

SENDING DATA FROM RASPBERRY-PI TO IBM WATSON

Date	31 October 2022
Team ID	PNT2022TMID27071
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

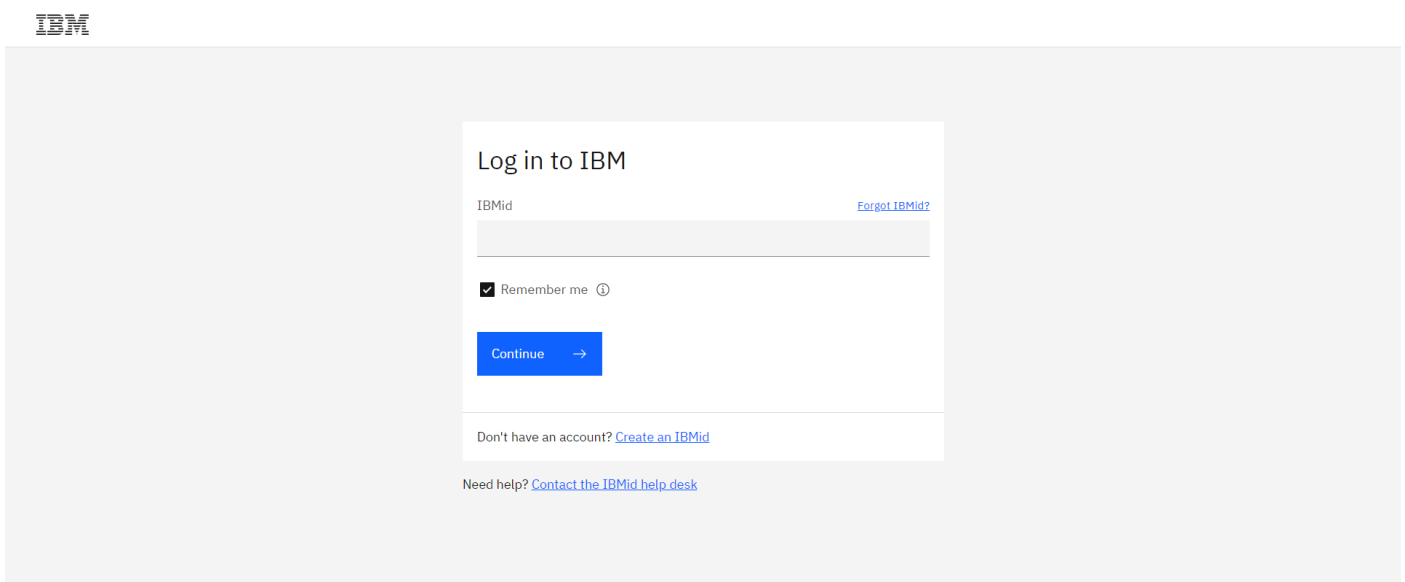
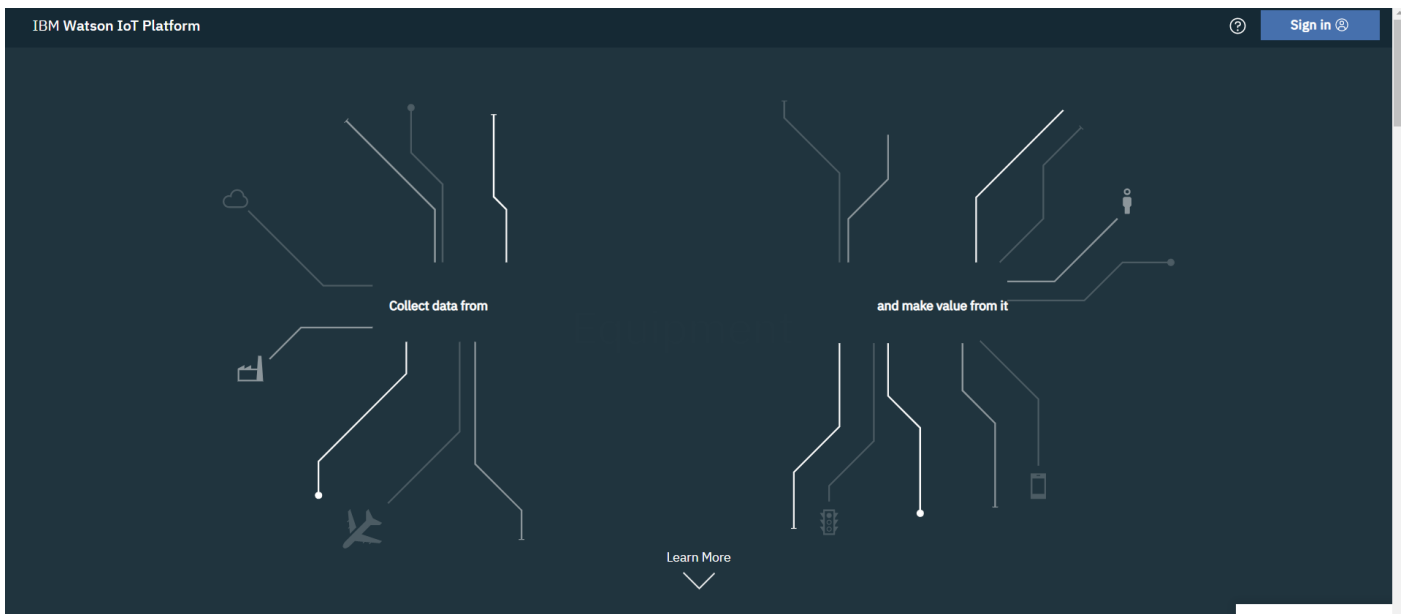
SOFTWARE:

- 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.





Log in to IBM

Logging in as 310819106044@smartinternz.com [Not you?](#)

Password

[Forgot password?](#)

☒ Remember me ⓘ

Log in →

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

Search resources and products...

Q

Catalog

Manage

Kumaran N T's Account

?

Q

Search the catalog...

Sell on IBM Cloud

Catalog settings

Category

^

Viewing 348 products

Alphabetically

☆ Recommended products (6)

📦 Compute (56)

📦 Containers (9)

🌐 Networking (30)

📦 Storage (24)

🧠 AI / Machine Learning (20)

📊 Analytics (26)

🔗 Blockchain (1)

🗄️ Databases (42)

🔧 Developer tools (48)

📊 Logging and monitoring (8)

🔄 Migration (8)

🔗 Integration (60)


🌐 Internet of Things (1)


🔒 Security (26)


📱 Mobile (1)


Type ⓘ


^


**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

**AnonTech ViziVault Platform**
By Anon Technology, Inc.
Manage personal information as-a-service safely, securely, and in compliance with data privacy regulations using ViziVault
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**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


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

**App Connect**
By IBM
Connect your applications, automate tasks, and improve productivity
Lite • Free • IBM supported

**App ID**
By IBM
User Authentication and User Profiles for your apps.
Lite • Free • EU Supported • Financial Services Validated • HIPAA Enabled • IAM-enabled • IBM supported

Activate Windows

Go to Settings to activate Windows.



➤ Check all details and click on create.

IBM Cloud

Search resources and products...

Q


Catalog

Manage

Kumaran N T's Account

?

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.

Type

Service

Provider

IBM

Updated on

08/15/2022

Category

Internet of Things

Compliance

IAM-enabled

Location

Frankfurt

London

Dallas

Washington DC

Related links

Docs

Terms

Create

About

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 Maximum of 500 application bindings Maximum of 200 MB of each of data exchanged, data analyzed and edge data analyzed	Free

The Lite service plan for Internet of Things Platform includes up to 500 registered devices, and a maximum of 200 MB each of data exchanged, data analyzed, and edge data analyzed per month.

Summary

Internet of Things Platform Free

Location: Frankfurt

Plan: Lite

Service name: Internet of Things Platform-ea

Resource group: Default

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

Create

Activate Windows

Go to Settings to activate Windows.

Add to estimate

➤ click on Launch

IBM Cloud

Search resources and products...

Q

Catalog

Manage

Kumaran N T's Account

?

Resource list /

Internet of Things Platform-c2

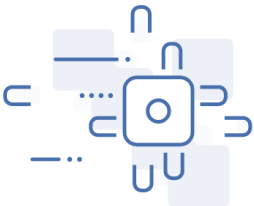
Active Add tags

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

The Lite service plan provides a lightweight development environment to get you started with the connectivity capabilities of Watson IoT Platform.

- Free
- 200 MB data-transfer limit

Non-Production

The Non-Production service plan is a full-featured, fully-integrated offering that enables you to explore Watson IoT Platform to see how the service can fit into your IoT environment.

- Starts at \$500 per month
- Capacity limit based on device type

Production

The Production service is a fully managed SaaS offering that enables you to manage and analyze enterprise IoT data.

- Includes IBM Service & Support
- Pricing based on number of devices per

Activate Windows

Go to Settings to activate Windows.

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

IBM Watson IoT Platform

310819106044@smartinternz.com
ID: yf0dy

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 ☐ Filter

<input type="checkbox"/>	Device ID	Status	Device Type	Class ID	Date Added	Descriptive Location
<p>You don't have any devices.</p> <p>Create a device.</p>						

Activate Windows
Go to Settings to activate Windows.

- After click on Add device this page will open

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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: Select or create a device type...

Device ID: Enter Device ID

Cancel Next

Browse Devices

All Devices Diagnose

Activate Windows
Go to Settings to activate Windows.

- Go to device type and fill the details.

The screenshot shows the 'Add Type' dialog in the IBM Watson IoT Platform. The 'Identity' tab is active, indicated by a blue circle and the word 'Identity' below it. A progress bar at the top shows the 'Identity' step as complete and the 'Device Information' step as pending. The dialog contains the following fields:

- Type:** A dropdown menu with 'Device' selected. An 'Or' separator is followed by a 'Gateway' button.
- Name:** A text input field containing 'Kumaran'. Below the field is a note: '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:** An empty text input field.

At the bottom right of the dialog are 'Cancel' and 'Next' buttons. An 'Activate Windows' watermark is visible in the bottom right corner of the screenshot.

Device Types

- Click on Finish

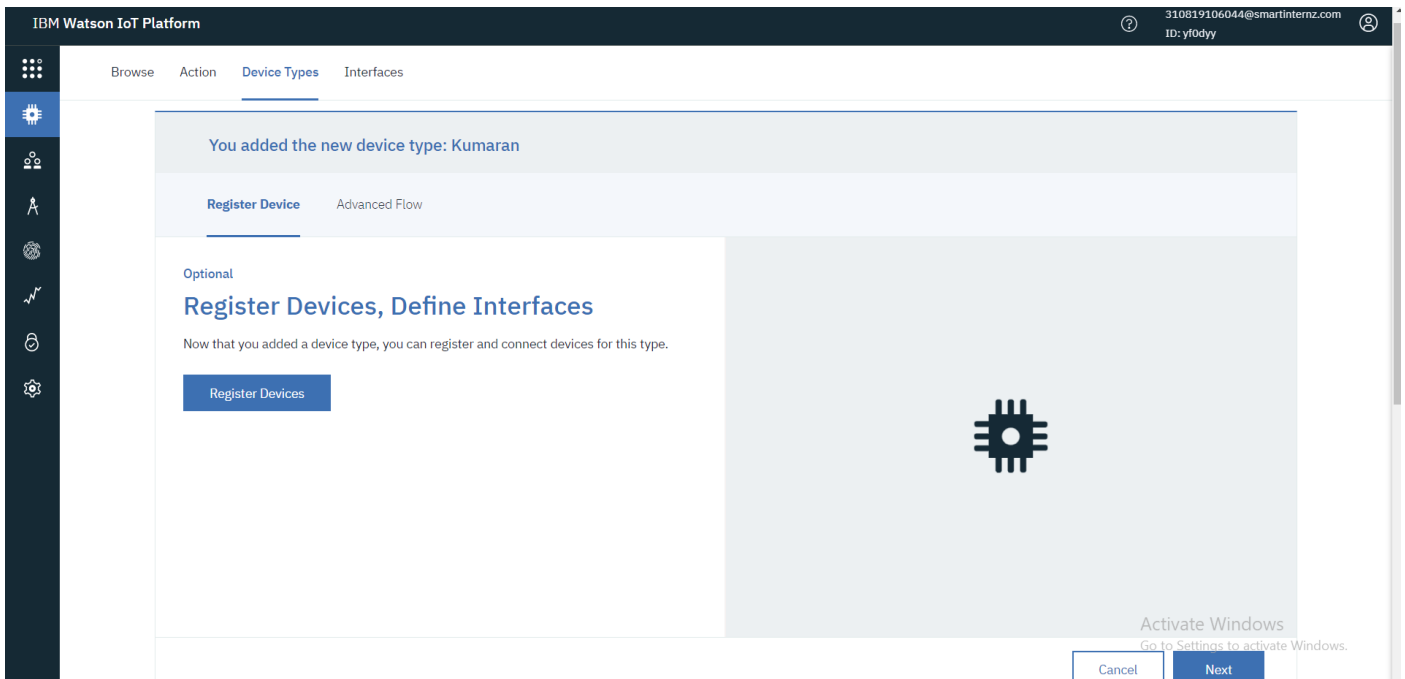
The screenshot shows the 'Add Type' dialog in the IBM Watson IoT Platform, now on the 'Device Information' tab. The 'Identity' tab is marked as complete with a checkmark, and the 'Device Information' tab is active with a blue circle. A note states: 'These attributes will be used as a template for new devices that are assigned this device type'. An 'Edit Metadata' link is in the top right. The dialog is divided into two columns of input fields:

Attribute	Input Field
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

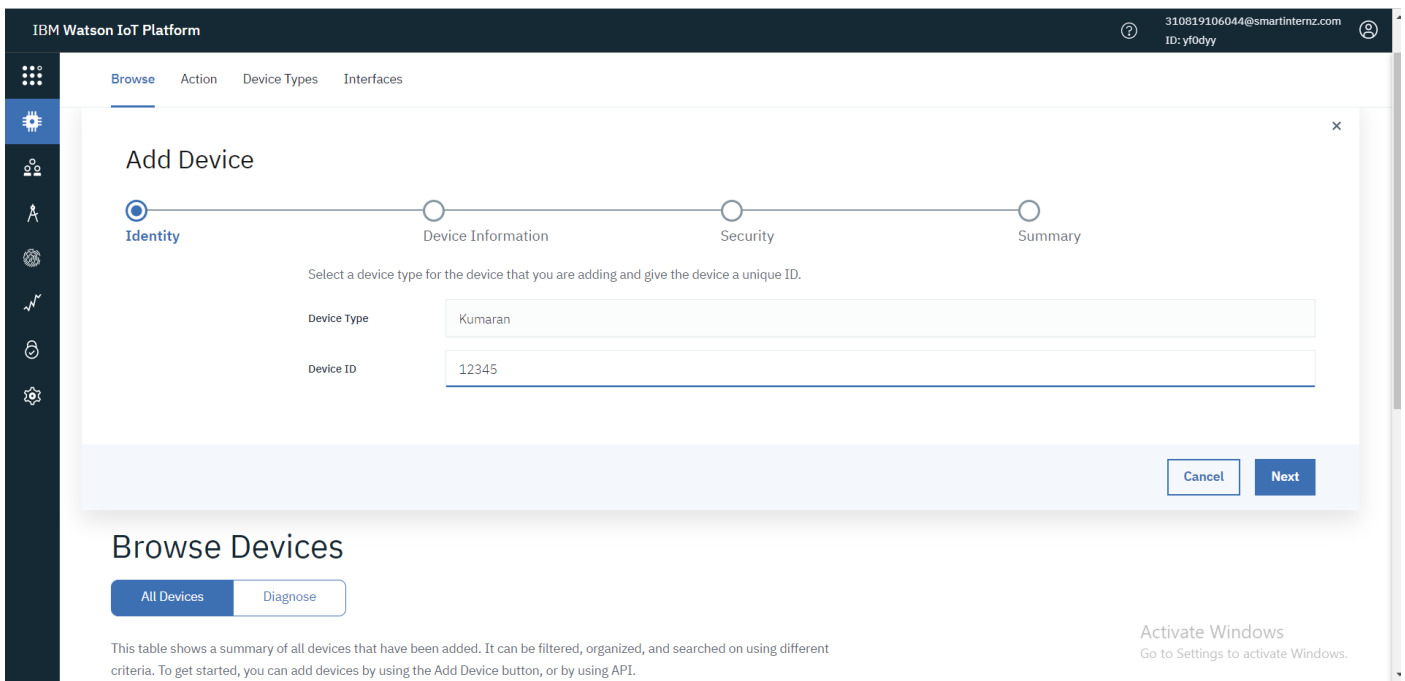
At the bottom right of the dialog are 'Back' and 'Finish' buttons. An 'Activate Windows' watermark is visible in the bottom right corner of the screenshot.

Device Types

- 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' form in the IBM Watson IoT Platform. The form is titled 'Add Device' and has a progress bar with four steps: Identity (checked), Device Information (active), Security, and Summary. The 'Device Information' step is active, and the form contains several input fields for device details. A 'Back' button is visible at the bottom right, and a 'Next' button is also present. The form is set against a light blue background with a dark blue header and sidebar.

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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	<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"/>

[Add Metadata +](#)

[Back](#) [Next](#)

Activate Windows
Go to Settings to activate Windows.

➤ Click on Next

The screenshot shows the 'Add Device' form in the IBM Watson IoT Platform, specifically the 'Security' step. The progress bar shows 'Identity' and 'Device Information' as completed steps, 'Security' as the current step, and 'Summary' as the next step. The 'Security' step is active, and the form contains two main sections: 'Auto-generated authentication token (default)' and 'Self-provided authentication token'. The 'Auto-generated authentication token' section explains that the service will generate a token for the user, which is 18 characters long and contains a mix of alphanumeric characters and symbols. The 'Self-provided authentication token' section 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. A text input field for the 'Authentication Token' is provided, with a placeholder 'Enter an optional token' and a help icon. Below the input field, there is a note that tokens cannot be recovered and are encrypted before being stored. A 'Back' button is visible at the bottom right, and a 'Next' button is also present. The form is set against a light blue background with a dark blue header and sidebar.

IBM Watson IoT Platform

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ID: yf0dyd

Browse Action Device Types Interfaces

Identity Device Information Security Summary

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

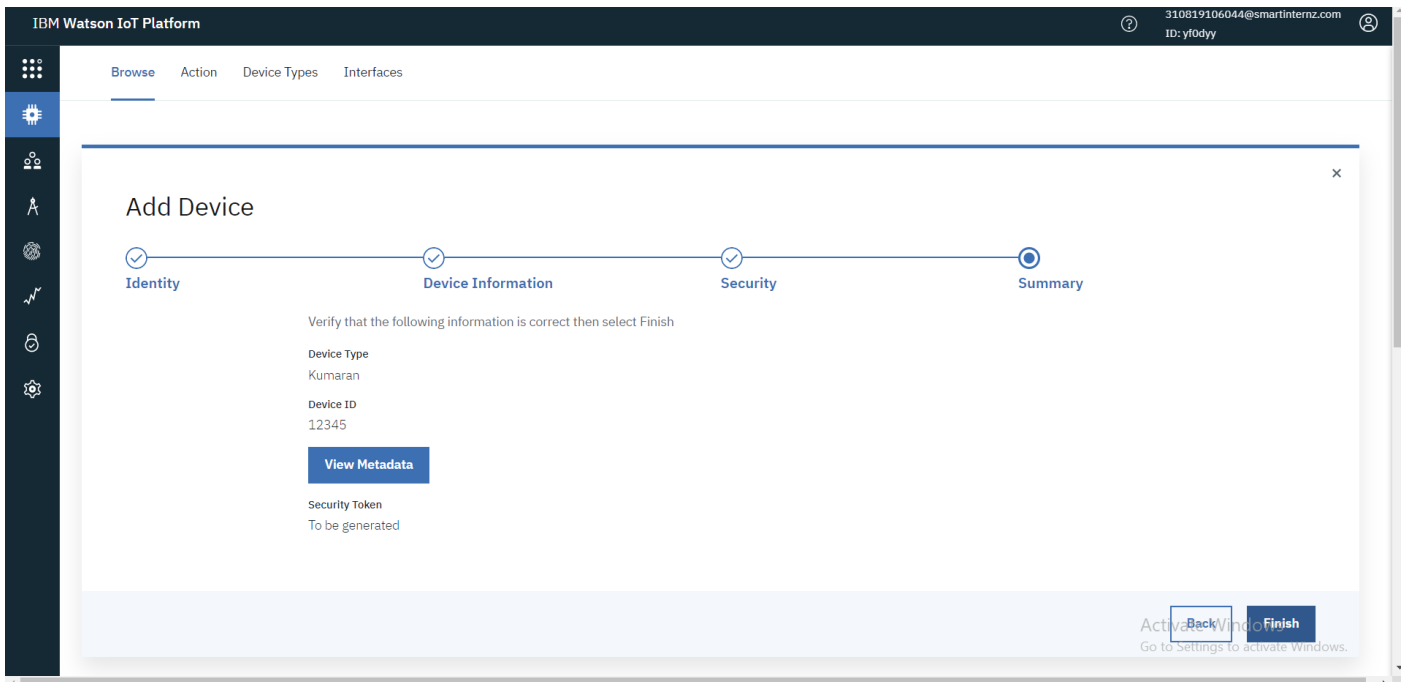
Make a note of the generated token. Lost authentication tokens cannot be recovered. Tokens are encrypted before being stored.

Authentication token are encrypted before we store them.

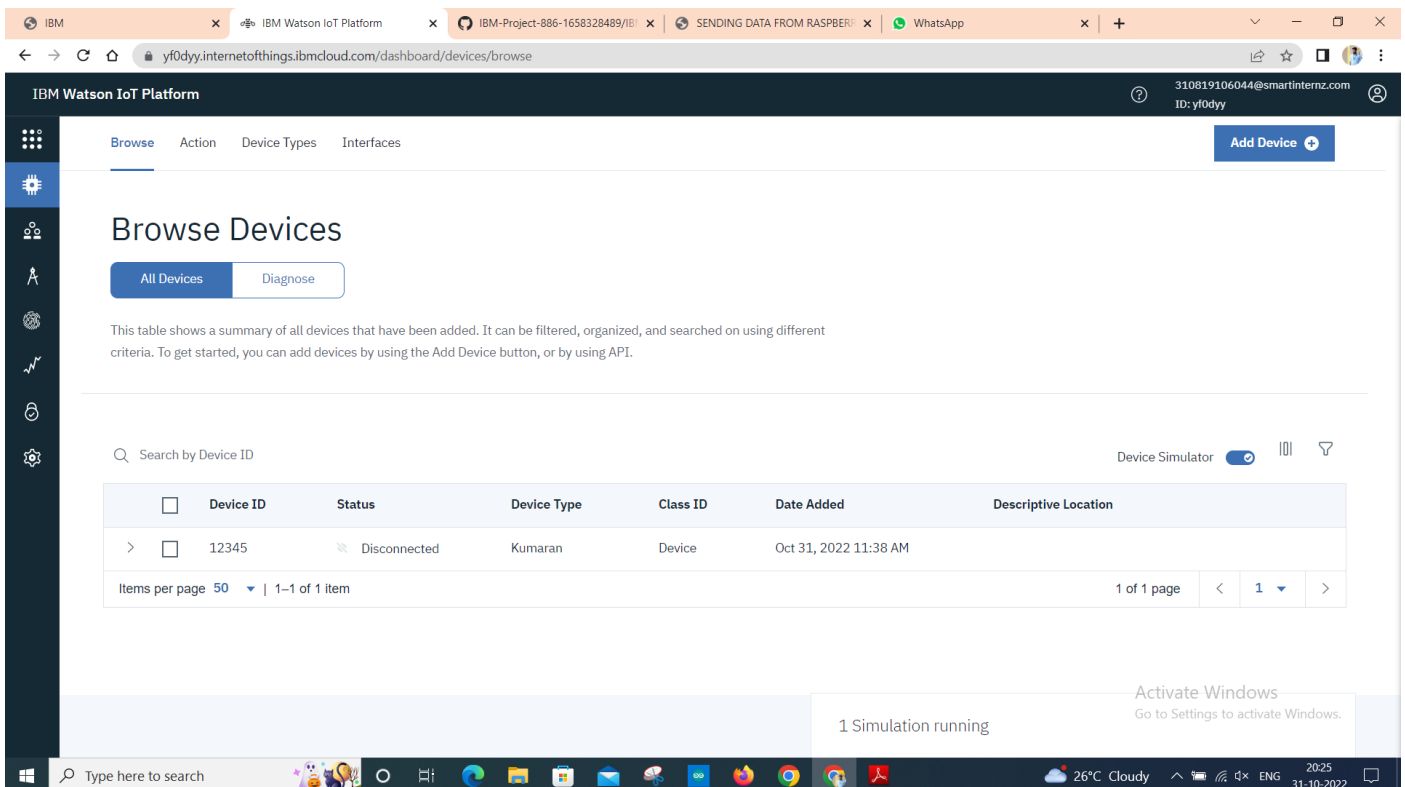
[Back](#) [Next](#)

Activate Windows
Go to Settings to activate Windows.

➤ 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 (0.84k) [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
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
100 690  0 690  0  0 457  0 --:--:--  0:00:01 --:--:-- 457
100 110k 100 110k  0  0 20117  0 0:00:03 0:00:03 --:--:-- 48190
pi@raspberrypi:~$ sudo dpkg -i iot_1.0-2_armhf.deb
(Reading database ... 115606 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 - 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[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% |#####| 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-py3-none-any.whl
Collecting paho-mqtt<=1.2 (from ibmiotf)
  Downloading paho-mqtt-1.3.1.tar.gz (60kB)
    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<=0.10.2 (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 (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 1.6MB/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/bbc3ad957e82f7b71ba80e316d65a83d9d735a6d12e6c0418
Running setup.py bdist_wheel for dicttoxml ... done
Stored in directory: /home/pi/.cache/pip/wheels/45/62/59/96910b33ec6a72ae66a13765401b50def5468024078e12cce
Running setup.py bdist_wheel for paho-mqtt ... done
Stored in directory: /home/pi/.cache/pip/wheels/20/08/0d/acdc8f289011b7be7d71deebef0642fb83be0313dfff0493
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 xmldo
ict-0.11.0
pi@raspberrypi:~$
```

- ```
File Edit Shell Debug Options Window Help
Python 2.7.13 (default, Jan 19 2017, 14:48:08)
[GCC 6.3.0 20170524] 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 = 29 C Humidity = 50 % to IBM Watson
Published Temperature = 29 C Humidity = 50 % to IBM Watson
|
```

➤ 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.

IBM Watson IoT Platform

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ID: yf0dy

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.

Q

Search by Device ID

Device Simulator

|   | Device ID         | Status                   | Device Type | Class ID | Date Added            | Descriptive Location |
|---|-------------------|--------------------------|-------------|----------|-----------------------|----------------------|
| > | <div></div> 12345 | <div></div> Disconnected | Kumaran     | Device   | Oct 31, 2022 11:38 AM |                      |

Items per page 50

1-1 of 1 item

1 of 1 page

<

1

>

1 Simulation running

Activate Windows

Go to Settings to activate Windows.

- 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 icons for various functions. The main content area shows a table of devices with columns: Device ID, Status, Device Type, Class ID, Date Added, and Descriptive Location. The device with ID 12345 is selected, and its details are shown in a modal window. The modal has tabs for 'Identity', 'Device Information', 'Recent Events', 'State', and 'Logs'. The 'Recent Events' tab is active, showing a list of events with columns: Event, Value, Format, and Last Received. The events are listed as 'event\_1' with various JSON values, all received 'a few seconds ago'.

| 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 IBM Watson IoT Platform interface for the 'Your boards' section. The top navigation bar includes 'Your boards' and 'Public boards'. A sidebar on the left contains icons for various functions. The main content area shows two boards: 'USAGE OVERVIEW' and 'RISK AND SECURITY OVERVIEW'. The 'USAGE OVERVIEW' board has 3 cards and is owned by the user. The 'RISK AND SECURITY OVERVIEW' board has 4 cards and is also owned by the user. A large dashed box with a plus sign indicates a placeholder for a new board. Below the boards, there is a section titled 'Boards shared with you'. At the bottom right, there is a notification that says '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.

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ID: yf0dy

+

 Create New Board

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

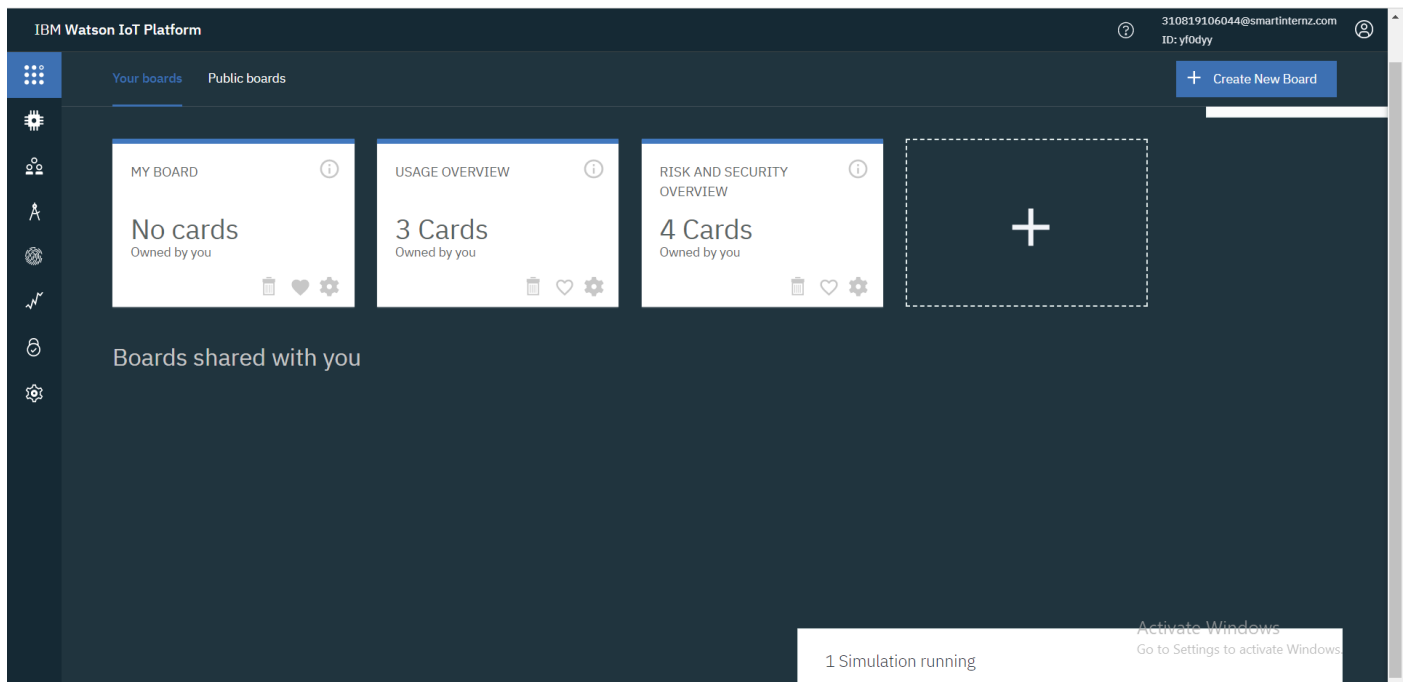
IBM Watson IoT Platform

310819106044@smartinternz.com  
ID: yf0dy

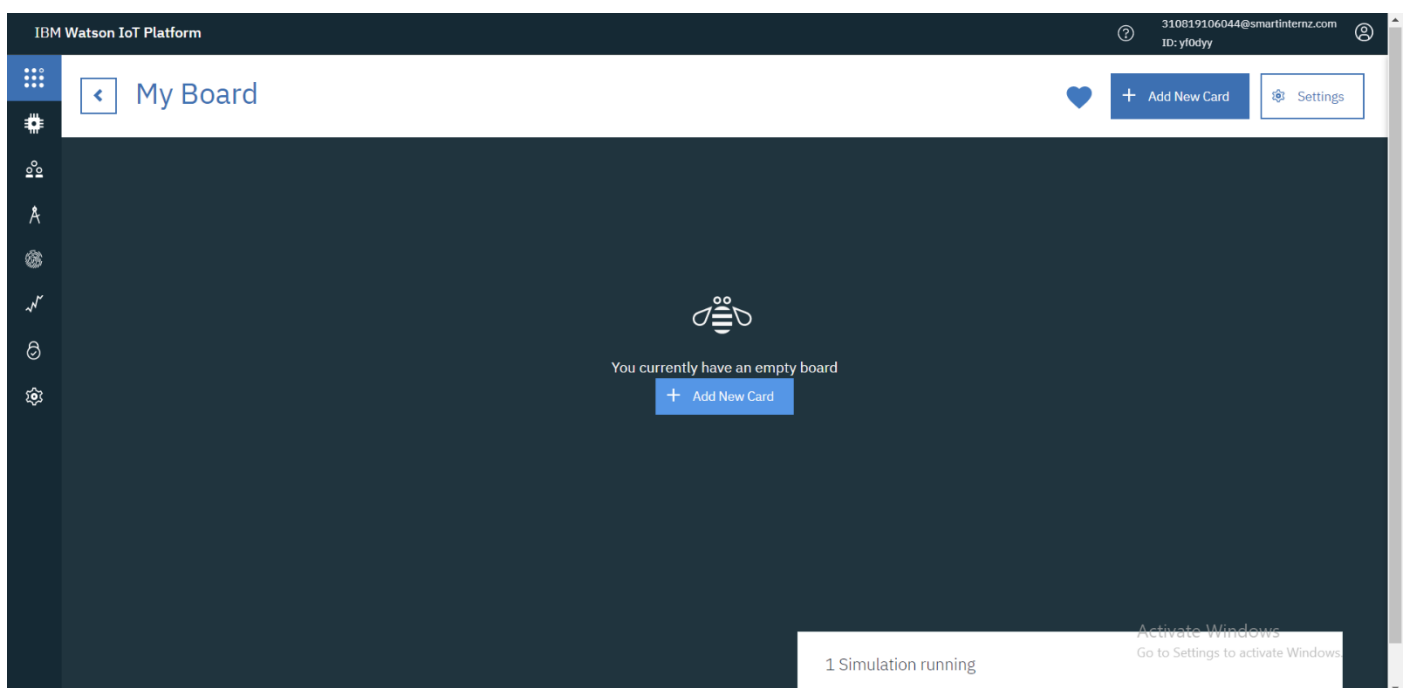
+

 Create New Board

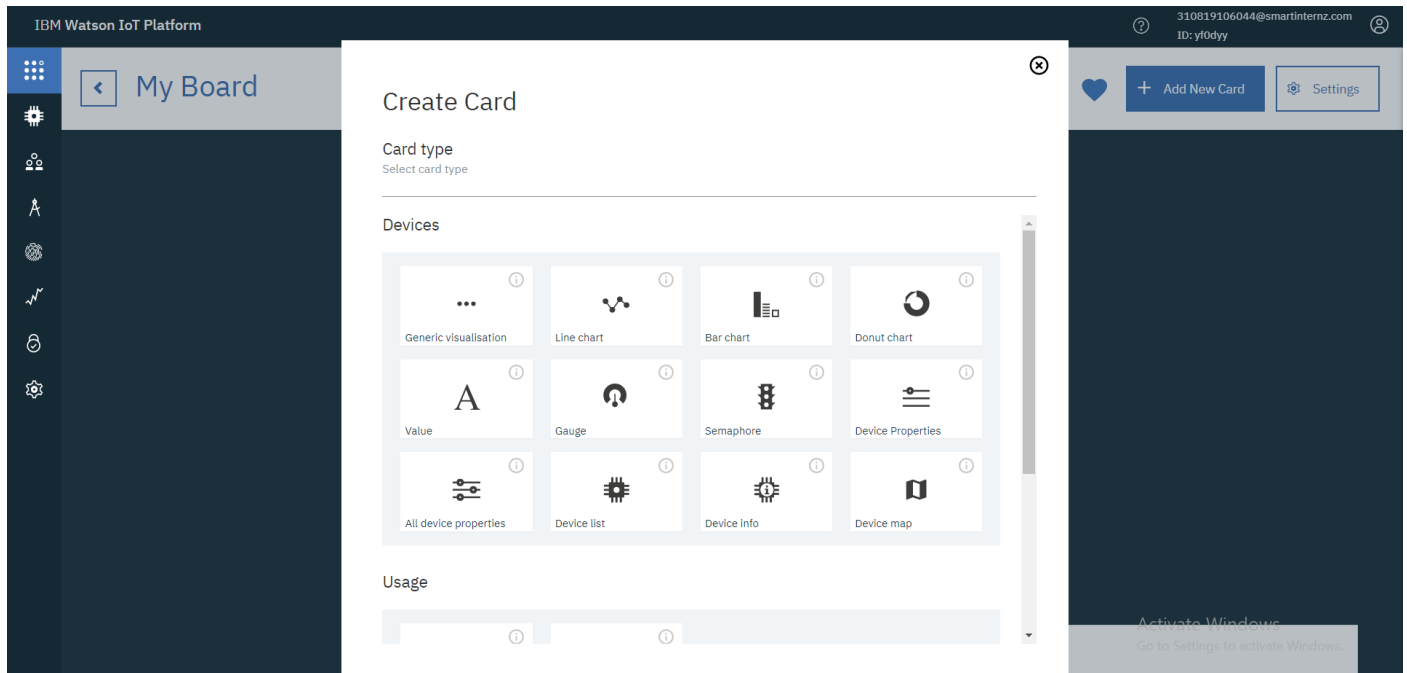
- Then double click on your boards name which you have created.



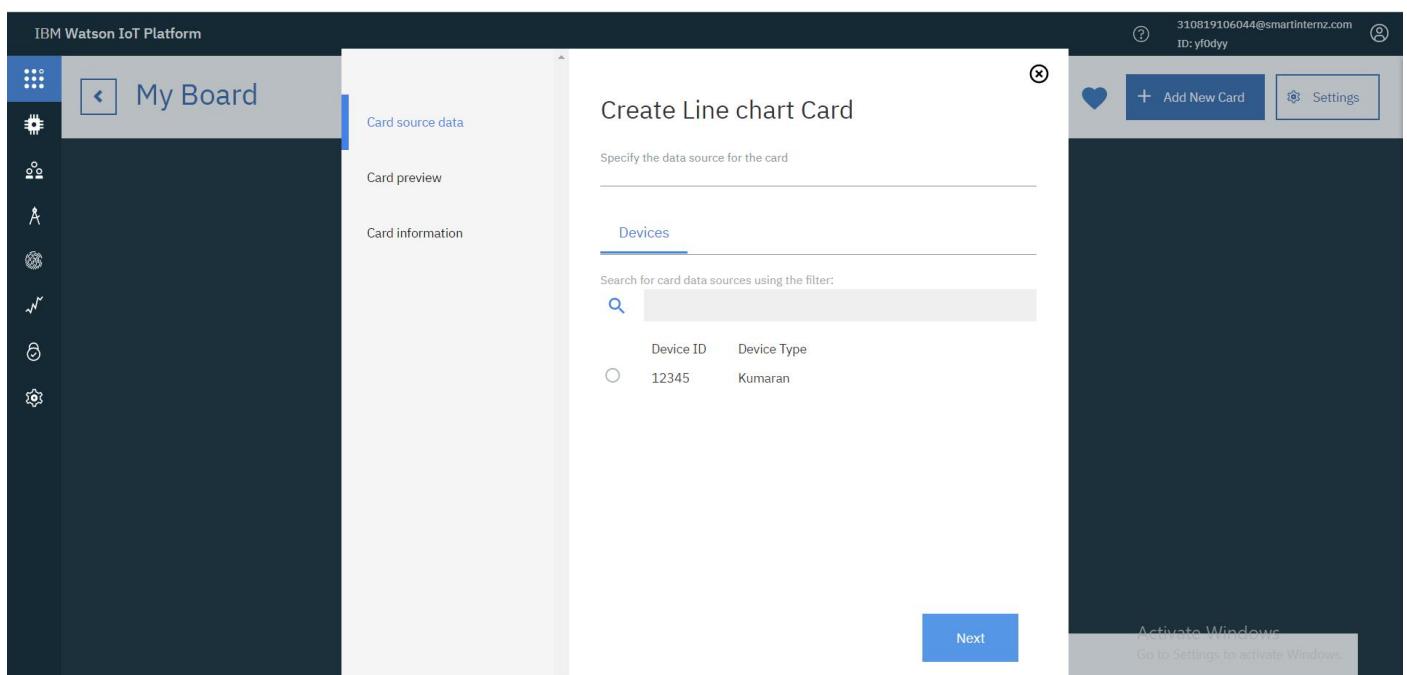
- Click on Add New Card



- 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

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

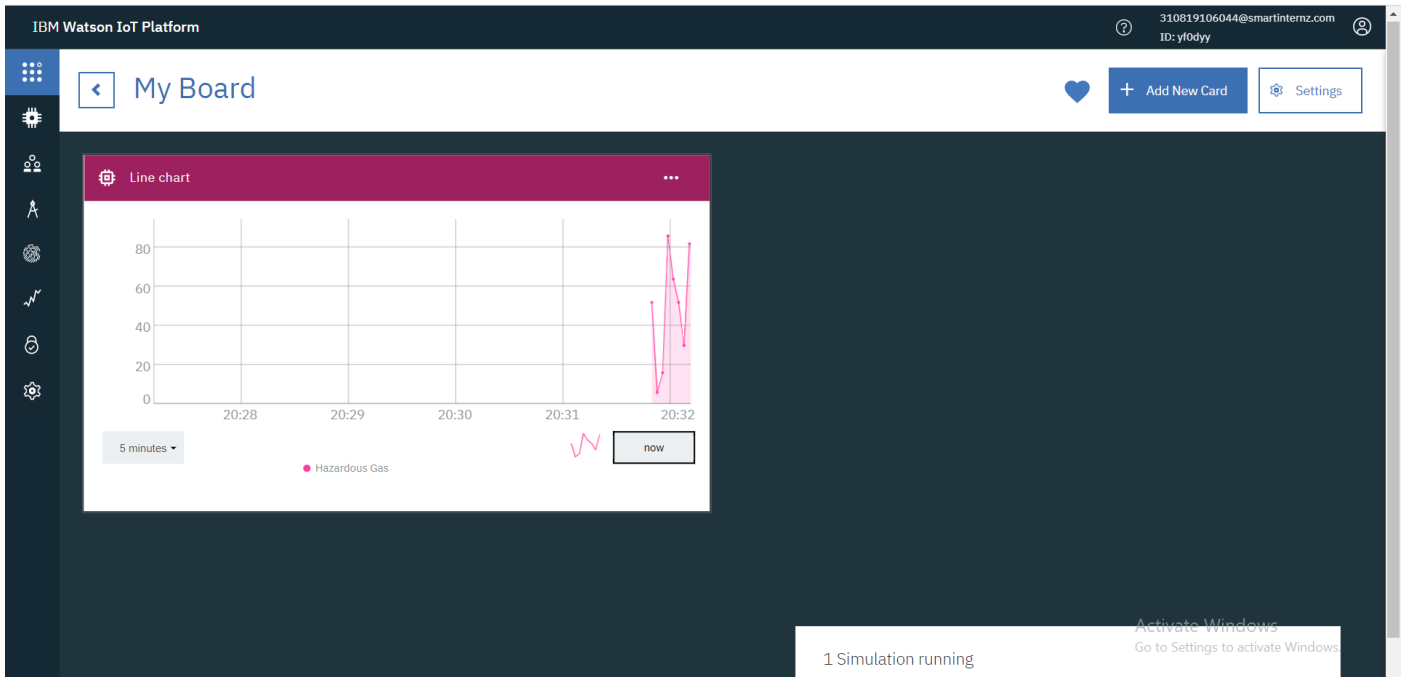
Color scheme

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

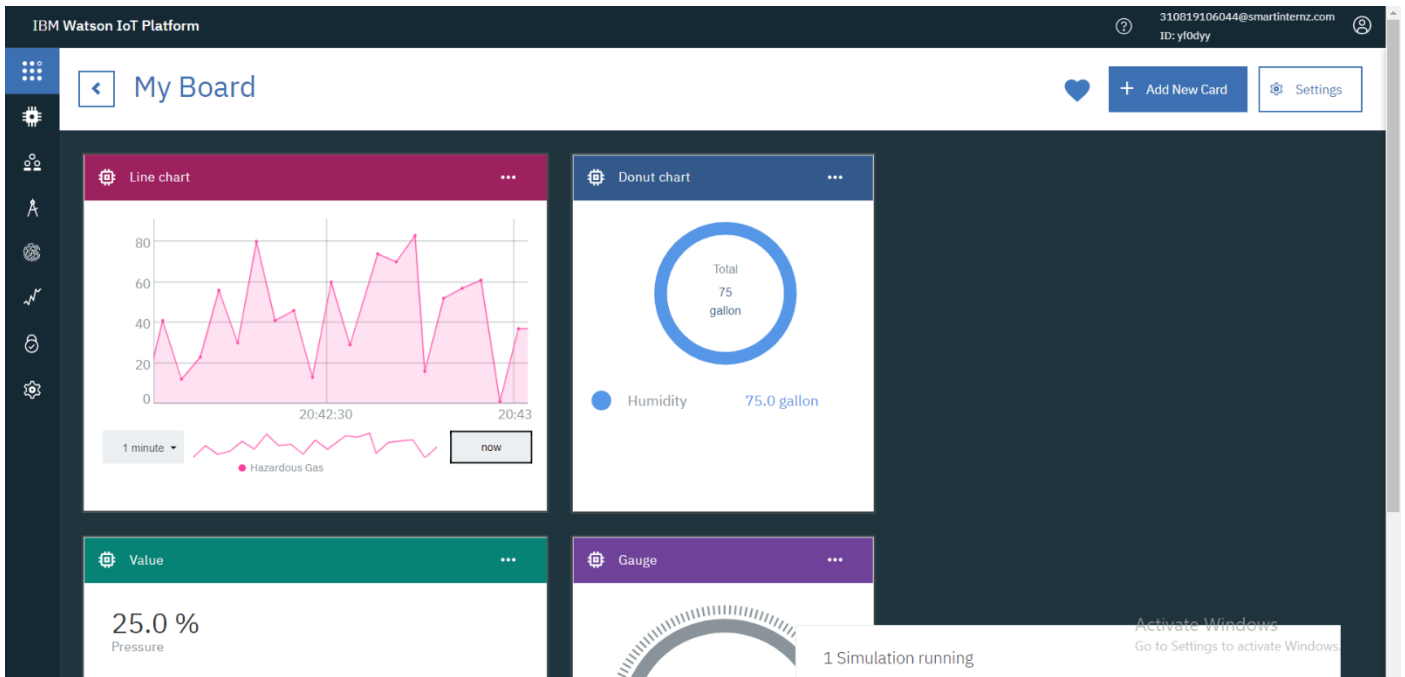
Back Submit

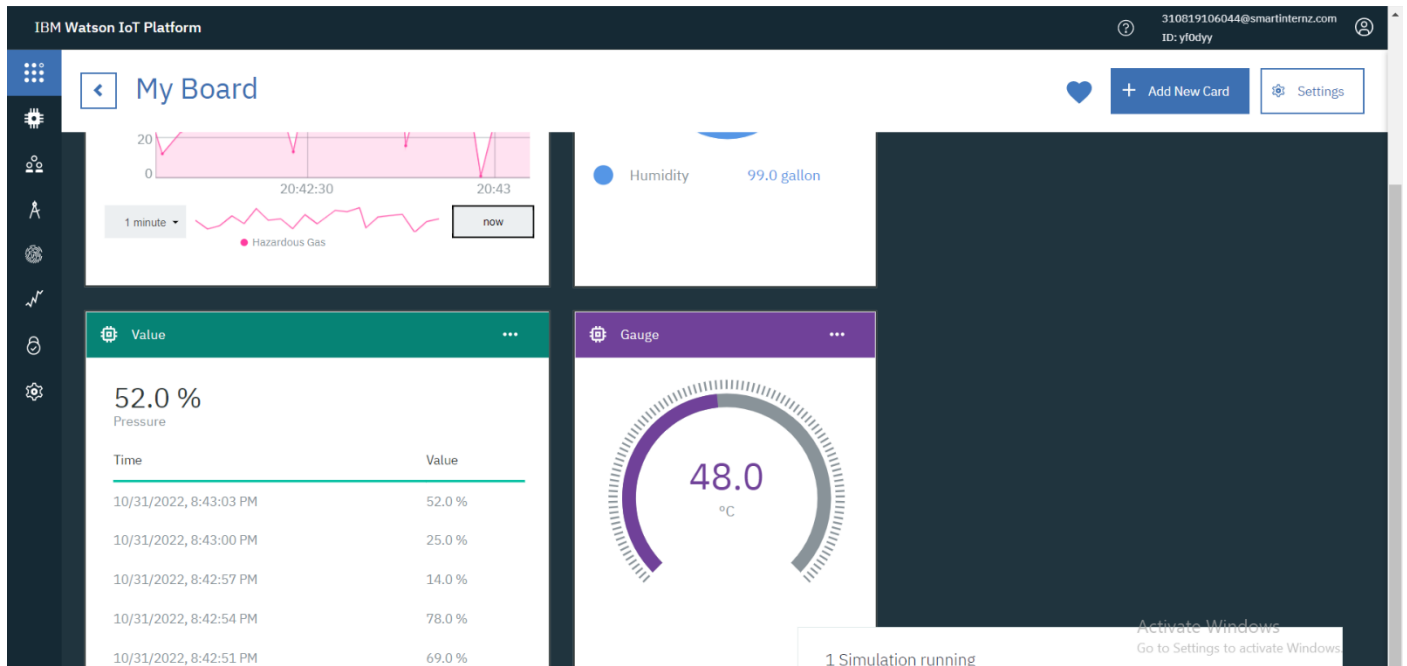


➤ Here is the graph



➤ 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.