






# MVP – Quick Starter Guide

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# Notes

This is a short manual on how to quickly start collecting data with our devices.

With this guide we aim at making the devices of our MVP available to all users, from experts in IoT development to beginners.

The code of each device, as well as other resources, are available open source in the following GitHub repository: https://github.com/ritaamartinho/IST-Thesis-MVP

Everyone is welcome to make the changes and upgrades they wish and share them with the community.

# Requirements

## RGB and ToF Nodes:

- Your RBG or ToF Nodes
- LoRa Gateway (or LoRa coverage)
- A The Things Network (TTN) Account
- A ThingsBoard (TB) Account (we used the cloud/professional edition with integrations)
- Arduino IDE installed on your computer.

## Vibration & Noise Node:

- Your Vibration & Noise Node (or the Arduino Nano RP2040 Connect)
- Wi-Fi coverage and its credentials.
- A ThingsBoard (TB) Account
- Arduino IDE installed on your computer.

## BLE System:

- Your BLE Receivers (or ESP32) and iBKS105 beacons from Accent Systems (or other beacons)
- Wi-Fi coverage and its credentials.
- A ThingsBoard (TB) Account
- Arduino IDE installed on your computer and iBKS Config Tool' app on your phone.

# RGB and ToF Nodes

## Step 1 – Create TTN and TB account. Create TTN devices.

1. Create your free TTN account at The Things Board.
2. Create as many devices as RGB and ToF Nodes you have on your TTN account (TTN keys you'll find here will be needed later).
3. Create your TB account at ThingsBoard.

   **Note:** We got the professional/cloud edition to use the TTN integration. If choose the free community edition, you'll need to create a virtual gateway for transitioning the data from TTN to the TB.

## Step 2 – Upload the Sketches with Arduino IDE

1. Download your device's sketch from the GitHub repository.
2. Install the Adafruit SAMD package and select the Adafruit Feather M0 board.
3. Make sure you have all the necessary libraries for your device/sketch installed.
4. Add your TTN keys to the secrets.h file.
5. Upload the sketch to the device.

   **Try it:** Feel free to make changes to the sketch to better fit the devices to your needs!

## Step 3 – Manage your data with the ThingsBoard

1. Follow this guide: https://thingsboard.io/docs/user-guide/integrations/ttn/

   **Tip:** (TB professional edition only) Get the Uplink Data Converter function from the GitHub repository. There's no need to create a Downlink Data Converter.
2. Customize your dashboards and watch the data being collected in real time!

   **Tip:** Jump to step 3 of this tutorial to help you get started with your TB dashboards: https://thingsboard.io/docs/getting-started-guides/helloworld-pe/#step-3-create-dashboard
3. For a deeper analysis of the data collected, you can download your data from the TB dashboards themselves or use the python script available in the GitHub repository.

   **Tip:** To use the python script don't forget to fill your TB credentials.

# Vibration & Noise Node

## Step 1 – Create TB account and TB devices

4. Create your TB account at ThingsBoard.

   **Tip:** If you will not be using the MVP LoRa devices, you can use the TB community edition with no additional effort. Also, if you don't want to deploy the TB on premises, you can use their live demo and start using right away.

5. Create as many devices as Vibration Nodes you have on your TB account (each device will have a device token needed in the next step).

   **Tip:** Check out this guide: https://thingsboard.io/docs/getting-started-guides/helloworld-pe/#step-3-create-dashboard

## Step 2 – Upload the Sketch with Arduino IDE

1. Download your device's sketch from the GitHub repository.
2. Install the Arduino Mbed OS Nano Boards core and select the Arduino Nano RP2040 Connect board.
3. Make sure you have all the necessary libraries for your device/sketch installed.
4. Add your Wi-Fi credentials and the device token from the TB to the secrets.h file.
5. Upload the sketch to the device.

   **Try it:** Feel free to make changes to the sketch to better fit the devices to your needs!

## Step 3 – Manage your data with the ThingsBoard

1. Customize your dashboards and watch the data collected in real time!

   **Tip:** Jump to step 3 of this tutorial to help you get started with your TB dashboards: https://thingsboard.io/docs/getting-started-guides/helloworld-pe/#step-3-create-dashboard

2. For a deeper analysis of the data collected, you can download your data from the TB dashboards themselves or use the python script available in the GitHub repository.

   **Tip:** To use the python script don't forget to fill your TB credentials.

# BLE System

## Step 1 – Create TB account and TB devices. Setup Beacons.

1. Create your TB account at ThingsBoard.

   **Tip:** If you will not be using the MVP LoRa devices, you can use the TB community edition live demo with no additional effort.

2. Create as many devices as BLE Receivers on your TB account (each device will have a device token needed in the next step).

   **Tip:** Check out this guide: https://thingsboard.io/docs/getting-started-guides/helloworld-pe/#step-3-create-dashboard

3. On the iBKS Config Tool app: Chose the iBeacon Service on your beacons; Set your UUID to identify your group of beacons (UUID needed in the next step); On the Major field set your beacon id (from 0 to 16, 0000 to 000a).

## Step 2 – Upload the Sketches with Arduino IDE

1. Download your device's sketch from the GitHub repository.

2. Install the ESP32 package, select the ESP32 Dev Module board and choose the partition scheme "No OTA (2MB APP/2MB SPIFFS)".

   **Tip:** For help when installing the ESP32 package, check out this guide: https://randomnerdtutorials.com/installing-the-esp32-board-in-arduino-ide-windows-instructions/

3. Make sure you have all the necessary libraries for your device/sketch installed.

4. Add the Wi-Fi credentials, the UUID and the TB device token to the secrets.h file.

5. Upload the sketch to the device.

## Step 3 – Manage your data with the ThingsBoard

6. Customize your dashboards and watch the data collected in real time!

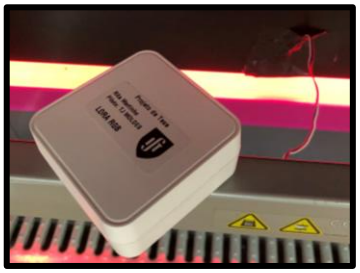
   **Tip:** Jump to step 3 of this tutorial to help you get started with your TB dashboards: https://thingsboard.io/docs/getting-started-guides/helloworld-pe/#step-3-create-dashboard

7. For a deeper analysis of the data collected, you can download your data from the TB dashboards themselves or use the python script available in the GitHub repository.

# MVP Installation Tips

## RGB Node

- ✓ Make sure the RGB Sensor is secured and pointing to the light you want to monitor.

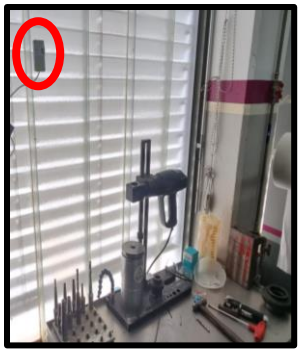


## ToF Node

- ✓ Developed to monitor the presence of people in front of desks and panels, but can also be used to detect the presence of objects.
- ✓ Make sure the device is secured and the sensor is pointing to the area you want to monitor. Make sure there are no obstructions to the sensor.

## Vibration & Noise Node

- ✓ Place the device on the structure of the machine you want to monitor. Make sure its secured and located in an optimal location for vibration monitoring.



## BLE System

- ✓ Place the BLE Receivers in the locations you want to monitor. Be aware that locations with the presence of metal can affect the BLE signals.
- ✓ If you want to locate a people, distribute the beacons by them (and remember their ids). If you want to locate objects that move, secure the beacons in those objects.