UM11087

IoT Toolbox Mobile Application User Manual

Rev. 0 — 19 December 2017 User Manual

Document information

Info	Content
Keywords	User Manual, IoT, Toolbox
Abstract	The IoT Toolbox is a mobile application developed by NXP Semiconductors and designed for the Android™ and iOS™ handheld devices.

Revision history

Rev	Date	Description
0	20171219	Initial version

Contact information

For additional information, please visit: http://www.nxp.com

1. Introduction

The IoT Toolbox is a mobile application developed by NXP Semiconductors. It is designed for Android™ and iOS™ handheld devices. The application allows the end-users to improve their out-of-the-box experience and provides a user-friendly way to test the Bluetooth® Low Energy (BLE) demo applications.

The IoT Toolbox is an all-in-one application that demonstrates NXP's BLE functionalities, the implementation of BLE and custom profiles and the compatibility with different smartphones.

The initial sections of this document provide the features supported by the mobile application, the hardware and software requirements for the application, and how to install the application. Section 5, Using IoT Toolbox introduces how to interact with the application and describes the functionality of each featured tool.

2. IoT Toolbox features

The IoT Toolbox mobile application features NXP's proprietary tools/applications, including:

- NXP BLE Beacon.
- Wireless UART.
- Over-The-Air Programming (OTAP).

It also supports the following standard profiles:

- Blood Pressure sensor.
- Cycling Speed and Cadence sensor.
- Glucose sensor.
- Health Thermometer.
- Heart Rate sensor.
- Proximity sensor.
- Running Speed and Cadence sensor.

3. IoT Toolbox requirements

Table 1. IoT toolbox requirements

Application version	Android	iOS
OS version	Android 4.3 or later	iOS 7.1 or later
Permission	Bluetooth settings Location access Media files access Storage access	Bluetooth Media files access

4. Installing IoT Toolbox

The mobile application is free in App Store® and Google Play™. To install the application, perform these steps:

1. Open the app store.
2. Search for **IoT Toolbox**.

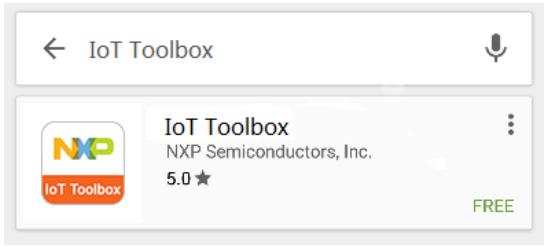


Fig 1. IoT Toolbox search

3. Select **IoT Toolbox** application.
4. Click **INSTALL**.

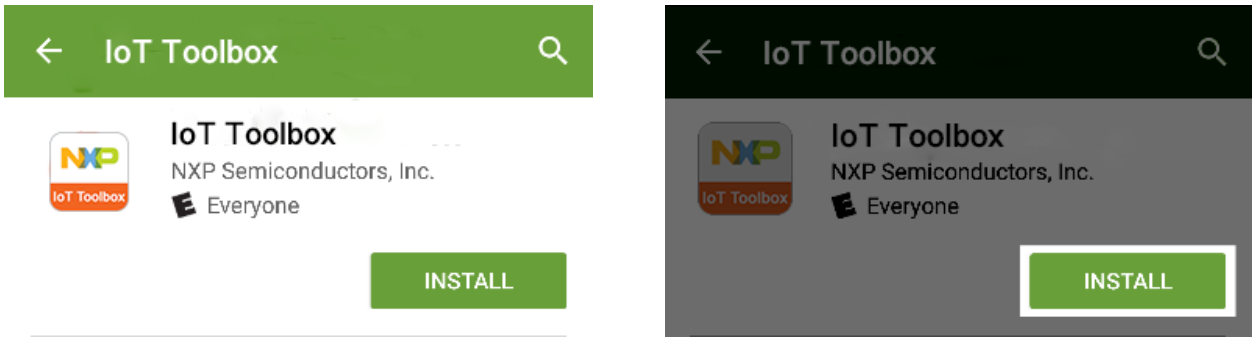


Fig 2. Install button

5. When asked for permissions, click **Accept**.

   Remark: If running Android 6 (or later), you are not asked for permissions during the installation. You are going to be prompted when the application requires to access each function.

6. You can launch the application from the app drawer now.

5. Using IoT Toolbox

Before launching the application, make sure that the location services are enabled and the Bluetooth radio is turned on. When the application asks for permission to use Bluetooth or location services, click **YES**. Otherwise, the application will not work.

5.1 Home screen

Fig 3 shows the IoT Toolbox home screen. In this screen, choose a tool to try. Select the right tool because the application can only detect a BLE device if it is programmed with the selected demo application (for example; if the BLE device is running the Beacon demo application, click **Beacons** to detect it).

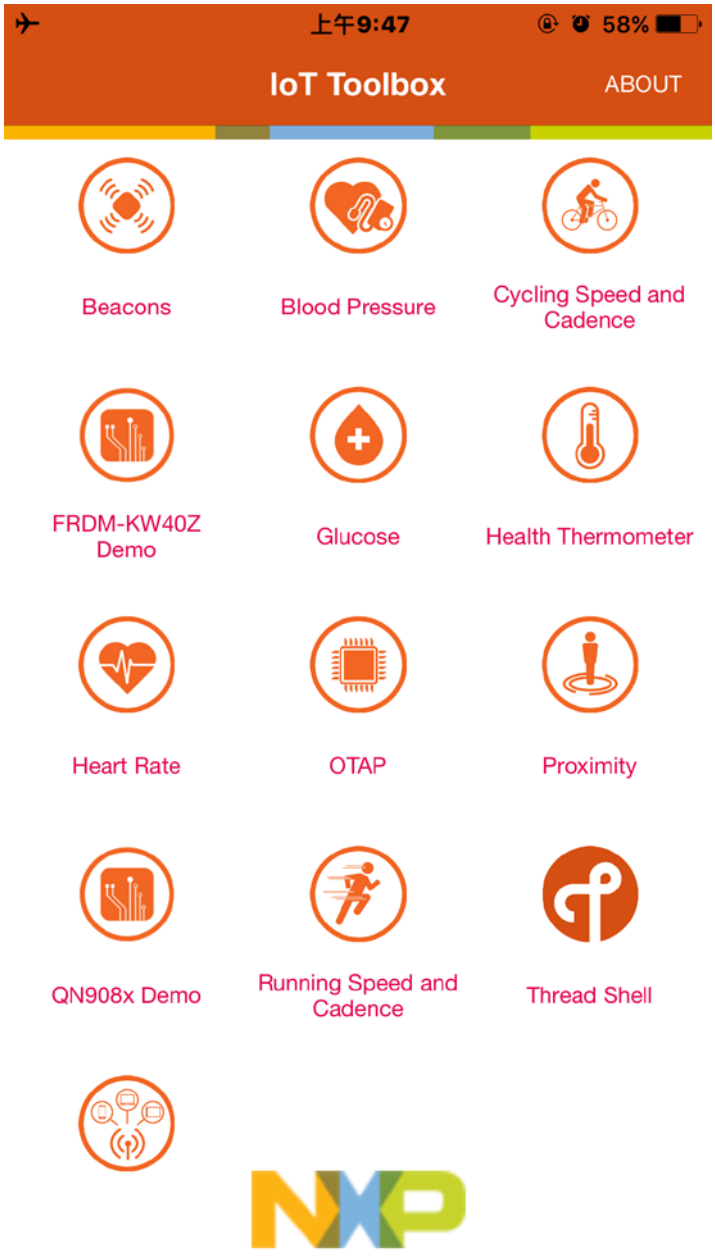


Fig 3. Home screen

5.2 Connecting to BLE devices

To access a certain feature, press the corresponding button on the home screen.

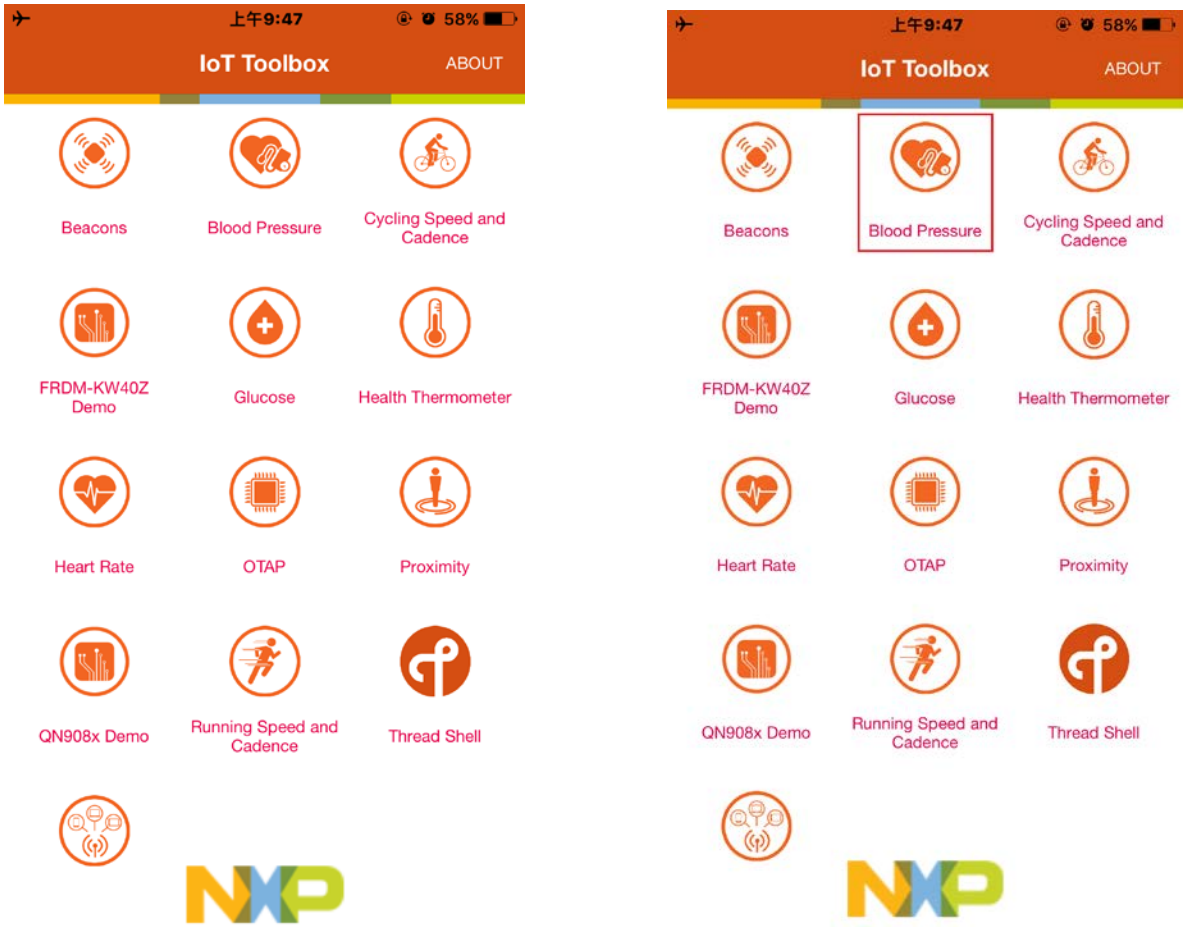


Fig 4. Accessing a feature

When a tool/application is selected, the BLE devices screen appears. This screen shows all the BLE devices running the corresponding demo. These BLE devices must be in the range and in the advertising mode. The application automatically starts scanning for BLE devices in the range. If not, the scanning can be manually started or stopped by pressing **SCAN** or **STOP** in the upper right corner.

Fig 5. SCAN button

If a BLE device is not listed, make sure it is turned on, in the range, and in the advertising mode. Select the correct tool in the IoT Toolbox application because the BLE device is only detected when it is programmed with the profile that the tool is looking for (to find and connect to a Heart Rate sensor BLE device, run the Heart Rate tool).

Fig 6. STOP button

When the desired sensor is found, select it to create a connection. When the connection is made, the application cannot connect to any other sensor in the range because it can only be connected to one BLE device at a time.

This connection process applies to every tool within the IoT Toolbox application, except for the BLE Beacon tool because there is no exclusive connection between the BLE Beacon and the device running the IoT Toolbox application. The BLE Beacons are broadcasting and always in the advertising mode.

5.3 Disconnecting from BLE devices

To disconnect from a BLE device, click **DISCONNECT** in the upper right corner of the screen.

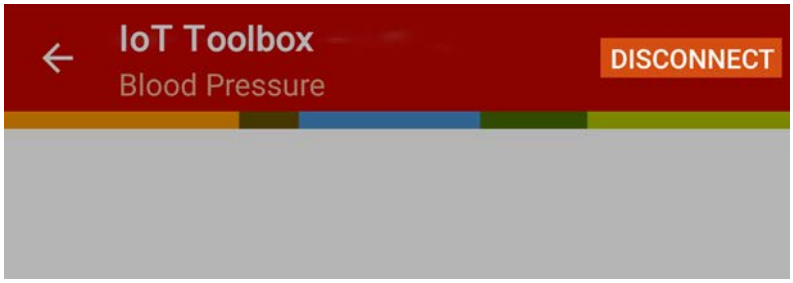


Fig 7. DISCONNECT button

Remark: If running the Beacons tool, this option is not available because there is no connection to start with.

Click **BACK** to return to the BLE devices screen, where the BLE devices in the range and in the advertising mode appear again. To go back to the home screen, click **BACK**.

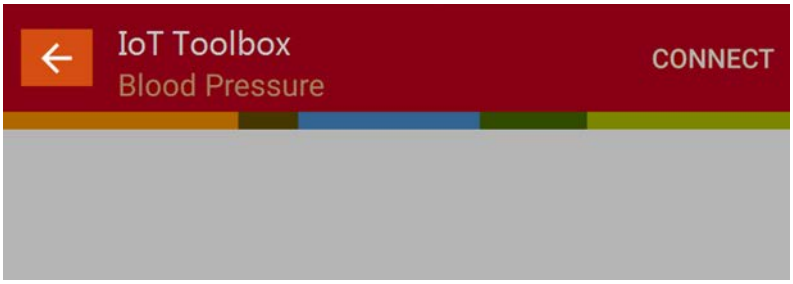


Fig 8. CONNECT button

5.4 Beacons tool

To access the Beacons tool, click **BEACONS** on the main screen.

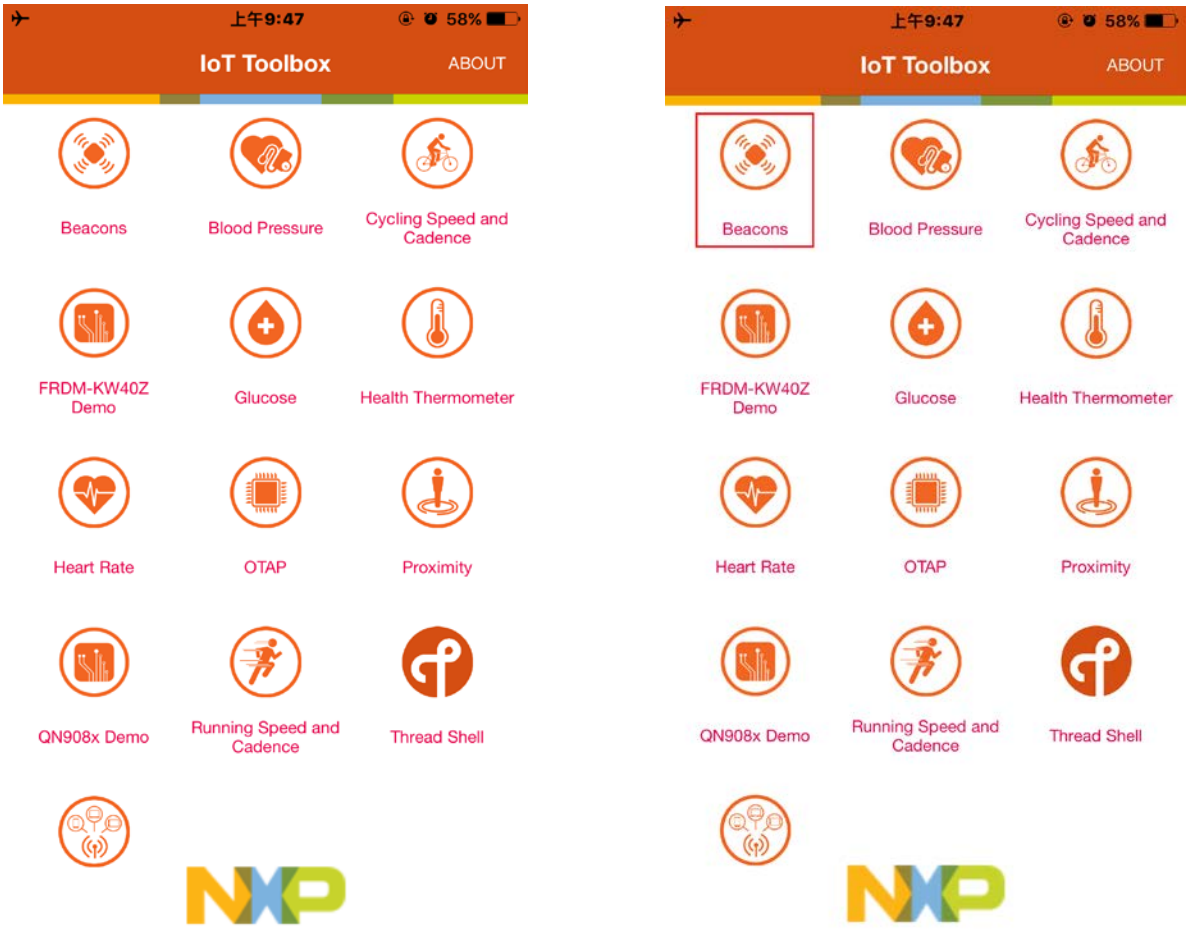


Fig 9. Beacons button

After you click **BEACONS**, the BLE devices screen appears.

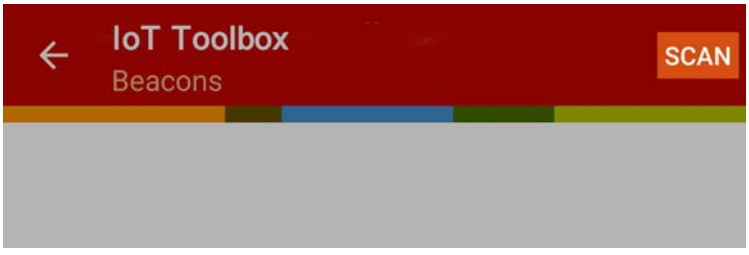


Fig 10. SCAN button

The application automatically starts scanning for the BLE devices in the range. If it does not, the scanning can be manually started or stopped by clicking **SCAN** in the upper right corner.

Fig 11. Automatic scanning for BLE devices

The BLE devices in the range are now listed on the screen. If a BLE device is not detected, make sure that it is in the advertising mode and running the Beacons demo.

This information is available for each BLE beacon: manufacturer ID, UUID, signal strength (RSSI), and three fields (labelled A, B, and C). With the Beacons tool, you have the option to customize a 160-character message for each beacon. Follow these steps to customize this message:

1. Select the desired beacon.
2. In the **Action** menu, click **Message**.

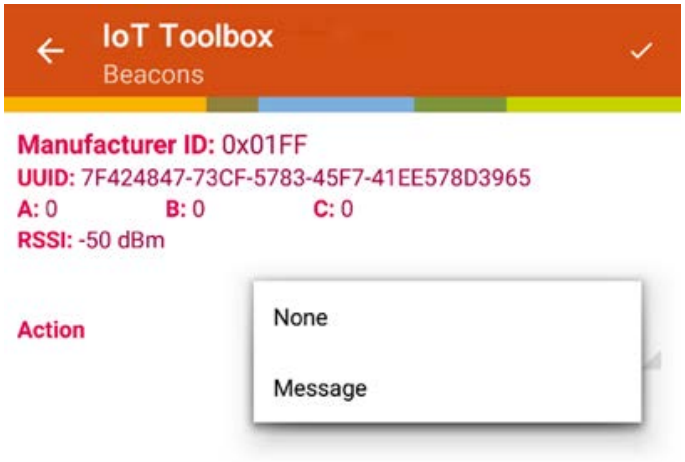


Fig 12. Message option

3. Write the message into the box. When ready, click in the upper right corner.

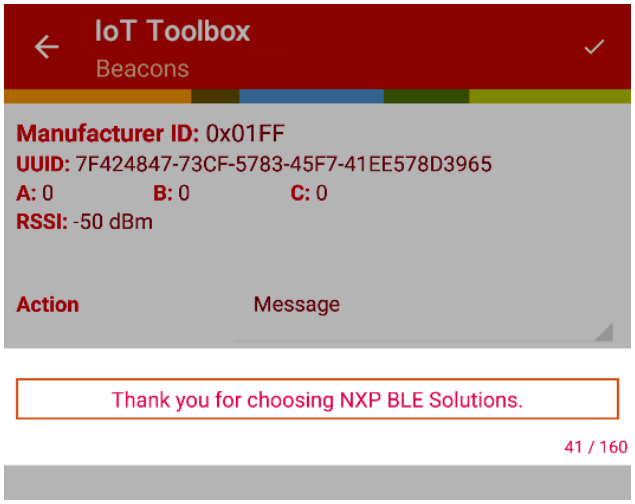


Fig 13. Message set

4. When detected, the beacon now displays the custom message.

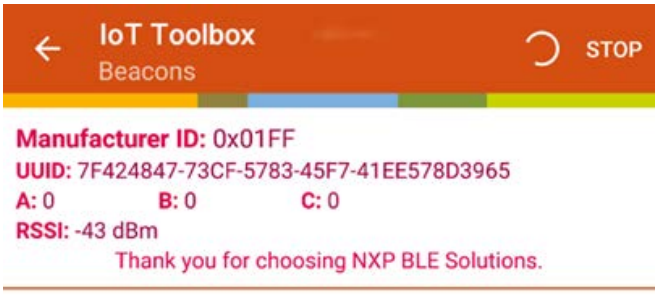


Fig 14. Custom message

5.5 Blood Pressure tool

Fig 15 shows the Blood Pressure sensor screen. To get to this screen, follow the steps shown in Section 5.2, Connecting to BLE devices and select the Blood Pressure tool.

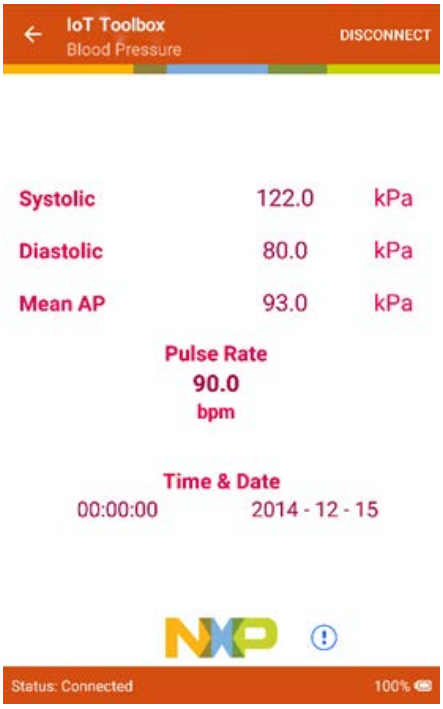


Fig 15. Blood pressure tool

The screen shows the systolic, diastolic, and main arterial pressures, as well as the pulse. The time, date, connection status, and the remaining battery life of the BLE device are shown in the lower part of the screen.

5.6 Cycling Speed and Cadence tool

Fig 16 shows the Cycling Speed and Cadence sensor screen. To get to this screen, follow the steps shown in Section 5.2, Connecting to BLE devices and select the Cycling Speed and Cadence tool.

Fig 16. Cycling speed and cadence tool

The screen shows the current speed (measured in kilometers per hour) and the pedaling rate (cadence, measured in revolutions per minute). Below is the option to change the wheel size. It is important to select the right size, because the speed shown above depends on the wheel size. The location of the sensor, the connection status, and the remaining battery life of the BLE device are shown in the lower part of the screen.

To change the wheel size, click **gear** in the middle of the screen.

Fig 17. Wheel size adjustment

Select the correct wheel size from the menu. Click **ACCEPT**.

Fig 18. ACCEPT button

5.7 Glucose tool

Fig 19 shows the Glucose sensor screen. To get to this screen, follow the steps shown in Section 5.2, Connecting to BLE devices and select the Glucose tool.

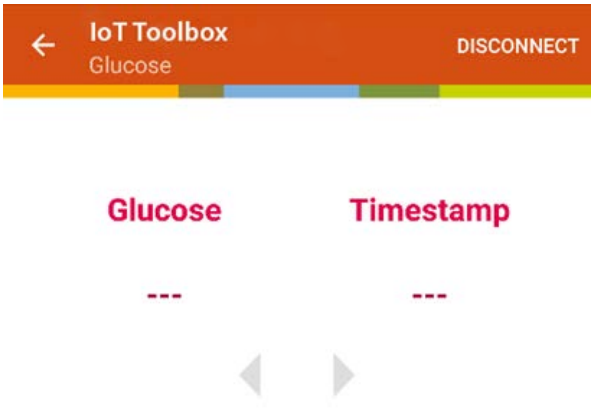


Fig 19. Glucose tool

The screen initially shows no information, except for the connection status and the remaining battery life of the BLE device (in the lower part of the screen).

To show a measurement, press the corresponding switch in the BLE device to take a measurement and, when taken, it is sent to the device running the IoT Toolbox application. When the measurement is received, it appears as Fig 20:

Fig 20. Measurement received

Each measurement contains the glucose level and the time and date of the measurement. If more measurements are made, the latest one is shown. Use the arrows to navigate to the previously-received measurements.

Fig 21. Navigate to previous measurements

5.8 Health Thermometer tool

Fig 22 shows the Health Thermometer sensor screen. To get to this screen, follow the steps shown in Section 5.2, Connecting to BLE devices and select the Health Thermometer tool.

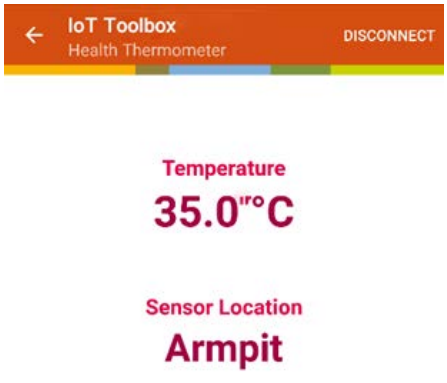


Fig 22. Health thermometer tool

It displays the temperature measured by the sensor located at the indicated place. The connection status and the remaining battery life of the BLE device are shown in the lower part of the screen.

5.9 Heart Rate tool

Fig 23 shows the Heart Rate sensor screen. To get to this screen, follow the steps shown in Section 5.2, Connecting to BLE devices and select the Heart Rate tool.

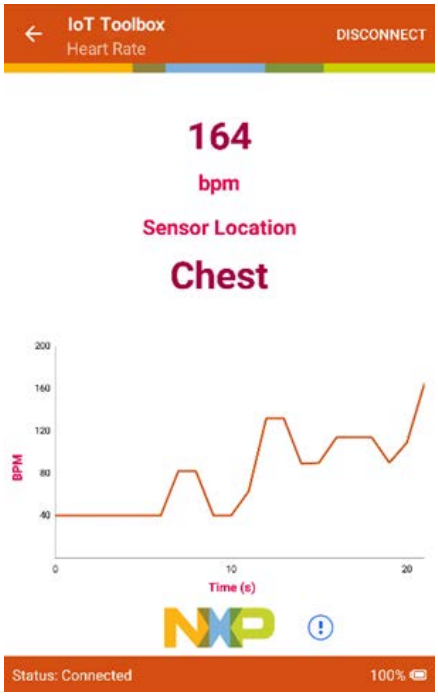


Fig 23. Heart rate tool

It displays the heart rate (in beats per minute), the sensor location, and a real-time plot of the received measurements (time of measurement vs. beats per minute). The connection status and the remaining battery life of the BLE device are shown in the lower part of the screen.

5.10 Proximity tool

Fig 24 shows the Proximity sensor screen. To get to this screen, follow the steps shown in Section 5.2, Connecting to BLE devices and select the Proximity tool.

Fig 24. Proximity tool

It displays the signal strength (RSSI) and the transmission strength. There are two alert level option buttons below that information. The connection status and the remaining battery life of the BLE device are shown in the lower part of the screen.

The “Link Loss Alert Level” field sets the alert level when the connection between the BLE device and the device running the IoT Toolbox application is lost. The “Immediate Alert” field changes the alert level in the BLE device in real time. To change the alert level in either of the settings, click **HIGH**, **MIDDLE**, or **OFF**.

Fig 25. Link Loss Alert field

5.11 Running Speed and Cadence tool

Fig 26 shows the Running Speed and Cadence sensor screen. To get to this screen, follow the steps shown in Section 5.2, Connecting to BLE devices and select the Running Speed and Cadence tool.

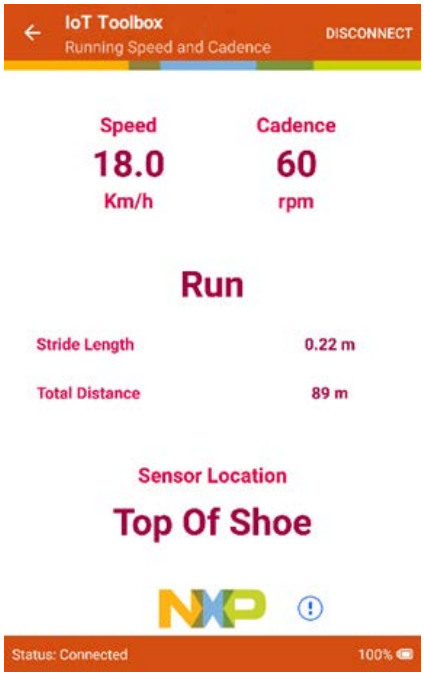


Fig 26. Running speed and cadence tool

It displays the current speed, steps per minute (cadence), the activity being measured (running or walking), the stride length, and the total distance traveled. The location of the sensor, the connection status, and the remaining battery life of the BLE device are shown in the lower part of the screen.

To switch between the **RUN** and **WALK** modes, press the corresponding button on the BLE device. The same information is displayed, but the activity changes.

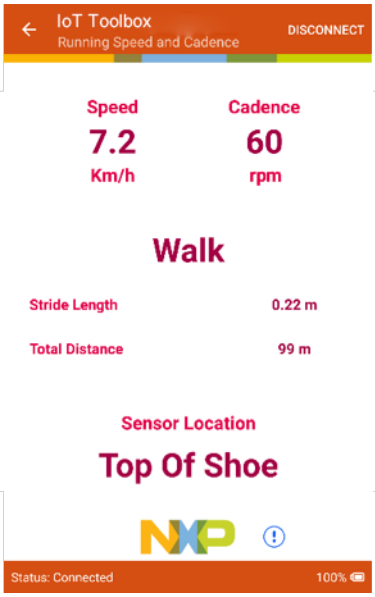


Fig 27. Walking activity measurement

5.12 Wireless UART tool

To start the wireless UART communication between the IoT Toolbox application and the BLE device running the Wireless UART demo, connect the BLE device via its serial port to a computer running a terminal application so that you see the received information and send the information from the BLE device to the device running the IoT Toolbox application.

Fig 28 shows the Wireless UART screen. To get to this screen, follow the steps detailed in Section 5.2, Connecting to BLE devices and select the Wireless UART tool.

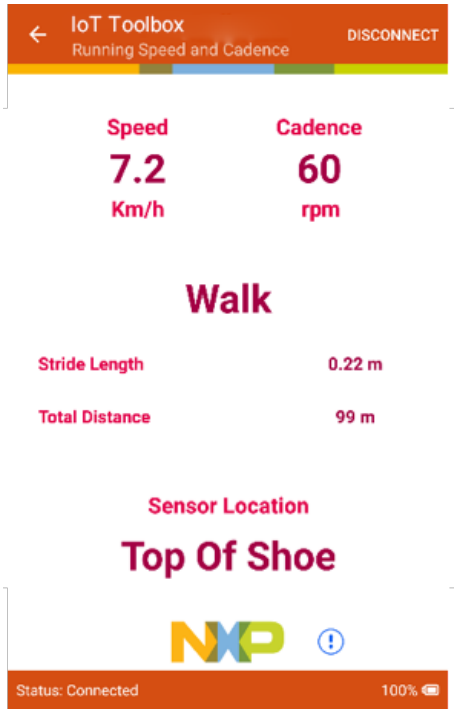


Fig 28. Wireless UART tool

The dialog box enables you to send an ASCII character to the BLE device. When received, the BLE device displays it in the terminal that it is connected to. When a message is sent from the terminal that the BLE device is connected to, it is received by the device running the IoT Toolbox application and displayed in the Wireless UART tool screen.

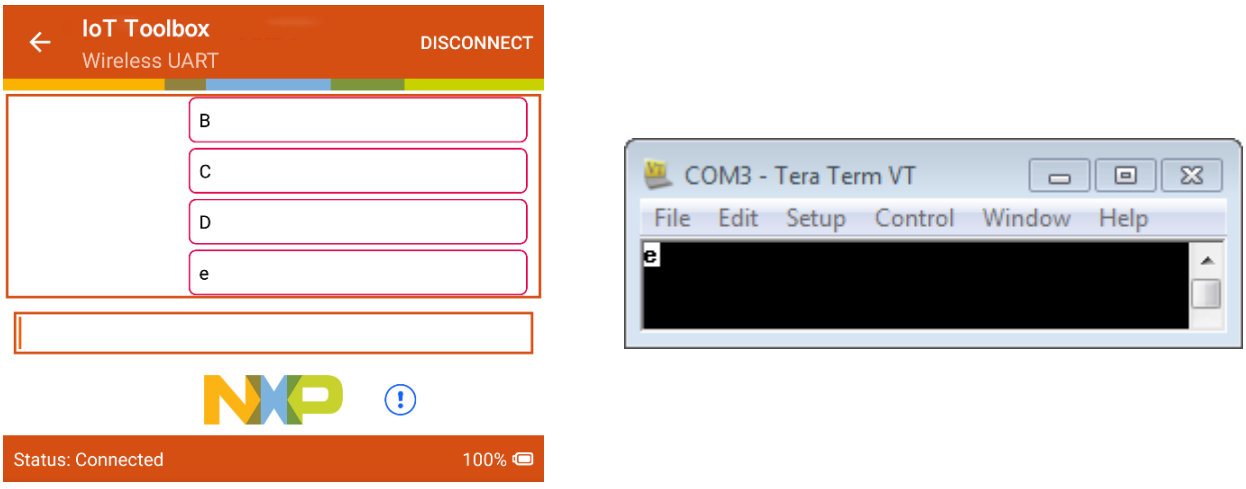


Fig 29. Sending an ADCII character to BLE device

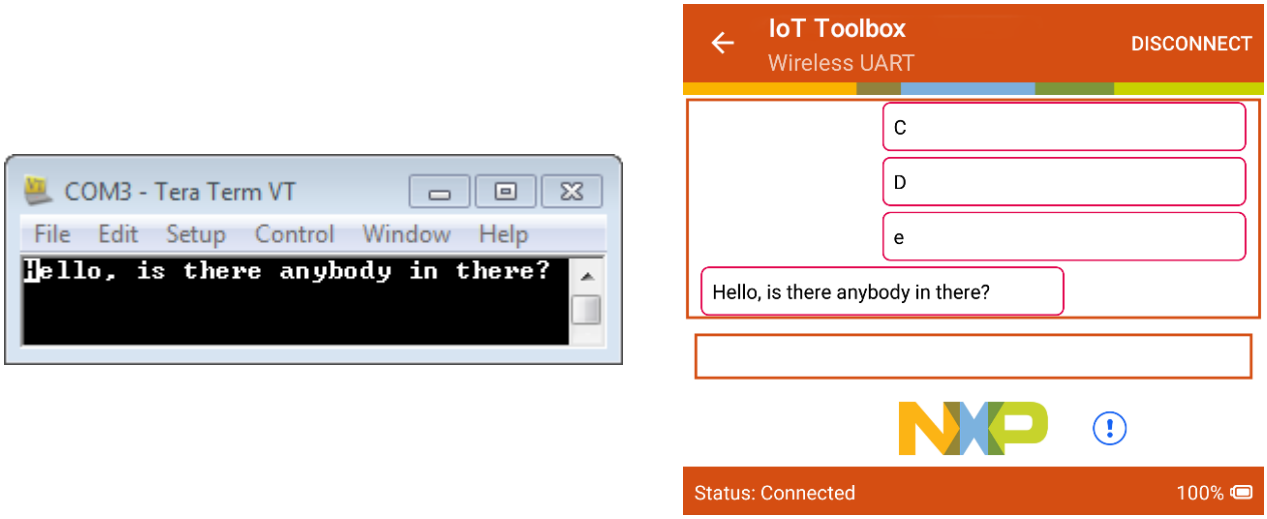


Fig 30. Receiving a message

On the screen, the characters on the right side are sent from the BLE device. The messages on the left side are sent from the application itself.

To configure the terminal to receive and send data from the BLE device, follow these steps:

1. Connect the BLE device to a computer through its serial port.
2. On the computer, open your preferred terminal application.
3. In the terminal, establish a connection with the serial port that the BLE device is connected to.

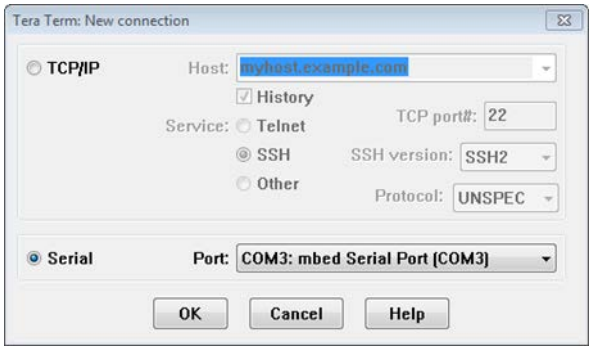


Fig 31. Configuring the terminal

4. Configure the connection with the settings shown in Fig 32.

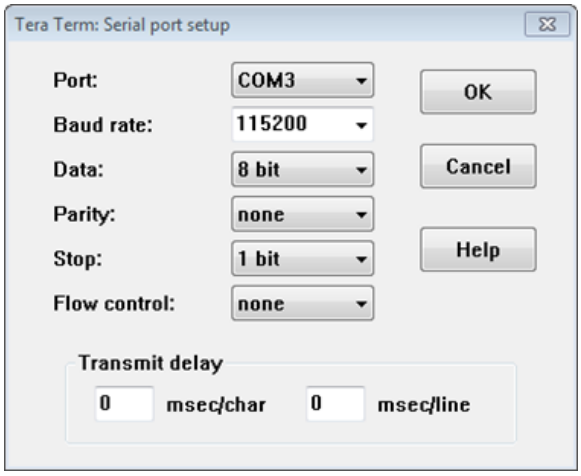


Fig 32. Configuring connection

5. Now you can send messages from the BLE devices and see the messages received.

- If you want to see the message that you are going to send from the BLE device, enable the “Local echo” setting in your terminal application.

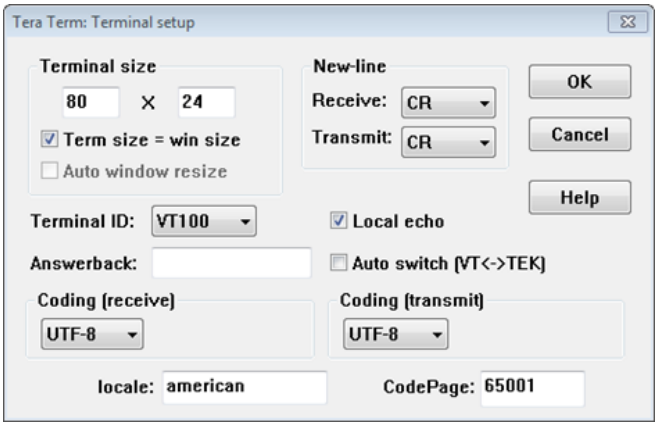


Fig 33. Local echo setting

5.13 Over-the-Air Programming (OTAP) tool

The OTAP tool enables you to program the BLE device with a different profile without connecting it to a computer. You may select the firmware file of the new profile from the device running the IoT Toolbox and send it to the BLE device wirelessly. The BLE device is flashed with the new profile and restarted automatically. The BLE device is then programmed with the new profile.

Fig 34 shows the OTAP screen. To get to this screen, follow the steps detailed in Section 5.2, Connecting to BLE devices and select the OTAP tool.

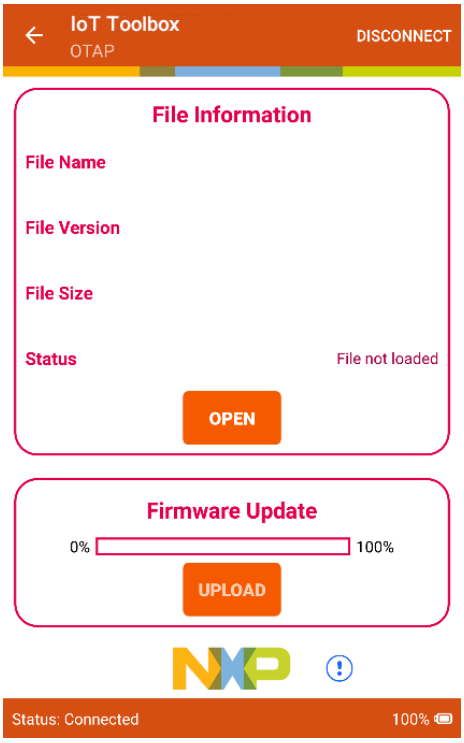


Fig 34. OTAP tool

To load the profile to be flashed on the BLE device, click **OPEN** and select the new firmware.

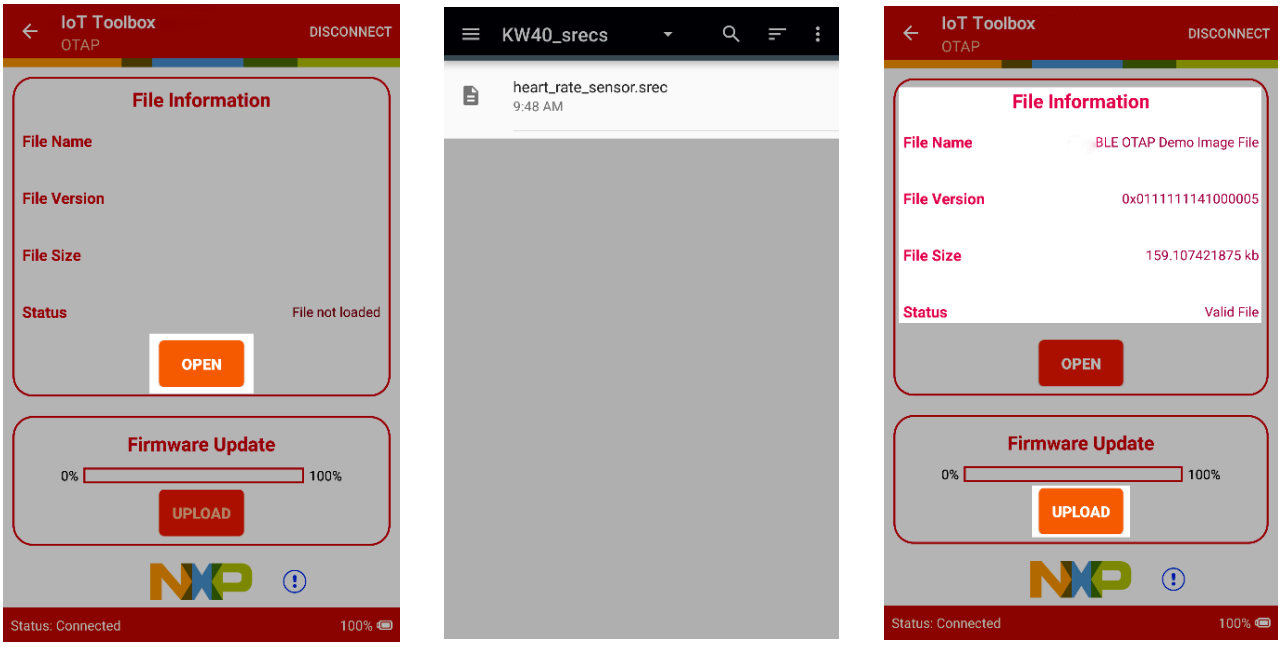


Fig 35. Loading a profile

If the selected firmware file is not valid, the IoT Toolbox application does not load it. If the file is valid, the application recognizes it and the option to upload the firmware file to the BLE device is available. If the firmware file is valid, click **UPLOAD** to start the update.

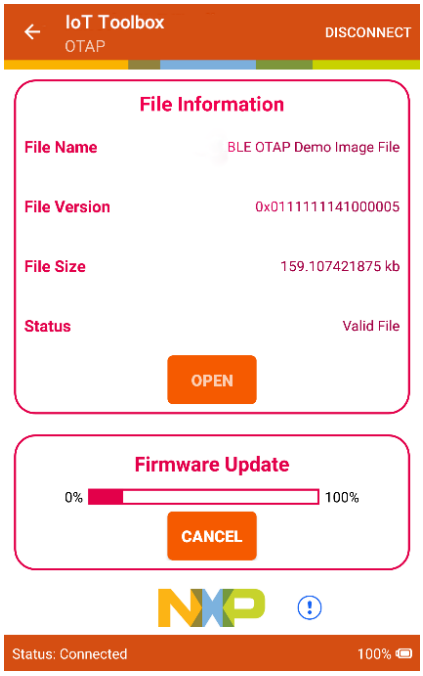


Fig 36. Firmware updating

This process can take some time (up to 10 minutes). When it is done, the “transfer successful” message appears. The BLE device restarts and boots with the new profile loaded.

5.14 QN908x Demo

Turn on BLE device to run the ISSDK Sensor BLE Example Firmware. Open the phone application and click **QN908x Demo** on the main screen, as shown in Fig 37.

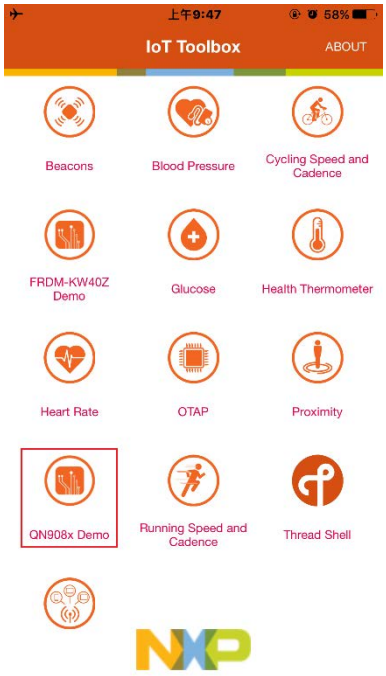


Fig 37. QN908x demo

The mobile phone starts scanning BLE devices automatically in the range and lists devices in the table, as shown in Fig 38.

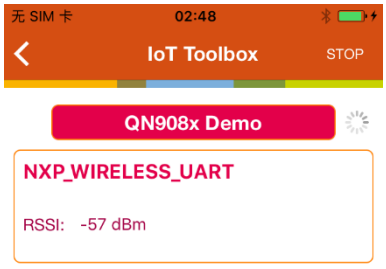


Fig 38. Connect BLE device

If the table is empty, the BLE device is not detected. Keep the mobile phone Bluetooth running and click **SCAN** to scan the BLE device, as shown in Fig 39.

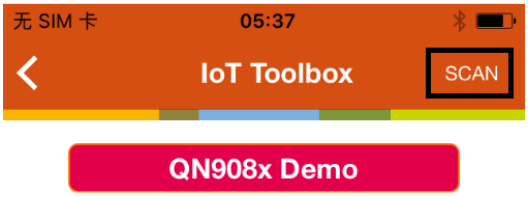


Fig 39. SCAN

Select a target BLE device by clicking the cell in the table. Click **Connect** and a new view that display BLE device service list appears, as shown Fig 40.

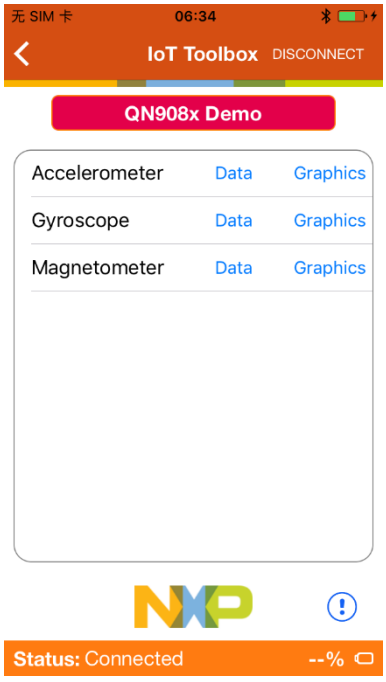
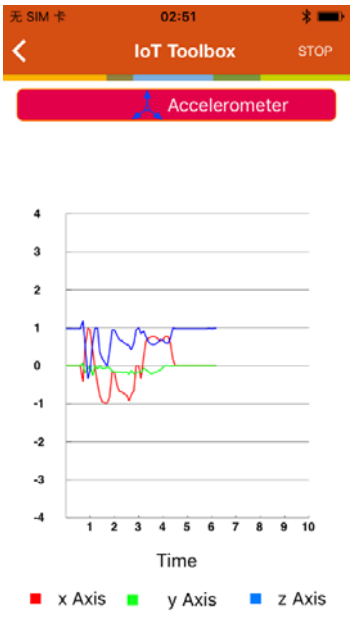


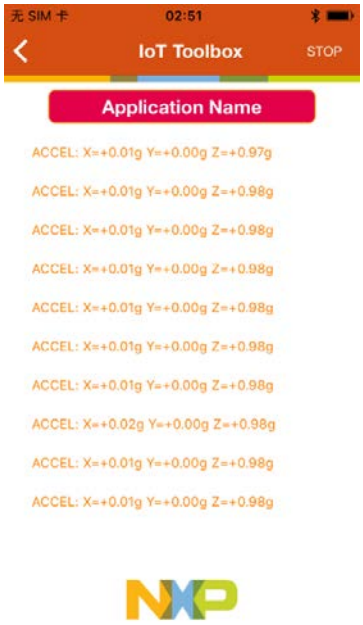
Fig 40. Service list

As shown in Fig 40, three services are offered. By clicking **Graphics** and **Data** on each service cell, the Graphical view or Data view appears.

1. Accelerometer



a. Graphics

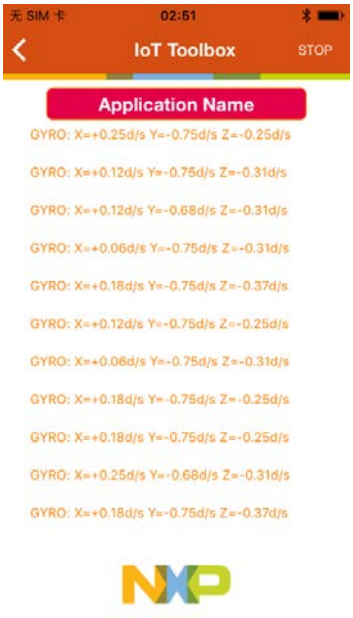


b. Data

Fig 41. Accelerometer

2. Gyroscope

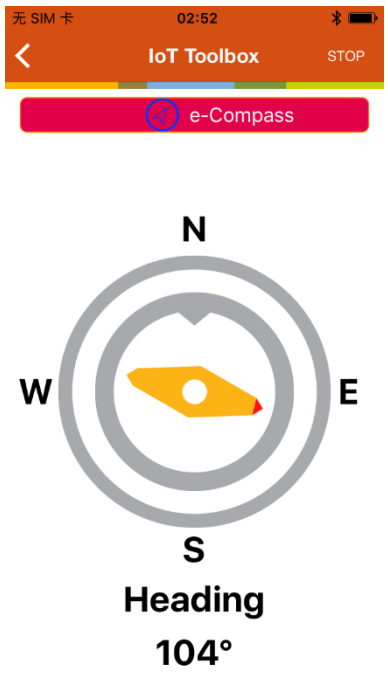
a. Graphics



b. Data

Fig 42. Gyroscope

3. Magnetometer



a. Graphics

b. Data

Fig 43. Magnetometer

6. Legal information

6.1 Disclaimers

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