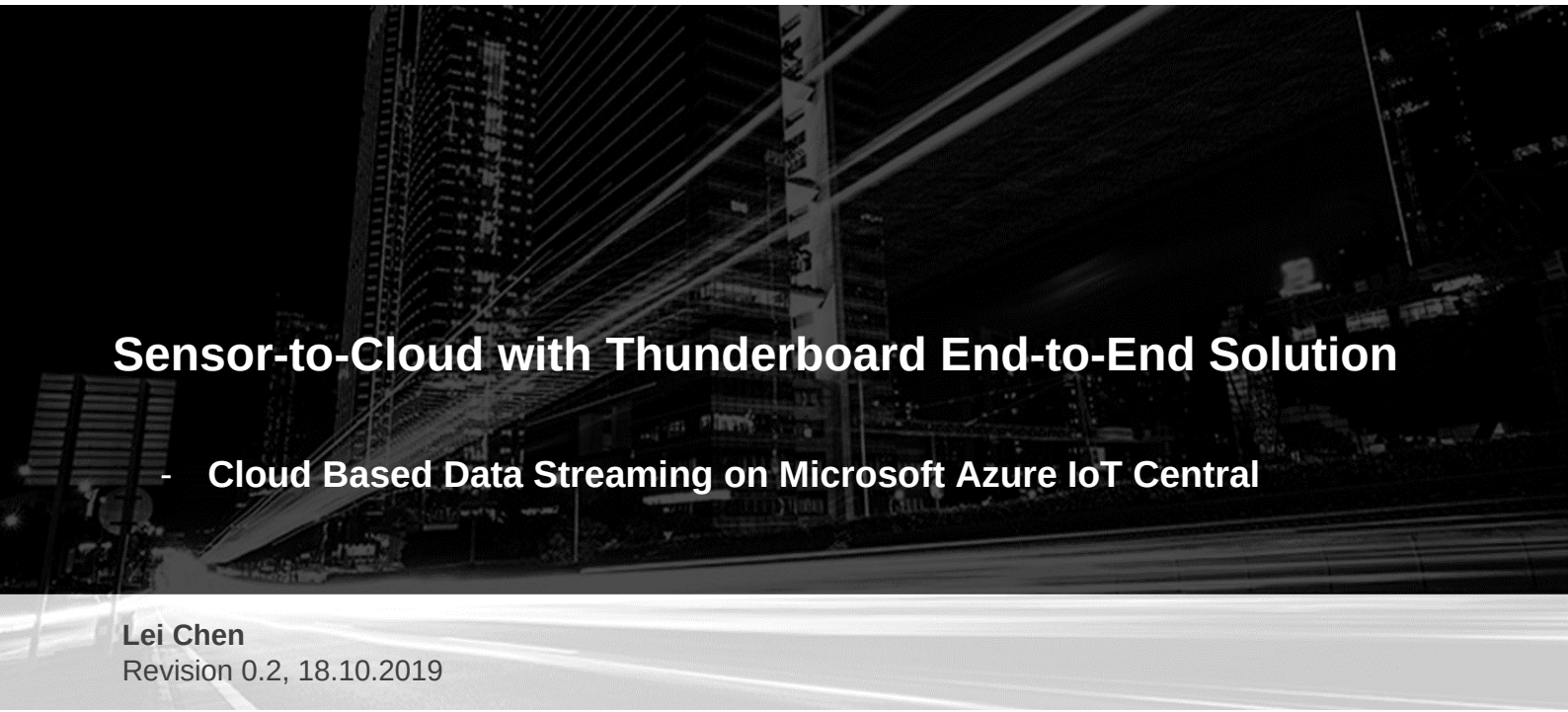
Aerospace & Defence | Lighting | Power Management | Internet of Things | Transportation

Components – EMEA

ESC – Software Solutions



Sensor-to-Cloud with Thunderboard End-to-End Solution

- Cloud Based Data Streaming on Microsoft Azure IoT Central

Lei Chen

Revision 0.2, 18.10.2019

Quick Start Guide

Revision History

Revision, Date	Editor	Subject (major changes)
Revision 0.2, 08.10.2019	Lei Chen	First version Draft

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Step by step on how to connect Thunderboard Sense to Azure IoT Central

Introduction

This guide shows you how to connect your Thunderboard Sense to Azure Cloud and stream environmental and motion data easily to the Azure IoT Central dashboard.

Hardware Requirements

The following equipment will be required:

- Thunderboard Sense SLTB001A.

  Thunderboard Sense is a small and feature packed development platform for battery operated IoT applications. The mobile app enables a quick proof of concept of cloud connected sensors. The multi-protocol radio combined with a broad selection of on-board sensors, make the Thunderboard Sense an excellent platform to develop and prototype a wide range of battery powered IoT applications. [1]
  Purchase a Thunderboard Sense if you don't already have one.
  Purchase link: https://www.arrow.com/en/products/sltb004a/silicon-labs

- A coin cell battery or a micro-USB cable for power supply.

Software Requirements

- There are iOS and Android mobile apps from Arrow Electronics available. The mobile app seamlessly communicates between the Thunderboard and Azure IoT Central to visualize sensor data collected or control the LED states on the Thunderboard Sense hardware. Download the Thunderboard mobile app from Apple Store / Google Play.

- Microsoft Account for Azure IoT Central.

  Azure IoT Central is a hosted, extensible software as a service (SaaS) platform that simplifies setup of your IoT solution and helps reduce the burden and costs of IoT management, operations, and development. Provide customers superior products and service while expanding your business possibilities. [2]

Run the Example

Step 1: Create an Azure IoT Central Application

Create up a new Microsoft cccount if you don't have one. Go to https://account.microsoft.com/account and follow registration steps.

When you have successfully registered the Microsoft Account, we are ready to create an Azure IoT Central application.

Navigate to the Azure IoT Central application manager website. Then sign in with a Microsoft account.

To start creating a new Azure IoT Central application, select **New Application**. This link takes you to the Create an application page: https://apps.azureiotcentral.com/create.

Choose a payment plan, more details: https://docs.microsoft.com/en-us/azure/iot-central/quick-deploy-iot-central.

Select the **Thunderboard Sense device template**. The Link for Thunderboard Sense IoT Central Device Template:

https://apps.azureiotcentral.com/create?appTemplate=29198d7c-f116-450c-98fd-c52fac58fd5d

An application template can contain predefined items such as device templates and dashboards.

Fill additional information required and select **Create** at the bottom of the page.

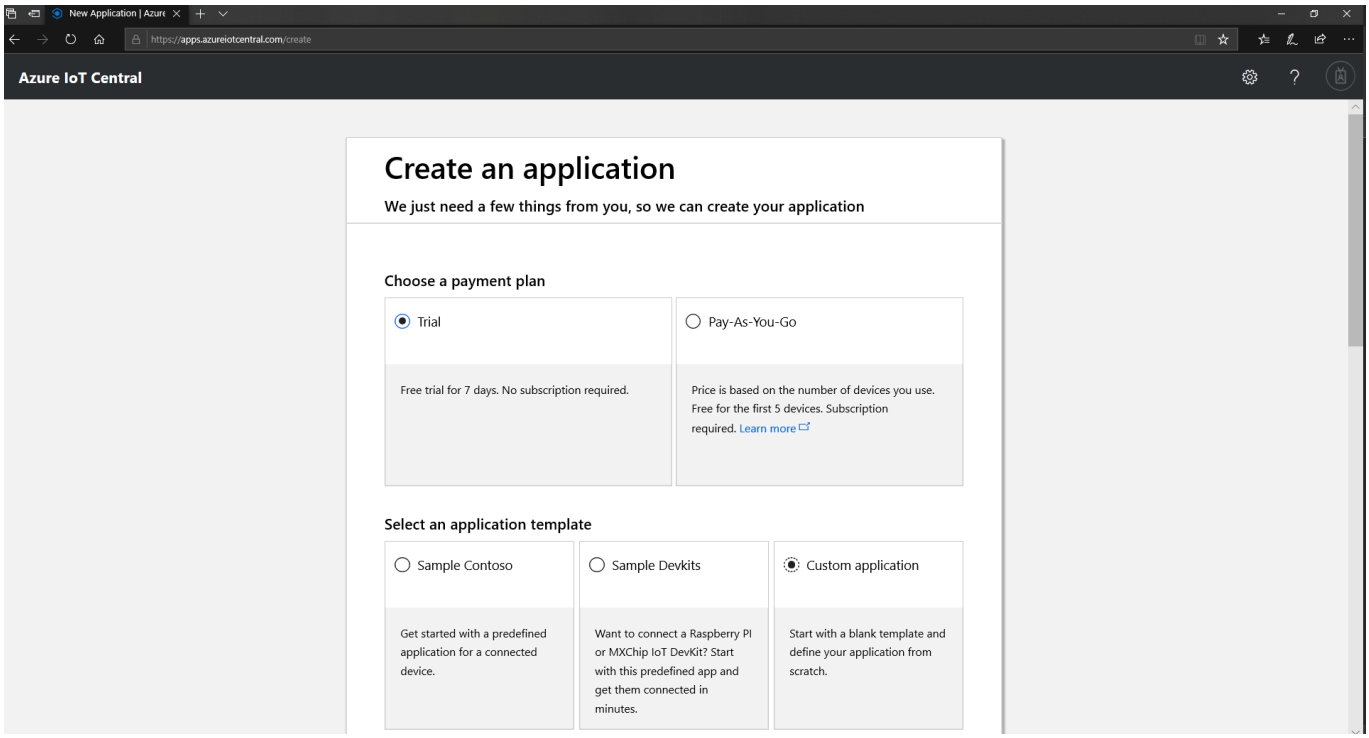

Figure 1: Create an Azure IoT Central Application

Step 2: Add a real device to an Azure IoT Central Application

To add a real device to your application, you use the Thunderboard Sense device template with name “Silicon Labs Thunderboard (1.0.0)”. Choose **Devices** in the left navigation menu. Notice that “Silicon Labs Thunderboard” device template is the one selected in the Device Explorer. To start connecting a real Thunderboard Sense device that uses this template, select **+,** then **Real**:

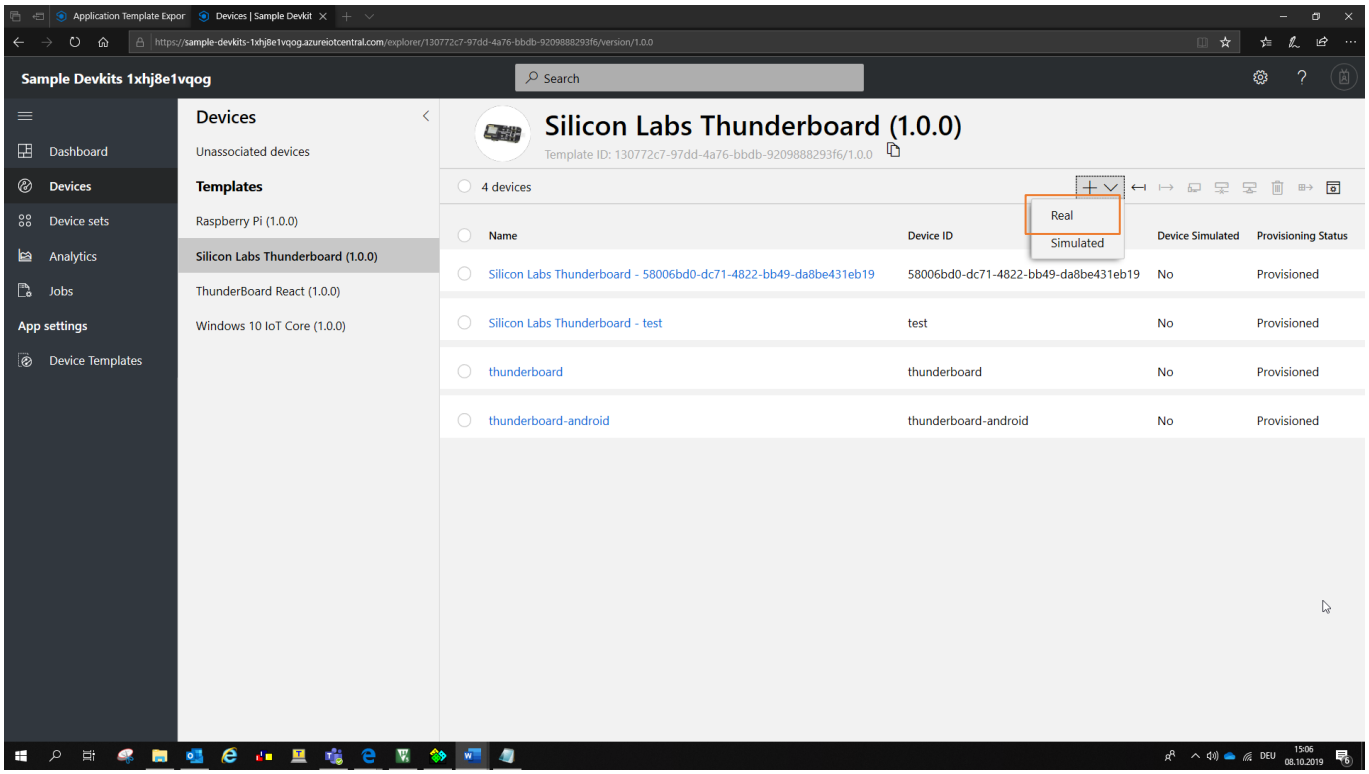

Figure 2: Azure IoT Central Device Explorer

Enter your own **Device ID** or use the suggested value. You can also enter a **Device Name** for your new device and choose Create. More detail: https://docs.microsoft.com/en-us/azure/iot-central/tutorial-add-device

On the device screen for your real connected Thunderboard Sense, choose **Connect**. The **Device Connection** page will pop up. On the **Device Connection** page, make a note of the **Scope ID**, **Device ID** and **Primary Key of Thunderboard** values. You use these values later in this guide.

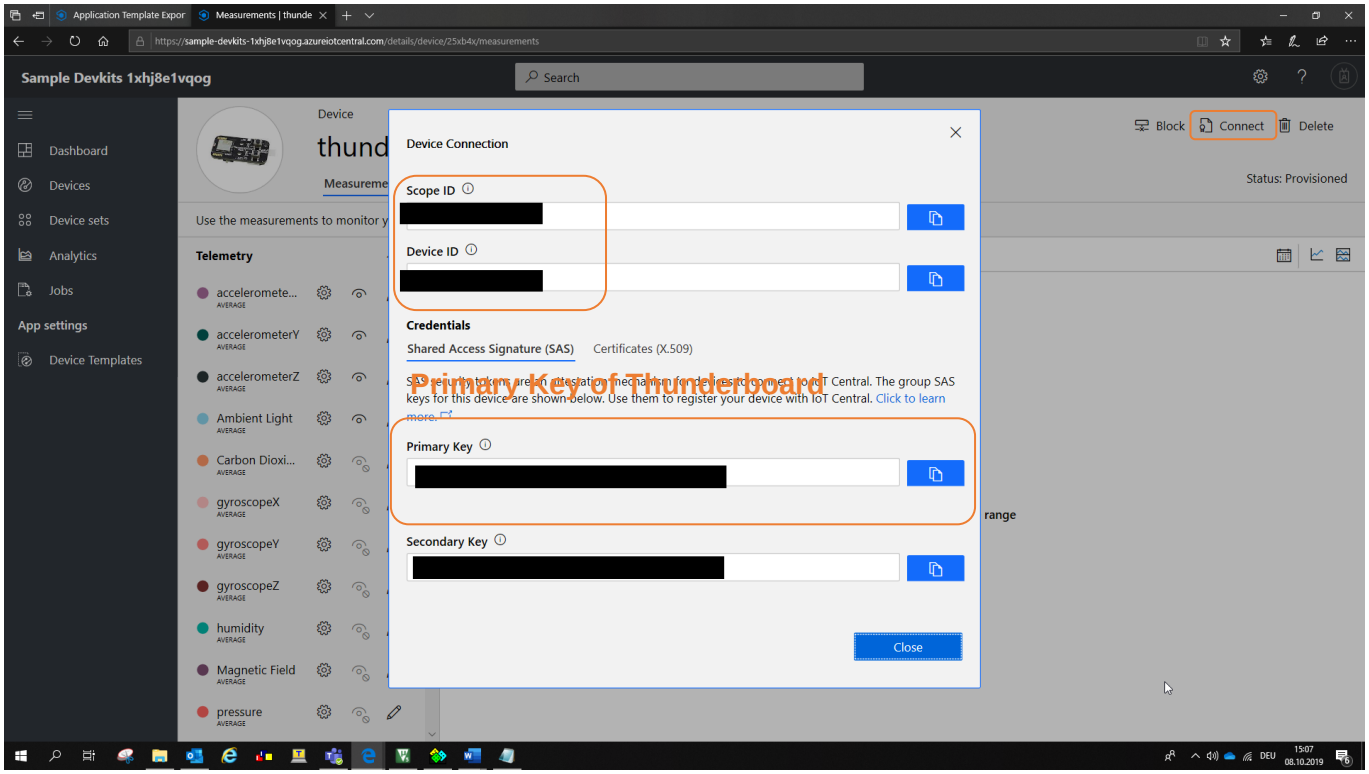

Figure 3: Device Connection Page

Choose **Administration** in the left navigation menu, choose **Device Connection**, make a note of the value of **Primary Key of Device Connection**. You use this value later in this guide.

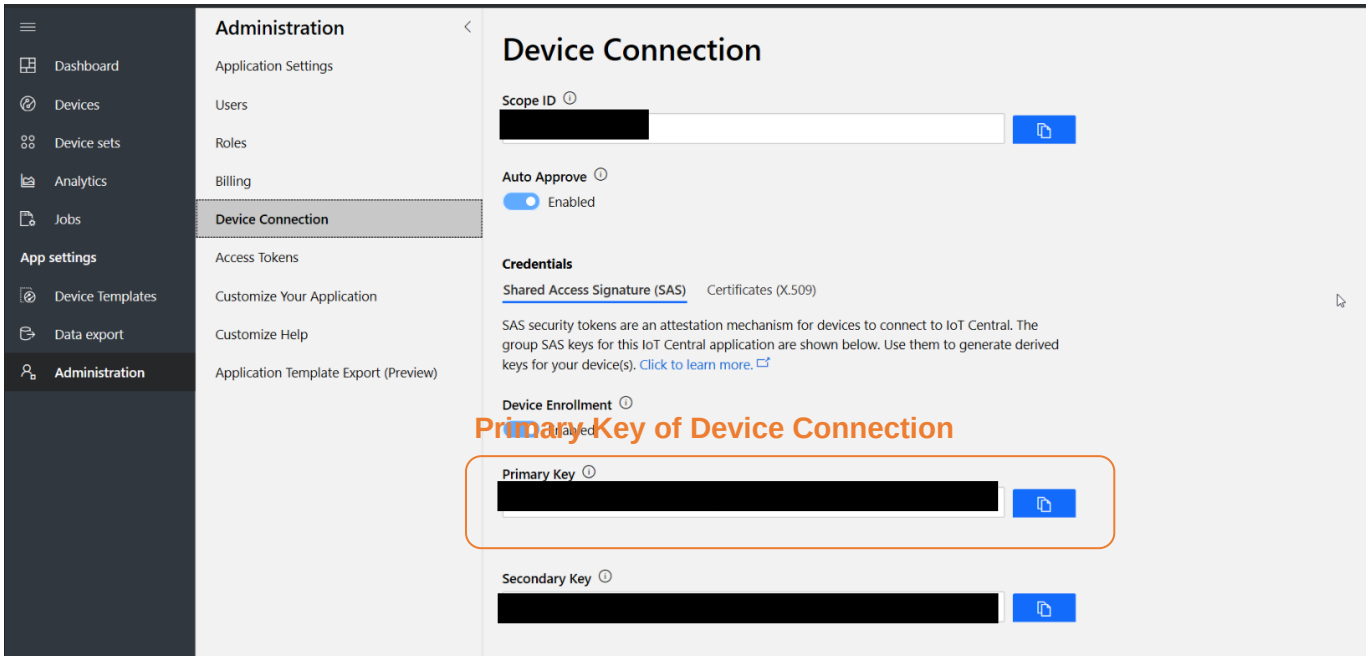

Figure 4: Device Connection Page 2

Step 3: Unbox Thunderboard Sense

Remove the Thunderboard Sense from the box. Place a battery in the coin cell battery holder on the bottom of the board or plug a micro-USB cable to supply power to your Thunderboard Sense.

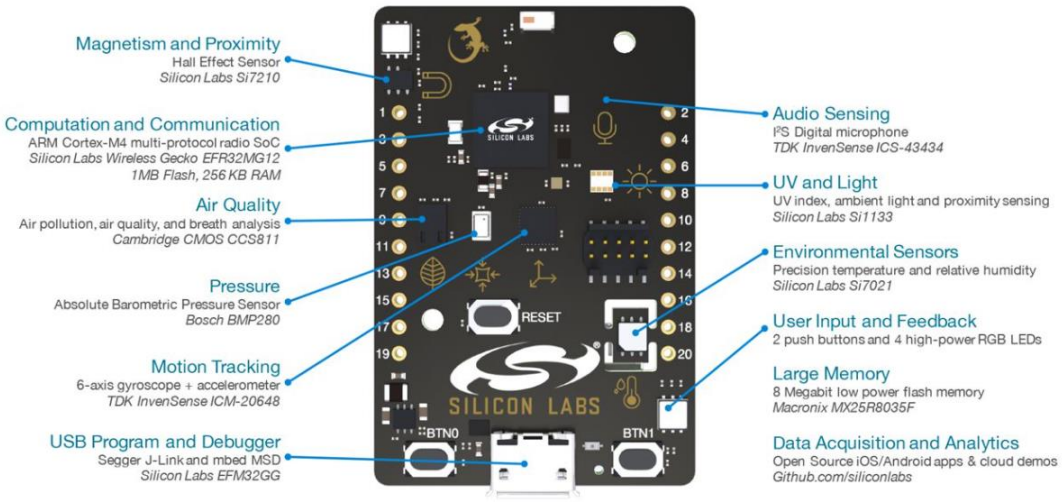

Figure 5: Thunderboard Sense [3]

Step 4: Use the Thunderboard Mobile App

Download and install the Thunderboard mobile app. Enable Bluetooth service and location service (GPS) on your mobile phone.

Launch the app, enter the **Scope ID**, **Device ID** and **Primary Key of Device Connection** you noted down earlier in the Step 2. Select **APPLY**.

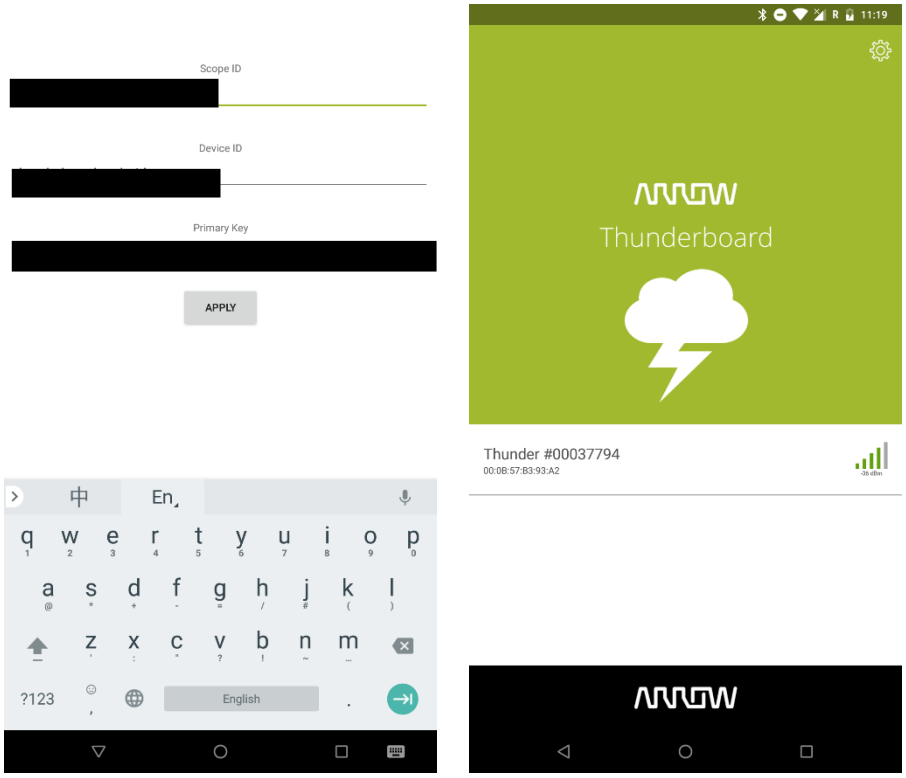

Figure 6: Use the Thunderboard Mobile App 1

Discover your Thunderboard Sense. Press the Reset button on the Thunderboard Sense to re-enable discovery mode. After pairing with the Sense board, you can access the app menu.

Step 5: Try the Sensors

When you have successfully paired the Sense board and mobile app, we are ready to test the sensor.

In the **Montion** menu you can calibrate the board and test the accelerometer and gyroscope.

The mobile app seamlessly connects your Thunderboard Sense to Azure IoT Central dashboard. Enable streaming of data to the cloud “STREAMING TO CLOUD”. View the data stream in your Azure IoT Central dashboard.

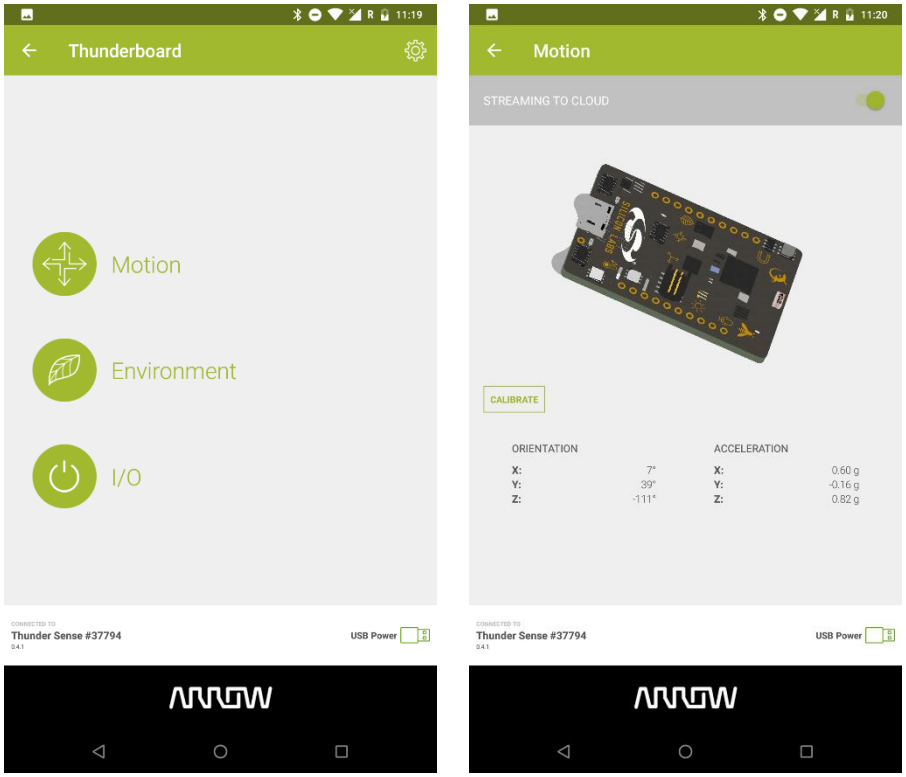

Figure 7: Use the Thunderboard Mobile App 2

You can view information about the Thunderboard Sense on the **Measurements**, **Settings**, **Properties**, **Rules** and **Dashboard** pages. The customized **Dashboard** is to display information about the Thunderboard Sense device. Choose the **Dashboard** view to see information about the device.

The chart on the **Dashboard** shows a plot of the device temperature, humidity and pressure. You can also see the maximum target temperature and humidity, average pressure for your Thunderboard Sense.

The chart on the **Measurements** show a plot of all the sensor data on the Thunderboard Sense. You can choose which data you want to display, either graphically or in a table.

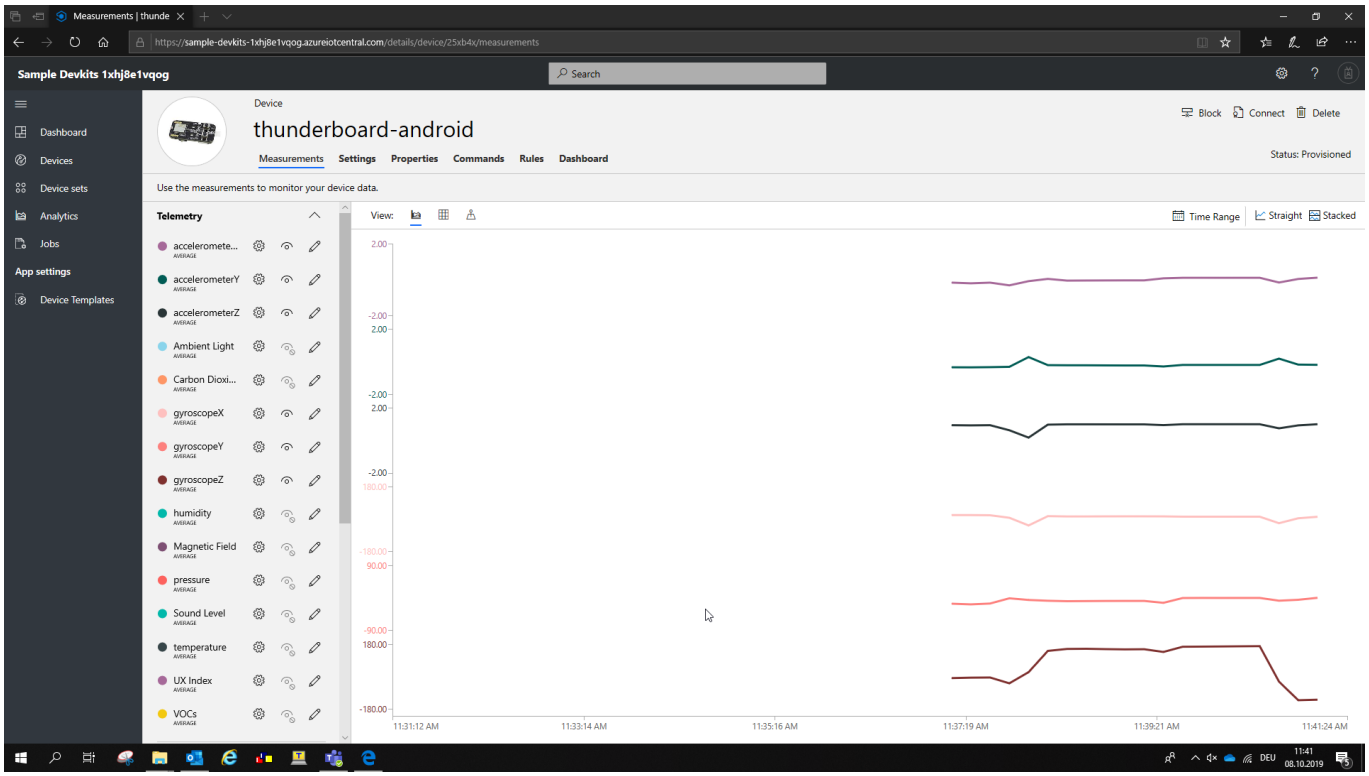

Figure 8: Azure IoT Central Dashboard 1

Select “Environment” to test several environmental Sensors.

Select “I/O” to test buttons and LEDs.

How to provision device on Azure IoT Central

In this section, you will register your device using software dps-keygen.

Click here to download dps-keygen package, then unzip the dps-keygen package.

In the windows command line go to the location where “dps_cstr.exe” located, default in the folder “\dps-keygen\bin\windows\dps_cstr”.

Run the command “dps_cstr” with “**Scope ID**”, “**Device ID**” and “**Primary Key of Thunderboard**” (see Figure 3: Device Connection Page) that you saved before. Command:

dps_cstr Scope_ID Device_ID Primary_Key_of_Thunderboard

Wait for the exe to complete, then copy and save the generated Connection String. When this step is completed, the provisioning status of your device is now “Provisioned”.

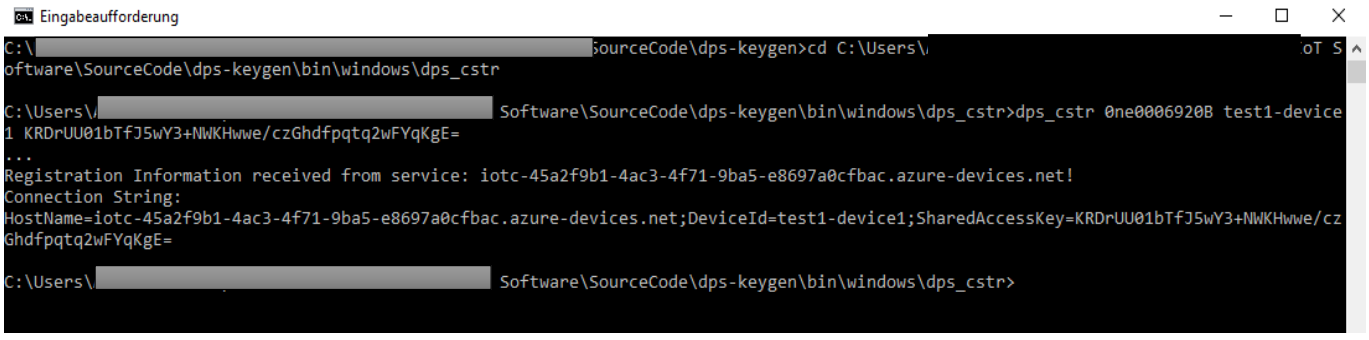

Figure 9: Device Provisionen

Reference

[1] https://www.silabs.com/products/development-tools/thunderboard/thunderboard-sense-kit

[2] https://azure.microsoft.com/en-us/services/iot-central/

[3] https://www.silabs.com/support/getting-started/thunderboard/thunderboard-sense