

Getting started with ST Robotics Smartphone App for Android and iOS platforms for STEVAL-ROBKIT1 Robotics Evaluation Kit

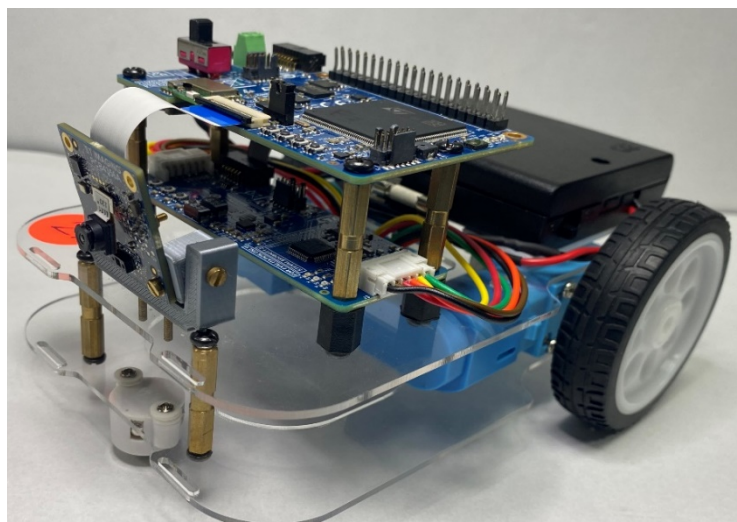
Introduction

The STRobotics Application for Android and iOS platforms enables users to configure and operate various robotic kits and boards from STMicroelectronics, such as the **STEVAL-ROBKIT1 Robotics Evaluation Kit**. This application facilitates the discovery, connection, and control of these robotic kits. It integrates the **BlueSTSDK** to ensure interoperability with various Bluetooth Low Energy (BLE) offerings from STMicroelectronics. The app is available for download on the Google Play Store and Apple App Store, providing easy access to STMicroelectronics' robotics solutions.

Upon establishing a connection, the app identifies the available features on the connected robotics kits and displays the status of various subsystems. Users can select different operation modes (e.g., Remote Control, Follow Me, and Edge Detection) and configure parameters for each mode. The app includes a user-friendly joystick interface for intuitive control of the robot's movement. Additionally, it offers features for plotting charts and logging real-time data from sensors. A debug console is available for sending direct commands, viewing log messages, and troubleshooting. The STRobotics App currently supports the following platforms:

- STEVAL-ROBKIT1 Robotics Evaluation Kit
- X-STM32MP-RBT01 Expansion board for robotics

Figure 1. STEVAL-ROBKIT1 Robotic Application Evaluation kit



1. Acronyms and abbreviations

Table 1. List of acronyms

Acronym	Description
STEVAL-ROBKIT1-1	Main Board
BLE	Bluetooth Low Energy
API	Application Programming Interface
SDK	Software Development Kit
JSON	JavaScript Object Notation
UI	User Interface
ToF	Time-of-Flight
ML	Machine Learning
AI	Artificial Intelligence
IDE	Integrated Development Environment
RSSI	Received Signal Strength Indicator

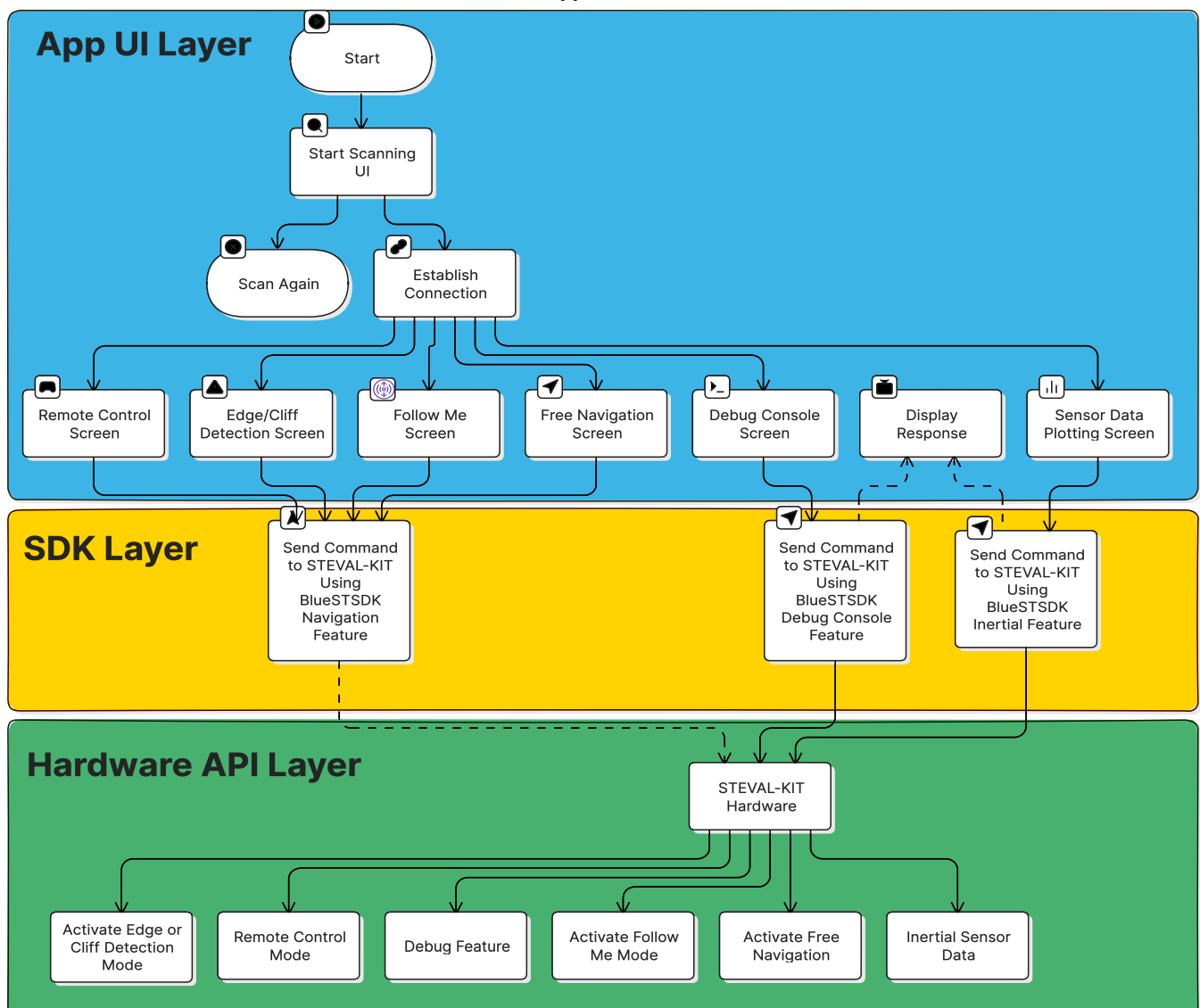
2. Getting started

2.1. Overview

The ST Robo kit app allows you to perform the following tasks:

- Scan nearby nodes along with their RSSI (Received signal strength indicator) values.
- Establish a connection with the nodes.
- Observe sensor data through real-time charts.
- Control the movement (both motion and direction) using a controller with a user-friendly interface.
- A Debug Console for real-time monitoring and troubleshooting capabilities.
- Access features like Follow Me, Edge Detection, Free Navigation, etc.

Figure 2 Flow Chart of Robotics Application



2.2. Architecture

The Robot Control Application is designed with two primary software components: the UI Layer and the SDK Layer. These layers ensure a smooth and intuitive user experience while managing complex underlying functionalities.

UI Layer

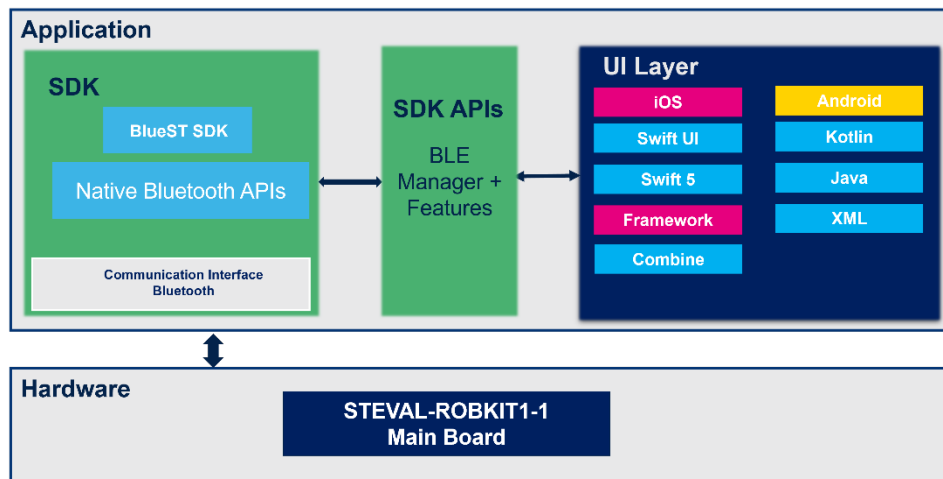
The UI Layer is the interface through which users interact with the robot. It is developed using SwiftUI and Combine for iOS, and Kotlin for Android, ensuring modern and reactive designs tailored to each platform. The UI provides screens for key features such as Remote Control, Follow Me, Free Navigation, Edge/Cliff Detection, Sensor Data Plotting, and Debug Console. Each screen corresponds to a specific robot functionality, allowing users to control the robot, monitor sensor data, and debug operations effortlessly. The UI dynamically interacts with the SDK APIs to trigger commands based on user inputs.

SDK Layer

The SDK Layer acts as the backbone of the application, providing an abstraction over Bluetooth communication and robot functionalities. It integrates BlueSTSDK and native Bluetooth APIs to handle tasks such as scanning, connection management, and feature execution. The SDK offers modular APIs that simplify interactions with features like navigation, inertial sensing, and debugging.

All commands initiated from the UI are processed through the BlueSTSDK and sent over Bluetooth Low Energy (BLE) to the STEVAL-ROBKIT1-1 hardware, enabling real-time control and feedback.

Figure 3 Application Architecture



2.3. Hardware requirements

To use the STSW-ROBKIT1 package you need following:

- STEVAL-ROBKIT1 (Robotics Evaluation Kit) – (1 Qty)
- Mobile (Android/iOS)
- AA Batteries – 1.5V (4 Qty)

2.4. Software requirements

- IOS
 - iPhone 5s or above , with iOS version 10.0 or above.
- Android
 - Android Oreo (8.0) or above , with android SDK version 26 or above.

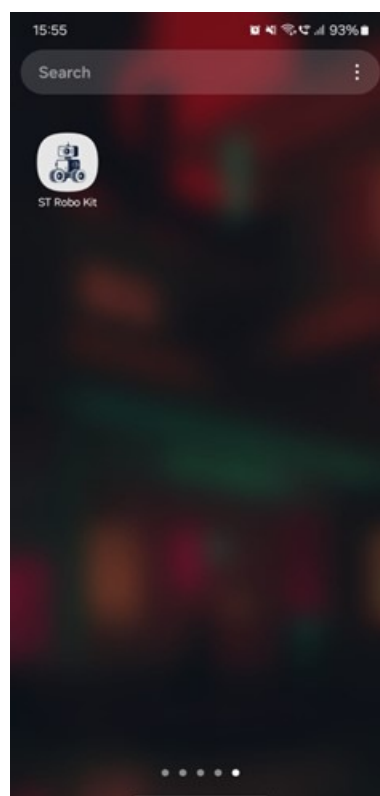
3. Download and install the application

3.1. Download and Install:

Follow the instructions below to install the ST Robo Kit app (Android, iOS) app:

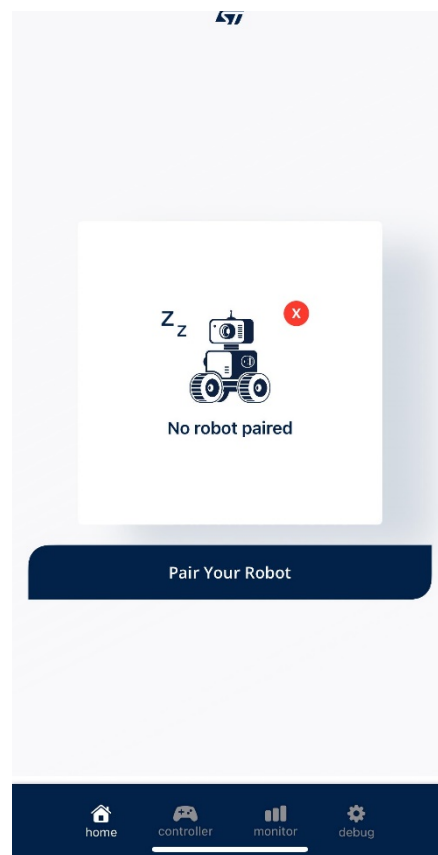
- Step 1. Follow the link to the App Store or Play store to download the app directly to your device.
- Step2. After downloading and installing, click on the icon as shown below

Figure 4 Launch app icon



- **Step 3.** After the launch screen, home screen will appear as shown below.
- **Step 4.** You will then be prompted to grant the required permissions and enable Bluetooth and location services on your device for the smooth functioning of the application.
- **Step 5.** Click on the “Pair Your Robot” button and start the connection process.

Figure 5 Landing Screen



4. How to use the app

4.1. Connecting to a node

- Step 1. After following the above steps, click on “Discover.” A screen will show you all the supported peripherals nearby along with RSSI data. You can slide the scanning area downwards to restart the scan.
- Step 2. Once you find your target node, click on it or pair button to establish a connection.

Figure 7 Scanning Screen

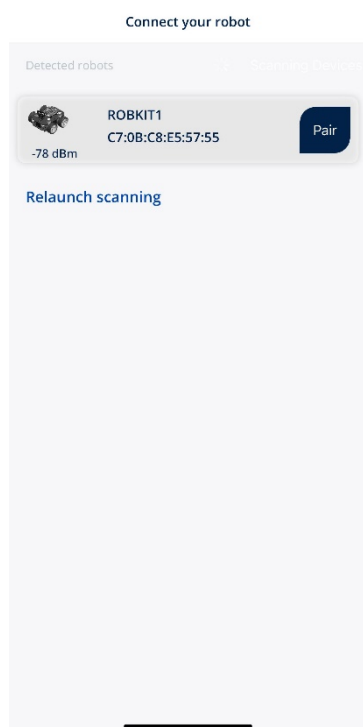
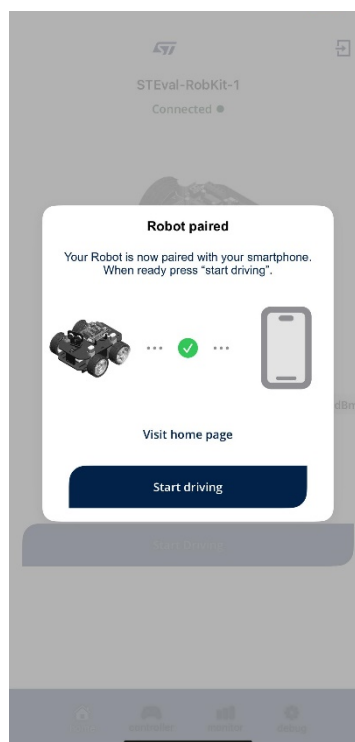
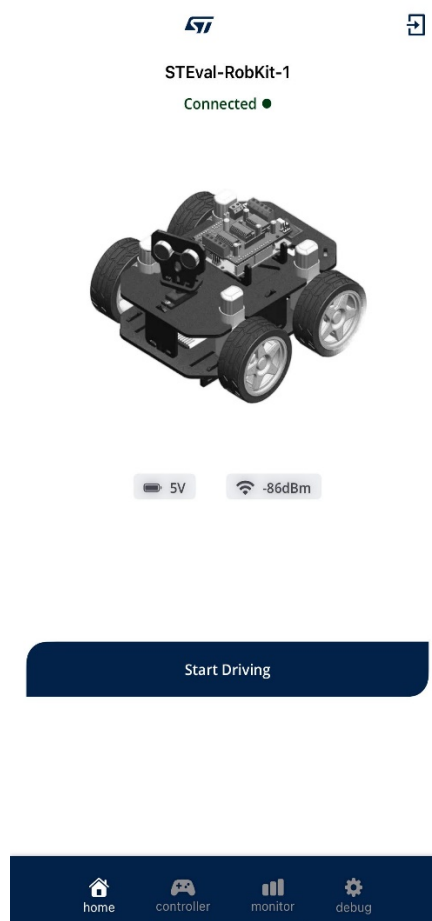


Figure 6 After Successful Connection



- step 3. After successfully connecting to the node. There will be a pop up screen for quick access to remote control feature.
- Step 4. From pop up screen user can visit to either remote control feature or home page, from home page you can see the menu options available lister as:
 - Home Page
 - Remote Controller
 - Plot sensor data graphically
 - Debug Console

Figure 8 Dashboard Screen



4.2. Details about the features

1. Remote control :

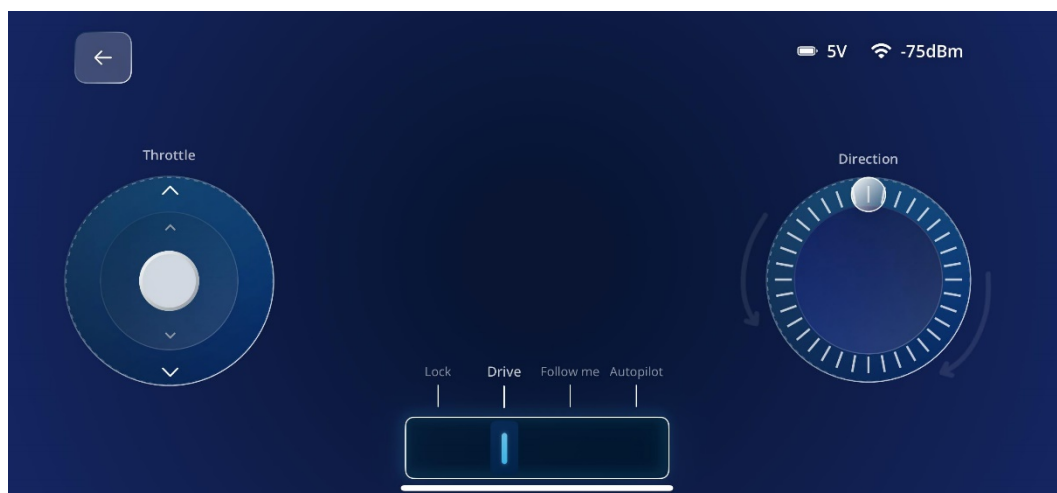
It is designed to operate the connected robot kit. Before any operation, the "active" toggle button should be enabled by tapping on it.

Linear Motion Joystick: Allows the user to move the robot kit forward and backward with speed adjustments based on user inputs.

Directional Motion Joystick: Allows the user to control the direction based on the angle provided by rotating the wheel.

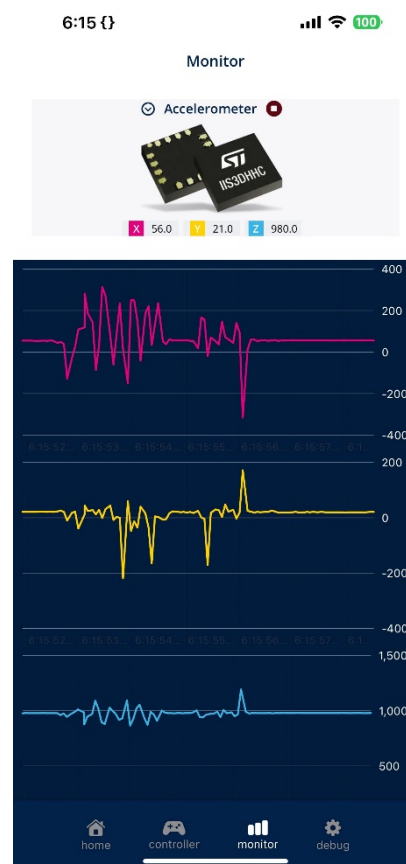
Mode Selection: Allows the user to switch to different modes. On reaching this screen you will find the mode automatically resting at lock position, in order to operate the remote control. User needs to switch to drive mode, similarly for follow me and free navigation respective buttons are there.

Figure 9 Remote Control Feature



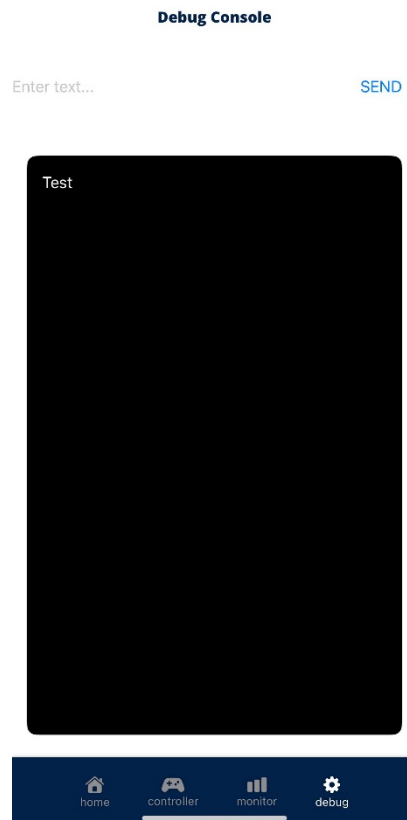
2. **Plot Sensors Data** : Based on the real-time data coming from the sensor on the connected node, the user can visualize charts. The drop-down list will show available sensors, and the user can select any one sensor from it. To play or pause the chart plotting, the user can tap the button as shown below.

Figure 10 Plot Data Screen



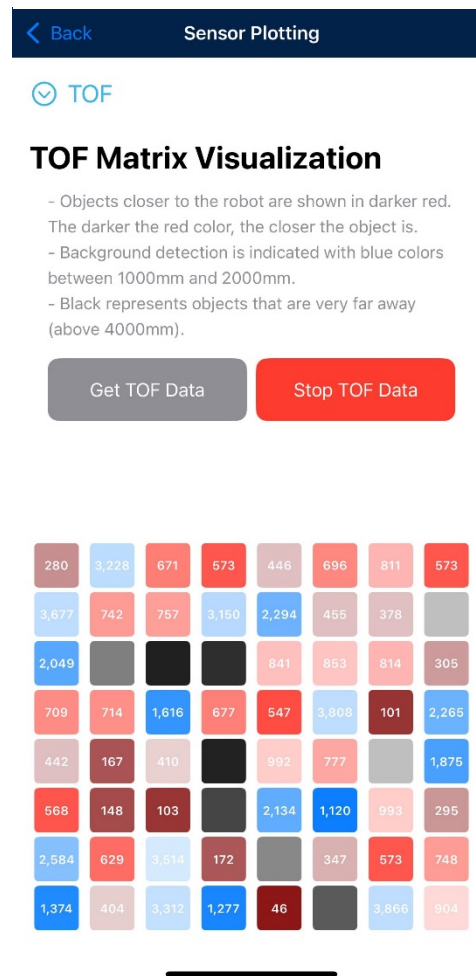
3. **Debug Console** : Users can enter text in the input field and click the send button to send debug commands to the firmware for troubleshooting or debugging.

Figure 11 Debug Console Feature



4. TOF Feature: Using 8X8 grid representing the TOF Data.

Figure 12 TOF Data Representation



Revision history

Table 13. Document revision history

Date	Version	Changes
29-Nov-2024	1	Initial release

Contents

The table of contents is empty because you aren't using the paragraph styles set to appear in it.

Figures

<u>Figure 1. STEVAL-ROBKIT1 Robotic Application Evaluation kit</u>	1
<u>Figure 2 Flow Chart of Robotics Application</u>	3
<u>Figure 3 Application Architecture</u>	4
<u>Figure 4 Launch app icon</u>	5
<u>Figure 5 Landing Screen</u>	6
<u>Figure 6 Connecting Screen</u>	7
<u>Figure 7 Scanning Screen</u>	7
<u>Figure 8 Dashboard Screen</u>	8
<u>Figure 9 Remote Control Feature</u>	9
<u>Figure 10 Plot Data Screen</u>	9
<u>Figure 11 Debug Console Feature</u>	10
<u>Figure 12 TOF Data Representation</u>	11

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