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Quick Start Guide

STM32Cube Function Pack for SensorTile.box PRO discovery box with multi-sensors and wireless connectivity
(FP-ATR-BLE1)

Version 2.1 (October 20, 2023)

Agenda

1. Hardware and Software overview
2. Setup & Demo Application
3. Documents & Related Resources
4. STM32 Open Development Environment: Overview

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1- Hardware and Software overview

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STEVAL-MKBOXPRO evaluation board

Hardware Overview (1/2)

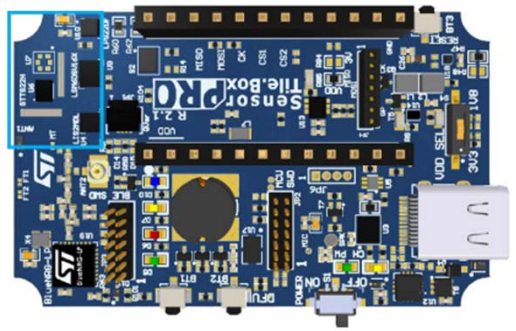
SensorTile.box-Pro - multi-sensors and wireless connectivity development kit for any intelligent IoT node

- The SensorTile.box-Pro (STEVAL-MKBOXPRO) s the new ready-to-use programmable wireless box kit for developing any IoT application based on remote data gathering and evaluation, exploit the full kit potential by leveraging both motion and environmental data sensing, along with a digital microphone, and enhance the connectivity and smartness of whatever environment you find yourself into.
- The SensorTile.box-Pro kit consists of an SensorTile.box-Pro core system, a 480mAh LiPo battery, an adapter for the ST-LINK debugger (STEVAL-MKIGIBV4), a plastic case, QVAR electrodes, Wireless charger receiver circuit and a flexible cable.

Key Features

- Ultra -low-power with FPU Arm-Cortex-M33 with TrustZone® microcontroller (STM32U585AI)
- High precision sensors to gather high-quality data: low-voltage local digital temperature sensor (STTS22H), six-axis inertial measurement unit (LSM6DSV16X), three-axis low-power accelerometer (LIS2DU12), 3-axis magnetometer (LIS2MDL), pressure sensor (LPS22DF) and digital microphone/audio sensor (MP23DB01HP)
- HW power switch, 4 programmable status LEDs (green, red, orange, blue), 2 programmable push-buttons, audio buzzer– Reset button, qvar with electrodes for user interface experience
- Interface for J-Link/SWD debug-probe, Interface for extension board and socket for DIL24 sensor adapters
- Connectivity: microSD™ card slot, Bluetooth® Low Energy 5.2 (BlueNRG 355AC), NFC tag (ST25DV04K)
- Power and charging options: USB Type-C® charging and connecting, 5 W wireless charging and 480 mAh battery

STEVAL-BKBOXPRO



Latest info available at **www.https://www.st.com/en/evaluation-tools/steval-mkboxpro.htm**

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STEVAL-MKBOXPRO evaluation board

Hardware Overview (2/2)

The STEVAL-MKBOXPRO development kit includes:

- the SensorTile.Box Pro (main board)
- a plastic case with M2.5 screws
- a 480 mAh 3.7 V LiPo battery
- Qvar electrodes
- wireless charger receiver circuit
- programmable NFC tag
- microSD™ card
- STEVAL-MKIGIBV4 STLINK adapter with programming cable

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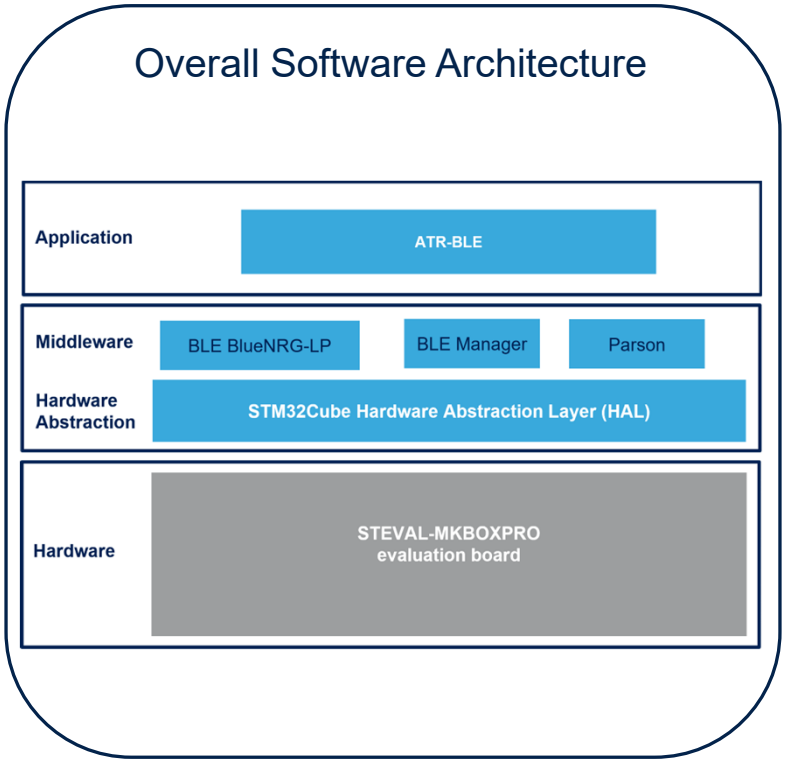
FP-ATR-BLE1 Software Description

The FP-ATR-BLE1 is STM32Cube Function Pack for SensorTile.box PRO discovery box with multi-sensors and wireless connectivity (STEVAL-MKBOXPRO) The purpose of this functional pack is to provide simple asset tracking application for STEVAL-MKBOXPRO Pro that could be controlled by Bluetooth and NFC connectivity.

The expansion is built on STM32Cube software technology to ease portability across different STM32 microcontrollers.

Key features

- Complete example application to develop node with BLE&NFC connectivity, environmental and motion sensors, and perform real-time Tracking sensor monitor
- Firmware compatible with ST Asset Tracking applications for Android/iOS controlling and reading the tracking log
- Firmware compatible with ST BLE Sensor applications for Android/iOS for firmware update over the Air (FoTA)
- Easy portability across different MCU families, thanks to STM32Cube
- Free, user-friendly license terms



Latest info available at www.st.com
FP-ATR-BLE1

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2- Setup & Demo Applications

Setup & Demo Applications
Software and Other prerequisites

- **STSW-LINK009**
  - STLINK-V3SET (or STLINK-V3MINI) USB driver
- **STSW-LINK007**
  - STLINK-V3SET (or STLINK-V3MINI) firmware upgrade
- **FP-ATR-BLE1**
  Copy the .zip file content into a folder on your PC. The package will contain source code example (Keil, IAR, STM32Cube IDE) based on **STEVAL-MKBOXPRO**
- **ST Asset Tracking application** (V3.4.0 or higher) for Android/iOS to download from Google Store / iTunes

2.1- Setup Overview

Setup Overview

HW prerequisites and setup for STEVAL-MKBOXPRO

- 1x STEVAL-MKBOXPRO evaluation board
- Laptop/PC with Windows 7, 8 or 10
- 1 x microUSB cable
- 1x type-C USB cable
- 1x ST-LINK-V3SET (or ST-LINK-V3MINI) debugger/programmer

MicroUSB Cable

type-C USB cable

ST-LINK-V3MINI

ST-LINK-V3SET

STEVAL-MKBOXPRO

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Setup Overview

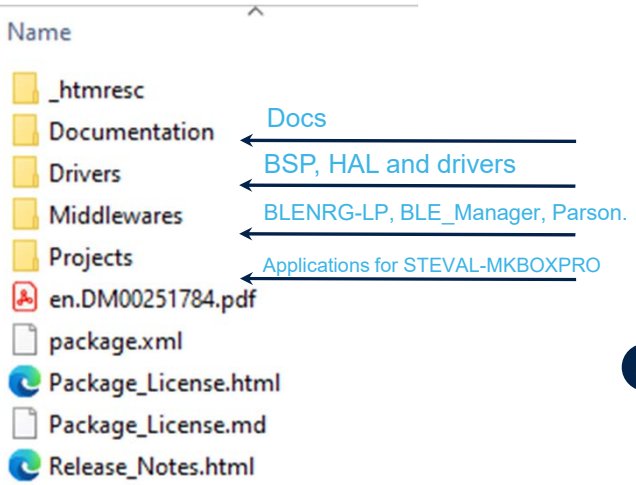
Start coding in just a few minutes

1 www.st.com/stm32ode

2 Select Function Pack: FP-ATR-BLE1

3 Download & unpack

FP-ATR-BLE1 package structure



4 . \STM32U585AI-SensorTile.boxPro/Applications/ATR_BLE/

Android™/iOS™ smartphone with ST Asset Tracking and ST NFC Sensor applications

6

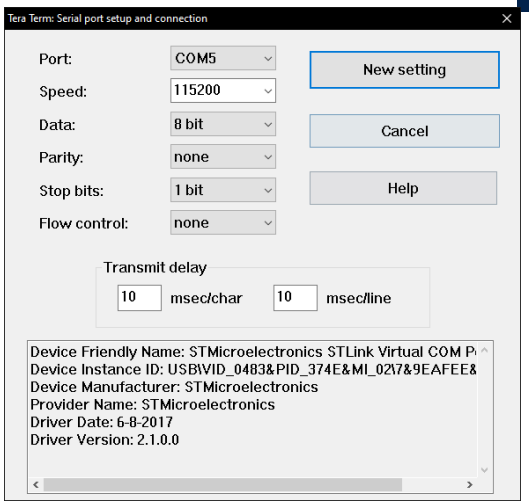
Use the pre-compiled binaries for registering your device, or alternative re-compile the code adding your device certificate

5

Setup Overview

Using serial line monitor – e.g.Tera Term

When recompiling the code, for each applications and for both supported boards, enabling (if disabled as default) the **ATRBLE1_ENABLE_PRINTF** define in **Inc/ATRBLE1_config.h** allows to use the Virtual Com Port



Configure the serial line monitor (speed, LF)

- After the RESET you could see the initialization phase
- Valid Configuration found on NFC or use the Default one
- Bluetooth Initialization at the button or after pressing the user button if the LED is not blinking

- Events recorded

Troubleshooting

When the board starts, it will use the blinking of the Blue LED for showing that everything is well initialized and it's in discovery mode waiting the connection from ST BLE Sensor Android/iOS application
This happens also when we wakeup the Bluetooth pressing the Board user button

In some rare situation, the board makes one automatic connection to the Smartphone, and so it' not visible during the board discovery procedure of ST BLE Android/iOS application
In this situation the Blue LED is not working because the board is already connected to the phone

If it happens, close the ST BLE sensor application and Switch off and Switch on the phone Bluetooth in order to close the connection with the board, in this way the Blue LED will start to blink and it will be possible to reconnect to the board using the ST BLE Sensor Android/iOS application

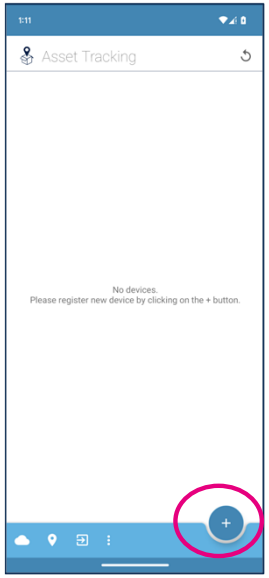
2.2- Demo Applications: ATR-BLE1

FP-ATR-BLE1
Board Registration (by Bluetooth)

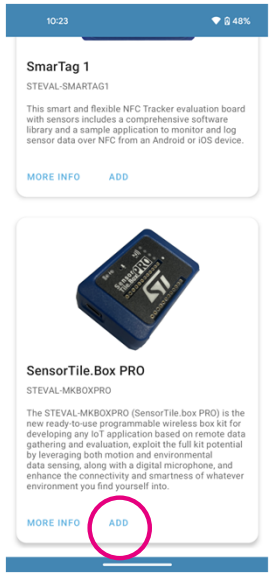
Enable the Bluetooth advertise

For reducing the power consumption the Bluetooth advertise it's not enabled when the ST asset tracking application is not connected to it. Each time we want to enable it for controlling/reading the asset tracking log using the ST asset tracking application, press the User Button.
The LED will start blinking

Make the login

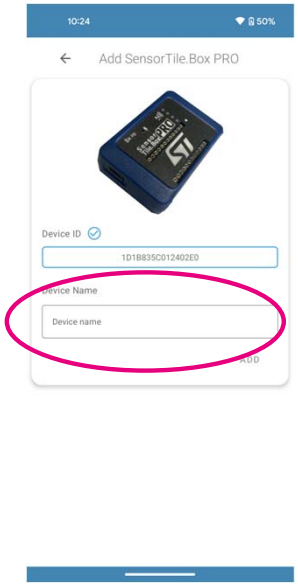


Add a new device

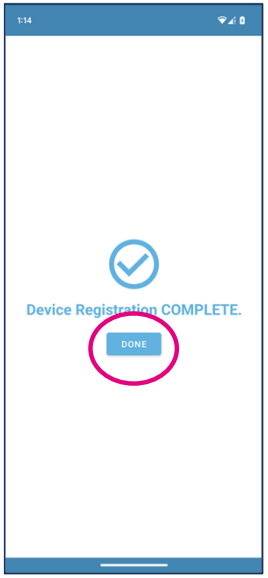


Select the SensorTile.box-Pro

Read the NFC tag for retrivieng the DeviceID



Add one Name



Board added

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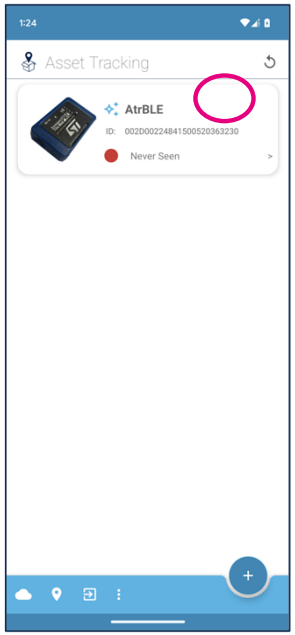
FP-ATR-BLE1
Log Configuration (by Bluetooth)

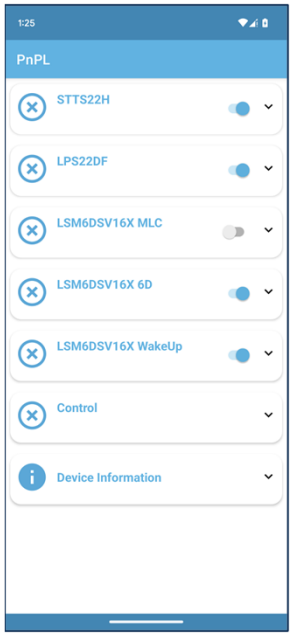
Enable the Bluetooth advertise

For reducing the power consumption the Bluetooth advertise it's not enabled when the ST asset tracking application is not connected to it. Each time we want to enable it for controlling/reading the asset tracking log using the ST asset tracking application, press the User Button.
The LED will start blinking

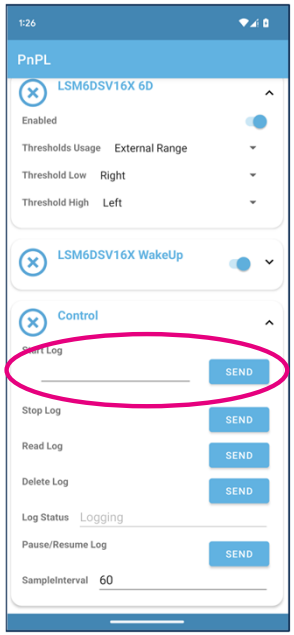


Select one device

Select "**via BLE**"



Select and configure the sensors



Add one epoc time and press "Send"

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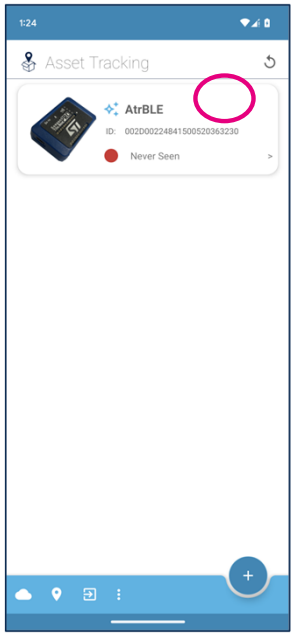
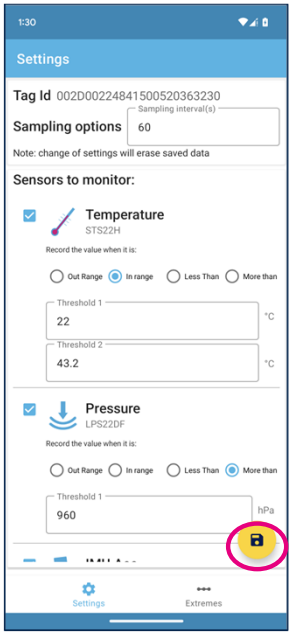
FP-ATR-BLE1
Log Configuration (By NFC)



Select one device

Select “**via NFC**”



Select and configure the sensors.

Save the configuration

FP-ATR-BLE1
Read Log recorded

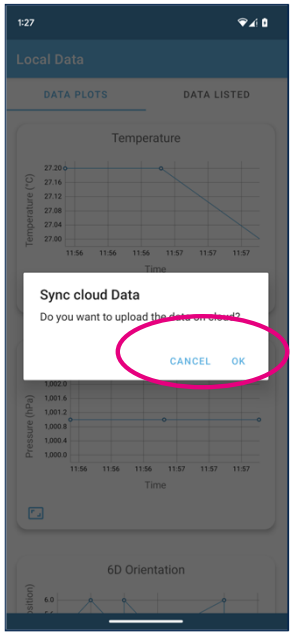
Enable the Bluetooth advertise

For reducing the power consumption the Bluetooth advertise it's not enabled when the ST asset tracking application is not connected to it. Each time we want to enable it for controlling/reading the asset tracking log using the ST asset tracking application, press the User Button.
The LED will start blinking

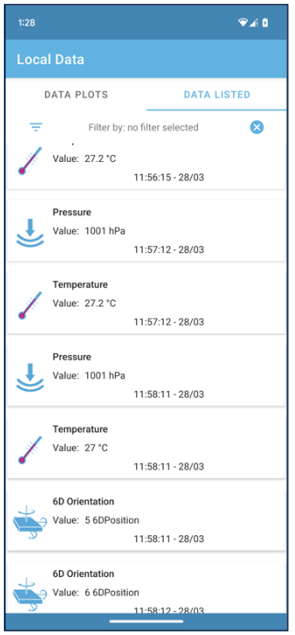
Using the NFC is possibile to read the Max/Min values recorded by the board

Using the BLE is possibile to read all the values recorded by the board and also their Max/Min values

Select "**local data**"



Possibility to load data on cloud



Loaded data

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4- STM32 Open Development Environment: Overview

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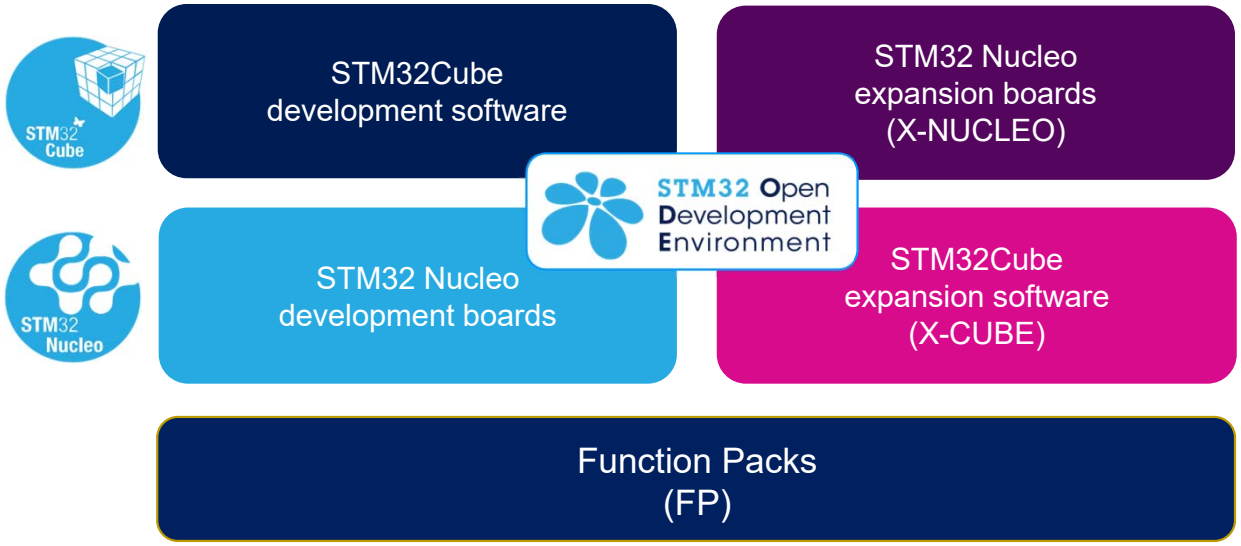
STM32 Open Development Environment
Fast, affordable Prototyping and Development

- The STM32 Open Development Environment (STM32 ODE) is an open, flexible, easy, and affordable way to develop innovative devices and applications based on the STM32 32-bit microcontroller family combined with other state-of-the-art ST components connected via expansion boards. It enables fast prototyping with leading-edge components that can quickly be transformed into final designs



For further information, please visit www.st.com/stm32ode

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Thank you

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