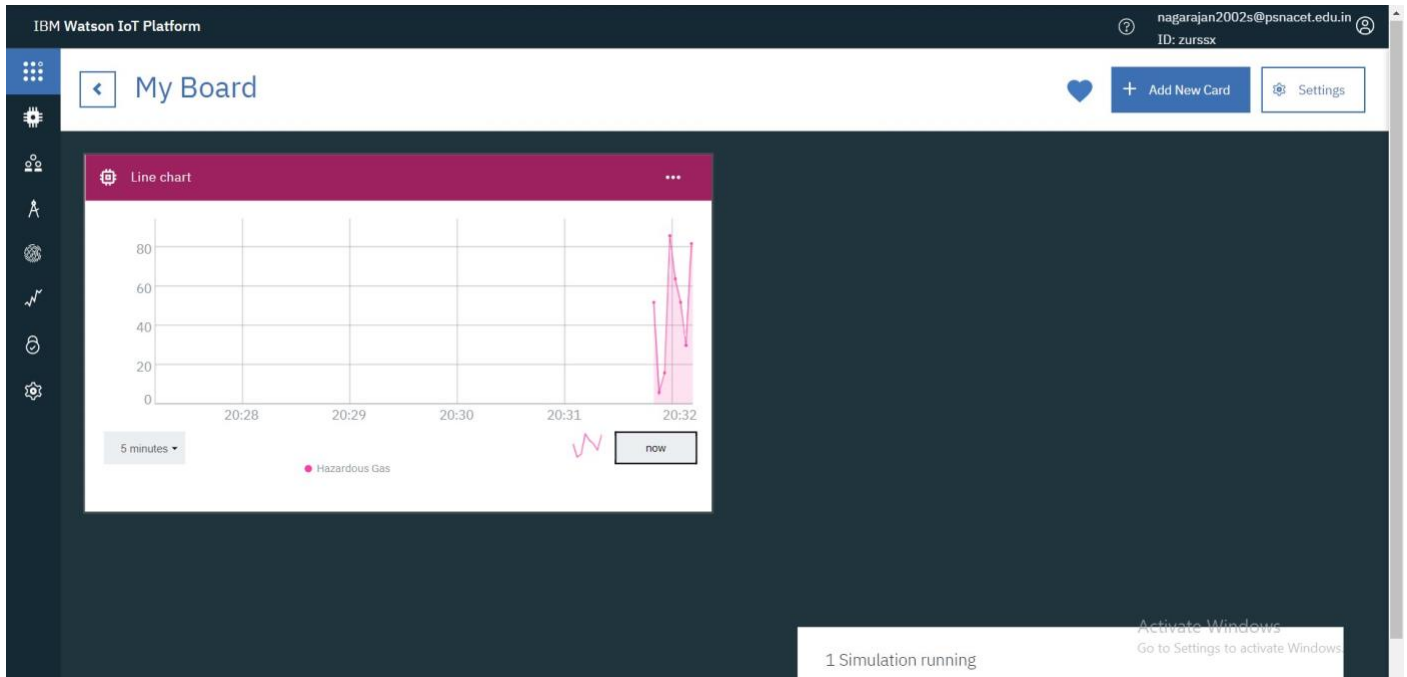
- Select the event, properly to be visualized on your graph and click next. In my case it is humidity



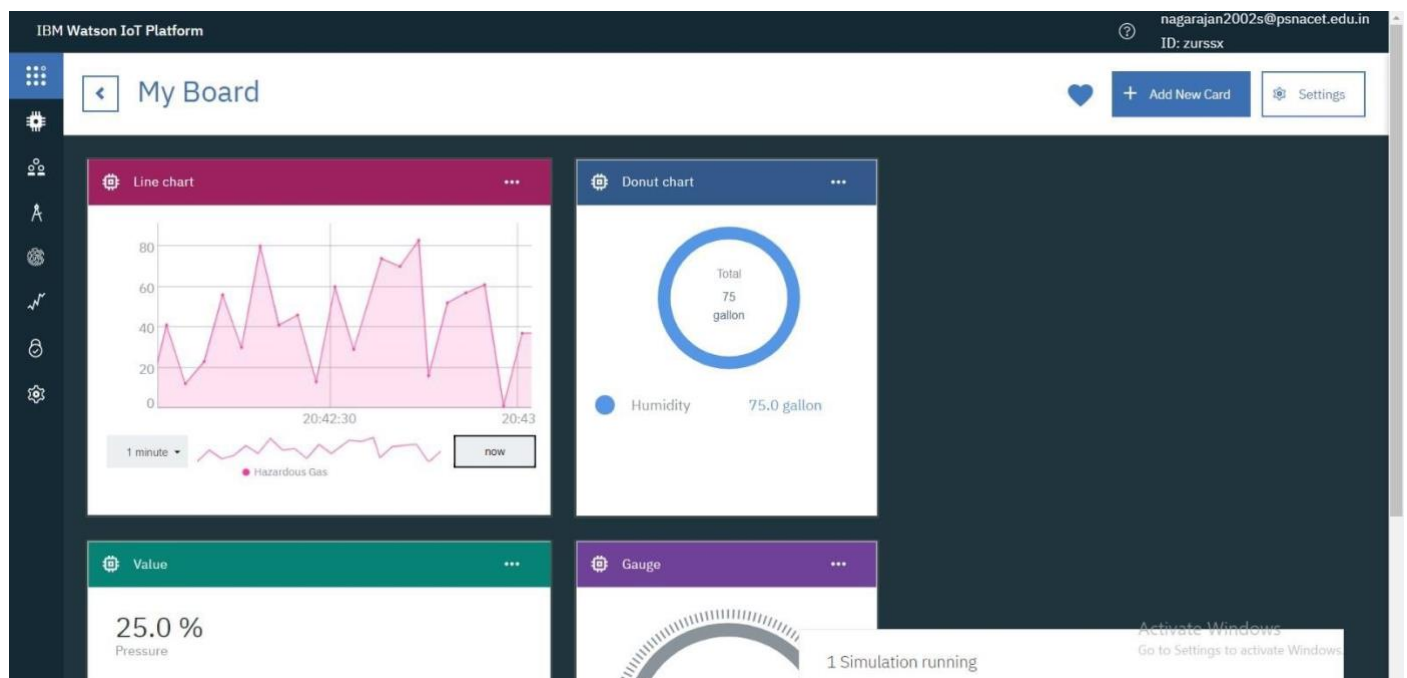
- Then select the size of the graph and color of the graph board you want and click next

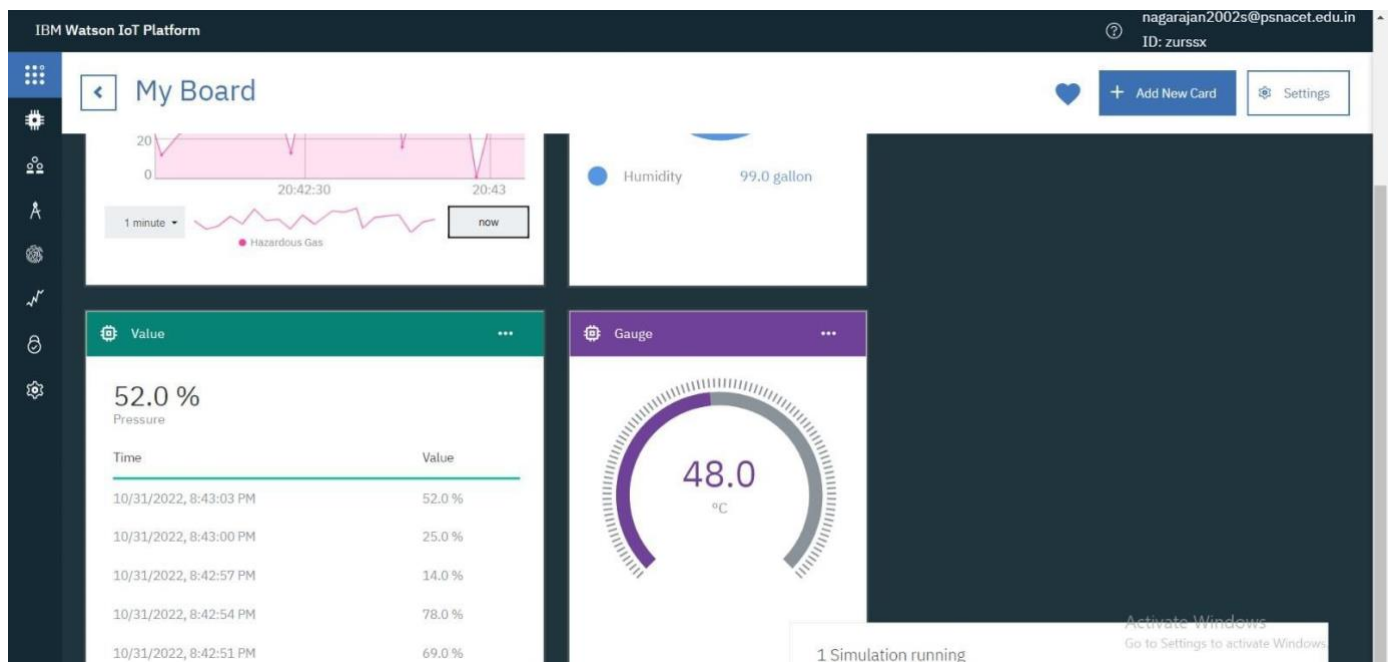


- Here is the graph



- 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.