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STMicroelectronics STM32Cube Wireless Industrial Node SensorTile Box

Hardware and Software overview

Hardware Overview

1. Sample implementations are available for:
2. STEVAL-STWINBX1 STWIN.box – SensorTile Wireless Industrial Node Development Kit
3. STEVAL-MKBOXPRO SensorTile.box-Pro multi-sensors and wireless connectivity development kit for any intelligent IoT node
4. STEVAL-STWINKT1B STWIN – SensorTile Wireless Industrial Node Development Kit

Hardware Overview (2/2)

- **STWIN.box – SensorTile Wireless Industrial Node**
- The STWIN.box (STEVAL-STWINBX1) is a development kit and reference design that simplifies prototyping and testing of advanced industrial sensing applications in IoT contexts such as condition monitoring and predictive maintenance.
- It is an evolution of the original STWIN kit (STEVAL-STWINKT1B) and features a higher mechanical accuracy in the measurement of vibrations, an improved robustness, an updated BoM to reflect the latest and best-in-class MCU and industrial sensors, and an easy-to-use interface for external add-ons.
- The STWIN.box kit consists of an STWIN.box core system, a 480mAh LiPo battery, an

adapter for the ST-LINK debugger (STEVAL-MKIGIBV4), a plastic case, an adapter board for DIL 24 sensors and a flexible cable.

Key Features

- Multi-sensing wireless platform for vibration monitoring and ultrasound detection
- Built around STWIN.box core system board with processing, sensing, connectivity, and expansion capabilities
- Ultra-low power Arm® Cortex®-M33 with FPU and TrustZone at 160 MHz, 2048 kBytes Flash memory (STM32U585AI)
- MicroSD card slot for standalone data logging applications
- On-board Bluetooth® low energy v5.0 wireless technology (BlueNRG-M2), Wi-Fi (EMW3080) and NFC (ST25DV04K)
- Wide range of industrial IoT sensors: Ultra-wide bandwidth (up to 6 kHz), low-noise, 3-axis digital vibration sensor (IIS3DWB), 3D accelerometer + 3D gyro iNEMO inertial measurement unit (ISM330DHCX) with Machine Learning Core, High-performance ultra-low-power 3-axis accelerometer for industrial applications (IIS2DLPC), Ultra-low power 3-axis magnetometer (IIS2MDC), Dual full-scale, 1.26 bar and 4 bar, absolute digital output barometer in full-mold package (ILPS22QS), Low-voltage, ultra low-power, 0.5°C accuracy I²C/SMBus 3.0 temperature sensor (STTS22H), Industrial grade digital MEMS microphone (IMP34DT05), Analog MEMS microphone with frequency response up to 80 kHz (IMP23ABSU)
- Expandable via a 34-pin FPC connector
- Latest info available at www.st.com/stwinbx1

Hardware Overview (2/2)

- The STEVAL-STWINBX1 development kit includes:
- The STEVAL-STWBXCS1 STWIN.box core system (main board)
- A plastic case with M3 bolts
- A 480 mAh 3.7 V LiPo battery
- The STEVAL-MKIGIBV4 ST-LINK adapter with programming cable
- The STEVAL-C34DIL24 adapter board for DIL24 sensors with the STEVAL-FLTCB01 flexible cable.

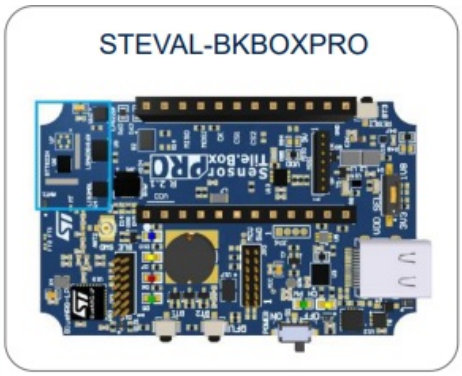
- **Hardware Overview (1/2)**

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 a 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
- Latest info available at [www. https://www.st.com/en/evaluation-tools/stevalmkboxpro.html](https://www.st.com/en/evaluation-tools/stevalmkboxpro.html)



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

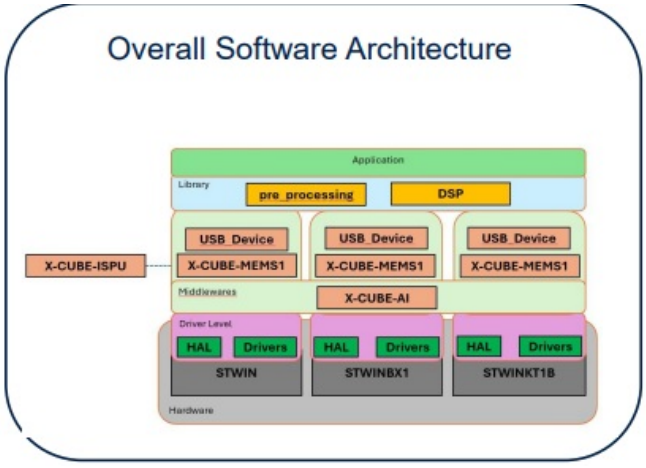
Software Overview

- FP-SNS-STAIOTCFT Software Description
- The FP-SNS-STAIOTCFT is a STM32Cube Function Pack built to be used together with the Web application ST AIoT Craft.
- The purpose of this functional pack is to provide simple applications that show how to build custom applications for STEVAL-MKBOXPRO, STEVAL-STWINBX1 and STEVAL-STWINKT1B boards.

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

Key features

- Complete applications on how to use:
- AI algorithms on MCU, MLC and ISPU
- Using PnPL protocol to communicate and sending commands/telemetries/properites
- Using USB serial communication to display the inference results
- Exploiting already existing X-CUBE-MEMS1/ISPU to target the different sensors
- Exploiting the X-CUBE-AI to import a chosen neural network
- Easy portability across different MCU families, thanks to STM32Cube
- Free, user-friendly license terms.
- Latest info available at www.st.com FP-SNS-STAIOTCFT



Setup & Demo Applications

Software and Other Prerequisites

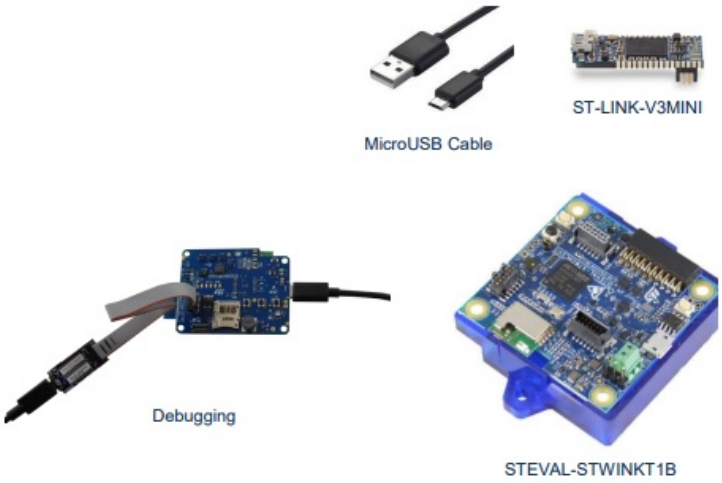
FP-SNS-STAIOTCFT

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-STWINKT1B, STEVAL-STWINBX1 and STEVAL-MKBOXPRO.

Setup Overview

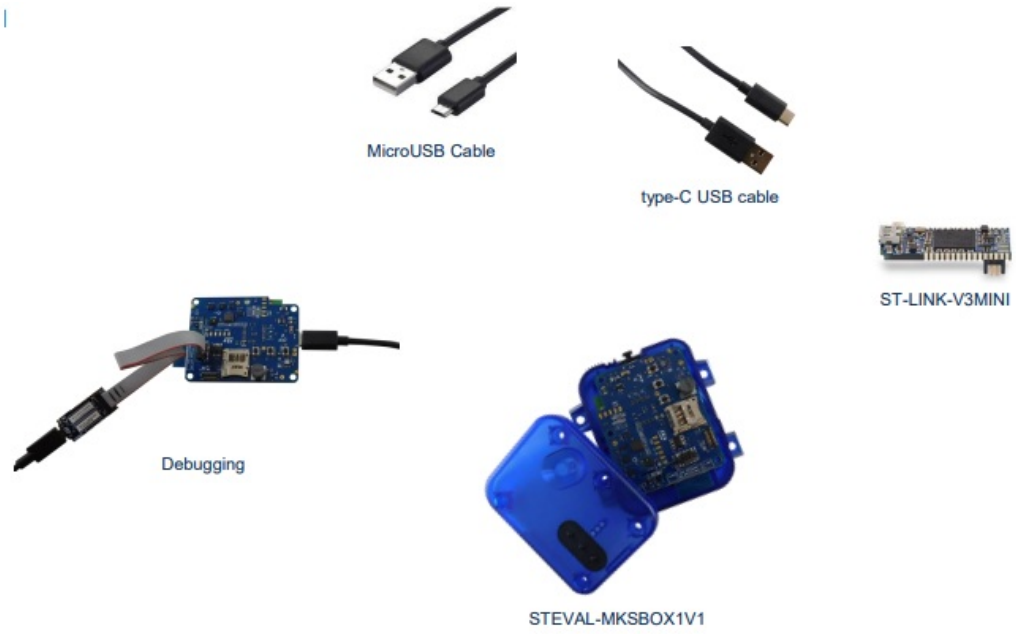
HW prerequisites and setup for STEVAL-STWINKT1B

- 1x STEVAL-STWINKT1B evaluation board
- Laptop/PC with Windows 10, 11
- 2 x microUSB cable
- 1x ST-LINK-V3SET (or ST-LINK-V3MINI) debugger/programmer



HW prerequisites and setup for STEVAL-STWINBX1

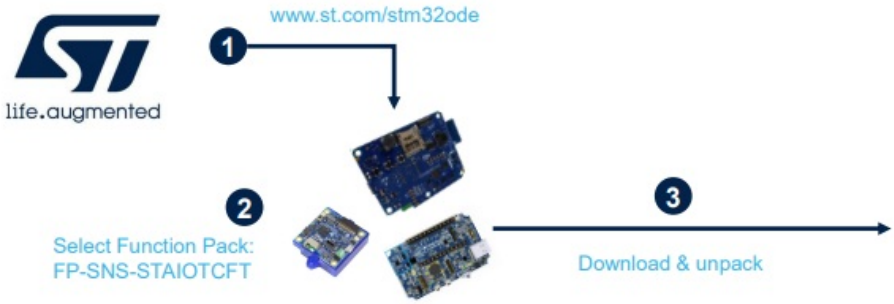
- 1x STEVAL-STWINBX1 evaluation board
- Laptop/PC with Windows 10, 11
- 1 x microUSB cable
- 1x type-C USB cable
- 1x ST-LINK-V3SET (or ST-LINK-V3MINI) debugger/programmer



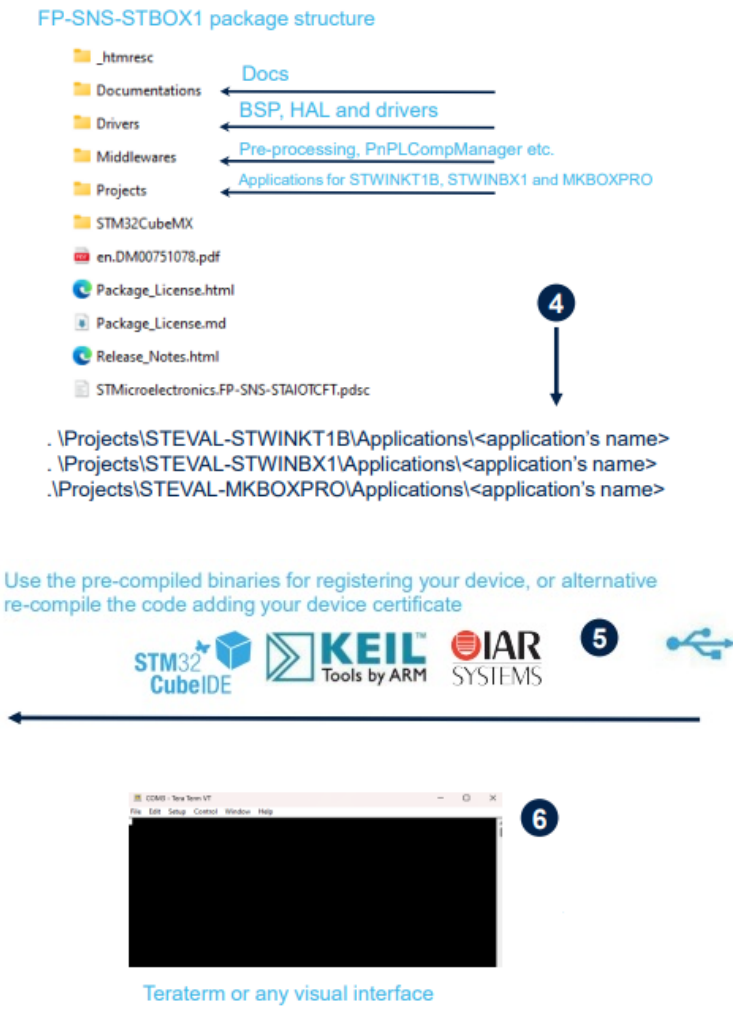
HW prerequisites and setup for STEVAL-MKBOXPRO

- 1x STEVAL-MKBOXPRO evaluation board
- Laptop/PC with Windows 10, 11
- 1 x microUSB cable
- 1x type-C USB cable
- 1x ST-LINK-V3SET (or ST-LINK-V3MINI) debugger/programmer

Start coding in just a few minutes



www.st.com/stm32ode



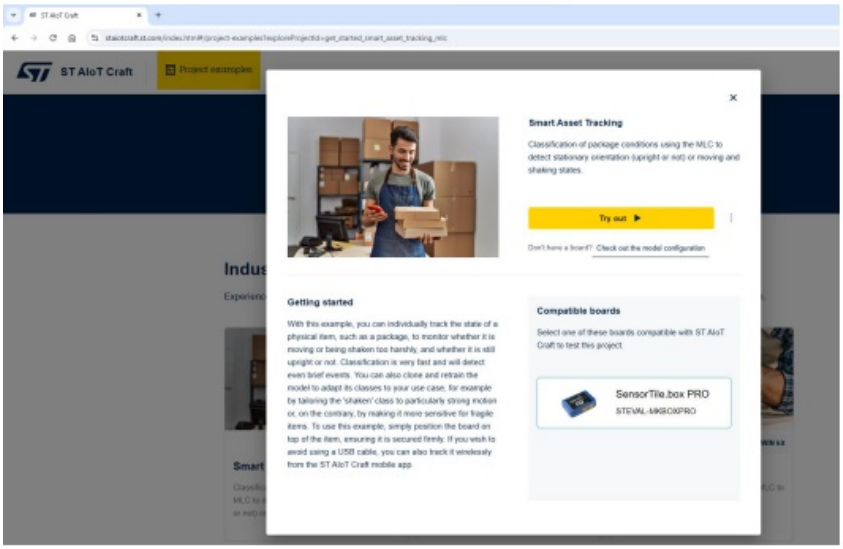
Troubleshooting for STEVAL-MKBOXPRO

When the board starts, for all the examples, the board will use the Orange LED for showing that everything is well initialized and it's working.

Demo Applications: AI Inertial

FP-SNS-STAIOTCFT (AI Inertial)

STEVAL-MKBOXPRO – STWINKT1B – STWINBX1



The purpose of this application is to show an inference application on the Machine Learning Core and on MCU, ISPU. For all the development boards the application starts streaming directly results regarding a classification of an Asset Tracking Scenario, but in principle any MLC application can be used by simply loading a new configuration by means of a specific PnPL command The Smart Asset Tracking scenario is the same displayed in the Portal of ST AIoT Craft.

Documents & Related Resources

All documents are available in the DESIGN tab of the related products webpage

- FP-SNS-STBOX1:
- DB: STM32Cube function pack – databrief
- UM: Getting started with the STM32Cube function pack – user manual
- Software setup file

STM32 Open Development Environment

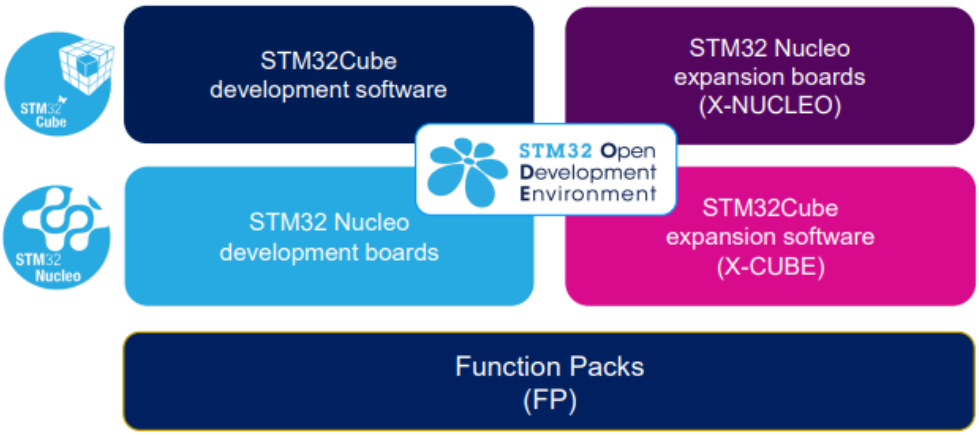
Overview

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



Thank you

FAQS

Q: What are the key features of the FP-SNS-STAIOTCFT?

A: The FP-SNS-STAIOTCFT provides simple applications for custom development on specific boards and is built on STM32Cube software technology for portability.

Q: Where can I find more information about the hardware and software prerequisites?

A: Detailed information about the hardware and software prerequisites can be found in the setup overview section of the user manual.

Q: How do I start coding using the FP-SNS-STAIOTCFT?

A: To start coding with the FP-SNS-STAIOTCFT, follow the setup instructions provided in the user manual and refer to the package structure documentation for guidance.

Documents / Resources

	STMicroelectronics STM32Cube Wireless Industrial Node SensorTile Box [pdf] User Guide STM32Cube, STM32Cube Wireless Industrial Node SensorTile Box, Wireless Industrial Node SensorTile Box, Industrial Node SensorTile Box, SensorTile Box

References

- User Manual

STMicroelectronics

Industrial Node SensorTile Box, SensorTile Box, STM32Cube, STM32Cube Wireless Industrial Node SensorTile Box, STMicroelectronics, Wireless Industrial Node SensorTile Box

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