Secure AVR BLE IoT Node - Getting Started Guide

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Introduction

This document describes the setup steps and operation of the Secure AVR® BLE IoT Node kit with the provided phone app. It helps users play with the factory programmed firmware and explore the key features of this kit. To further understand the design, we have two additional user guides focusing on software and hardware details respectively. Refer to Secure AVR BLE IoT Node - Software User Guide and Secure AVR BLE IoT Node -Hardware User Guide for more information.

Features

- Secure AVR BLE IoT Node general introduction
- Steps to setup Secure AVR BLE IoT Node
- Phone app operation manual

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1. Overview

Secure AVR BLE IoT Node is a kit used to showcase a typical IoT application powered by Microchip ATtiny1617 MCU, an 8-bit high-performance AVR microcontroller. The kit is equipped with an ATECC508A CryptoAuthentication™ device, a RN4871 Bluetooth 4.2 Low-Energy module, and a triaxial acceleration sensor. The essential features of a typical IoT application, Control, Security, Connectivity, and Low Power are demonstrated by running factory programmed firmware in this kit.

The front and back side of the board are shown in the figures below.

Figure 1-1. Front Side View

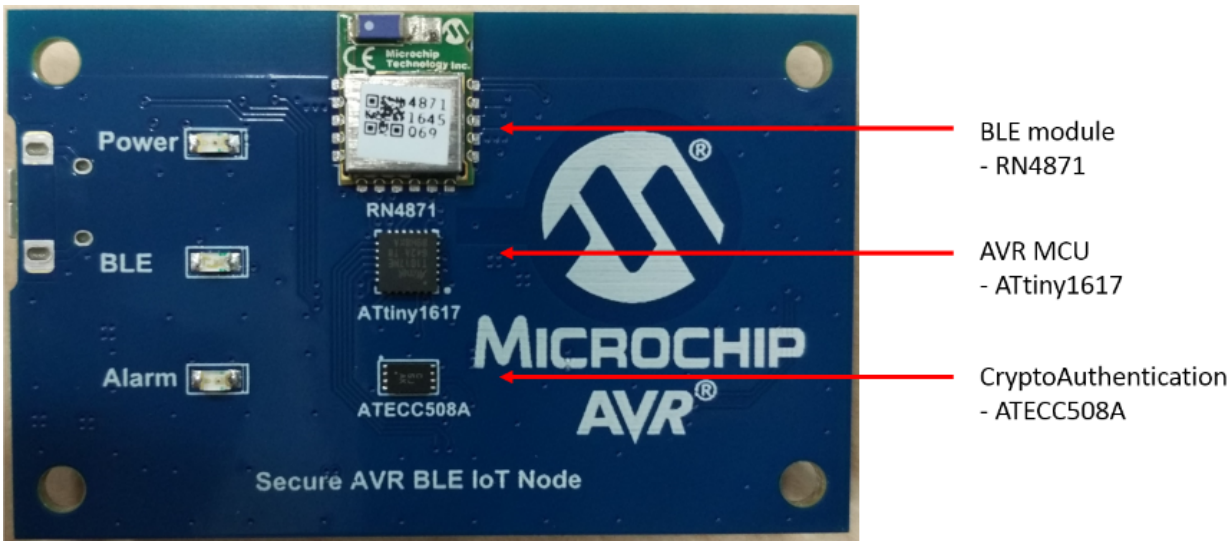
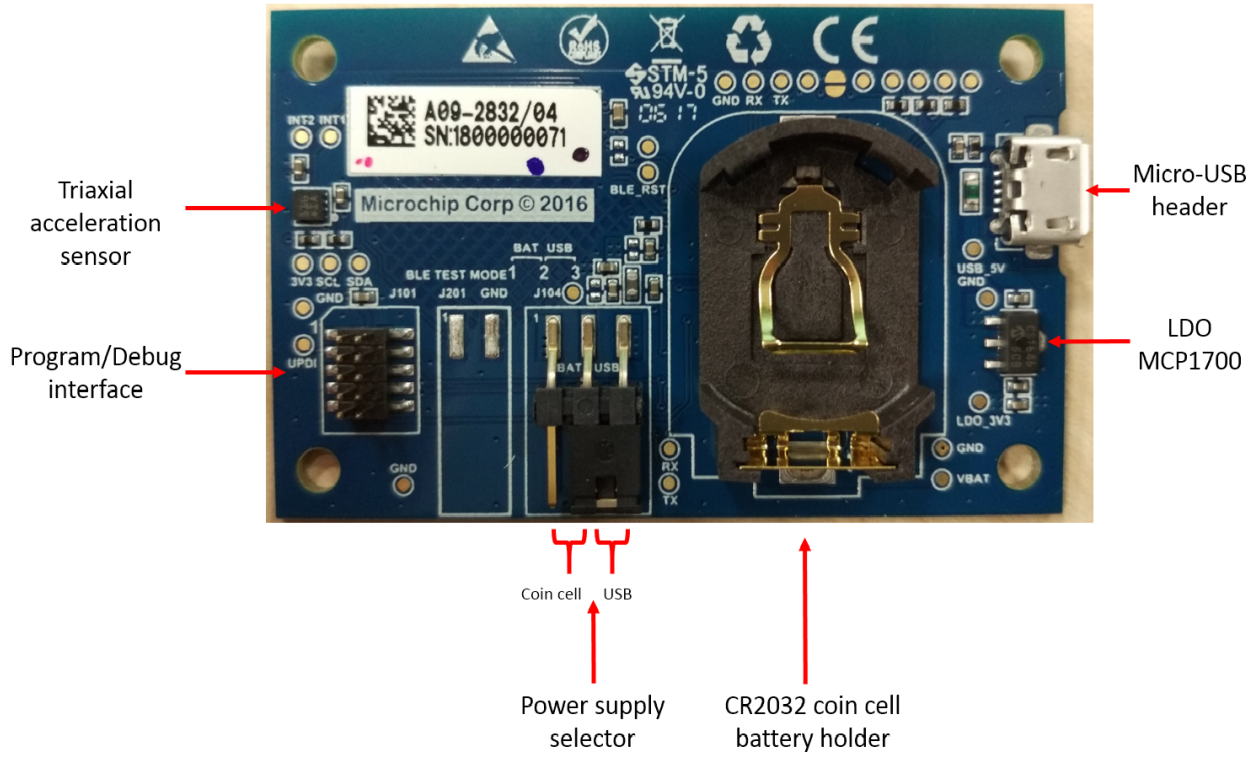


Figure 1-2. Back Side View



2. Secure AVR BLE IoT Node Setup

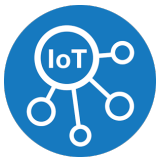
2.1 Prerequisites

Before using the Secure AVR BLE IoT Node, the following prerequisites should be ready.

- An Android or iOS smartphone
  - An Android device with Android 4.3 or higher
  - An iOS device with BLE support
- The Microchip **Secured AVR BLE IoT Node** app installed on the phone
  - Android app: https://play.google.com/store/apps/details?id=com.microchip.wearable&hl=en
  - iOS app: search for "Secured AVR BLE IoT Node" in apple App Store

  If the app is installed successfully, the following app icon can be found on the phone.

  Figure 2-1. Secured AVR BLE IoT Node App



- CR2032 coin cell or Micro-USB cable

2.2 Setup Steps

The first step is to select the power supply for the Secure AVR BLE IoT Node kit. As indicated in Figure 1-2, a three-pin header is used to select coin cell or USB.

If the kit is to be USB powered:

- Put a jumper to select USB from the "Power supply selection" header
- Plug in the USB cable to the micro-USB header on the kit. The other side of the USB cable can be connected to a PC or dedicated USB power adapter.

If the kit is to be battery powered:

- Put a jumper to select coin cell from "Power supply selection" header
- Insert a CR2032 coin cell into the battery clip with the anode facing up

After the kit is powered, the following LED status can be seen:

- Power LED will blink once per 5 seconds
- BLE LED will blink once per 3 seconds
- Tap the kit with some strength, the Alarm LED will blink once

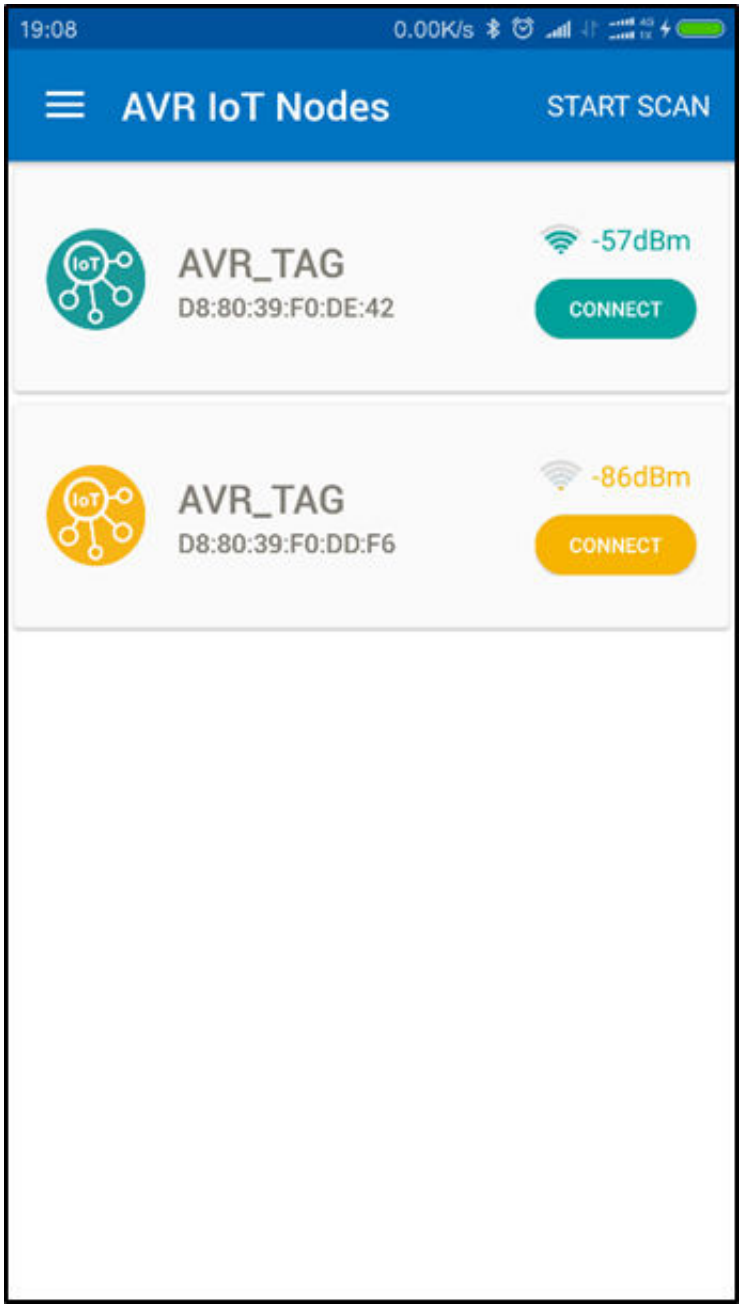
3. App Operation Manual

In this section, the app provided to work with the Secure AVR BLE IoT Node will be introduced. For app installation, refer to Prerequisites.

3.1 Node Scan and Discovery

After launching the app, it will automatically scan for the available Secure AVR BLE IoT Nodes. The app will notify if Bluetooth on the phone is disabled, otherwise it will automatically scan for nodes nearby. The scan can also be started manually by tapping the "START SCAN" button on the top right. All the valid nodes will be discovered and displayed in the app after the scan period. Refer to the figure below for more information.

Figure 3-1. Node Scan and Discovery



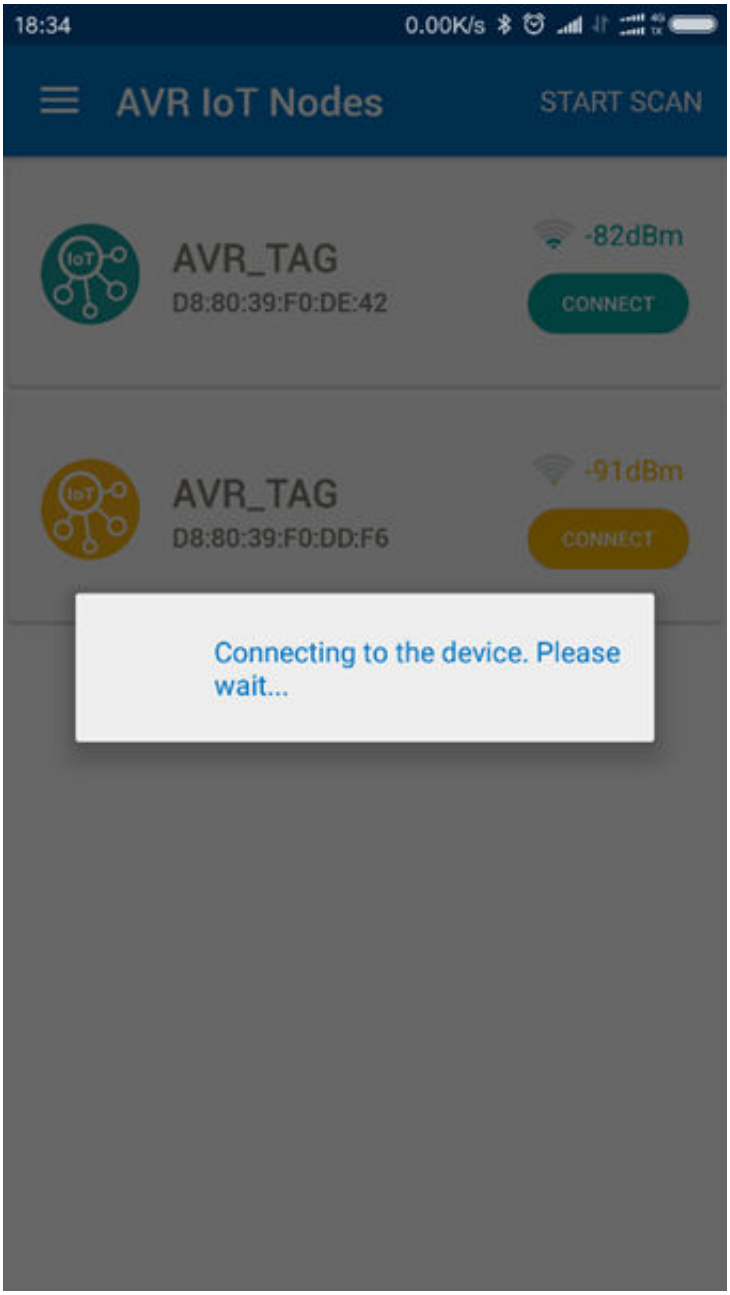
On this page, the BLE MAC address (not available for iOS app) and signal strength of listed nodes will be displayed. If a node is not displayed in the list, make sure it is powered and close to the phone. Then re-scan by tapping the "START SCAN" button on the top right.

By tapping the "CONNECT" button of the listed node, the phone app will start connecting to the node and the Node Connecting window pops up.

3.2 Node Connecting

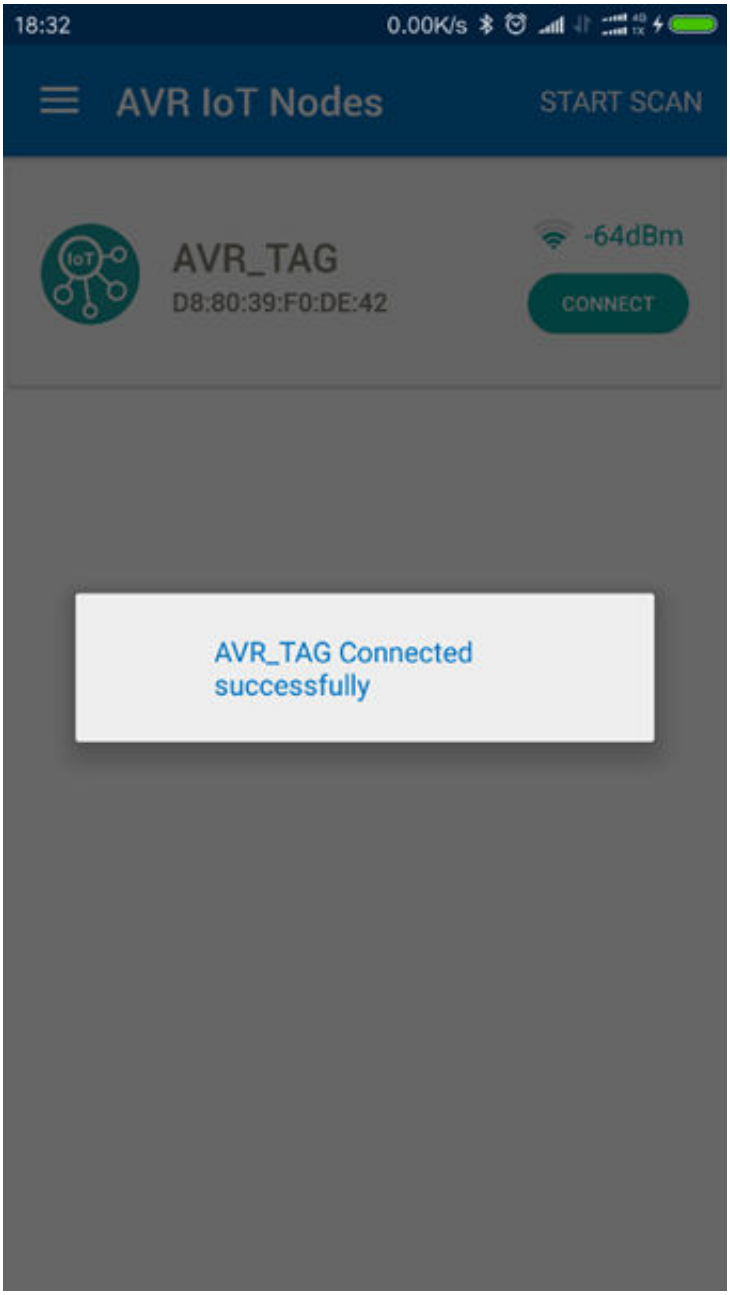
The following page is displayed if the phone app tries to connect to a node.

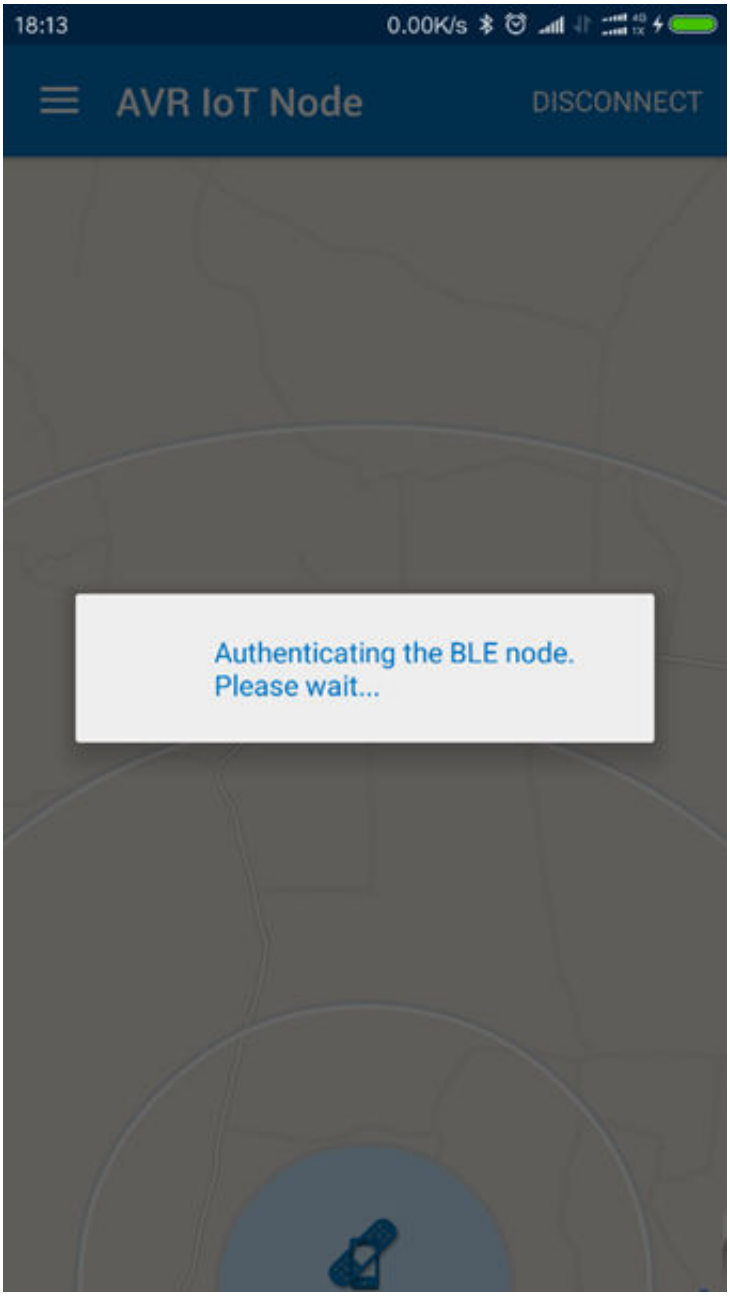
Figure 3-2. Node Connecting



If the BLE connection is established successfully, it will show that the node is connected and then indicate that the authentication is in progress, as shown below.

Figure 3-3. Node Connected and Authenticating





At the same time, the BLE LED on the kit blinks twice per 1.5 second indicating that the BLE connection is established. The Power LED keeps blinking quickly as there is much data exchange between the node and phone app during the node authentication process.

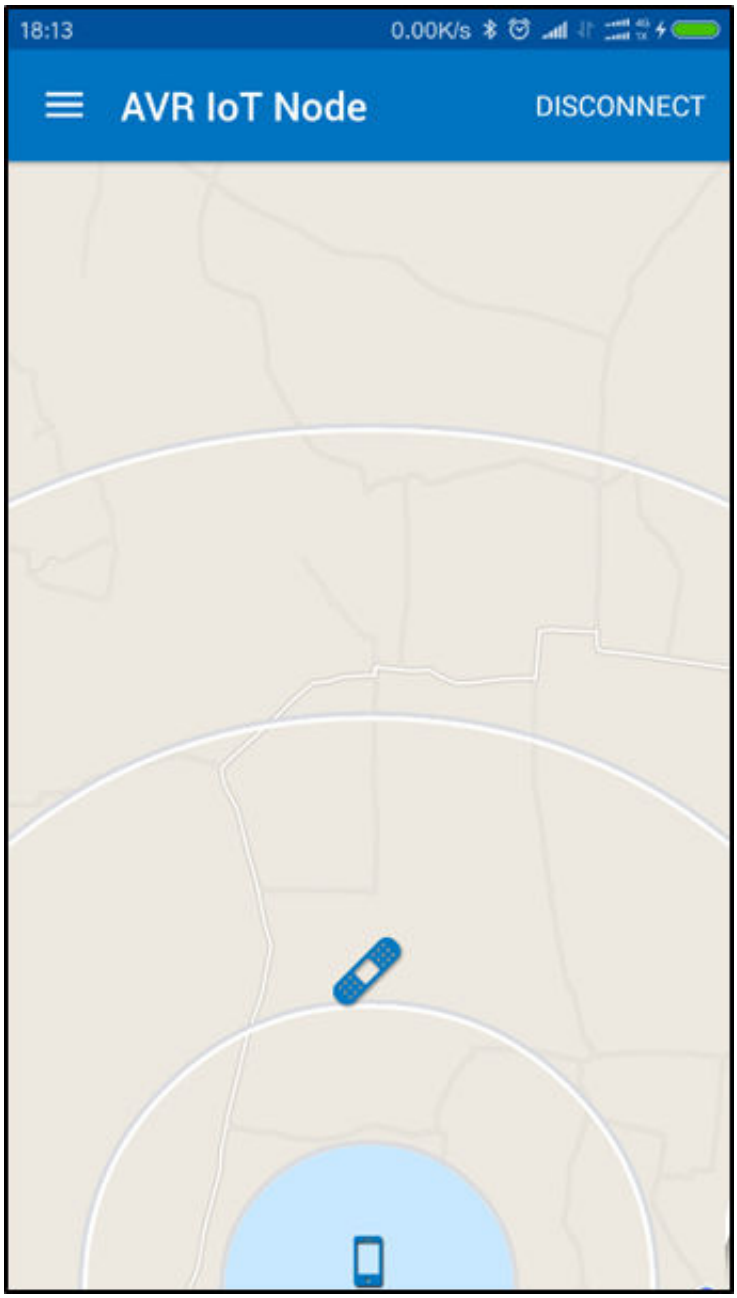
Once the node authentication process is completed successfully, the app will switch to the Approximate Range page. Otherwise, it goes back to the Node Scan and Discovery page in case of connection timeout or authentication failure. A re-scan is needed by tapping "START SCAN" button in such cases.

3.3 Approximate Range

After a node is connected and authenticated by the app, the Approximate Range page is displayed. It displays the status of the BLE link and the approximate range between the phone and the node based on

RSSI (received signal strength indication). Once a connected node is out of range or disconnected unintentionally for a period of time, the app will beep to notify the user.

Figure 3-4. Approximate Range



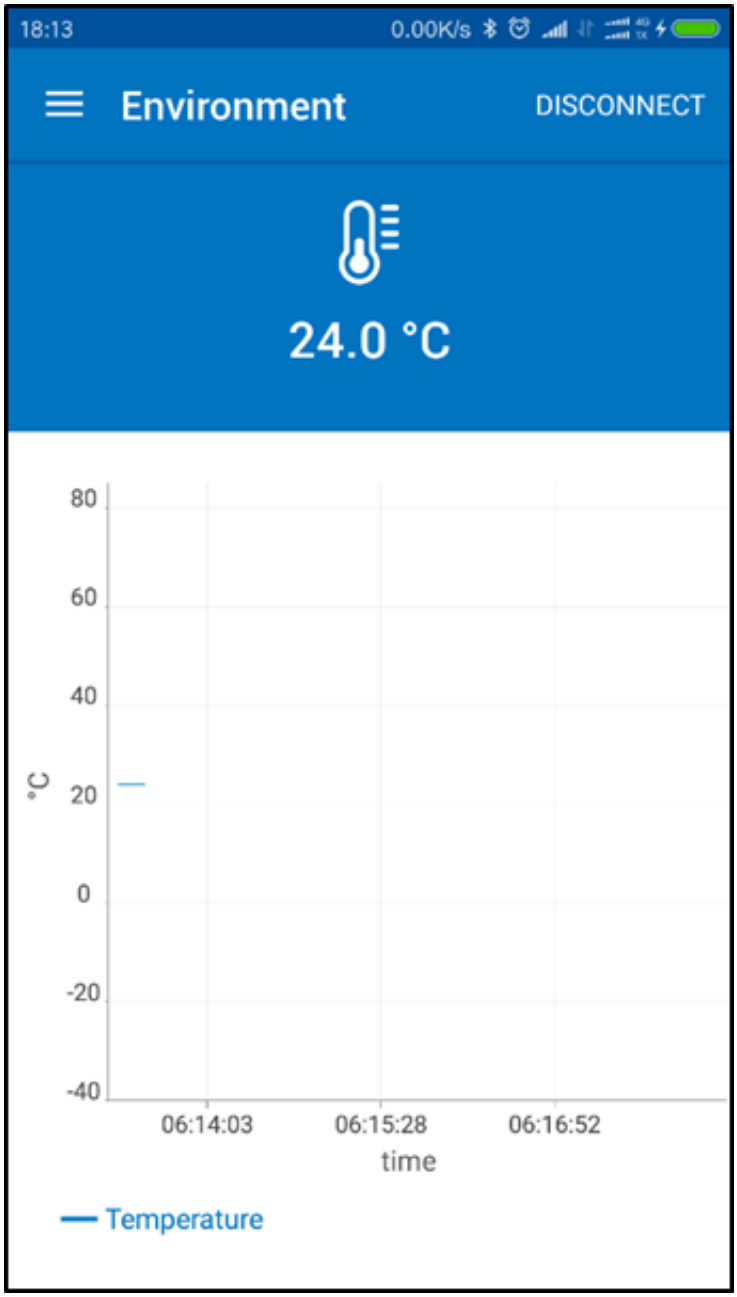
There is a "DISCONNECT" button on the top right of the screen. By tapping this button, the node gets disconnected and the app goes back to the Node Scan and Discovery page.

Swipe left to show the Temperature Sensor page.

3.4 Temperature Sensor

This page displays the real-time ambient temperature reported by the node. The temperature data comes from the acceleration sensor on the node and the offset is ±2K. Swipe right or left as well as zoom in or out within the temperature graph to see more data.

Figure 3-5. Temperature Sensor



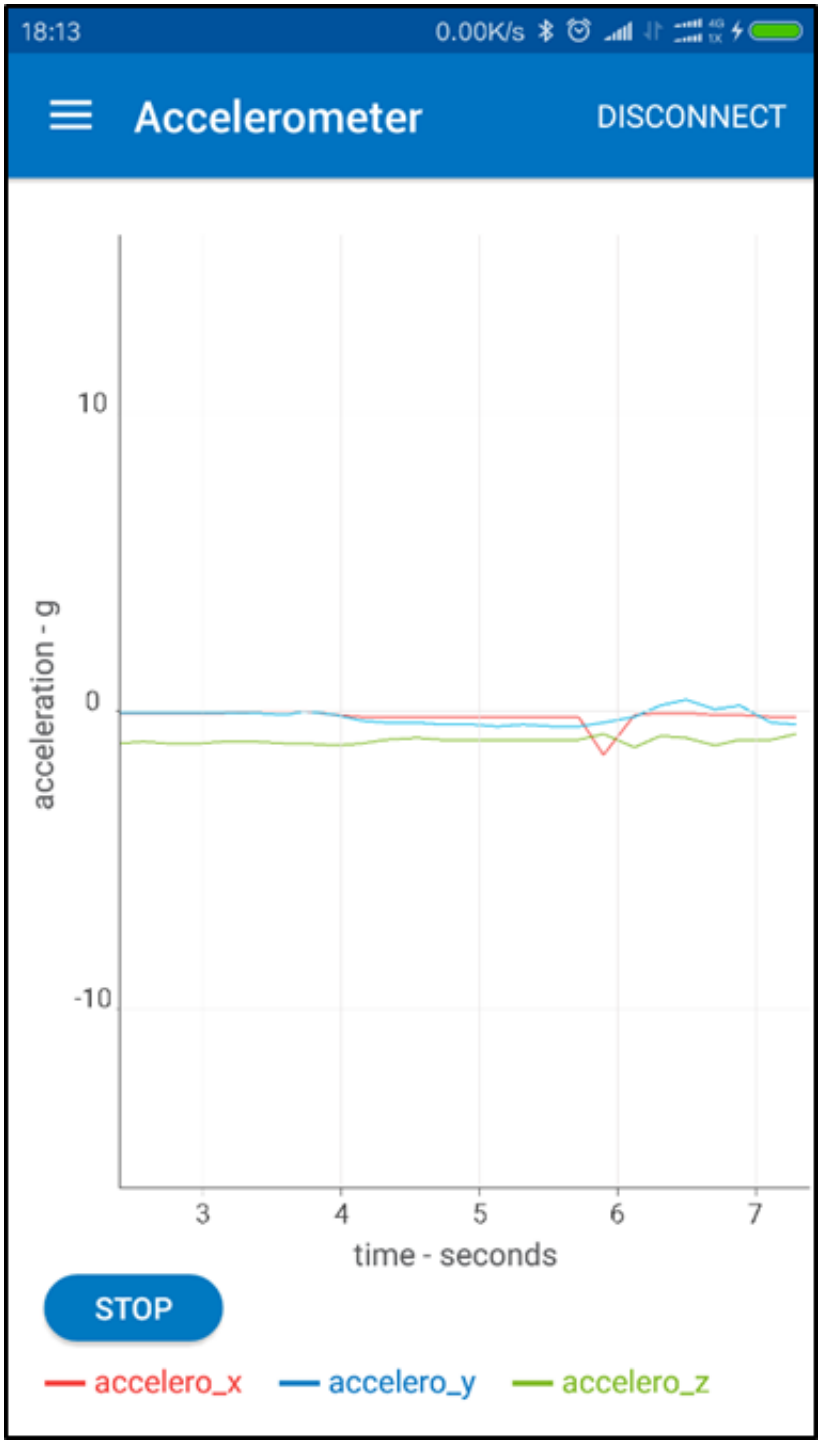
There is a "DISCONNECT" button on the top right of the screen. By tapping this button, the node gets disconnected and the app goes back to the Node Scan and Discovery page.

Swipe left outside the temperature plot to show the Acceleration Sensor page. Swipe right outside the temperature plot to show the Approximate Range page.

3.5 Acceleration Sensor

On this page, the 3-axial acceleration sensor data, namely the x-, y-, and z-axis acceleration data, is displayed. The acceleration sensor graph is a 2D plot of acceleration (g) against time.

Figure 3-6. Acceleration Sensor



By default, the sensor data is not shown on the screen. There is a "START" button on the bottom left of the screen. By tapping this button, the real-time sensor data is streaming into the screen and the button text changes to "STOP". Tapping it again stops the data stream.

There is a "DISCONNECT" button on the top right of the screen. By tapping this button, the node gets disconnected and the app goes back to the Node Scan and Discovery page.

Swipe right outside the acceleration plot to show the Temperature Sensor page.

4. Revision History

Doc. Rev.	Date	Comments
A	06/2017	Initial document release

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