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**SensorTile.box PRO**  
The new programmable  
wireless box kit flexible to  
your expertise

# SensorTile.box PRO

## Ready-to-use programmable wireless IoT node

ST makes IoT sensing accessible with a ready-to-use device connectable via Bluetooth® to your smartphone



Built into a compact box  
Bundled with app for smartphone

Can be configured for users of any skill level to support learning, prototyping, or even as a module within a commercial end-product.

Connects out-of-the-box with several cloud services to further extend opportunities for learning and new-product development



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[st.com/sensortileboxPRO](https://st.com/sensortileboxPRO)



# SensorTile.box PRO

## A uniquely flexible solution



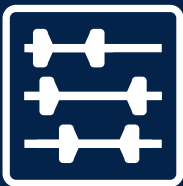
### Fast prototyping

- **Design** IoT node and wearable sensor applications quickly and easily, without performing any programming



### Complete solution

- **From simple to advanced** programming
- Connectivity and cloud / ecosystem



### Expandable & customizable

- **Develop** accessories to expand SensorTile.box PRO features
- **Tailor** the device to your needs

# Fast prototyping & complete solution



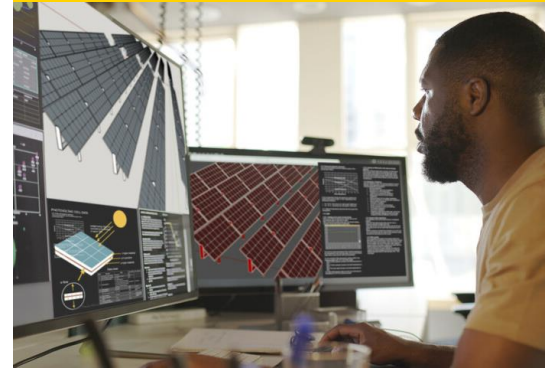
# One box for many users

## Users with no programming skills / focus



You can experience the platform using the **pre-loaded libraries**, combining them to build your **customized solution**.

## System integrators



You benefit from a **compact, integrated platform** that embeds **high-performance sensing** and processing capabilities.

## Cloud developers



You can experiment the various functions of the box, by **programming applications** using our pre-integrated set of sensors.

## Education



You get an **easy access** to sensors technology by using the built-in **simple programming mode**.

# Three different working modes

1

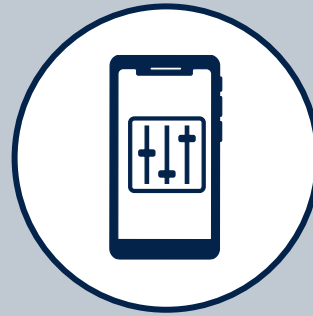
ENTRY MODE



Enjoy different **ready-to-use applications** already embedded in the tool, approaching the IoT world from the baseline

2

EXPERT MODE



Explore in deep the different possibilities offered by the tool while **managing parameters, algorithms, and output** directly from your smartphone

3

PRO MODE



**Create from scratch** your own tailored application exploiting provided libraries, AI algorithms and in general the **STM32 open development environment**

# Entry mode

## No need to program anything



Access the broad range of **predefined applications** through ST BLE Sensor Classic application

- **Ready to use mode**
- Baseline to **start** approaching from scratch the IoT world
- **Embedded applications** can be used to solve **specific problems**, or to simply start getting familiar with the ecosystem.



Pedometer



Human activity recognition



Level



Barometer



Sensor fusion quaternion



Data recorder



Compass



Baby crying detection



Free-fall detection



NFC tag writer



QTouch



In-vehicle baby alarm

# Expert mode



Create new applications on ST BLE Sensor Classic application using the graphical interface

- Create additional applications, using available building blocks
- Build your own application, without programming



## Power optimization

Only the required sensors are active

## Ad hoc calibration and control

User's control over the process of data extraction and transformation

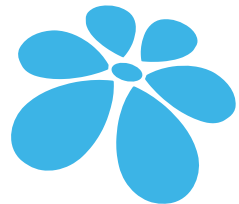
## Extended range of application

Flexible and adaptable to plenty of situations





Fully program your tailored applications, leveraging on the complete **STM32 open development environment**.



**STM32** Open  
Development  
Environment

- Full STM32Cube development software **compatibility**. **STM32 ODE** provides tools and software, expansion software and functions completely free of charge
- Development environment **open** to other **external sources** (you can develop your own algorithm in another working space and integrate it afterwards)
- Available function packs covering many applications
- **STLINK** adapter with programming cable included in the bundle kit

# Meet SensorTile.box PRO

# Sense, process, and connect

## Motion sensors



6-axis inertial measurement unit  
**LSM6DSV16X**



3-axis low-power accelerometer  
**LIS2DU12**



3-axis magnetometer  
**LIS2MDL**

## Processing & memory



Ultra-low-power with FPU Arm Cortex-M33 with TrustZone®  
**STM32U585AI**



microSD™ card slot



## Environmental sensors

Low-voltage local digital temperature sensor  
**STTS22H**



Altimeter / pressure sensor  
**LPS22DF**



Digital microphone / audio sensor  
**MP23DB01HP**



## Connectivity

Bluetooth Low Energy 5.2 SoC  
**BLUENRG-355AC**



NFC tag on board  
**ST25DV04K**



# Power options and user interface

## Power options



USB Type-C® charging port



Wireless charging



480 mAh long life battery



## User interface

4 programmable LEDs



2 programmable buttons  
+ reset button



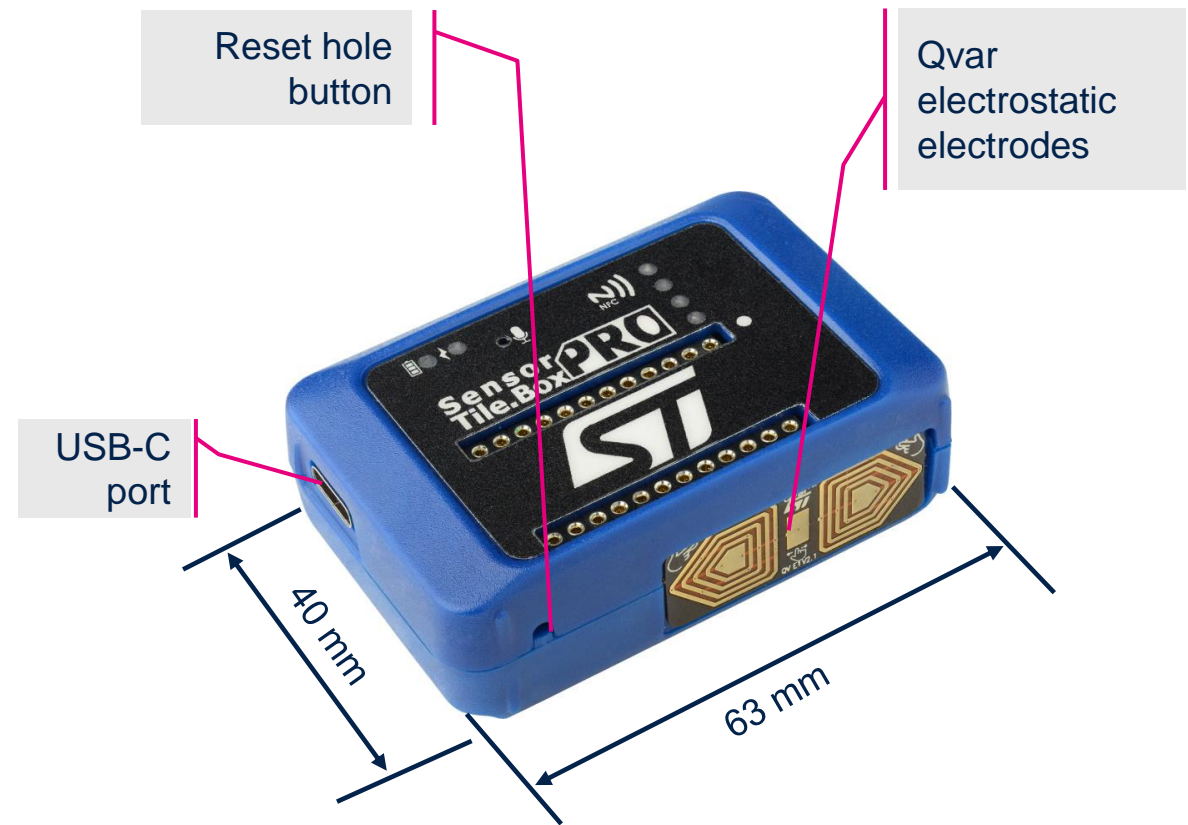
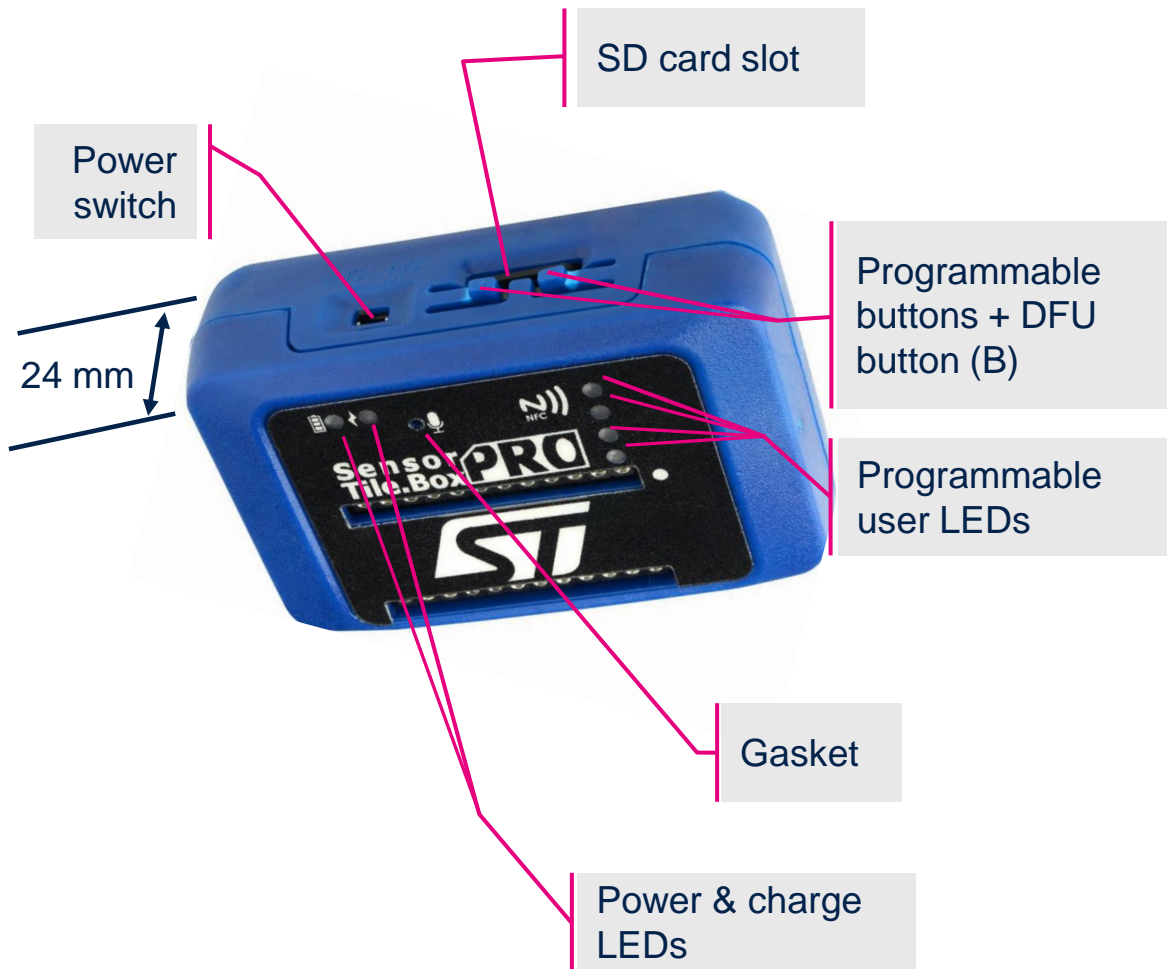
Programmable audio buzzer



Qvar sensor electrodes

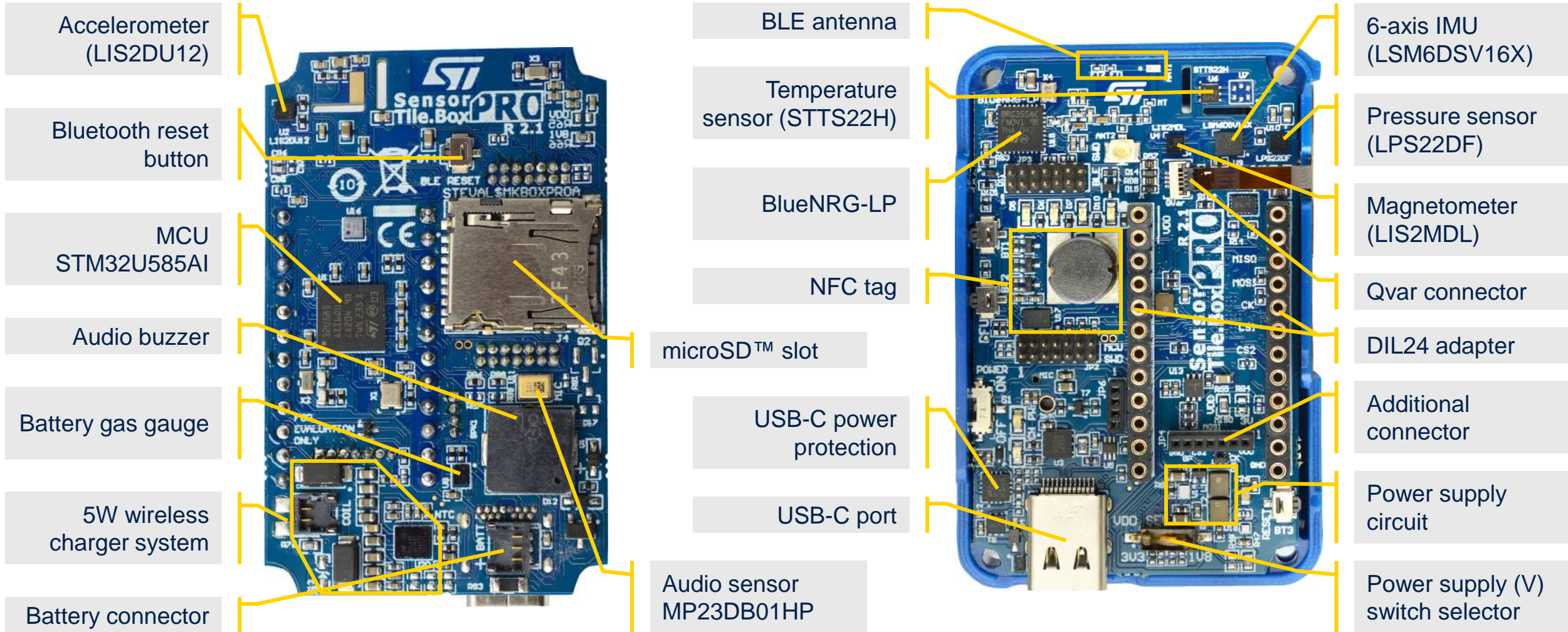


# Meeting the SensorTile.box PRO from the outside



Order code: [STEVAL-MKBOXPRO](#)

# Meeting the SensorTile.box PRO from the inside



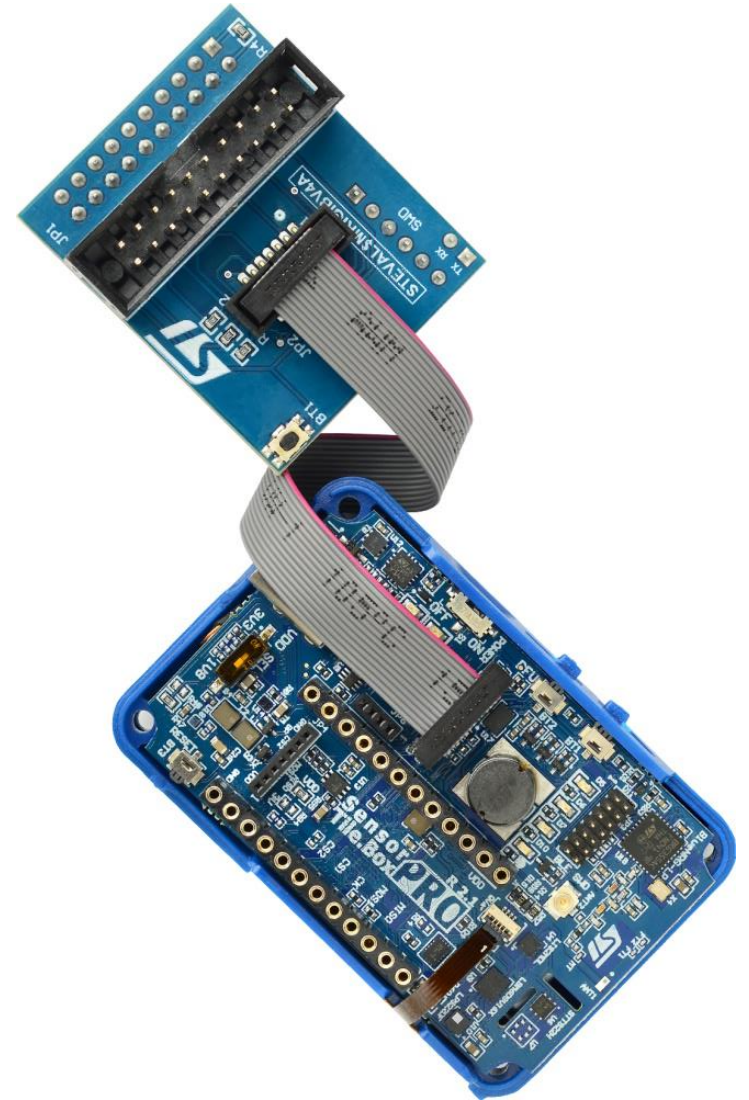
# The kit overview: all with you!



Blister with quick starting guide

STEVAL-MKIGIBV4 STLINK adapter with programming cable

SensorTile.box PRO

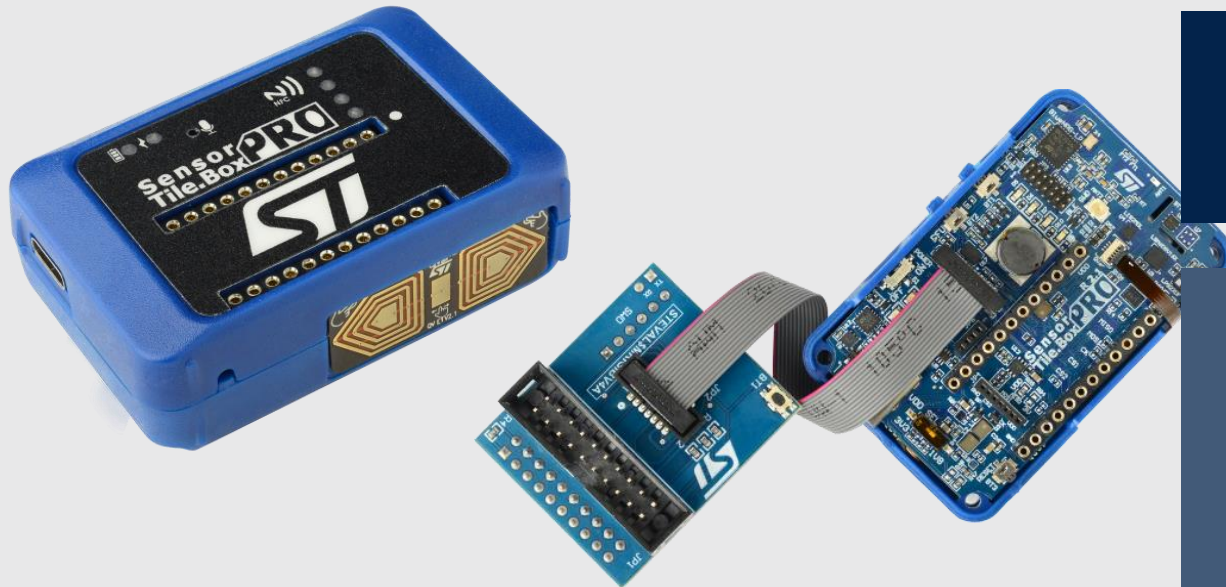


# A strong ecosystem



# ST ecosystem supporting learning and prototyping

## SensorTile.box PRO ready-to-go IoT node



### Firmware

**STSW-MKBOXPRO-FS**

**STSW-MKBOX-BLEDK**

### Pre-integrated application example

**FP-SNS-DATALOG2**

**FP-ATR-BLE1**

**FP-SNS-BLEMESH1**

**FP-SNS-STBOX1**

### BLE applications

**ST BLE Sensor Classic**

**ST asset tracking**

**STEVAL-MKBOXPRO**

40 x 63 x 20 mm (L x l x h)

[www.st.com/sensortileboxpro](http://www.st.com/sensortileboxpro)



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# STSW-MKBOXPRO-FS

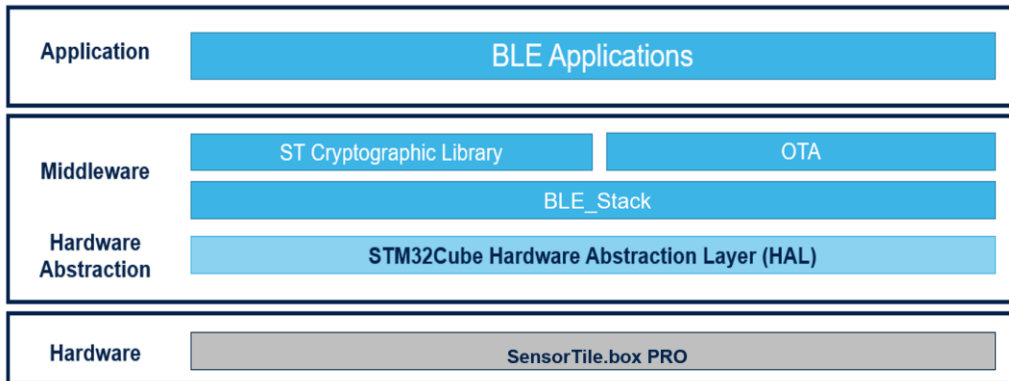
## STSW-MKBOXPRO-FS firmware restores FOTA functionality



- The STSW-MKBOXPRO-FS firmware allows to **restore the ability to use the basic functionalities** of the default firmware
- It upgrade firmware over-the-air (FOTA) to the latest version if FOTA functionality is overwritten or deleted due to a custom firmware upload.
- To work properly, it requires either STLINK driver installed on PC or STM32CubeProgrammer installed on PC.

# STSW-MKBOX-BLEDK

## STSW-MKBOX-BLEDK firmware for BlueNRG-LP



The STSW-MKBOX-BLEDK is the **software package for BlueNRG-LP Bluetooth® Low Energy system-on-chip**. Users can program the BlueNRG-LP to run the following BLE applications:

- BLE sensor demo
- BLE OTA reset manager
- BLE OTA firmware manager
- BLE beacon
- BLE throughput
- BLE serial port

# Pre-integrated application examples

SensorTile.box PRO is supported by several STM32Cube function packs



## FP-SNS-DATALOG2



High speed sensor data capture software suite via USB or SD card up to 6 Mb/s with possibilities to change input parameters

## FP-ATR-BLE1



For asset tracking using BLE connectivity

## FP-SNS-STBOX1



For building custom applications using the PRO Mode

## FP-SNS-BLEMESH1



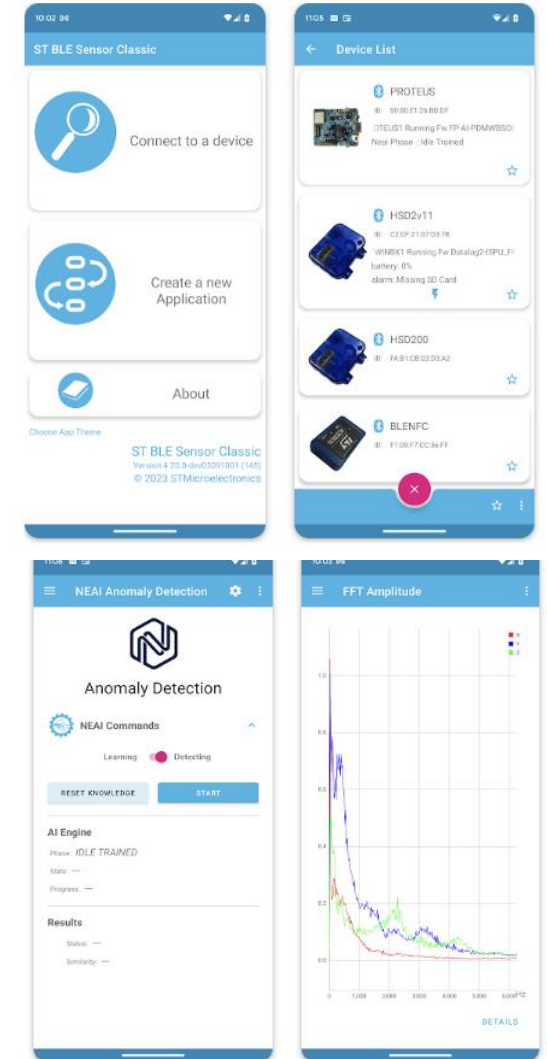
For viewing real-time environmental and motion sensor data using the BLE Mesh sensor model

# ST BLE Sensor Classic app

An app to get the most out of your device



- Sensor data reception and command transmission over Bluetooth® Low Energy
- Data logging, plotting & publishing on the cloud
- Support for multiple STM32Cube function packs
- Development of applications for SensorTile.box PRO



# ST BLE Sensor Classic app & SensorTile.box PRO

## Build your application for SensorTile.box PRO



- Browse the available app examples to speed up your development.
- Assemble different building blocks to quickly develop your custom app using data retrieved from the device.

The screenshot shows the 'SensorTile Classic' app interface. It is divided into three panels:

- Example Apps categories:** A list of categories including Motion, Environmental, Log, AI & MLC, User Interface, and Connectivity. The 'Motion' category is highlighted with a blue box.
- Example Apps:** A list of specific apps including Compass, Free-Fall Detection, Level, Pedometer, and Sensor Fusion - Quaternion. The 'Compass' app is highlighted with a blue box.
- App Detail View:** A detailed view of the 'Compass' app. It includes a description: 'This app uses the LSM6DSV16X iNemo 6-axis inertial measurement unit and the LIS2MDL 3-axis compensated magnetometer to show the orientation estimation of Sensor Tile.boxPRO related to the Earth-North or level indication.' It also mentions the sensor fusion algorithm (MotionFX library) and the Kalman filter used for minimizing sensor inaccuracies.

At the bottom of each panel, there are navigation icons for 'SENSORS', 'START', and 'MORE'. The 'App Detail View' also includes 'EDIT' and 'PLAY' buttons.

# ST asset tracking app

## An app for asset tracking



- Configuration of SensorTile.box PRO from a compatible mobile device with Bluetooth® connectivity.
- Data logging for specific sensors, setting threshold triggers to start & stop logging activity.
- Communication with the FP-ATR-BLE1 function pack firmware running on the STM32 microcontroller of SensorTile.box PRO, which manages the specific environmental and motion sensor data logging activity.



# Stories





# Play the game with SensorTile.box PRO @ Sensor+Test 2023

ST @ S+T



A programmable board  
that adapts to your expertise

Leveraging only on the IMU (LSM6DSV16X), the Qvar capabilities and the connectivity of the board, you managed to use the board as a **controller for a video game** so that it knows exactly the orientation and you can move the character forward using the buttons.

<https://youtu.be/F4c9V1791Vw>



# Personalized fitness training with SensorTile.box PRO @ MWC 2023

ST @ MWC



ISPU - pulling its weight for AI learning

**ST makes your life easier!**

Discover a self-learning AI IMU in fitness training that automatically detects and recognizes movements

Watch the video!

<https://youtu.be/xN1uWAfs6q4>



# Resources

Here are the main resources for SensorTile.box PRO



[st.com/sensortileboxPRO](https://st.com/sensortileboxPRO)



[Data brief, user manual, quick start guide](#)

[CAD resources](#) (Gerber files, BOM, schematics)

[Tools & Software](#) (MCU embedded software, app)

[Featured videos and tutorials](#) and [ST MEMS & sensors community](#)

# Our technology starts with You



Find out more at [www.st.com/sensortileboxpro](http://www.st.com/sensortileboxpro)

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