

SENDING DATA FROM RASPBERRY-PI TO IBM WATSON

Date	31 October 2022
Team ID	PNT2022TMID17245
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: Open IBM cloud and login into your account



Log in to IBM Cloud

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

Sign in with

IBMid



username@example.com

Continue



[Forgot ID?](#)



Remember ID

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

IBM Cloud

Search resources and products...

Q Catalog Manage SANJAI KUMAR V's Ac...

?

Dashboard

Edit dashboard Upgrade account Create resource

For you

Select an option

Build

Explore IBM Cloud with this selection of easy starter tutorials and services.

Explore IBM Cloud Shell

Try a command-driven approach for creating, developing, and deploying a web project.

Getting started 2 min

Create and deploy an application

Browse our starter kits, and then select one to jump start the process to create and deploy your app.

Getting started 5 min

Visit the IBM Cloud catalog

Explore our unique product catalog that contains 190+ services and software for your business solutions.

Getting started 1 min

Build a web app with Watson Speech to Text

Deploy a conversational interface compatible with any application, device, or channel.

Getting started 15 min

Get started with Watson Discovery

Get up to speed on Watson Discovery with step-by-step tutorials, deep-dive videos, and complete examples of working code.

Recommended 2 hr

News

View all

Unified Key Orchestrator Now Supports Easy Multicloud Key Management for Google KMS

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IBM Cloud status

View all

https://cloud.ibm.com/catalog IBM Cloud Pak for Network

- Check all details and click on create.

IBM Cloud

Search resources and products...

Q

Catalog

Manage

SANJAI KUMAR V's Ac...

?

Q

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 (10)

Internet of Things (1)

Security (25)

Mobile (1)

Type

All

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

App Configuration

By IBM

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

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Bare Metal Servers for Classic

Bare Metal Servers for VPC

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

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

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

Block Storage

- Tick agreements and then click on create.

IBM Cloud

Search resources and products...

Q

Catalog

Manage

SANJAI KUMAR V's Ac...

?

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

London

Dallas

Washington DC

Related links

Docs

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

Summary

Internet of Things Platform

Free

Location: Frankfurt

Plan: Lite

Service name: Internet of Things Platform-yb

Resource group: Default

!

Existing Lite plan instance

You can have only 1 Lite plan instance of this service per resource group. [Delete](#) your current Lite plan instance in Default resource group to create a new one, or [view the existing instance.](#)

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

Create

Add to estimate

- Click launch

IBM Cloud Search resources and products... Catalog Manage SANJAI KUMAR V's Ac...

Resource list / Internet of Things Platform-gb 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.

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.

Production

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

○ Login into IBM Watson IOT platform

IBM Watson IoT Platform Sign in

Collect data from

Cars

and make value from it

Learn More

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



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Log in to IBM

Logging in as 310819106071@smartinternz.com Not you?

Password

[Forgot password?](#)

☐ Remember me ⓘ

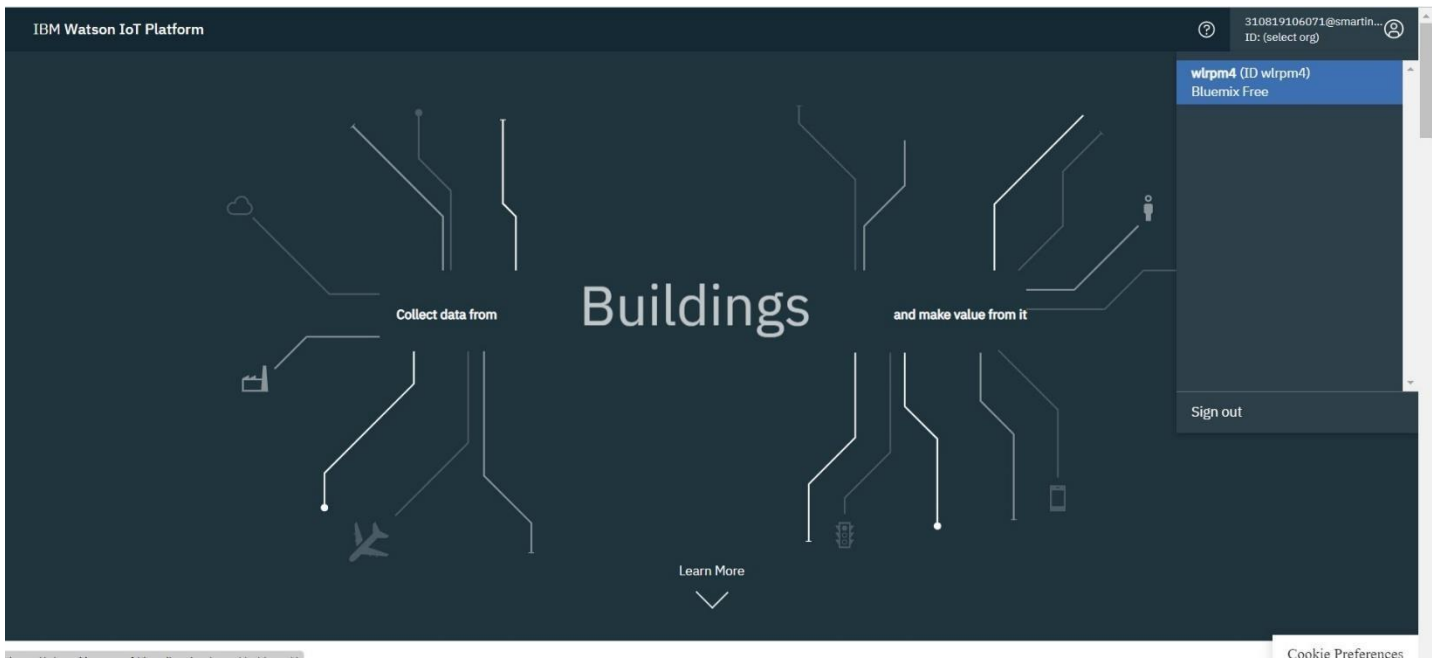
Log in →

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

The image shows the 'Browse Devices' page in the IBM Watson IoT Platform. The header includes the logo and a user profile for '310819106071@smartinternz.com'. The main content area has a 'Browse' tab selected, with 'Action', 'Device Types', and 'Interfaces' tabs. A blue 'Add Device' button is in the top right. Below the tabs, there's a 'Browse Devices' section with 'All Devices' and 'Diagnose' buttons. A paragraph explains that the table shows a summary of all devices and can be filtered, organized, and searched. Below this is a search bar 'Search by Device ID' and a 'Device Simulator' toggle. The table lists two devices:

<input type="checkbox"/>	Device ID	Status	Device Type	Class ID	Date Added	Descriptive Location
> <input type="checkbox"/>	12345	Disconnected	Testdevicetype	Device	Nov 5, 2022 1:04 PM	
> <input type="checkbox"/>	14325	Disconnected	Testdevicetype	Device	Nov 5, 2022 5:33 AM	

At the bottom, there's a pagination bar showing '1 of 1 page' and a '1 Simulation running' status.



After click on Add device this page will open

IBM Watson IoT Platform

310819106071@smartinternz.com
ID: wlrpm4

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

1 Simulation running

○ Click on

○ Go to device type and fill the details.

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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

Device

Or

Gateway

Name

TestdeviceTy

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

Cancel

Next

Device Types

1 Simulation running

Click on Finish

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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

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

Edit Metadata

Back

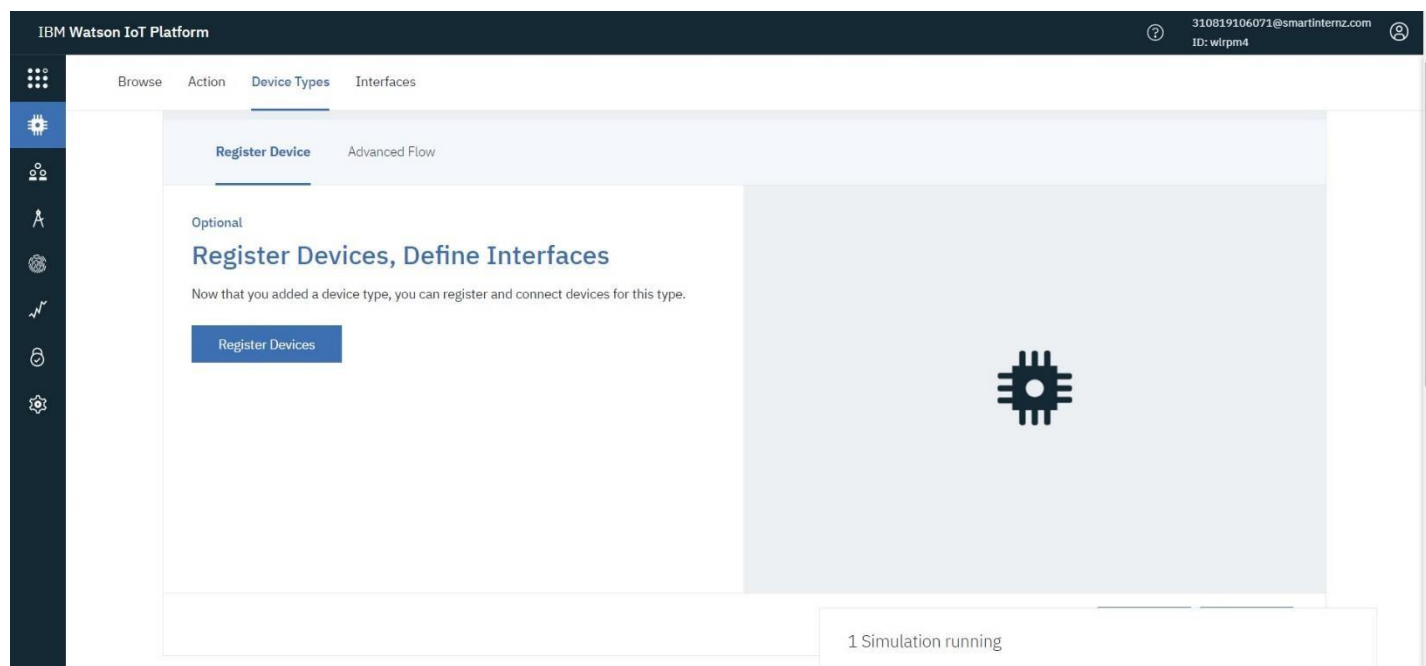
Finish

Device Types

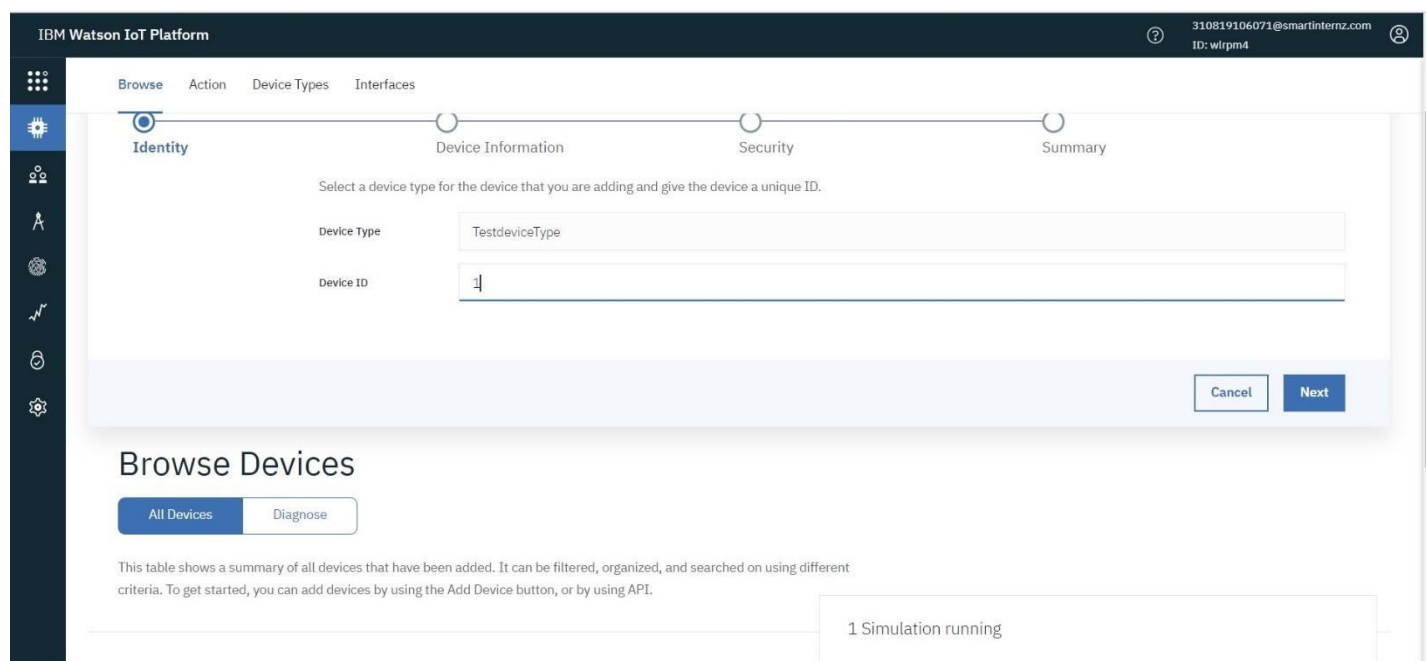
1 Simulation running

Register Device.

○ Click on



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



Click on

Next

The screenshot shows the 'Add Device' wizard in the IBM Watson IoT Platform. The top navigation bar includes 'Browse', 'Action', 'Device Types', and 'Interfaces'. The wizard progress bar shows four steps: Identity (completed), Device Information (current), Security, and Summary. The 'Device Information' step contains a form with the following fields:

Field	Placeholder
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

Below the form is an 'Add Metadata +' button. At the bottom right are 'Back' and 'Next' buttons.

Click on Next

The screenshot shows the 'Security' step of the 'Add Device' wizard. It contains a text input field for an 'Authentication Token' with the placeholder 'Enter an optional token'. Above the field, there is explanatory text: 'characters and symbols. The token is returned to you at the end of the device registration process.' and 'can include hyphens, underscores, and periods. Do not use repeated characters, dictionary words, user names, or other predefined sequences.' Below the field, there is a warning: 'Make a note of the generated token. Lost authentication tokens cannot be recovered. Tokens are encrypted before being stored.' and a note: 'Authentication token are encrypted before we store them.' At the bottom right are 'Back' and 'Next' buttons.

Browse Devices

Below the 'Browse Devices' section, there are two buttons: 'All Devices' and 'Diagnose'. Below these buttons, there is a table with the following content:

Device Name	Status
1 Simulation running	Running

Finish

○ Click on

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Browse Action Device Types Interfaces

Add Device

Identity Device Information Security Summary

Verify that the following information is correct then select Finish

Device Type
TestdeviceType

Device ID
12345

[View Metadata](#)

Security Token
To be generated

[Back](#) [Finish](#)

1 Simulation running

Browse Devices

○ Device is created

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ID: wlrpm4

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 ☒

<input type="checkbox"/>	Device ID	Status	Device Type	Class ID	Date Added	Descriptive Location
> <input type="checkbox"/>	12345	Disconnected	TestdeviceType	Device	Nov 7, 2022 4:35 AM	
> <input type="checkbox"/>	12345	Disconnected	Testdevicetype	Device	Nov 5, 2022 1:04 PM	
> <input type="checkbox"/>	14325	Disconnected	Testdevicetype	Device	Nov 5, 2022 5:33 AM	

Items per page 50 | 1-3 of 3 items

1 of 1 page

1 Simulation running

STEP-2: INSTALLING NECESSARY PACKAGES ON YOUR PI:

- Now we are going to install necessary packages on your pi.
- Open your terminal in your pi and type the following commands
- `curl -LO https://github.com/ibm-messaging/iot-raspberrypi/releases/download/1.0.2.1/iot_1.0-2_armhf.deb`
- `sudo dpkg -i iot_1.0-2_armhf.deb`

○ service iot status

Following are the images as to what appears on your pi's terminal when u type these commands

```
File Edit Tabs Help
--2017-10-23 06:55:22-- http://ftp.nl.debian.org/debian/pool/main/o/openssl/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: 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  358K/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
            └─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-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>=2.5.0 (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 (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/7e/f9/45/bbc33ad957e82f7b71ba80e31d65a83d9d735a0d12e0c9418
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/20/d8/0d/acdc8f289011b7be7de71deebe6e42fb83be0313dfff0493
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:gegt14: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.

IBM Watson IoT Platform

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ID: wlrpm4

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

101

	Device ID	Status	Device Type	Class ID	Date Added	Descriptive Location
>	12345	Disconnected	TestdeviceType	Device	Nov 7, 2022 4:35 AM	
>	12345	Disconnected	Testdevicetype	Device	Nov 5, 2022 1:04 PM	
>	14325	Disconnected	Testdevicetype	Device	Nov 5, 2022 5:33 AM	

Items per page 50 | 1-3 of 3 items

1 Simulation running

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

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Browse Action Device Types Interfaces

Add Device +

Device ID	Status	Device Type	Class ID	Date Added	Descriptive Location
12345	Disconnected	TestdeviceType	Device	Nov 7, 2022 4:35 AM	

Identity Device Information Recent Events State Logs

The recent events listed show the live stream of data that is coming and going from this device.

Event	Value	Format	Last Received
event_test	{"temperature":42,"humidity":28,"hazardous gas..."}	json	a few seconds ago
event_test	{"temperature":16,"humidity":24,"hazardous gas..."}	json	a few seconds ago
event_test	{"temperature":42,"humidity":41,"hazardous gas..."}	json	a few seconds ago
event_test	{"temperature":14,"humidity":81,"hazardous gas..."}	json	a few seconds ago
event_test	{"temperature":18,"humidity":8,"hazardous gas":..."}	json	a few seconds ago

1 Simulation running

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

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

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Your boards Public boards

Create New Board +

Sort By Recently changed

Your boards

RISK AND SECURITY OVERVIEW

4 Cards

Owned by you

USAGE OVERVIEW

3 Cards

Owned by you

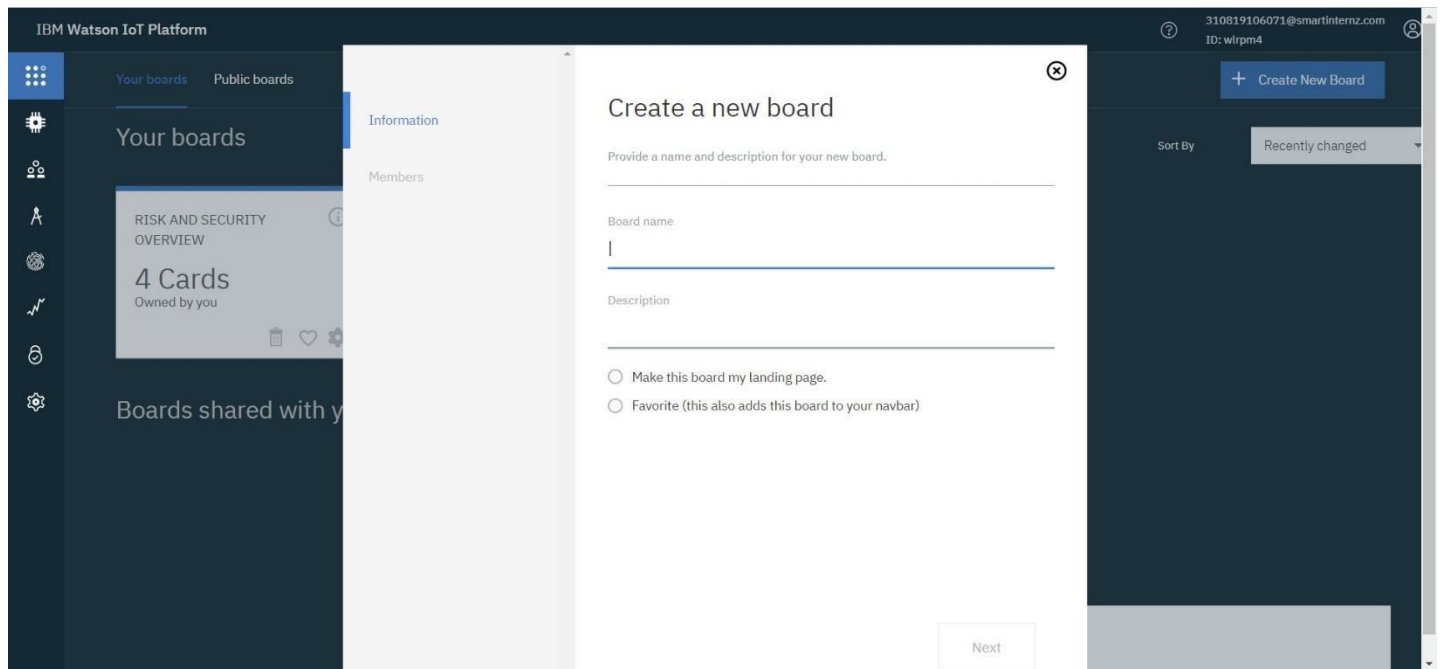
+

Boards shared with you

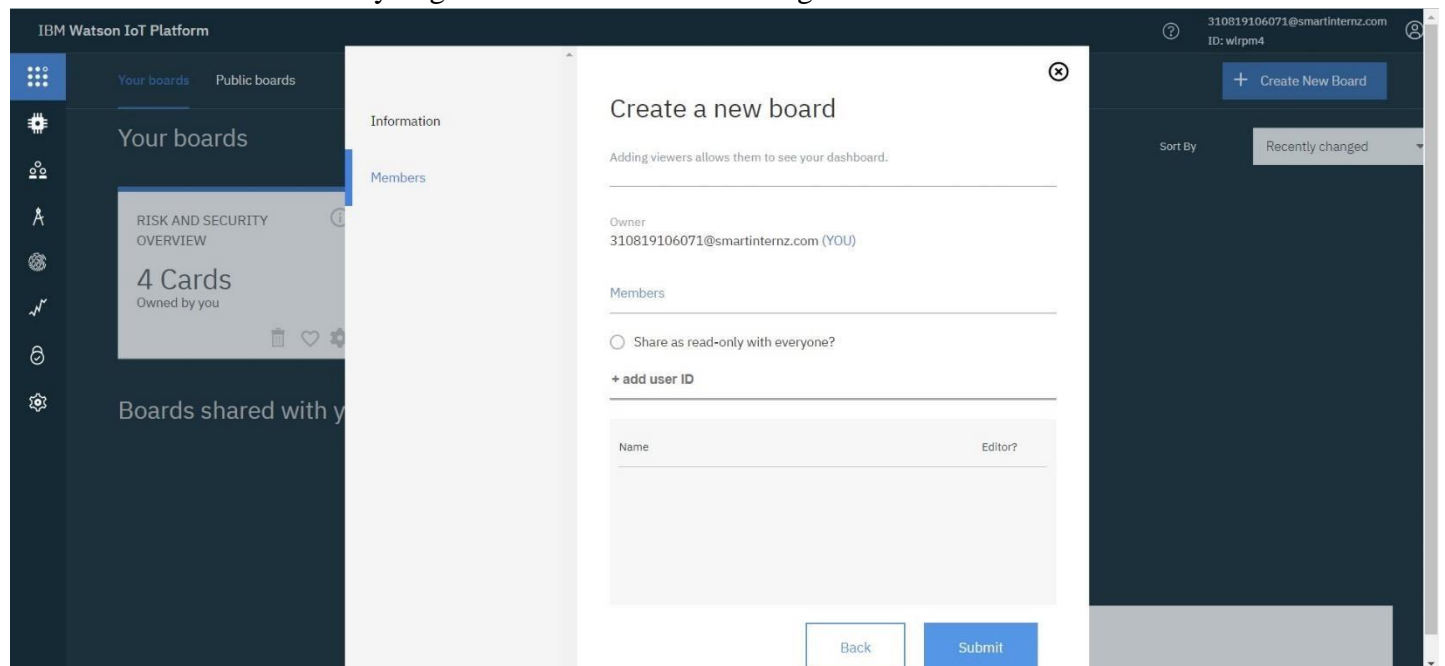
1 Simulation running

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

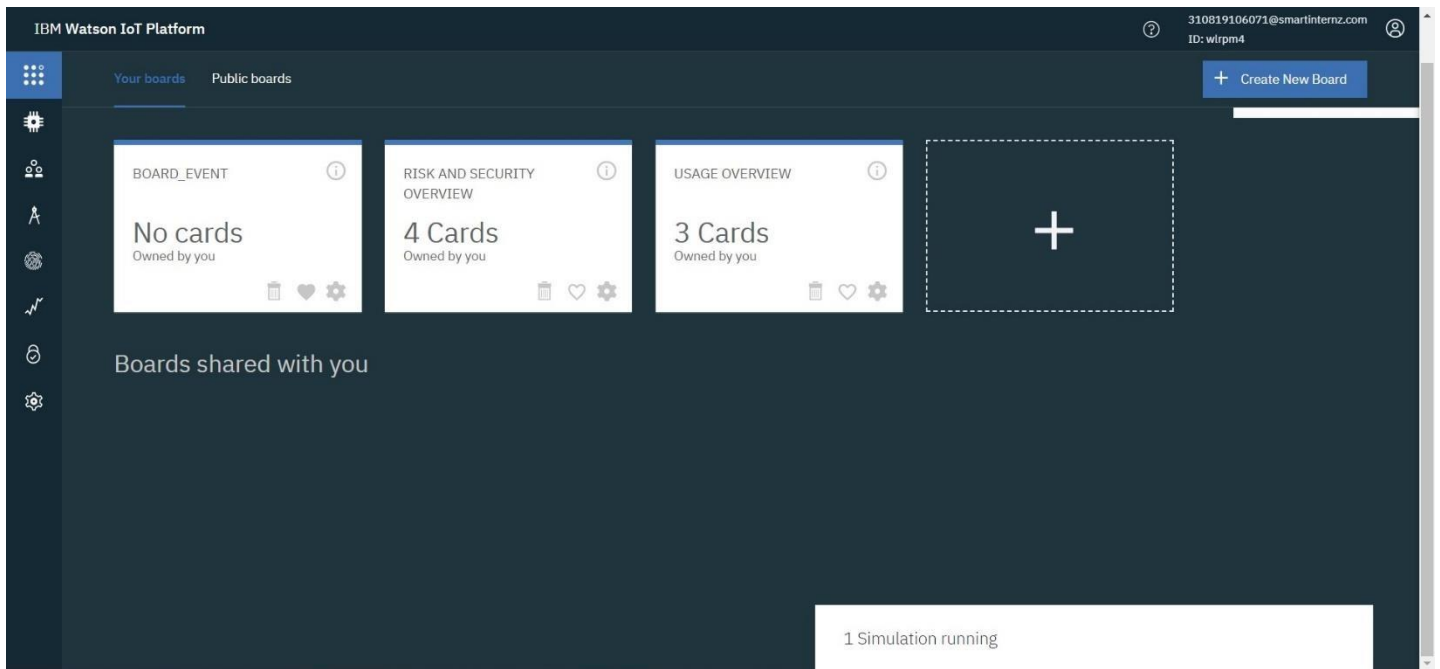
The given below window appears give a name and description to your board as shown in the window below.



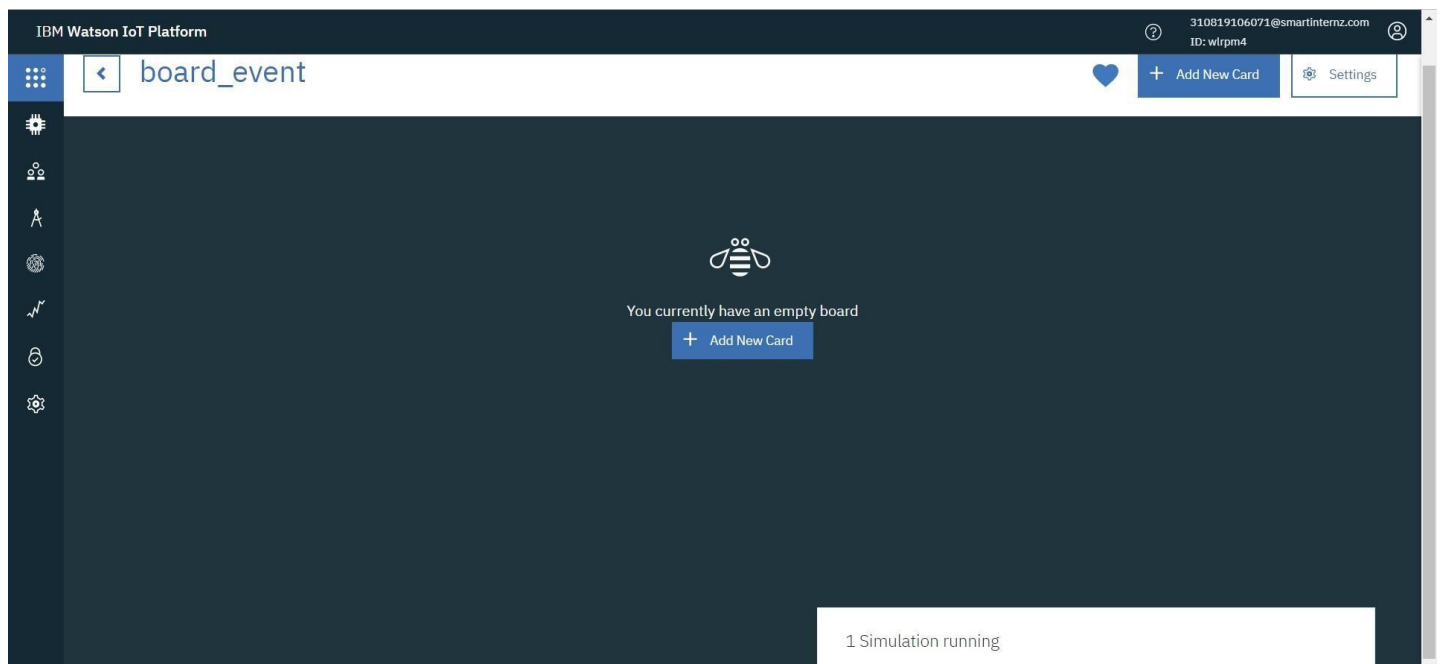
- Then click on Next you get the below window then again click on Submit



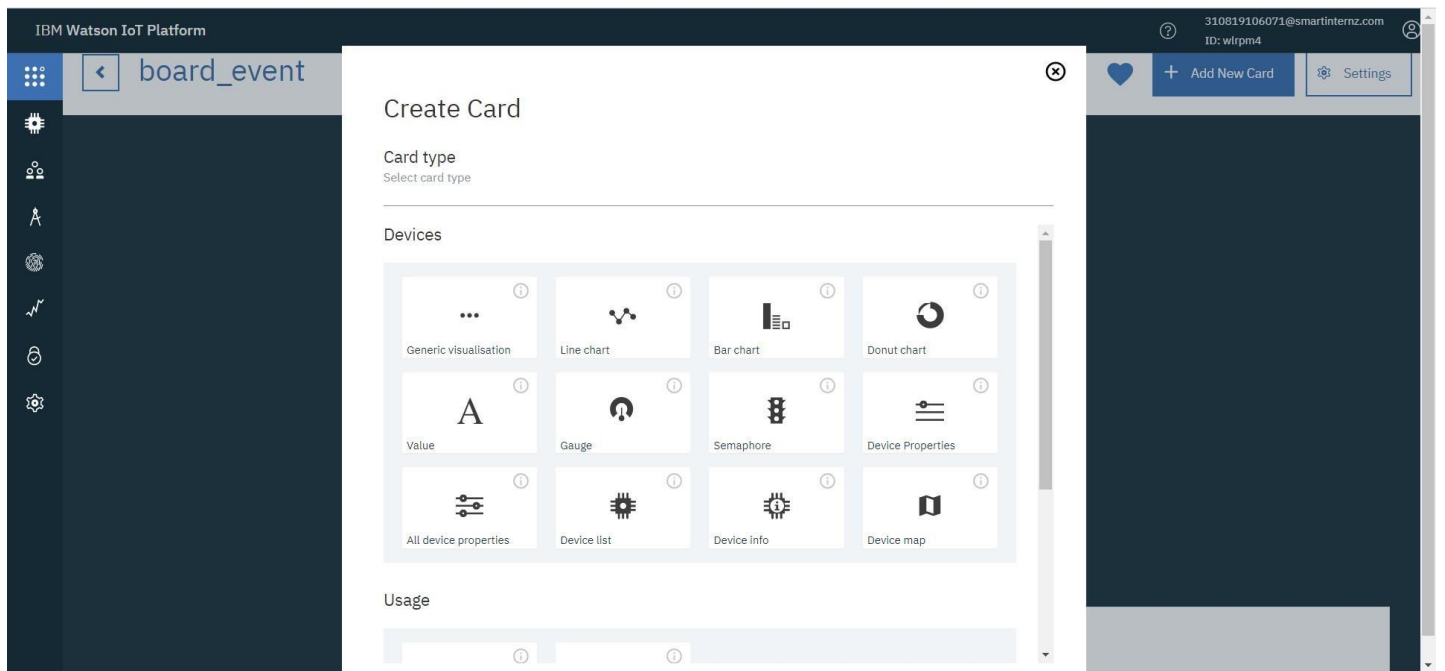
- Then double click on your boards name which you have created.



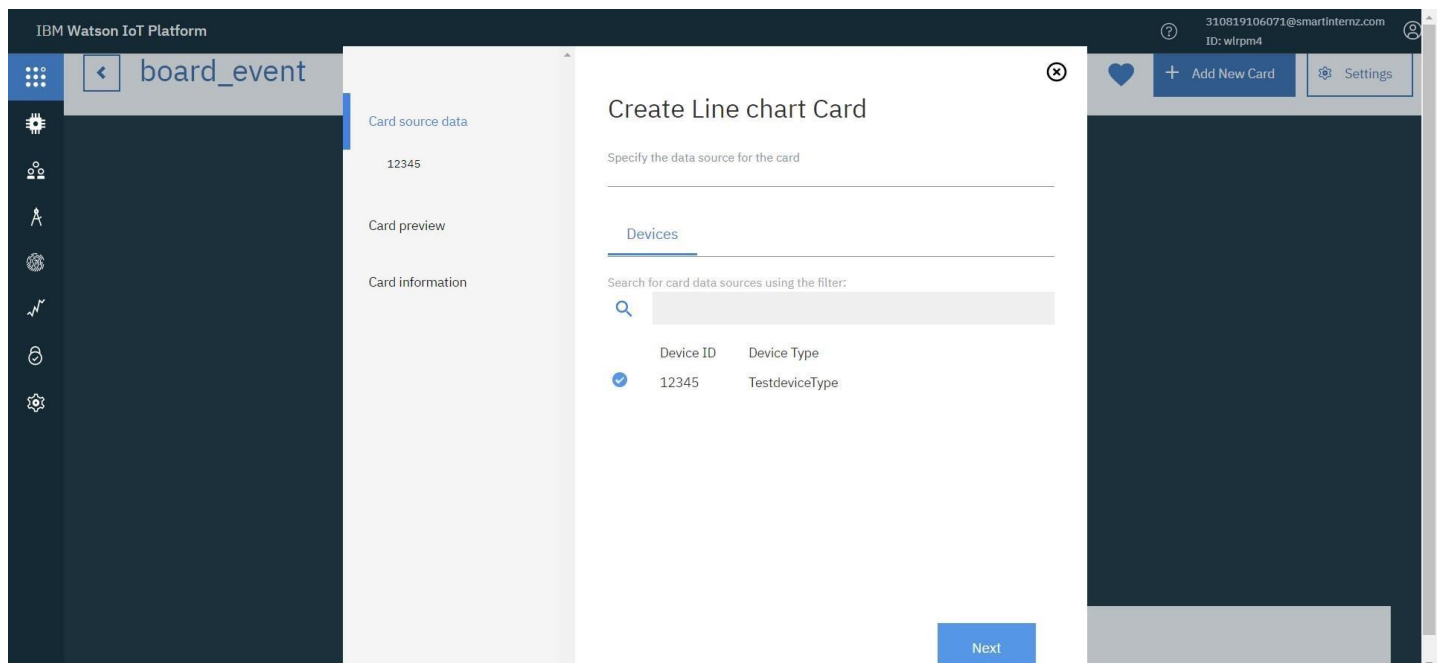
- Click on Add New Card



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



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



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

IBM Watson IoT Platform

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board_event

12345

Card source data

Card preview

Card information

Create Line chart Card

Connect data set

event_test

Property

temperature

Name

temperature

Type

Number

Unit

°C

Min

0

Max

100

Connect new data set

Back

Next

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

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310819106071@smartinternz.com
ID: wlrpm4

board_event

12345

Card source data

Card preview

Card information

Create Line chart Card

Enter title and description of the card

Title

Line chart

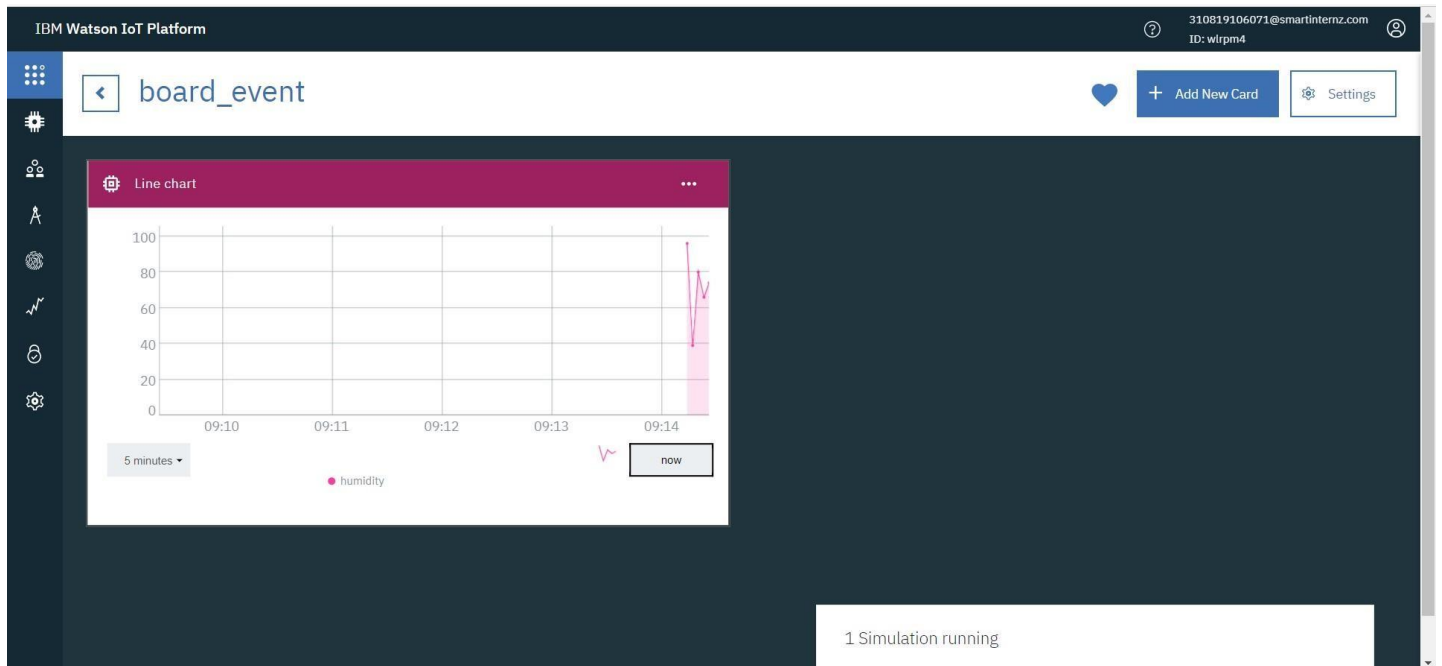
Color scheme

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

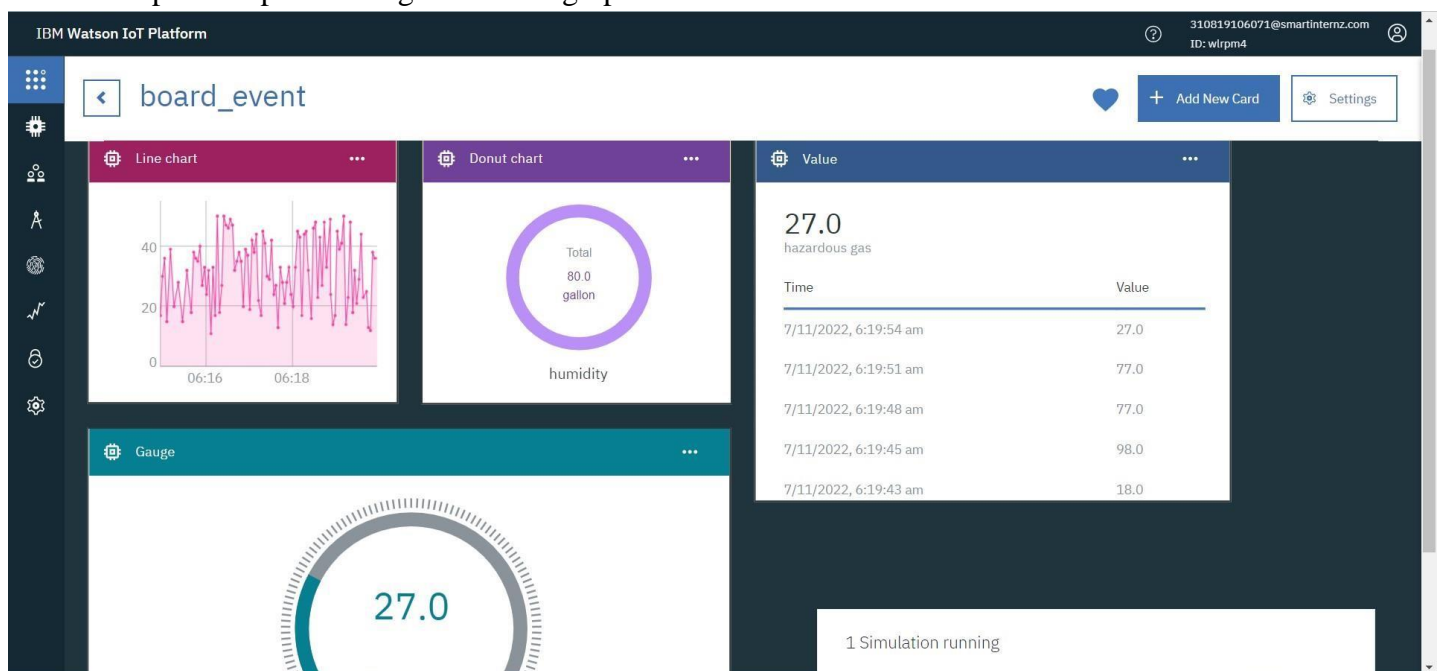
Back

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.