

HO CHI MINH CITY, UNIVERSITY OF TECHNOLOGY  
DEPARTMENT OF COMPUTER SCIENCE AND ENGINEER



## **Application Based Internet of Things Report - LAB 1**

*Student:* Nguyễn Đức Phúc

*ID:* 1914691

HỒ CHÍ MINH CITY



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## 1 Introduction

In this first LAB, students are proposed to create a simple Thingsboard backend and Dashboard for an IoT application. Students are supposed to follow steps listed in the Implementation section to finish the first Lab.

## 2 Implementation

### 2.1 Step 1: Create account and a device

A refferent video is posted in the link bellow:

<https://www.youtube.com/watch?v=kWF5ZSkXfE4>

Please login to Thingsboard and create a device, named **IoT Project** for instance.

### 2.2 Step 2: Implement python source code

In this step, please create a github account and upload your source code to github. The link of your source code is required to present in this report.

[https://github.com/bibom108/IOT\\_Lab/blob/main/Lab1/main.py](https://github.com/bibom108/IOT_Lab/blob/main/Lab1/main.py)

The manual video for this step can be found at:

[https://www.youtube.com/watch?v=pJKTgCq\\_J7Y](https://www.youtube.com/watch?v=pJKTgCq_J7Y)

At this step, two random values simulated for the temperature and humidity are sent to the server every 10 seconds.

### 2.3 Step 3: Simple Thingsboard dashboard

Design a simple dashboard with 2 labels to display the values of temperature and humidity. The manual for this step can be found at:

<https://www.youtube.com/watch?v=8eQ0ag5Ymfo>

### 2.4 Step 4: Use advanced UI in Thingsboard

Please use a UI in the Analogue Gauge and Digital Gauge in your dashboard, to present the value of temperature and humidity.

Publish your dashboard and present the link in this report

<https://demo.thingsboard.io/dashboard/8d4431b0-7831-11ec-91d1-9b16bfb7b504?publicId=0e184000-6d34-11ec-8159-03103585248e>

A manual video is posted at:

<https://www.youtube.com/watch?v=LFellRi-5iU>

## 2.5 Step 5: Add a map to the dashboard

Finally, add a map to your dashboard. In this case, the **longitude** and **latitude** are required in your python source code. At this step, the latitude and longitude can be set to 10.8231 and 106.6297.

A manual video is posted at:

<https://www.youtube.com/watch?v=0XMqH8mdWi0>

## 3 Extra point (1 point)

Dynamic update the current longitude and latitude. Explain your implementation in python source code such as the library which is used, some main python source code to get the value of longitude and latitude.

**Solution:**

### 3.1 Coding idea

- Due to the lack of GPS equipment (most of nowadays laptop doesn't have GPS integrated on it), so I decide to based on IP address to track current location. Python has a **geocoder** library that be able to implement this.
- With the above approach, these are the following pros and cons:

- **Pros:** Do not require GPS, quickly update location with Internet connection. Short implementation.
- **Cons:** The detected location based on IP address, so result aren't as accurate as GPS's result. Beside, with VPN, the result can be changed without changing the real location.

### 3.2 Implementation

+ Firstly, we need to intall **geocoder** library by typing the following code in terminal:

```
1 pip install geocoder
```

+ Then we import **geocoder** library to our main code:

```
1 import geocoder
```

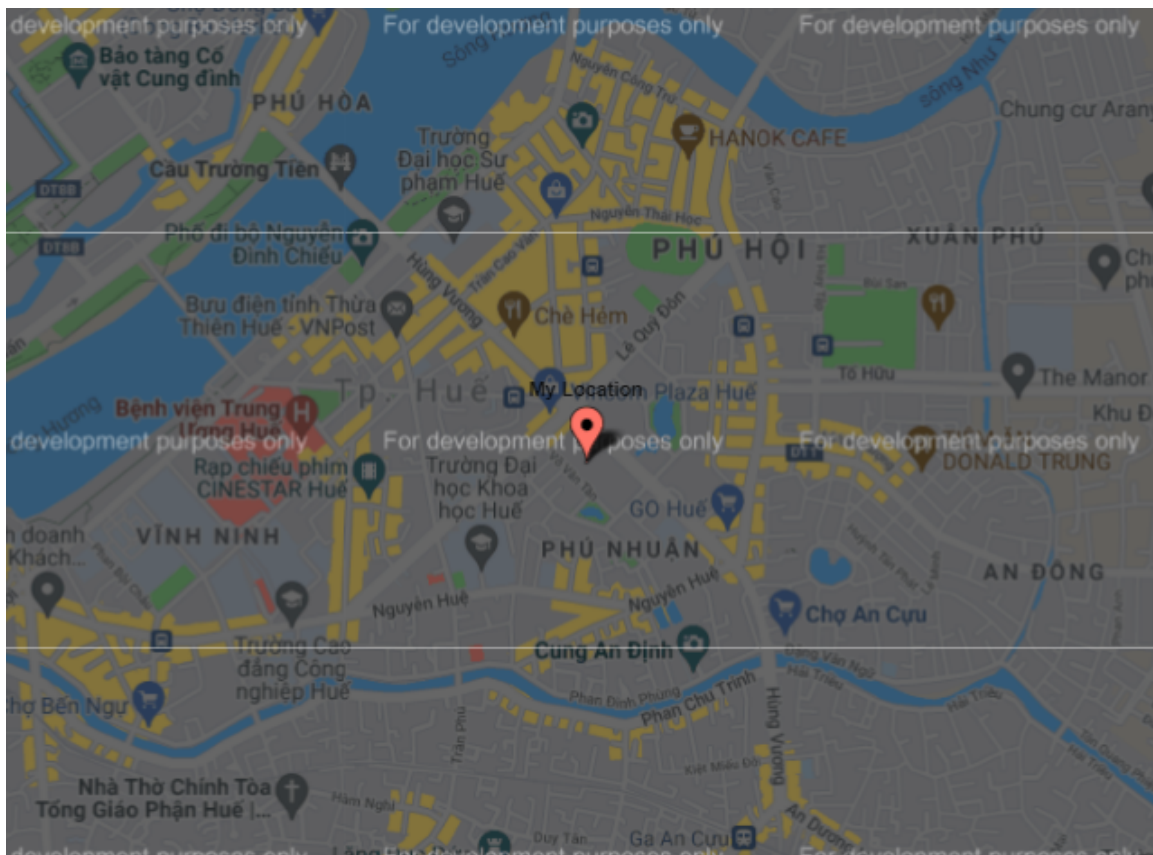
+ Get our current location by these code:

```
1 while True:  
2     g = geocoder.ip('me')
```

```
3 longitude = g.latlng[1]      # get the longitude
4 latitude = g.latlng[0]      # get the latitude
5 collect_data = {'temperature': temp,
6                 'humidity': humi,
7                 'light': light_intesity,
8                 'longitude': longitude,
9                 'latitude': latitude
10                }           # JSON data transfered to gateway
11 temp += 1
12 humi += 1
13 light_intesity += 1
14 client.publish('v1/devices/me/telemetry',
15               json.dumps(collect_data), 1)
16 time.sleep(10)
```

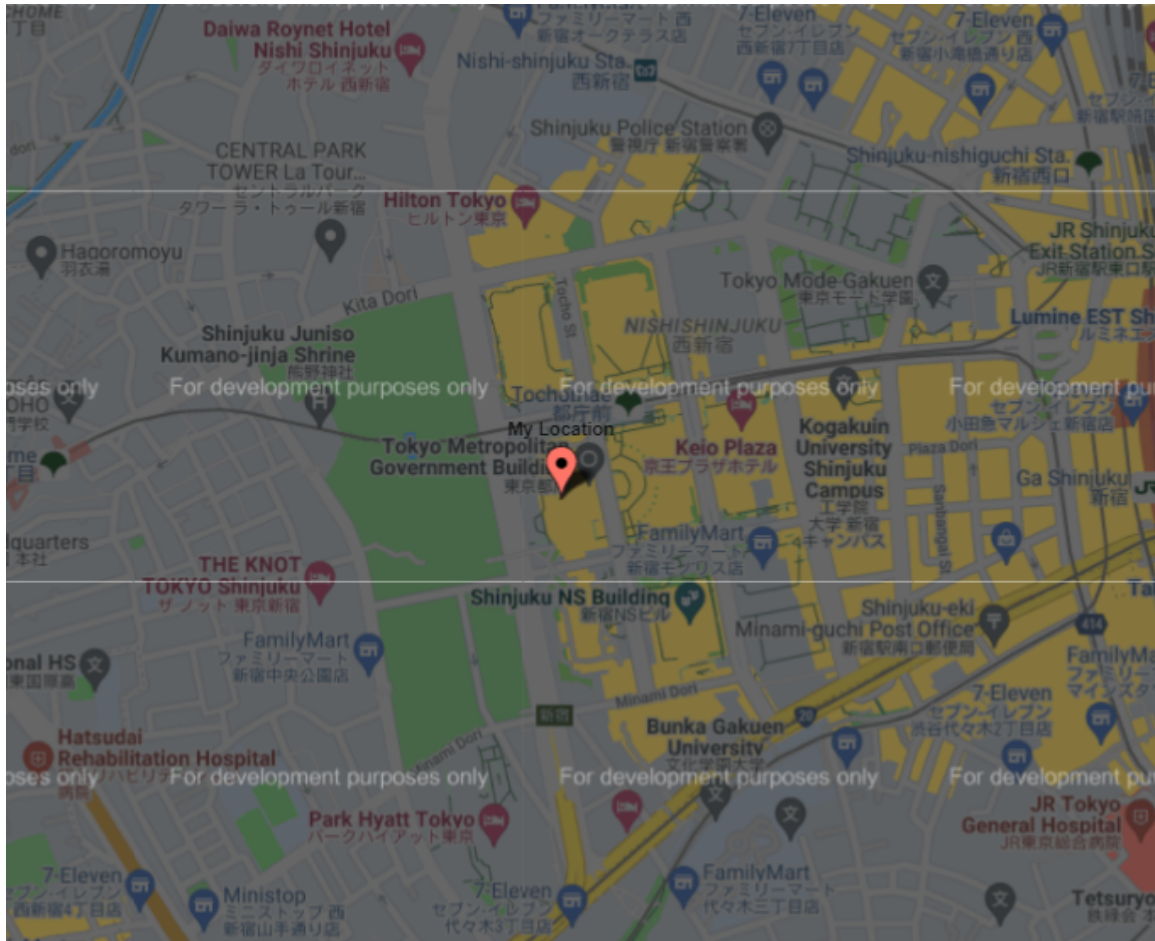
### 3.3 Valuate the result

- **Case 1:** Using my real IP address, the gateway displays my real location which at Thua Thien Hue province.



Hình 1: My real location at Thua Thien Hue province

- **Case 2:** To demonstrate dynamic location, using a program named **ProtonVPN**, which a program allow you to fake your IP to another country for free, I change my IP to Tokyo's IP, and the gateway display my VPN's location at Tokyo.



Hình 2: *My VPN's location at Tokyo*