AR Remote Maintenance POC

Importing and Building Guidelines

Contents

Requirement

Before jumping on to building the prototype, there are some tools that are needed for the development to be executed. Listed below are the software and hardware tools that we could use to develop and test out our prototype:

Tools	Requirement	Category
Unity Hub	3.3.0 (Latest)	Software
Unity Editor	2021.3.11f1	Software
Microsoft Visual Studio Community 2019	16.11.17	Software
Android Devices	Android 8.0 (minimum with AR Core Supported)	Hardware
iOS Devices	A9 Chip and iOS 11 (minimum)	Hardware
Data Cables	Support Data Transfer	Hardware
Thingsboard Server	Running	Software/ Hardware

List of AR Core Supported Devices:

https://developers.google.com/ar/devices

List of AR Kit Supported Devices:

https://developer.apple.com/library/archive/documentation/DeviceInformation/Reference/iOSDeviceCompatibility/DeviceCompatibilityMatrix/DeviceCompatibilityMatrix.html

Step One: Setting Up Thingsboard

To make the POC to be working, please ensure that there is a ThingsBoard server that are currently running in the local network environment.

The initial steps are to make a new tenant so that we could establish the connection to Thingsboard with our Devices and Application.

1. Login to the Thingsboard Server as sysadmin.
   (Username: sysadmin@thingsboard.org P/W: sysadmin)

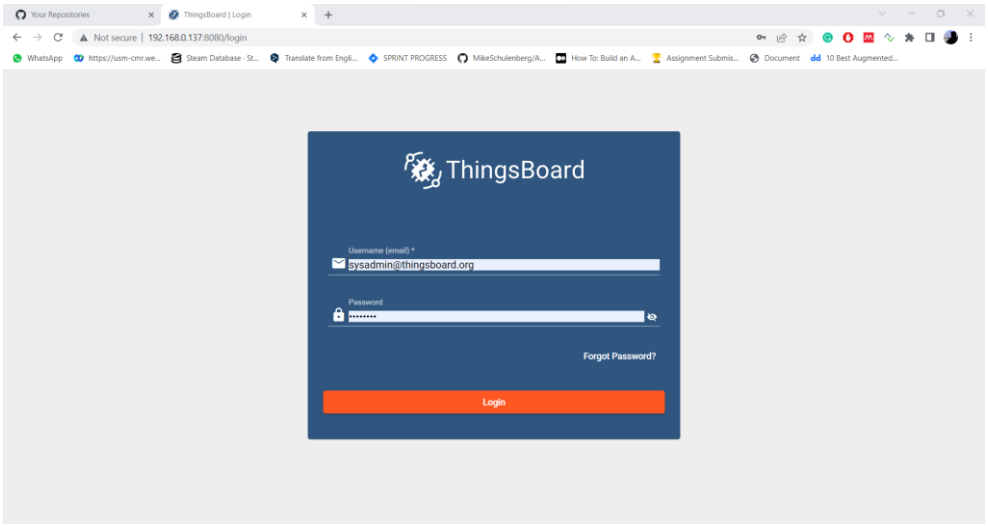


Figure 1: Login as Sysadmin

2. After logging in, you are directed to the main dashboard. Click on the Tenant tab and click on the "+" symbol. Enter the title name and click Add.

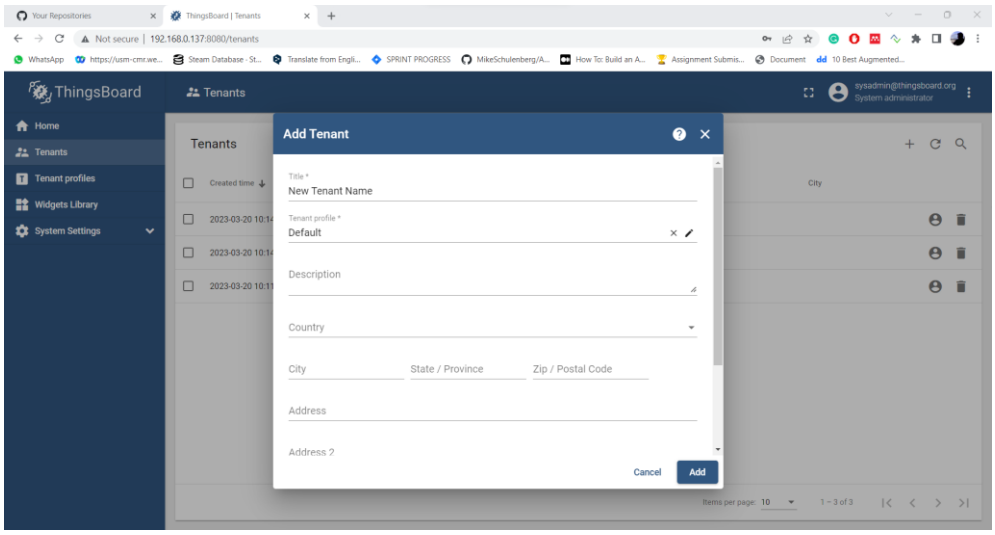


Figure 2: Creating New Tenant

3. After successfully creating the user, there will be a new user registered in the Tenant Section. Click the newly created Tenant and you will be shown details regarding the new tenant. Proceed this step by clicking the “Manage Tenant Admins”.

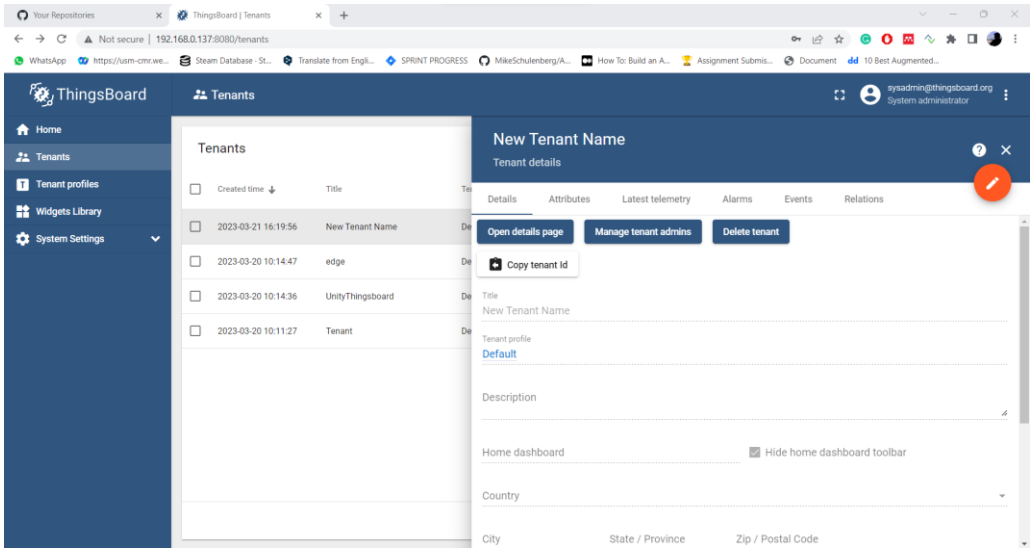


Figure 3: Details of Tenant

4. After clicking “Manage Tenant Admins”, you will be directed to Tenant Admin page. Click the “+” symbol to register new user to the server under the newly created tenant. Enter the necessary information regarding the user (email, username).

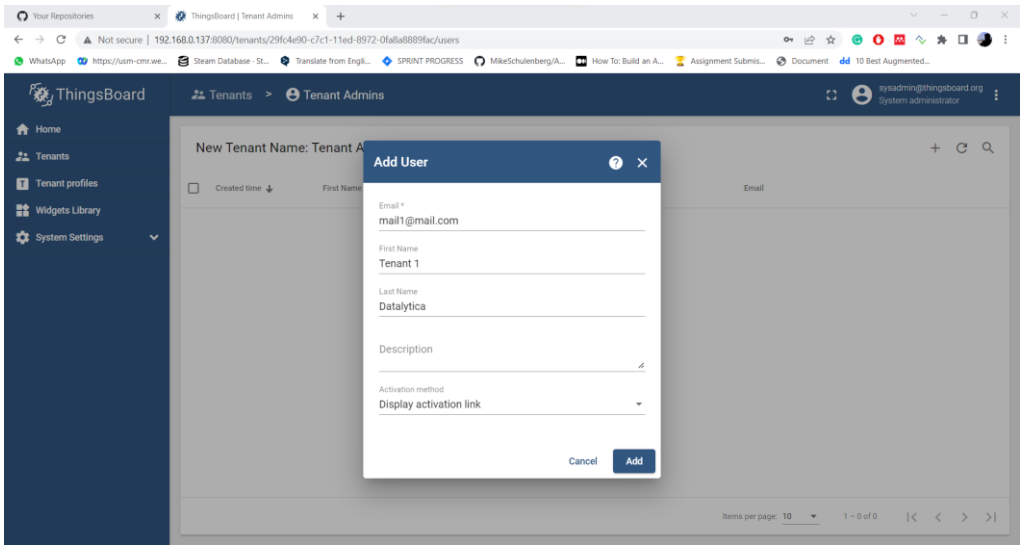


Figure 4: Creating New User

5. After registering the new user, you will be prompted by a popup window that shows an activation link. Click on the blue highlighted “activation link”. To activate the account

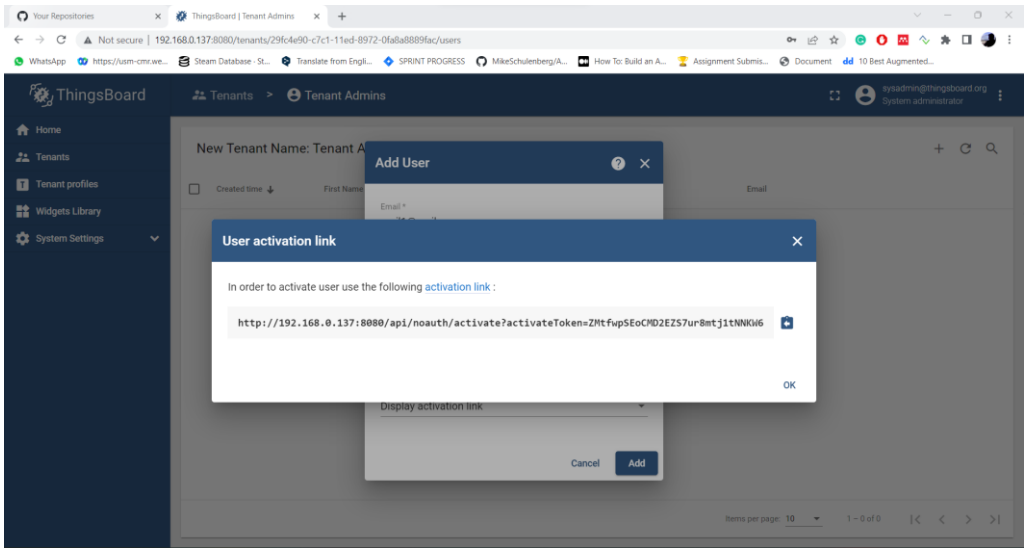


Figure 5: Activation Link for New User Account

6. Clicking the link will be directing you to create a new password for the newly created user in ThingsBoard. Enter the suitable password and click “Create Password”.

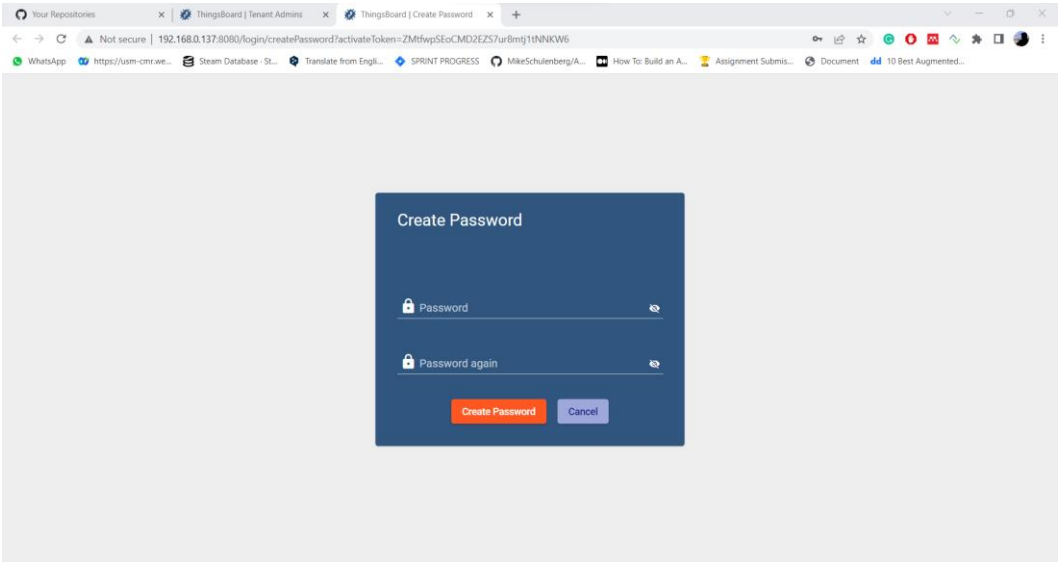


Figure 6: Setting Up New Password for New User

7. After setting up the password, you are redirected to the newly registered account dashboard page.

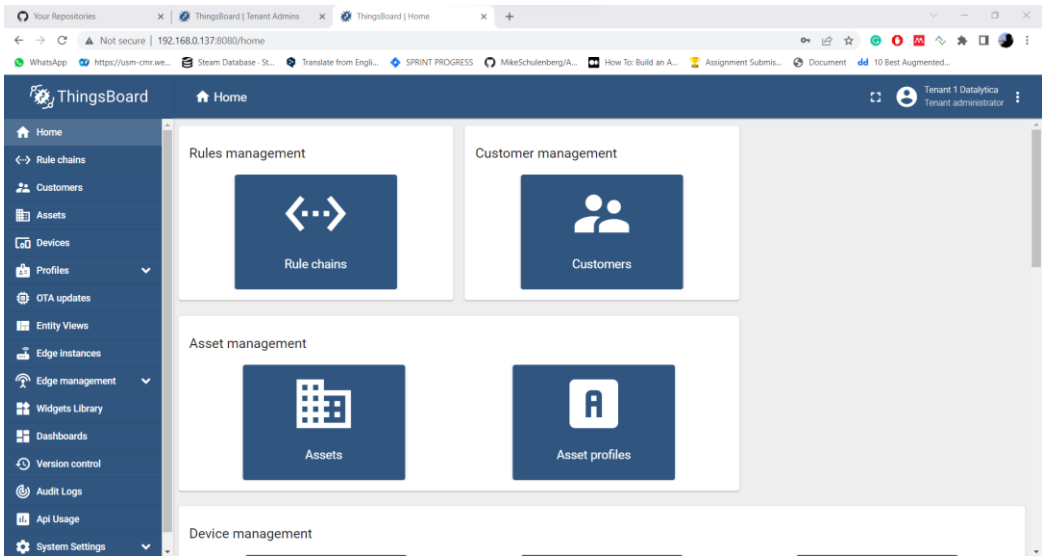


Figure 7: New User Dashboard Page

8. Now, we must create device to receive in ThingsBoard. On the device page, click on the "+" symbol and click "Add new Device".

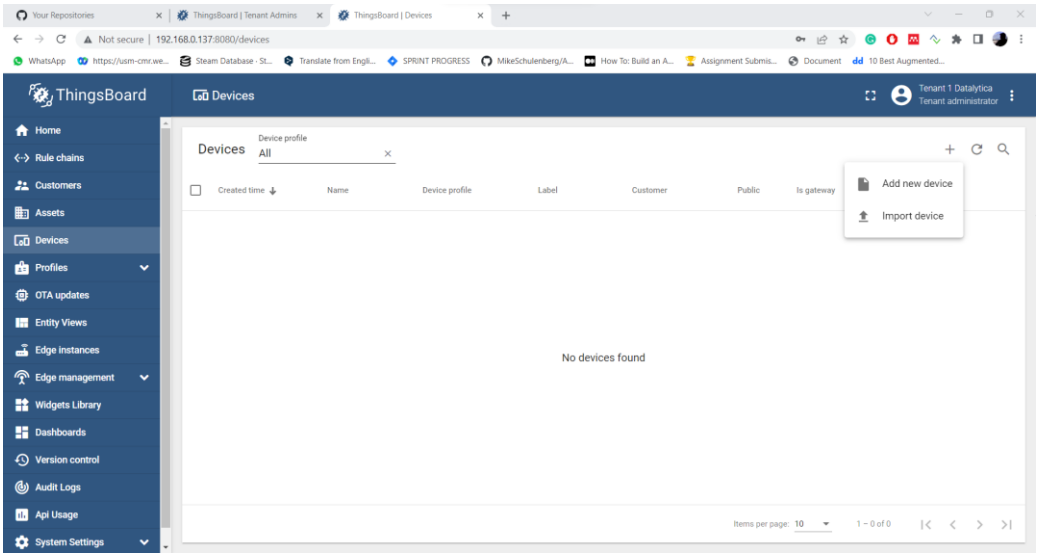


Figure 8: Adding New Device

9. Insert a name for the newly created device. Continue the step by clicking “Add”.

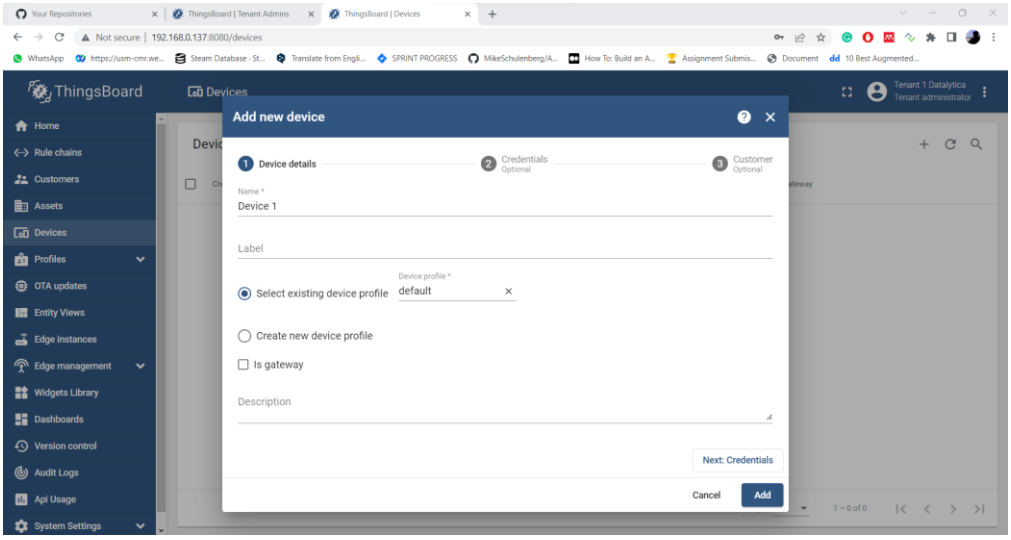


Figure 9: Inserting New Device Details

10. After adding the new device, click on the “Shield” icon to get device credentials. By default, it should be Access Token. Copy those Access Token as we will be using this later step.

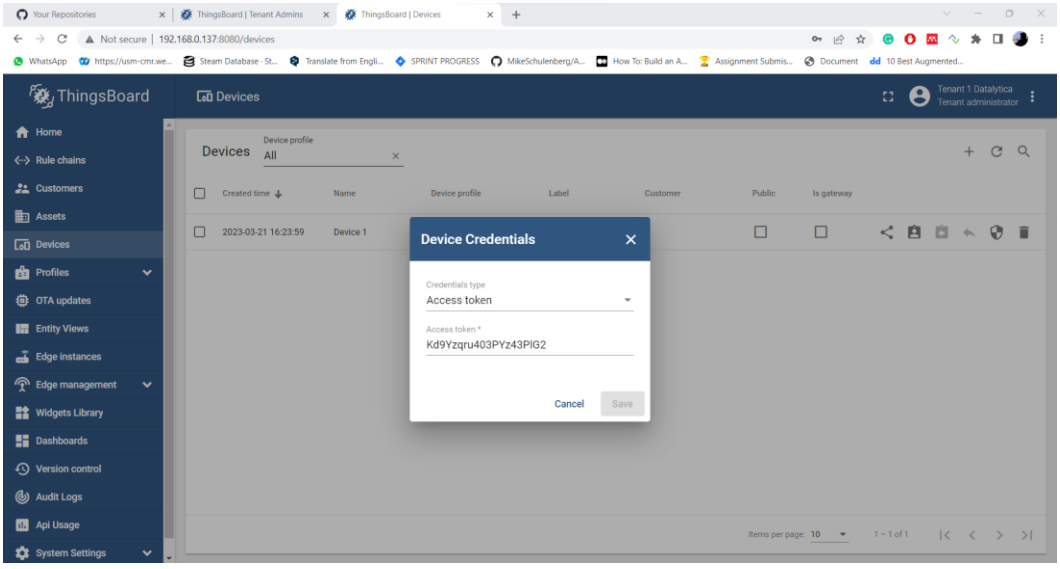


Figure 10: Getting Device Access Token

Step Two: Getting the Source Code

1. Moving on with the next step is getting the source code for our AR-IOT POC Project. In order to get the project files, we need to head to GitHub which is a code repository that could keep our projects. Click the link below to be directed to the page:

   Link: https://github.com/DatalyticAi/AR-RemoteMaintenance_POC

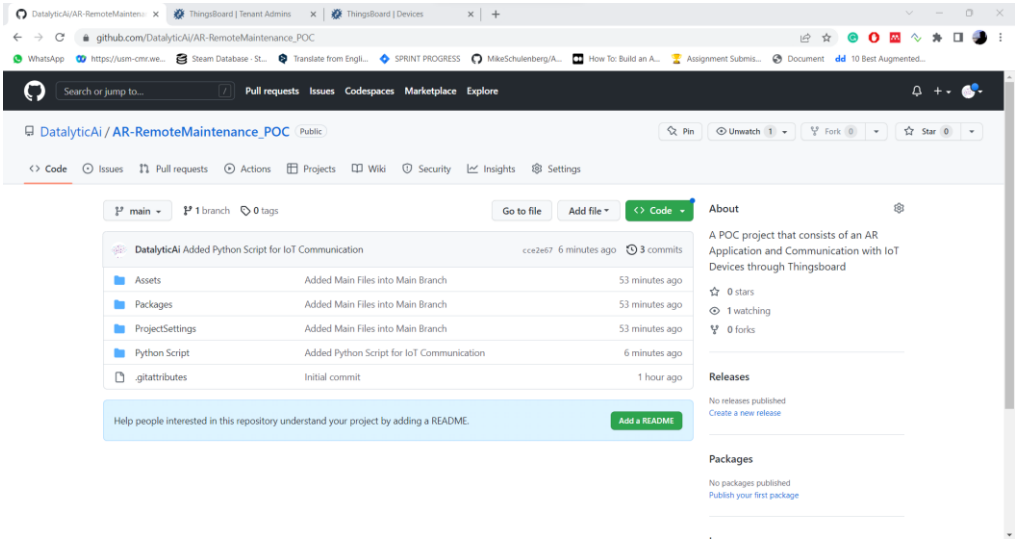


Figure 11: GitHub Repository

2. After being redirected to the Repository Page, click on "<> Code" button and click "Download Zip" to acquire the file. After downloading the file, extract the file so it could be accessible.

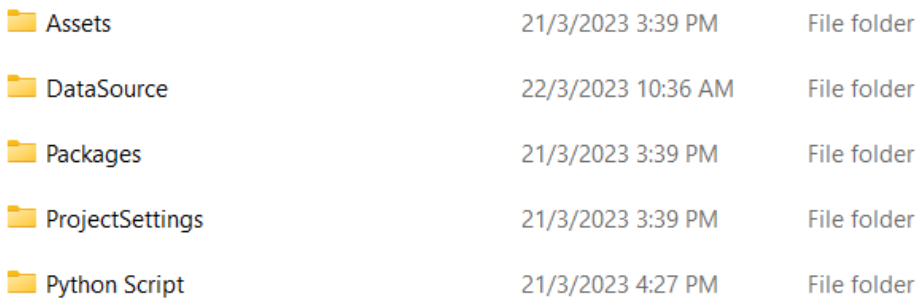


Figure 12: Extracted Downloaded Project Folder

Step Three: Setting Up Unity Environment

1. From the extracted folder, there are 3 folders that are important for the Unity Project which is Asset, Packages and Project Settings. Copy those folders.

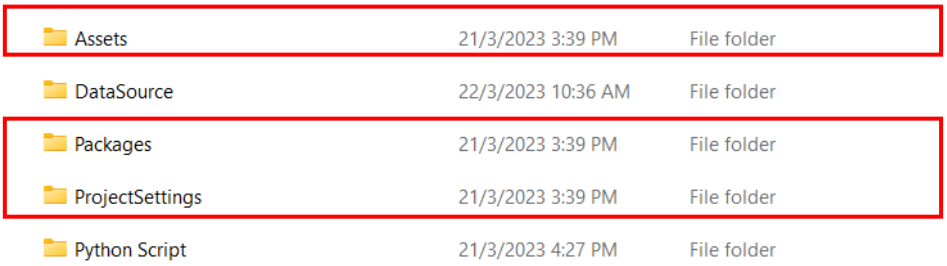


Figure 13: Folders that are needed to be copied.

2. Create a new Unity Project by opening Unity and click “New Project”.

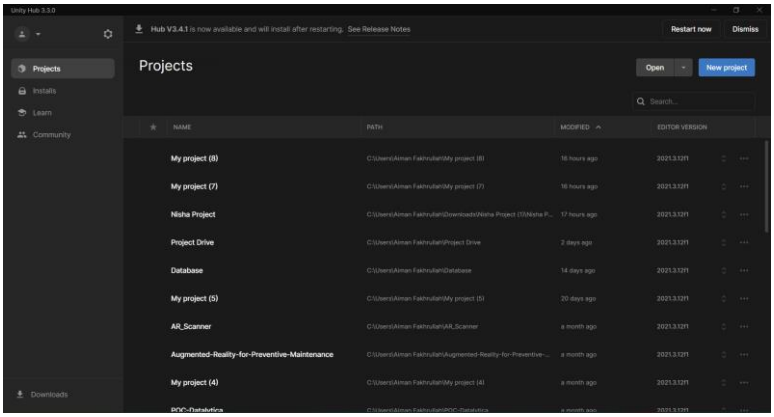


Figure 14: Create New Project in Unity

3. After clicking the “New Project” button, you will be directed to the new project page. Insert an appropriate name for the project and place it under any appropriate location.

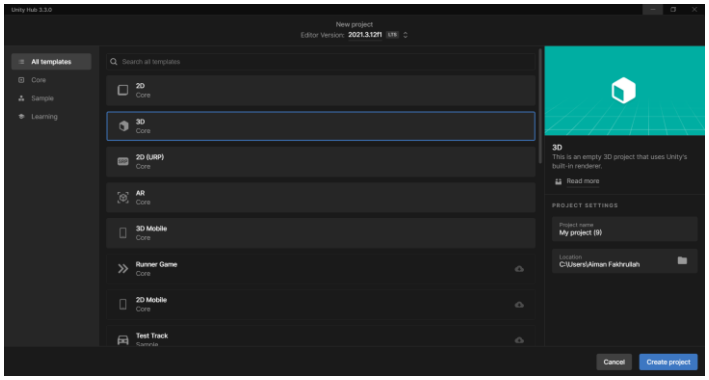


Figure 15: Naming New Project

4. After creating the project, you will be set to the blank 3D Project page.

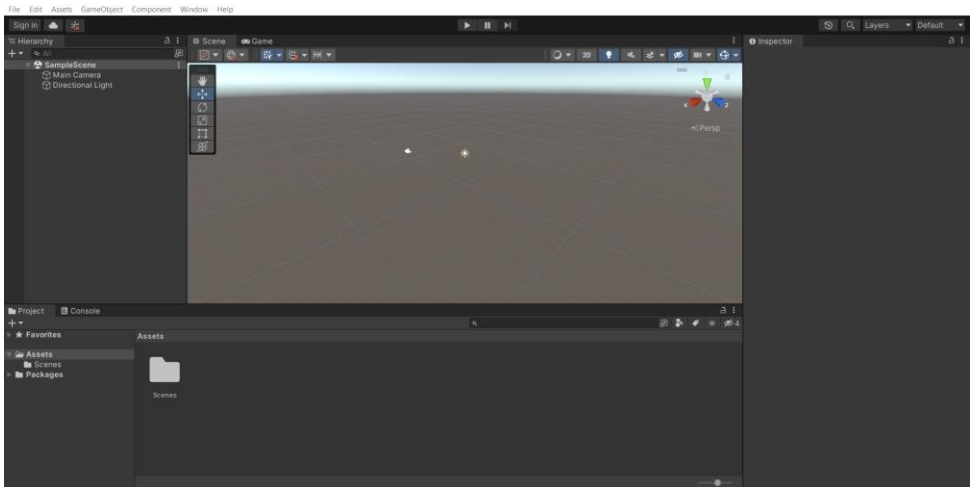


Figure 16: Unity Blank 3D Page

5. Now, head to the folder in which the Unity project are located.

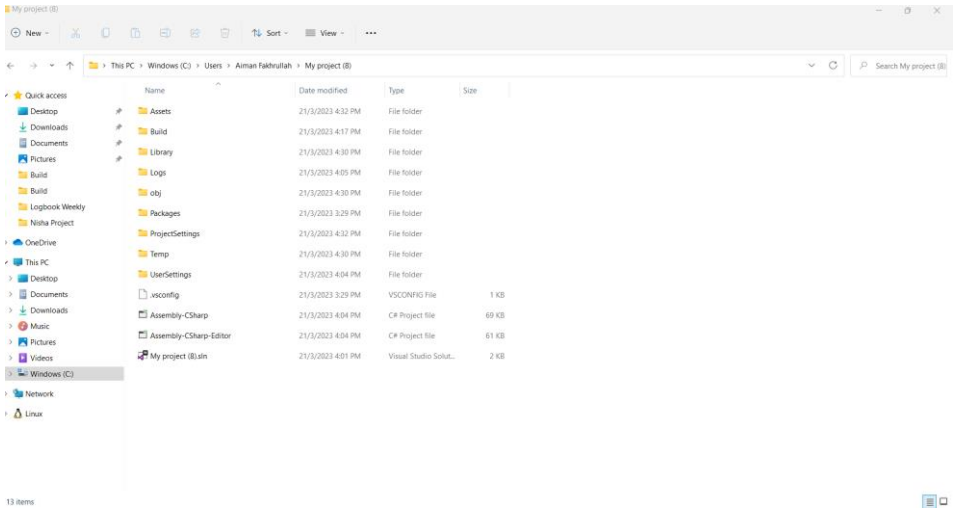


Figure 17: Unity Project Directory

6. Based on the extracted folders that has been copied which is Asset, Packages and Project Settings, paste the folders in the Unity Project Folder.

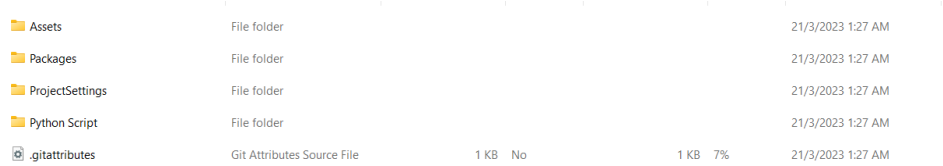


Figure 18: Folder that are needed to be inserted to Unity Project

7. Your Unity will be taking some time to load the new settings. After the load completion, all the necessary files and folders are uploaded Into the Project. The most important folder for this project is “Communication”.

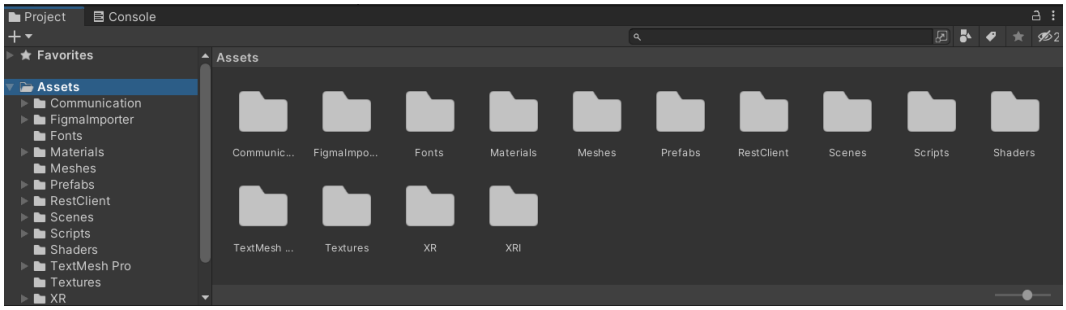


Figure 19: Newly Imported Folder Data

Step Four: Editing the Python Codes.

1. Having imported the folder inside Unity Project, there are some things that are needed to be done before building the project. First, we need to look on the python codes that sends the data to ThingsBoard server. The code could be found in the extracted folder.

Figure 20: Python Script Folder

2. In the Python Script folder, there are some couple of things that need to be adjusted.

   The adjusted lines are listed below:
   a. Path Location for Data Source
   b. Access Token
   c. Broker IP Address

```
path_a=r"C:\Users\Aiman Fakhrullah\Documents\Datalytica\ProjectPOC_Data\machine_a.csv"
ACCESS_TOKEN_A='bh0hgMgxd0jf2mWzSDdD'#Token of your device

path_b=r"C:\Users\Aiman Fakhrullah\Documents\Datalytica\ProjectPOC_Data\machine_b.csv"
ACCESS_TOKEN_B='gCWTusIVXUgPfEHH3YmJ'#Token of your device

#broker="192.168.50.5"  # Home network
broker="192.168.0.137"                  #host name
port=1883                       #data listening port
```

Figure 21: Lines that needed to be changed.

3. First let's look on to changing the path location of the data source. You could copy the path from the extracted file by "Right Click" and select the "Copy as Path" options.

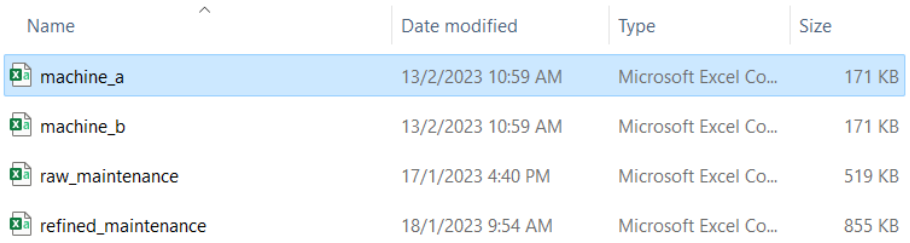


Figure 22: Data Sources

4. After copying the path directory, paste the path in the path location in either path_a or path_b. Best to match the data source with machine_a with path_a and machine_b with path_b.

```
path_a=r"C:\Users\Aiman Fakhrullah\Documents\Datalytica\ProjectPOC_Data\machine_a.csv"
ACCESS_TOKEN_A='bh0hgMgxd0jf2mWzSDdD'#Token of your device

path_b=r"C:\Users\Aiman Fakhrullah\Documents\Datalytica\ProjectPOC_Data\machine_b.csv"
ACCESS_TOKEN_B='gCWTusIVXUgPfEHH3YmJ'#Token of your device
```

Figure 23: Path for Data Source in Python

5. Next, we are getting the Access Token for the device. Based on the registered device, you could copy the credentials and paste in the Access Token area. Best to match the credentials with the access token according to the path name as it represents which device it is.

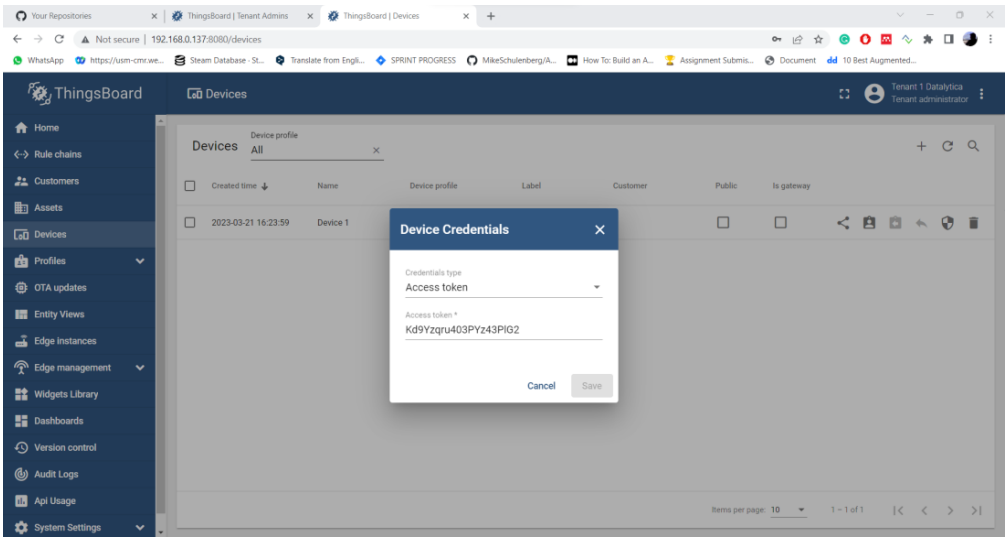


Figure 24: Access Token Credentials

6. Then, we need to know what the IP Address is for sending Data to Thingsboard Server. Simply head on to the Thingsboard Page and copy the IP Address in the address bar. In the example provided below, it should be **192.168.0.137**.

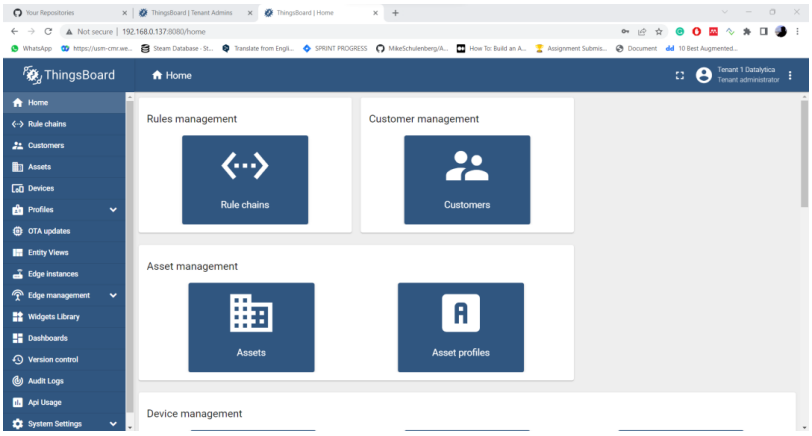


Figure 25: Getting IP Address from Address Bar

7. Paste the IP Address in the broker section in the code and the python part is good to go.

```
#broker="192.168.50.5"  # Home network
broker="192.168.0.137"                  #host name
port=1883                       #data listening port
```

Figure 26: Broker IP Address

Step Five: Editing the Unity Codes.

1. In the Unity Part, there are several codes that are needed to be looked at. This is mainly to change the IP address for the Thingsboard Server. Simply change the IP Address to the one that could be connected to ThingsBoard server.

```
RestClient.Post<AuthResponse>("http://192.168.0.137:8080/api/auth/login", payload).Then(res =>

RestClient.Get("http://192.168.0.137:8080/api/tenant/devices?deviceName=" + deviceNameVariable).Then(res =>

RestClient.Get("http://192.168.0.137:8080/api/plugins/telemetry/" + saved_device_entity_type + "/" + saved_device_id +
```

Figure 27: IP Address that needed to be changed.

These are the codes that needed to be change in term of IP Address:

a. Auth.cs
b. Devices.cs
c. Telemetry.cs

Completing this step will leads us to the next step which is building the POC Application.

Step Six: Building and Testing.

1. Moving on with building the POC Application, there are some steps that are needed to be done. The first one is to change the platform build to Android. As Unity by default were set with PC platform.

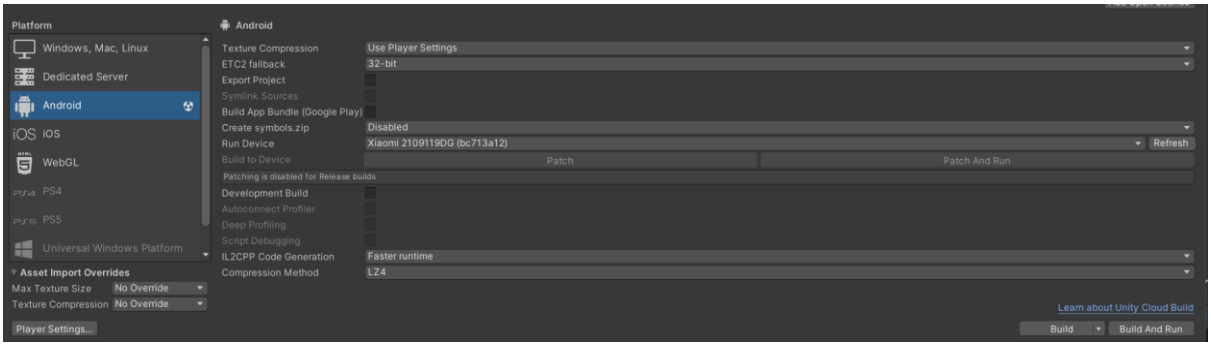
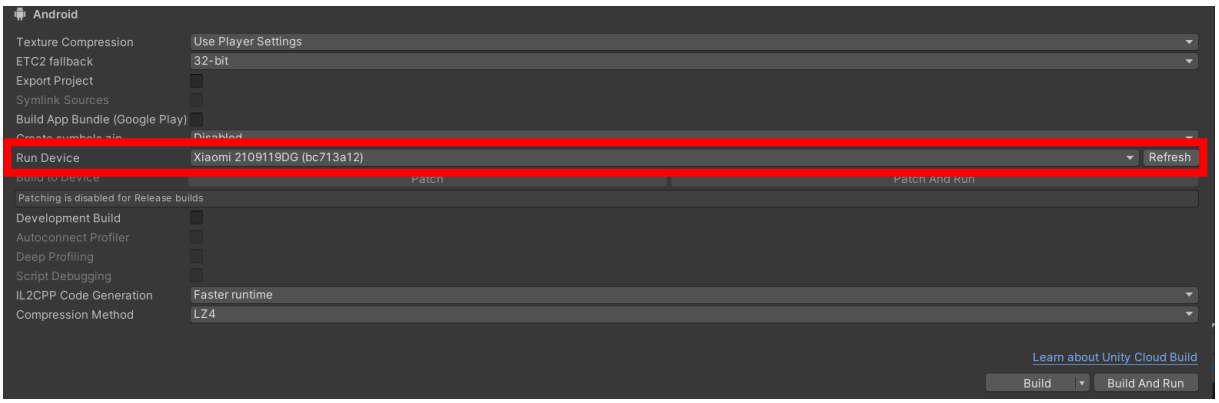


Figure 28: Changing to Android Platform in Unity

2. After changing the platform to Android, connect your smartphone with the laptop using USB Cable to ensure that Unity detects the device in which it needed to be built. Click “Refresh” to detect the device.

   Important Notice: Please Ensure that your Smartphone has Debug USB Devices Enabled



3. After detecting the device, you can proceed by clicking the “Build and Run” button. Wait for the build to be completed and it will be appeared in your smartphone.

Figure 29: Build and Run Button

4. After the application appear in your smartphone, this completes the step-by-step tutorial on building the POC Application. Congratulations!

Step Seven: How To Use.

General Steps

1. Run the Python Files.
2. Login using the registered email address and password that has been made from the Tenant Admin in Thingsboard Server.

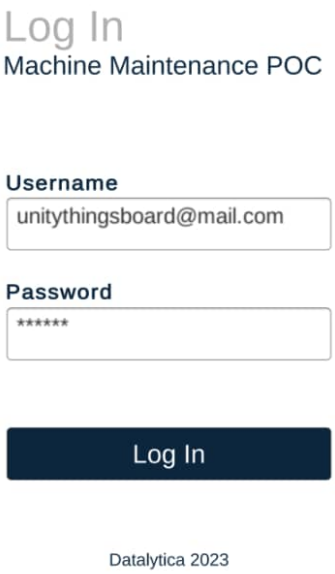


Figure 30: Login Page

Machine Reader

1. For Machine Reader option, you could scan the QR code that could be found in the Images folder.
2. When scanning, an overlay should be pop up to show the real time data regarding the mock machine.

Figure 31: Overlay in Machine Reader Page

3. Press the “Reset AR” button to scan the Next QR Code.
4. When a Popup Screen Appear, you could investigate the options that are available.
5. To continue the machine progress, simple head on to the python file and prompt “Enter”.

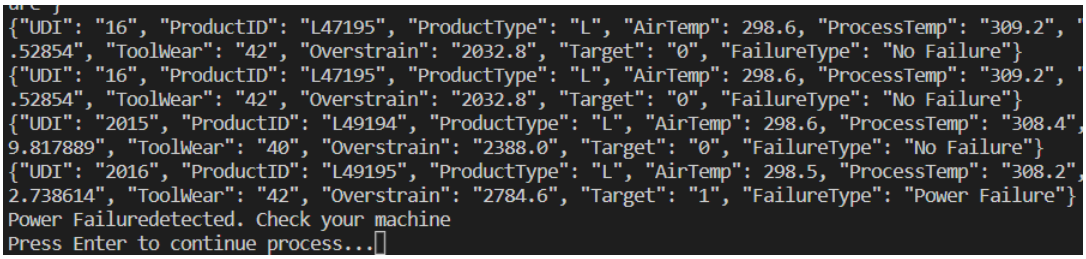


Figure 32: Prompt Script

6. The process will continue as usual.

Check Reading

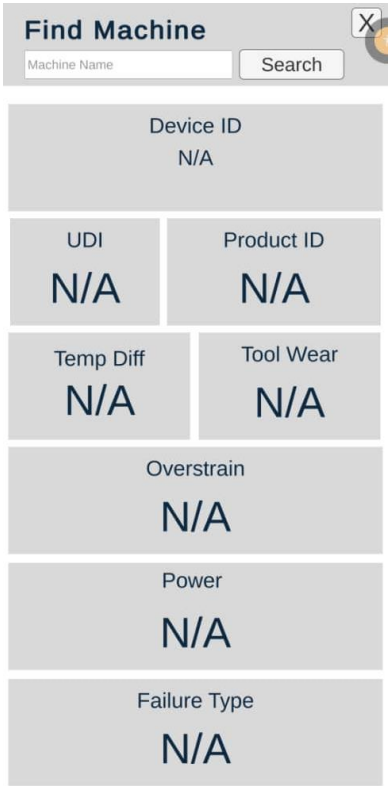
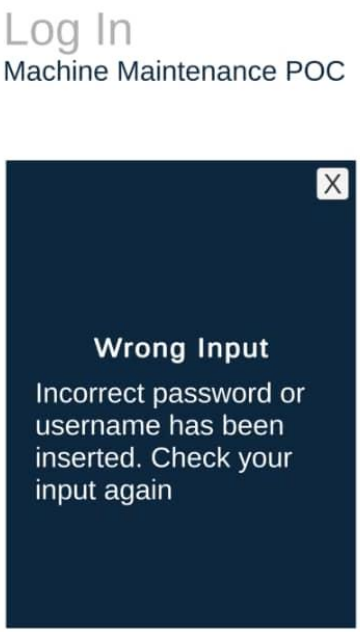


Figure 33: Check machine reading.

1. To check the current machine reading, you could simply insert the machine name and click search.
2. If the machine name is available in the ThingsBoard server, you could access the data information.

FAQ / Common Error.

a) It says that I could not connect with the application.



Solution:

- Please ensure that the smartphone is connected to the network where the Thingsboard Server is located.
- Please insert the correct email address and password in which has been registered in ThingsBoard Tenant Admin.