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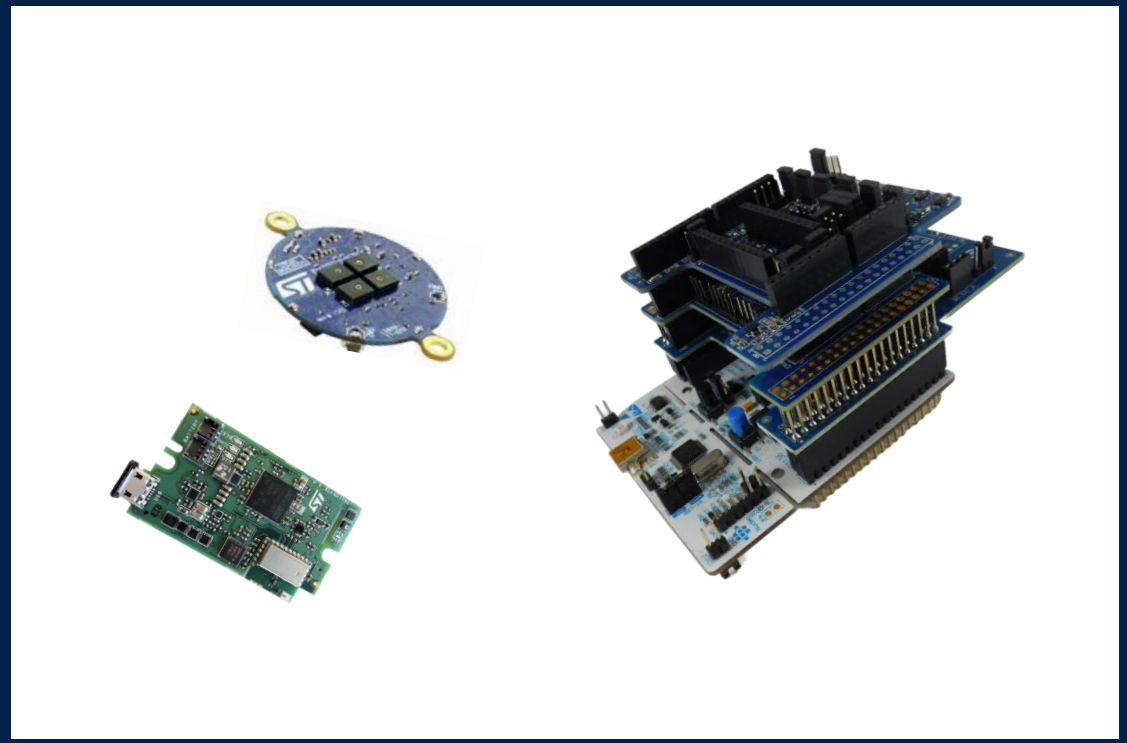

Quick Start Guide

STM32Cube function pack for IoT node with BLE connectivity, digital microphone, environmental and motion sensors
(FP-SNS-ALLMEMS1)

Version 4.3.0 (July 13, 2023)

Agenda

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

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1- Hardware and Software overview

Hardware Overview

Sample implementations are available for:

1. STM32 Nucleo with expansion boards
   - NUCLEO-F446RE (or NUCLEO-L476RG) + X-NUCLEO-CCA02M2 + X-NUCLEO-BNRG2A1 + X-NUCLEO-IKS4A1 (or X-NUCLEO-IKS01A3)

3. STEVAL-BCNKT01V1 evaluation boards
   - STEVAL-BCNCS01V1 + STEVAL-BCNCR01V1 + STEVAL-BCNST01V1

4. STEVAL-MKSBOX1V1 evaluation boards

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Motion MEMS and environmental sensors expansion board

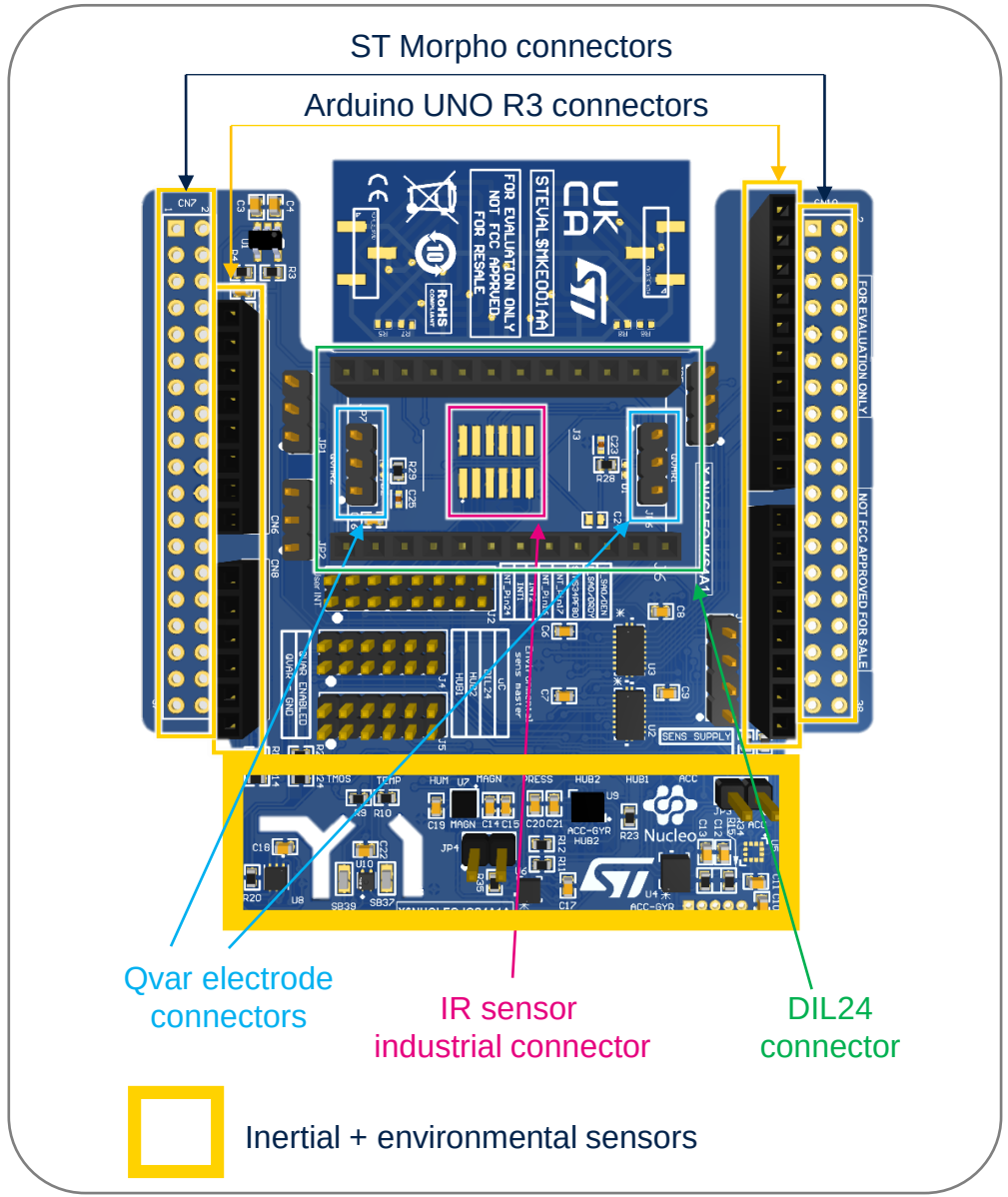
STM32 Nucleo with Expansion boards - Hardware Overview (1/9)

X-NUCLEO-IKS4A1 Hardware Description (1/2)

- The X-NUCLEO-IKS4A1 is a motion MEMS and environmental sensor evaluation board system.
- This expansion board allows application development with features like Sensor HUB,camera module integration and QVAR touch/ swipe gestures.
- It is compatible with the Arduino UNO R3 connector layout, and is designed around ST's latest sensors.

Key Product on board

- LMS6DSO16IS: MEMS 3D accelerometer (±2/±4/±8/±16 g) + 3D gyroscope (±125/±250/±500/±1000/±2000 dps) with ISPU (Intelligent Processing
- LIS2MDL: MEMS 3D magnetometer (±50 gauss)
- LIS2DUXS12: Ultra low-power MEMS 3D accelerometer (±2/±4/±8/±16 g) with Qvar, AI, & anti-aliasing
- LPS22DF: Low-power and high-precision MEMS pressure sensor, 260-1260 hPa absolute digital output barometer
- SHT40AD1B: humidity sensor from Sensirion
- STTS22H: Low-voltage, ultralow-power, 0.5 °C accuracy temperature sensor (–40 °C to +125 °C)
- LSM6DSV16X: MEMS 3D accelerometer (±2/±4/±8/±16 g) + 3D gyroscope (±125/±250/±500/±1000/±2000/±4000 dps) with embedded sensor fusion, AI, Qvar



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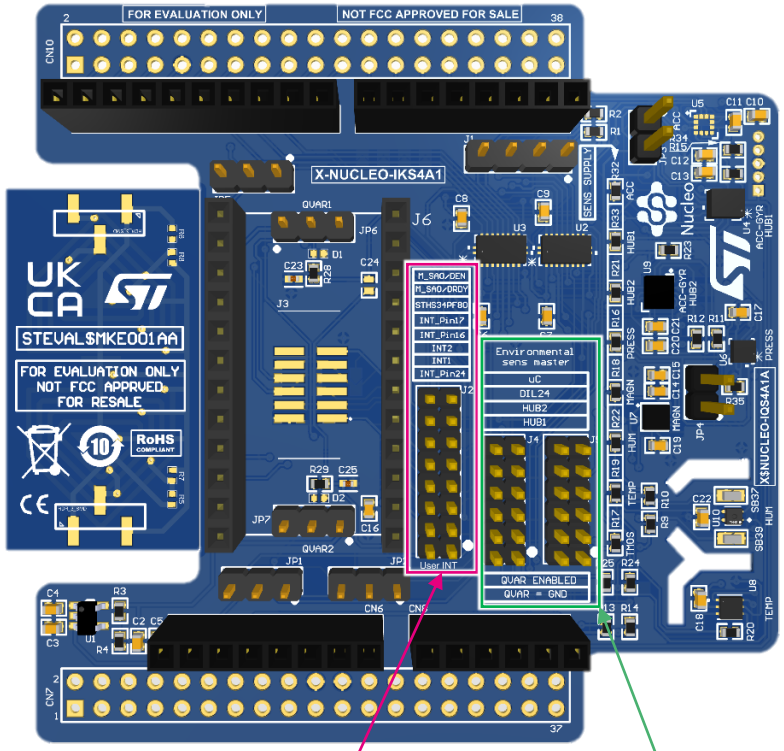
Motion MEMS and environmental sensors expansion board
STM32 Nucleo with Expansion boards - Hardware Overview (2/9)

X-NUCLEO-IKS4A1 Hardware Description (2/2)

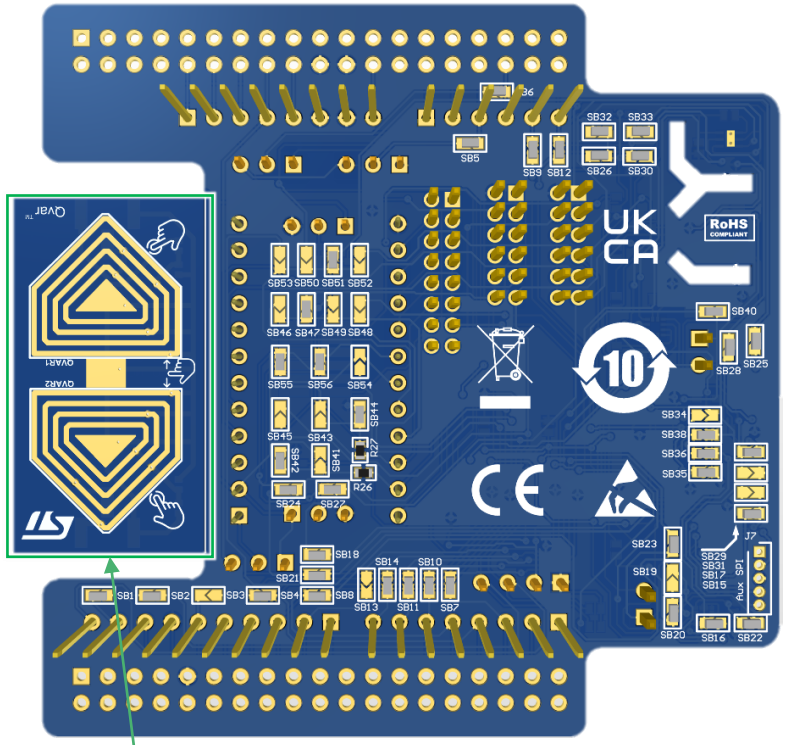
Top view



DIL24 + humidity sensor INT selelctor

I2C bus + Qvar enable selector

Bottom view



Detachable Qvar electrode

Latest info available at www.st.com
X-NUCLEO-IKS4A1

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Motion MEMS and environmental sensors expansion board

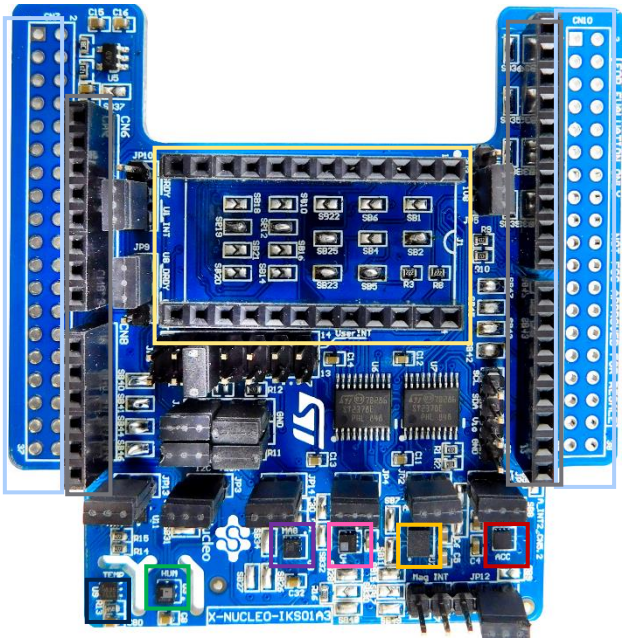
STM32 Nucleo with Expansion boards - Hardware Overview (3/9)

X-NUCLEO-IKS01A3 Hardware Description

- The X-NUCLEO-IKS01A3 is a motion MEMS and environmental sensor evaluation board system.
- It is compatible with the Arduino UNO R3 connector layout, and is designed around ST's latest sensors.

Key Product on board

- LSM6DSO MEMS 3D accelerometer (±2/±4/±8/±16 g) + 3D gyroscope (±125/±250/±500/±1000/±2000 dps)
- LIS2DW12 MEMS 3D accelerometer (±2/±4/±8/±16 g)
- LIS2MDL MEMS 3D magnetometer (±50 gauss)
- LPS22HH MEMS pressure sensor, 260-1260 hPa absolute digital output barometer
- HTS221: Capacitive digital relative humidity and temperature
- STTS751 Digital Temperature sensor
- DIL 24-pin Socket available for additional MEMS adapters and other sensors (UV index)



HTS221 LSM6DSO ST morpho connector**
LPS22HH LIS2DW12 Arduino UNO R3 connector
LIS2MDL STTS751 DIL 24-pin

*** Connector for the STM32 Nucleo Board*

Latest info available at www.st.com
X-NUCLEO-IKS01A3

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Bluetooth Low Energy Expansion Board

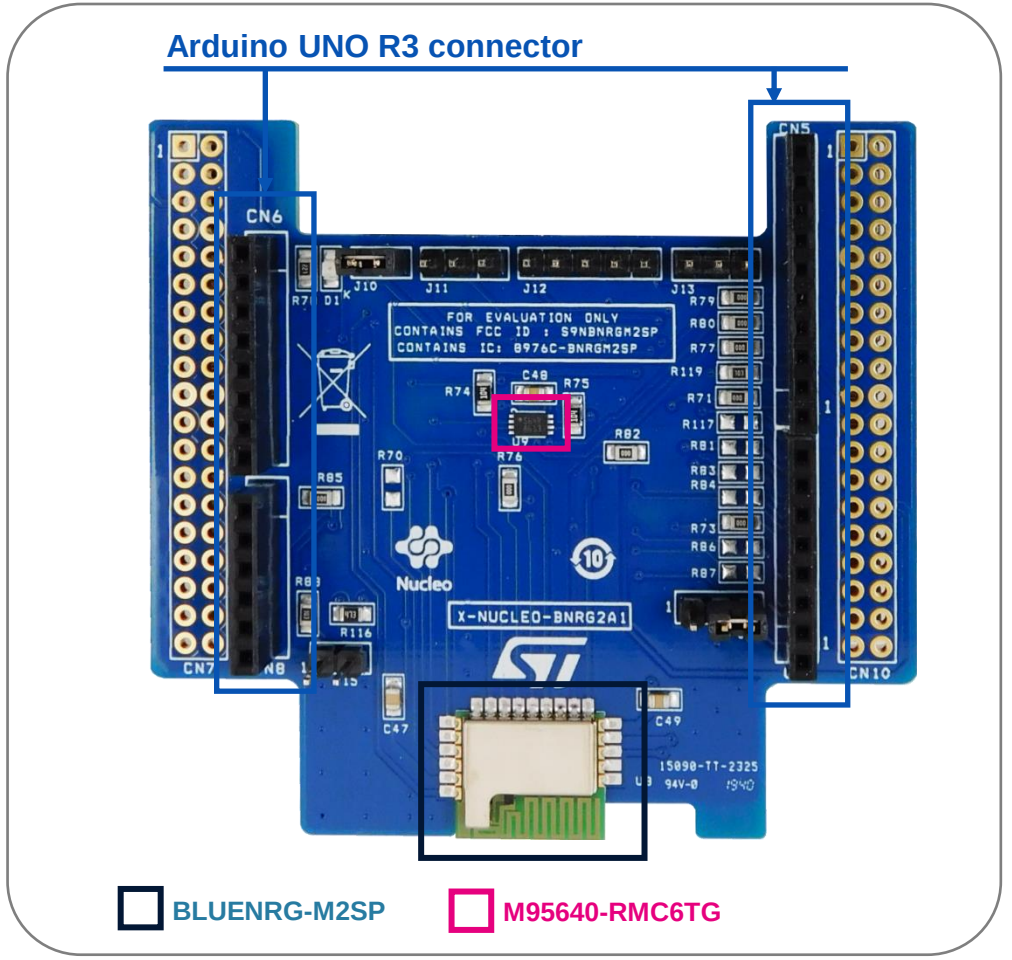
STM32 Nucleo with Expansion boards - Hardware Overview (4/9)

X-NUCLEO-BNRG2A1 Hardware Description

- The X-NUCLEO-BNRG2A1 is a Bluetooth Low Energy (BLE) evaluation and development board system, designed around ST's BLUENRG-M2SP Bluetooth Low Energy module based on BlueNRG-2.
- The BlueNRG-2 processor hosted in the BLUENRG-M2SP module communicates with the STM32 microcontroller, hosted on the Nucleo development board, through an SPI link available on the Arduino UNO R3 connector.

Key Product on board

- BLUENRG-M2SP Bluetooth Low Energy, FCC and IC certified (FCC ID: S9NBNRGM2SP, IC: B976C-BNRGM2SP), module based on Bluetooth® Low Energy wireless network processor BlueNRG-2, BLE v5.0 compliant.
- BLUENRG-M2SP integrates a BALF-NRG-02D3 balun and a PCB antenna. It embeds 32 MHz crystal oscillator for the BlueNRG-2.
- M95640-RMC6TG 64-Kbit serial SPI bus EEPROM with high-speed clock interface



Latest info available at www.st.com
X-NUCLEO-BNRG2A1

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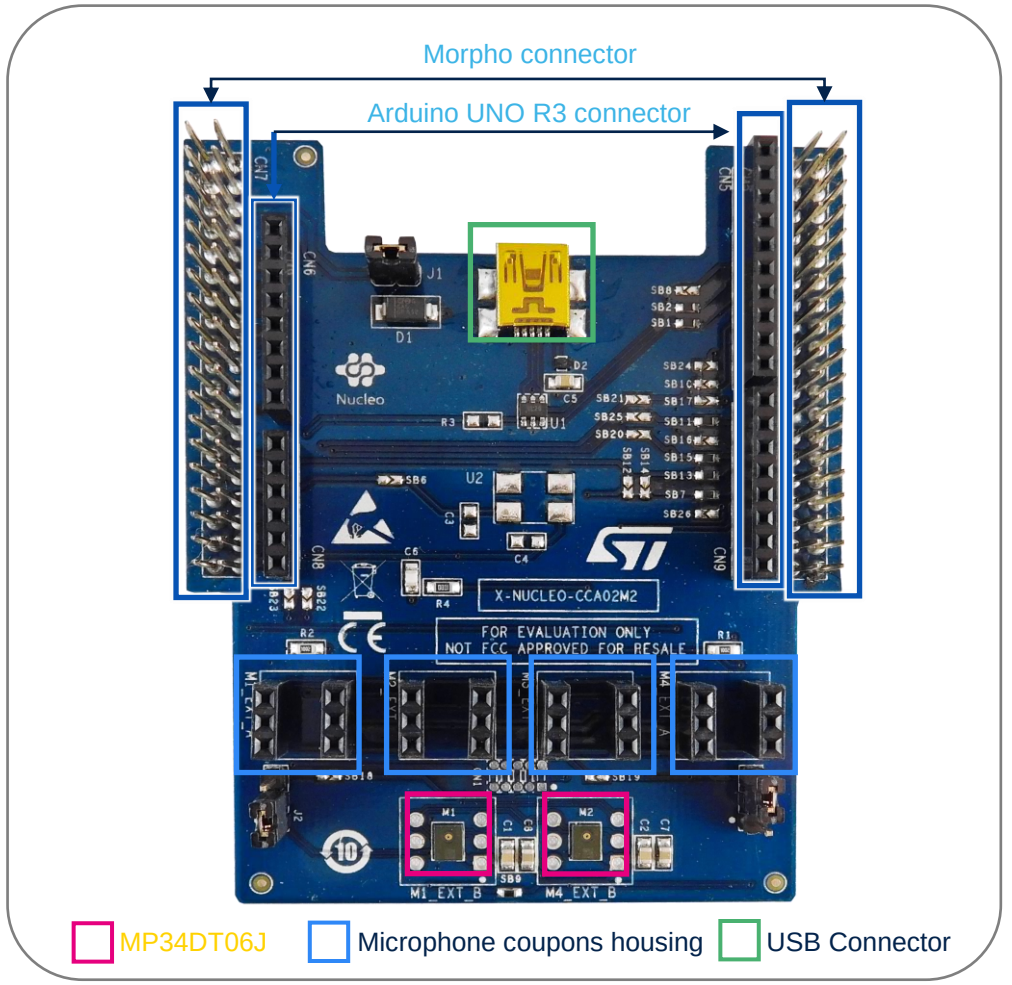
MEMS Microphones expansion board (X-NUCLEO-CCA02M2)

STM32 Nucleo with Expansion boards - Hardware Overview (5/9)

X-NUCLEO-CCA02M2 Hardware Description

- The X-NUCLEO-CCA02M2 is an expansion board that has been designed around MP34DT06J digital MEMS microphone. It is compatible with the ST morpho connector layout and with digital microphone coupon boards such as STEVAL-MIC001V1, STEVAL-MIC002V1 and STEVAL-MIC003V1.
- The X-NUCLEO-CCA02M2 embeds two MP34DT06J microphones and allows synchronized acquisition and streaming of up to 4 microphones through I²S, SPI, DFSDM or SAI peripherals.



Key Product on board

- MP34DT06J ultra-compact, low-power, omnidirectional, digital MEMS microphone built with a capacitive sensing element and an IC interface.

Latest info available at www.st.com
X-NUCLEO-CCA02M2

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Important Hardware Additional Information

STM32 Nucleo with Expansion boards - Hardware Overview (6/9)

1. For F4xx STM32 Nucleo motherboard, there is a hardware conflict between the X-NUCLEO-IKS01A2 expansion board and the X-NUCLEO-CCA02M2 expansion board through the Arduino UNO R3 extension connector. The hardware conflict is onto 5,6 and 7 pin of the CN9 arduido

    a) For X-NUCLEO-IKS4A1:
    - In the pin 5 (SB8) and 6 (SB10) there are the interrupts INT2 and INT1 for LSM6DSV16X component (used for the feature hardware)
    - In the pin 7 (SB11) there is the interrupt for LPS22DF component

    b) For X-NUCLEO-CCA02M2:
    - In the pin 5 (SB7) there is the clock for the Microphones
    - In the pin 6 (SB15) there is the clock x2 for the Microphones
    - In the pin 7 (SB17) there is the connection for the microphone PDM34 (solder bridge open as default)

2. For F4xx STM32 Nucleo motherboard, there is a hardware conflict between the X-NUCLEO-IKS01A3 expansion board and the X-NUCLEO-CCA02M2 expansion board through the Arduino UNO R3 extension connector. The hardware conflict is onto 5,6 and 7 pin of the CN9 arduido

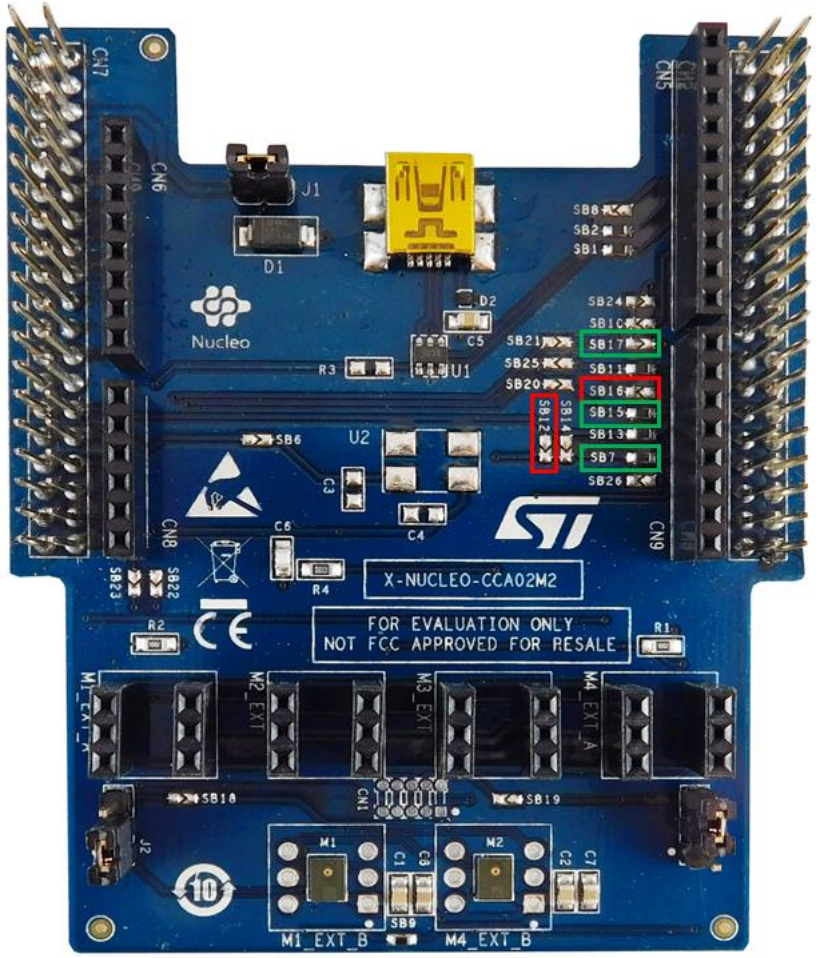
    a) For X-NUCLEO-IKS01A3:
    - In the pin 5 (SB43) and 6 (SB45) there are the interrupts INT1 and INT2 for LSM6DSL component (used for the feature hardware)
    - In the pin 7 (SB47) there is the interrupt for LPS22HB component

    b) For X-NUCLEO-CCA02M2:
    - In the pin 5 (SB7) there is the clock for the Microphones
    - In the pin 6 (SB15) there is the clock x2 for the Microphones
    - In the pin 7 (SB17) there is the connection for the microphone PDM34 (solder bridge open as default)

For this reason, the hardware features are not available for F4xx STM32 Nucleo motherboard (The related GPIO pins is not configured).

Important Hardware Additional Information

STM32 Nucleo with Expansion boards - Hardware Overview (7/9)



Modifications of the X-NUCLEO-CCA02M2 board

3. With L4 STM32 Nucleo motherboard:

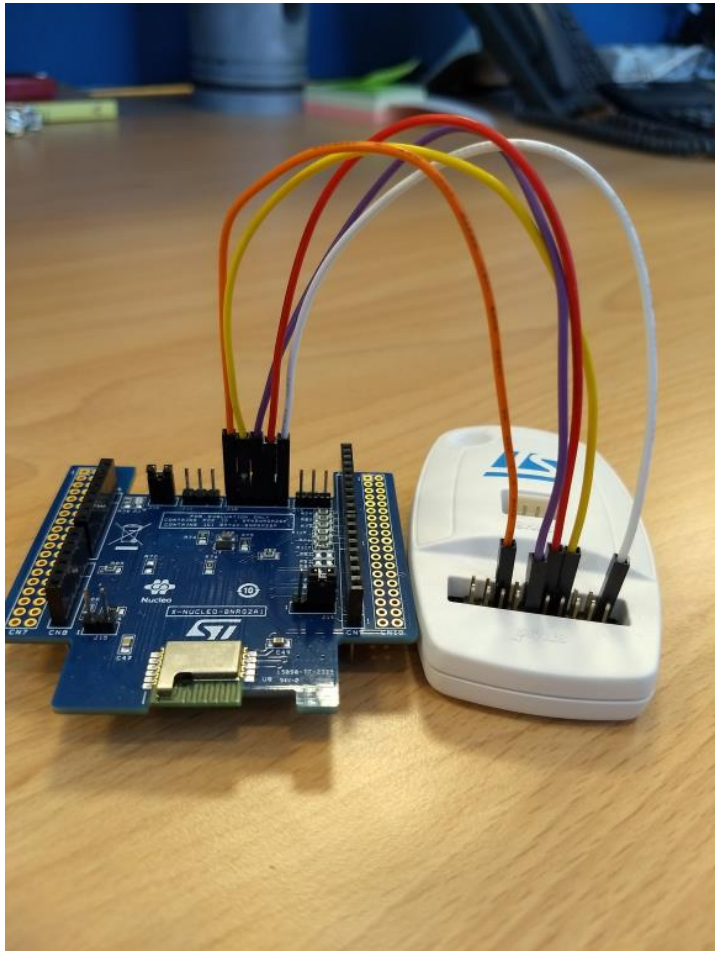
   a) before to connect the board X-NUCLEO-CCA02M2 with the STM32 L4 Nucleo motherboard through the Morpho connector layout onto X-NUCLEO-CCA02M2 board:
      - close the solder bridges SB12, SB16 (red highlight) and open the solder bridges SB7, SB15 and SB17 (green highlight - To enable the signal clock from L4 Nucleo motherboard)
      - if additional microphones are plugged in the board, close the solder bridge SB17.

   b) before to connect the X-NUCLEO-IKS4A1 expansion board with the X-NUCLEO-CCA02M2 expansion board:
      - remove the solder bridge SB47 if additional microphones are plugged onto X-NUCLEO-CCA02M2 board

   c) before to connect the X-NUCLEO-IKS01A3 expansion board with the X-NUCLEO-CCA02M2 expansion board:
      - remove the solder bridge SB47 if additional microphones are plugged onto X-NUCLEO-CCA02M2 board

Important Hardware Additional Information

STM32 Nucleo with Expansion boards - Hardware Overview (8/9)



BlueNRG-2 library does not work with the stock firmware that is loaded in the BLE module of X-NUCLEO-BNRG2A1 expansion board.

For this reason:

- first of all, it is needed to solder on X-NUCLEO-BNRG2A1, if it is not soldered, a 0 Ohm resistor at R117.
- Then you can use a standard ST-Link V2-1 with 5 jumper wires female-female together with STSW-BNRGFLASHER software tool (currently available only for Windows PC) in order to update the firmware of the BLE module of X-NUCLEO-BNRG2A1.

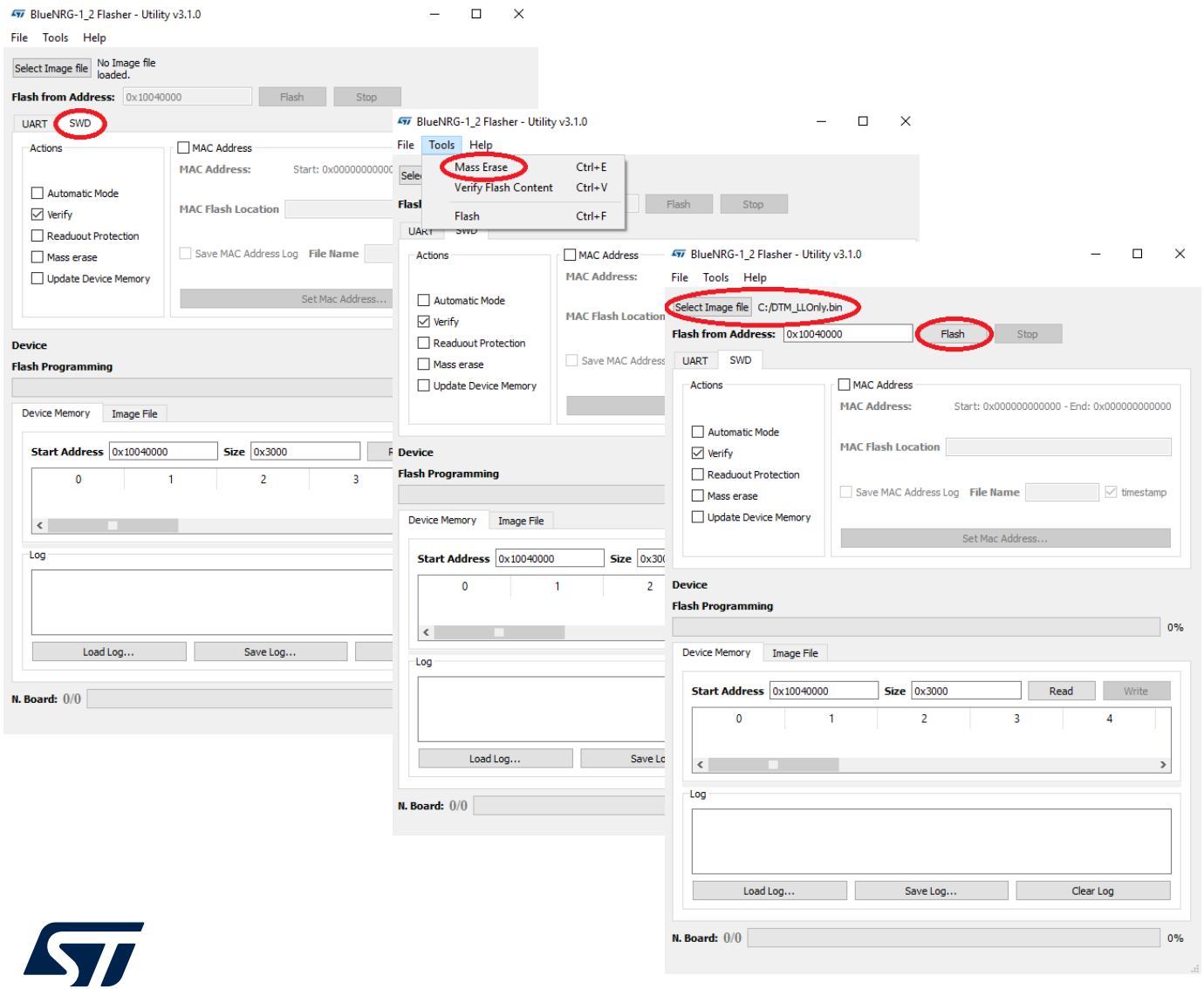
You need to connect the J12 pins of the X-NUCLEO-BNRG2A1 to the pins of the ST-Link V2-1 as shown in the picture and follow the steps show in the next slide.

In particular we have the following connections:

	J12	ST-Link V2-1
Pin	1	1
Pin	2	9
Pin	3	12
Pin	4	7
Pin	5	15

Important Hardware Additional Information

STM32 Nucleo with Expansion boards - Hardware Overview (9/9)



1. install the ST BlueNRG-1_2 Flasher Utility and open it, then select the SWD tab
2. Erase the flash memory of the BlueNRG-2 chip
3. Download the Link Layer Only firmware for the BLE module from the following link DTM_LLOnly.bin
4. Load the Link Layer Only firmware in the ST BlueNRG-1_2 Flasher Utility and then press the "Flash" button
5. If you need to restore the stock firmware of the BLE module of X-NUCLEO-BNRG2A1, you can repeat the procedure using this firmware image DTM_Full.bin
6. If you should find some issues during the update process, you can try to repeat the procedure closing the J15 jumper on the X-NUCLEO-BNRG2A1 expansion board.

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BlueCoin Starter kit (STEVAL-BCNKT01V1)
Hardware Overview

BlueCoin Starter kit Hardware Description

- STEVAL-BCNKT01V1 is the starter kit for the BlueCoin board (STEVAL-BCNCS01V1), a highly integrated development and prototyping platform for augmented acoustic and motion sensing, aiming to improve system design cycle and accelerate delivery of results

- Two host boards are also provided as part of the kit:
  - The CoinStation provides audio output, battery management and two Time-of-flight ranging sensors.
  - The Cradle is a small host board featuring USB and SD card interfaces, it is useful for on-the-field testing and data acquisition campaigns.

Key Product on board

- BlueCoin module (STEVAL-BCNCS01V1) with STM32F446, LSM6DSM, LSM303AGR, LPS22HB, 4x MP34DT06J, BlueNRG-MS, BALF-NRG-01D3, STBC03JR
- CoinStation (STEVAL-BCNST01V1) board
- BlueCoin Cradle (STEVAL-BCNCR01V1)
- 130 mAh Li-Po battery
- Plastic box for housing the BlueCoin cradle and the battery
- SWD programming cable

Latest info available at www.st.com
STEVAL-BCNKT01V1

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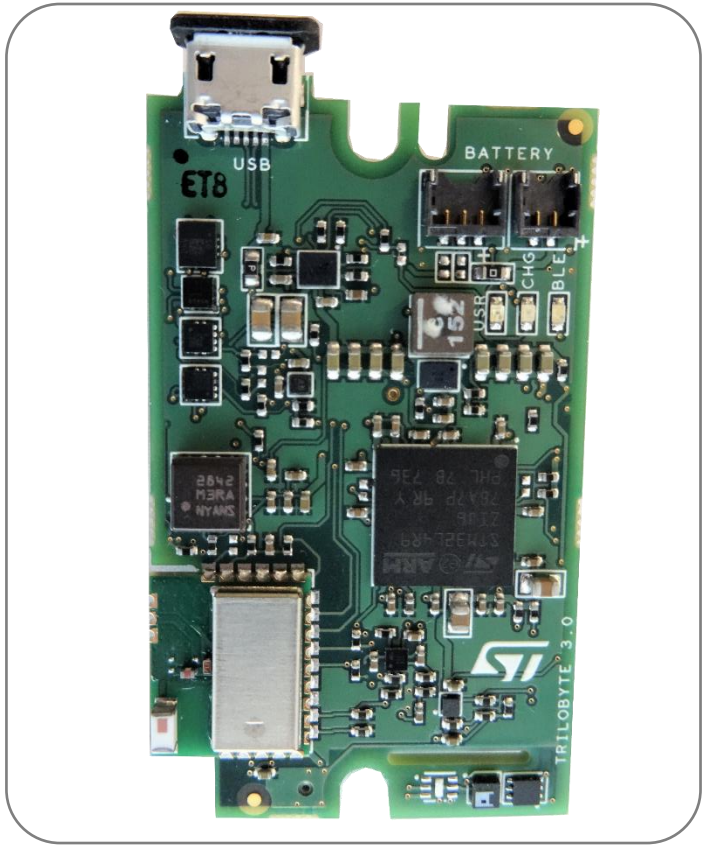
SensorTile.box wireless multi sensor development kit (STEVAL-MKSBOX1V1)
Hardware Overview

SensorTile.box wireless multi sensor development kit Hardware Description

- The STEVAL-MKSBOX1V1 (SensorTile.box) is a ready-to-use box kit with wireless IoT and wearable sensor platform to help you use and develop apps based on remote motion and environmental sensor data, regardless of your level of expertise.
- The SensorTile.box board fits into a small plastic shroud with a long-life rechargeable battery, and the ST BLE Sensor app on your smartphone connects via Bluetooth to the board and allows you to immediately begin using the wide range of default IoT and wearable sensor applications.
- SensorTile.box includes a firmware programming and debugging interface that allows professional developers to engage in more complex firmware code development using the STM32 Open Development Environment (STM32 ODE), which includes a sensing AI function pack with neural network libraries



Key Product on board

- Ultra-low-power STM32L4 Series MCUs based on ARM® Cortex® -M4 MCU 120 MHz with 2048 kbytes Flash (STM32L4R9ZI)
- Accurate temperature : STTS22H
- Low power precise 6x IMU: LSM6DSOX
- Stand-alone XLs: LIS3DHH, LIS2DW12
- Magnetometer: LIS2MDL
- Altimeter / pressure sensor : LPS22HH
- Wide-band microphone: MP23ABS1
- Humidity sensor: HTS221

Latest info available at www.st.com
STEVAL-MKSBOX1V1

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FP-SNS-ALLMEMS1
Software Overview

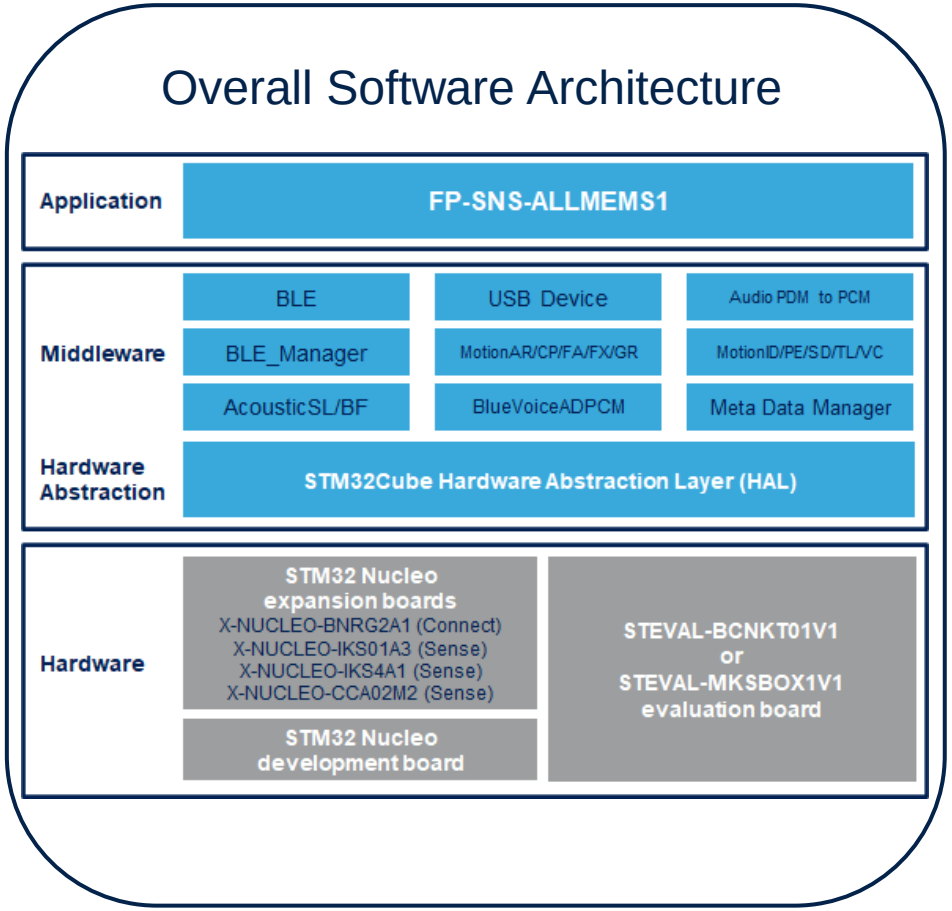
Software Description

- FP-SNS-ALLMEMS1 is an STM32Cube function pack which lets you connect your IoT node to a smartphone via BLE and use a suitable Android™ or iOS™ like the ST BLE Sensor app to view real-time environmental sensor data, motion sensor data, digital microphone levels and battery level.
- The package also enables advanced functionality such as voice communication over BLE, sound source localization and acoustic beam forming using inputs from multiple microphones, as well as sensor data fusion and accelerometer-based real-time activity recognition, gesture recognition, motion intensity recognition. Moreover, provides real-time information about the user current pose based on data from a device, working mode (sitting/standing desk position), tilt angles of the device, the repetition quantity of various fitness activities performed and the vertical movement.
- This package, together with the suggested combination of STM32 and ST devices can be used to develop specific wearable applications, or smart things applications in general.

Key features

- Complete firmware to develop an IoT node with BLE connectivity, digital microphone, environmental and motion sensors.
- Middlewares libraries for sensor data fusion, accelerometer-based real-time activity recognition, gesture recognition, motion Intensity recognition, user current pose recognition, working mode recognition, tilt angles evaluation, fitness activities quantity repetition, acoustic source localization and beam forming, audio processing and streaming over BLE communication profile.
- Compatible with STBLESensor application for Android/iOS, to perform sensors data reading, audio and motion algorithms features demo, and firmware update (FOTA).
- Easy portability across different MCU families, thanks to STM32Cube.
- Free, user-friendly license terms.

Overall Software Architecture



Latest info available at www.st.com
FP-SNS-ALLMEMS1

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2- Setup & Demo Examples

Setup & Demo Examples

Software and Other prerequisites

- **STSW-LINK004**
  - STM32 ST-LINK Utility (STSW-LINK004) is a full-featured software interface for programming STM32 microcontrollers
- **FP-SNS-ALLMEMS1**
  - Copy the .zip file content into a folder on your PC. The package will contain source code example (Keil, IAR, STM32CubeIDE) based only on **NUCLEO-F446RE** or **NUCLEO-L476RG** or **STEVAL-BCNKT01V1** or **STEVAL-MKSBOX1V1**
- **ST BLE Sensor** Application for Android/iOS to download from Google Store / iTunes

2.1- Setup Overview: STM32 Nucleo with Expansion boards

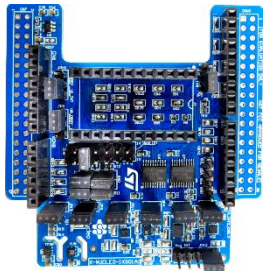
Setup Overview

HW prerequisites with STM32 Nucleo Expansion boards

- 1x Bluetooth Low Energy Expansion Board (**X-NUCLEO-BNRG2A1**)
- 1x Motion MEMS and Environmental Sensor Expansion Board (**X-NUCLEO-IKS4A1** or **X-NUCLEO-IKS01A3**)
- 1x Digital MEMS Microphone Expansion Board (**X-NUCLEO-CCA02M2**)
- 1x STM32 Nucleo Development Board (**NUCLEO-F446RE** or **NUCLEO-L476RG**)
- 1x Android™ or iOS™ device
- 1x PC with Windows 7 and above
- 1x USB type A to Mini-B USB cable

NUCLEO-F446RE
NUCLEO-L476RG

X-NUCLEO-IKS4A1

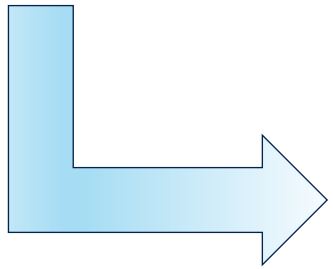


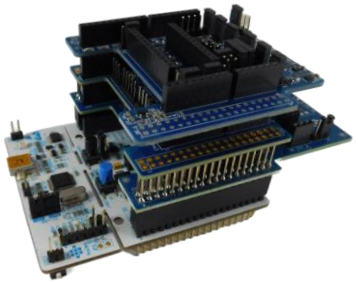
X-NUCLEO-IKS01A3

X-NUCLEO-BNRG2A1

X-NUCLEO-CCA02M2

Mini USB





It is necessary to connect the boards in the order shown in this picture

Setup Overview

HW prerequisites and setup with BlueCoin (1/2)

- 1x BlueCoin Kit (**STEVAL-BCNKT01V1**):
  - **BlueCoin Core System: BCNCS01V1**
  - **BlueCoin Coin Station: BCNST01V1**
  - **BlueCoin Cradle: BCNCR01V1**
  - **Battery**
  - **Programming cable**
- 1x Android™ or iOS™ device
- 1x PC with Windows 7 and above
- 1x STM32-Nucleo or ST-Link programmer
- 1x USB type A to Mini-B USB cable for the ST-Link
- 1x USB type A to Micro-B USB cable for BlueCoin Cradles and Coin Station

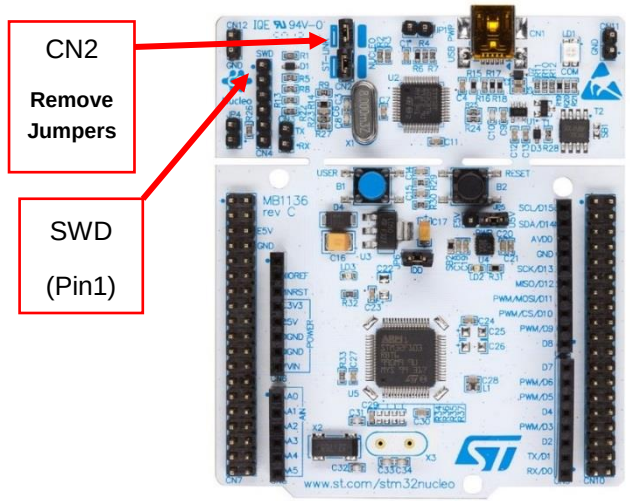
Mini USB

Micro USB

Setup Overview

HW prerequisites and setup with BlueCoin (2/2)

- In order to program the board you need to connect an external ST-Link to the SWD connector on the cradles, a 5pin flat cable is provided within the BlueCoin Kit package
- The easiest way is to get an STM32-Nucleo board which includes an ST-Link V2.1 programmer
- Be sure that CN2 Jumpers are OFF and connect your STM32 Nucleo board to the ClueCoin Coin Station through the provided cable paying attention to the polarity of the connectors. Pin 1 can be identified by a little circle on the PCB silkscreen (STM32 Nucleo board and BlueCoin Coin Station)



SWD connections with 5-pin flat cable

Setup Overview

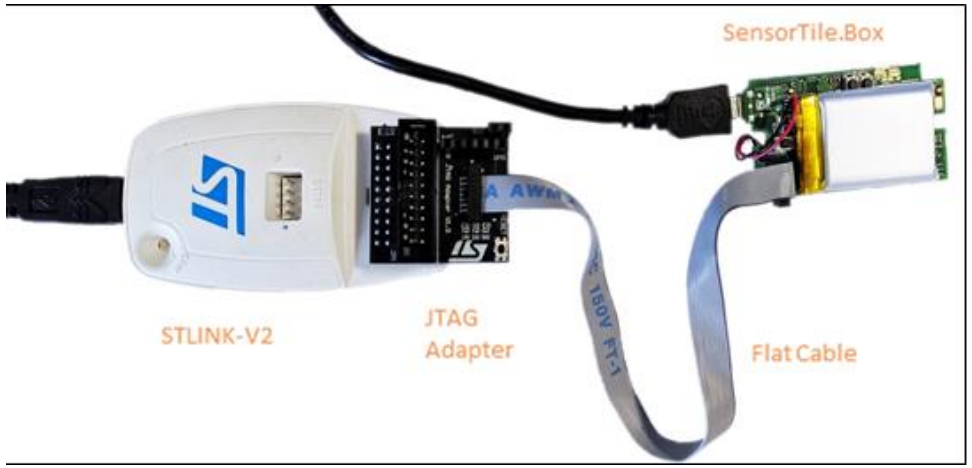
HW prerequisites and setup with SensorTile.box

- 1x STEVAL-MKSBOX1V1 evaluation board
- Laptop/PC with Windows 7, 8 or 10
- 1 x microUSB cable
- 1x USB type A to Mini-B USB cable
- ST-Link/V2 in-circuit debugger/programmer for STM8 and STM32

Micro USB

ST-Link/V2

Mini USB



STEVAL-MKSBOX1V1

Setup Overview

Start coding in just a few minutes (1/3)

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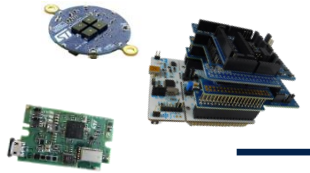
1 www.st.com/stm32ode



2 Select Function Pack: FP-SNS-ALLMEMS1

3 Download & unpack

FP-SNS-ALLMEMS1 package structure

- _htmresc
- Documentation ← Docs
- Drivers ← BSP, HAL and drivers
- Middlewares ← BlueNRG-MS, BlueNRG2, Audio, Motion, BLE_Manager
- Projects ← Application example
- Utilities ← Boot loader binary
- en.DM00251784.pdf
- Package_License.html
- Package_License.md
- Release_Notes.html

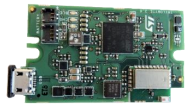
4

.\Projects\STM32F446ME-BlueCoin\Applications\ALLMEMS1
.\Projects\STM32F446RE-Nucleo\Applications\IKS01A3\ALLMEMS1
.\Projects\STM32F446RE-Nucleo\Applications\IKS4A1\ALLMEMS1
.\Projects\STM32L4R9ZI-SensorTile.box\Applications\ALLMEMS1
.\Projects\STM32L476RG-Nucleo\Applications\IKS01A3\ALLMEMS1
.\Projects\STM32L476RG-Nucleo\Applications\IKS4A1\ALLMEMS1

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

STM32 CubeIDE | KEIL Tools by ARM | IAR SYSTEMS

5



Android™/iOS™ smartphone and ST BLE Sensor application 6

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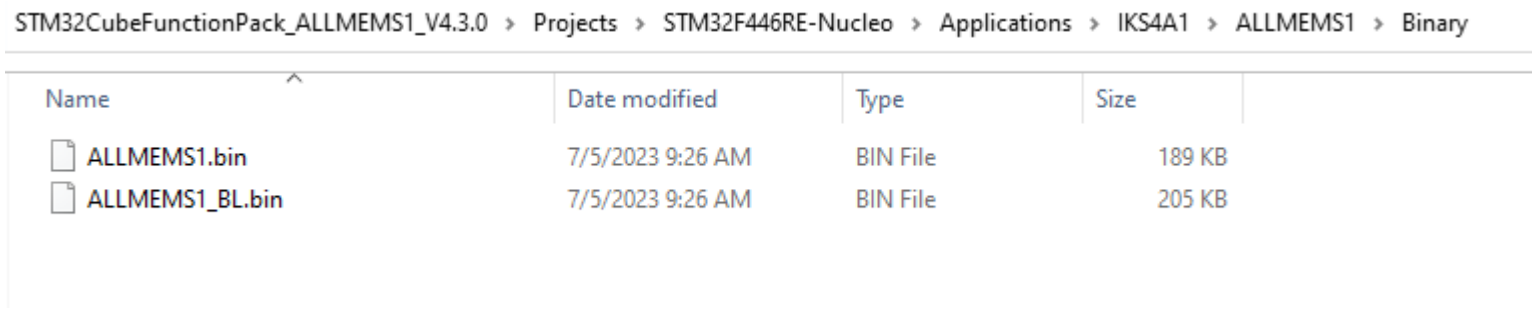
Setup Overview
Start coding in just a few minutes (2/3)

1. **How to install the pre-compiled binary:**
   - For each applications, there is inside the package one folder called “Binary”



   - It contains:
     - pre-compiled FP-SNS-ALLMEMS1 FW that could be flashed to a supported STM32 Nucleo Board using the ST-Link at the right position (0x08004000)
       - Important Note: this pre-compiled binary is compatible with the FOTA update procedure
     - pre-compiled FP-SNS-ALLMEMS1 + BootLoader FW that could be directly flashed to a supported STM32 Nucleo Board using the ST-Link or by doing “Drag & Drop” (the latter only for STM32 Nucleo boards)
       - Important Note: this pre-compiled binary is not compatible with the FOTA update procedure

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Setup Overview
Start coding in just a few minutes (3/3)

2. How Install the code after compiling the project:

- Compile the project with your preferred IDE

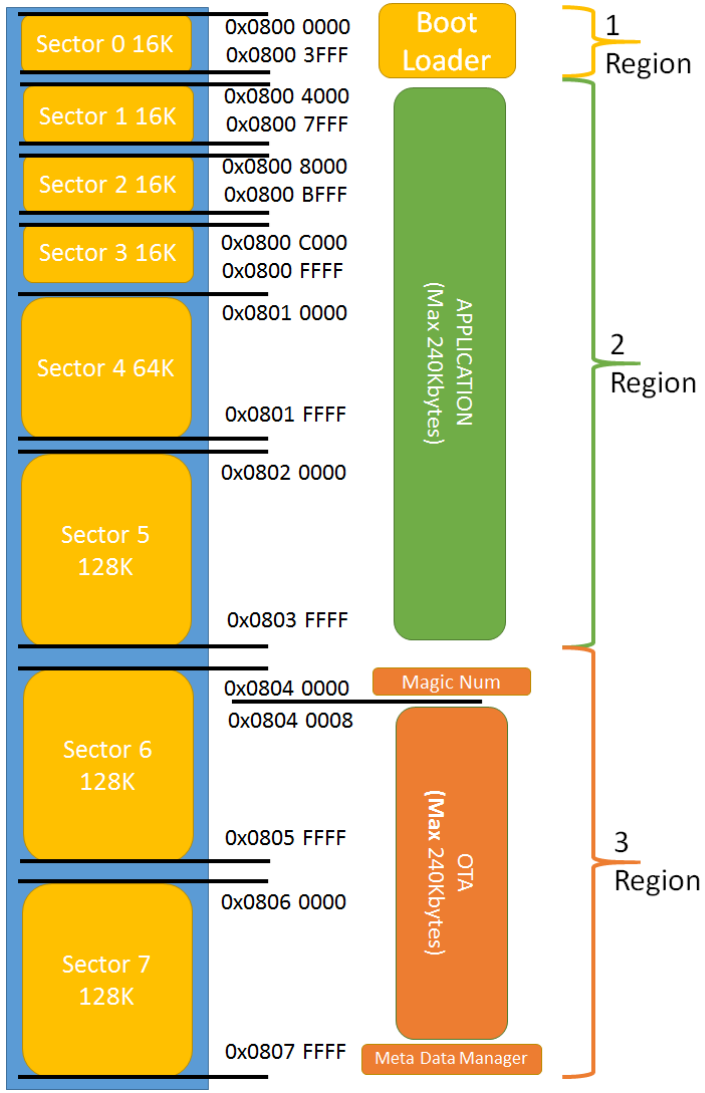
- In the folder Utilities there is a scripts *.sh that makes the following operations:
  - Full Flash Erase
  - Flash the right BootLoader at the right position (0x08000000)
  - Flash the ALLMEMS1 firmware at the right position (0x08004000)
    - This is the firmware that was compiled with the IDE
    - This firmware is compatible with the FOTA update procedure
  - Save a complete Binary FW that includes both ALLMEMS1 and the BootLoader
    - This binary can be directly flashed to a supported STM32 board using the ST-Link or by doing “Drag & Drop”
    - Important Note: this additional pre-compiled binary is not compatible with the FOTA update procedure

Before to execute the *.sh script, it is necessary to edit it to set the installation path for STM32CubeProgrammer.

BootLoaderPath/<BootLoader file name> and BinaryPath as input are required when execute *.sh script

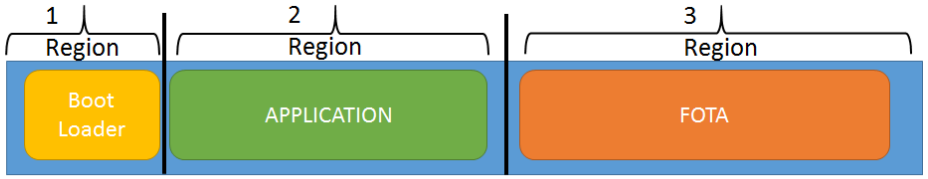
Setup Overview

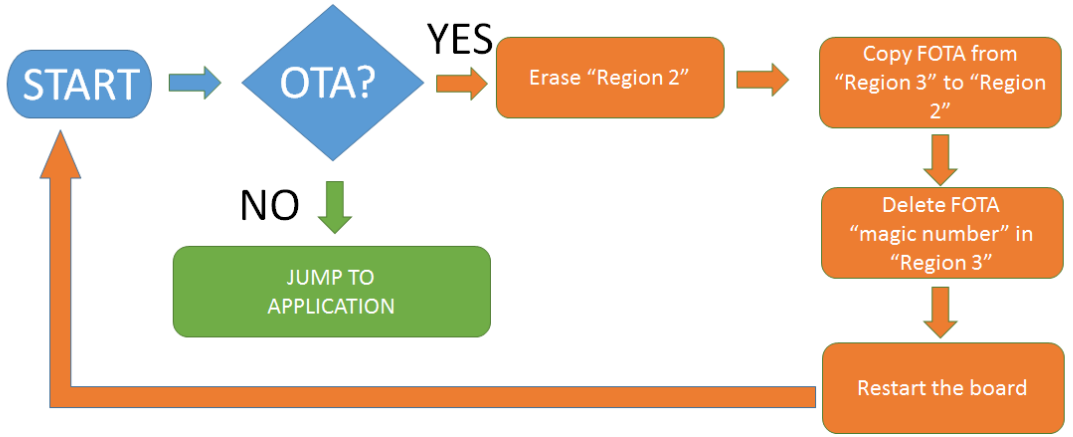
Flash Management and Boot Process



Flash Structure for STM32F446RE

FLASH Organization





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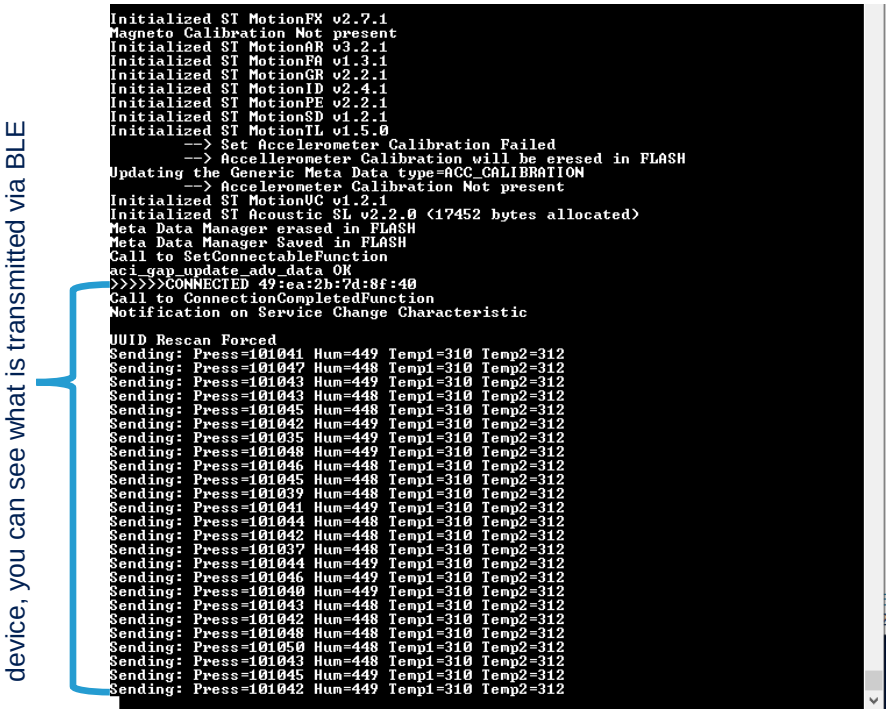
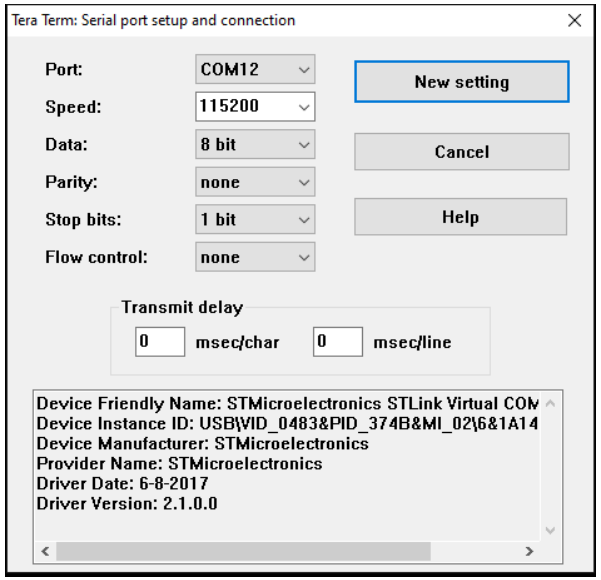
Setup Overview

Bluetooth low energy and sensors software

Pressing the **RESET** User button on STM32 Nucleo board. You could see the initialization phase

When the boards are connected to an Android or iOS device, you can see what is transmitted via BLE





Configure the serial line monitor (speed, LF)

NOTE

- Available for STM32F446RE-Nucleo and STM32L476RG-Nucleo
- Available for STEVAL-MKSBOX1V1 if ALLMEMS1_ENABLE_PRINTF is enabled
- Not available for STEVAL-BCNKT01V1

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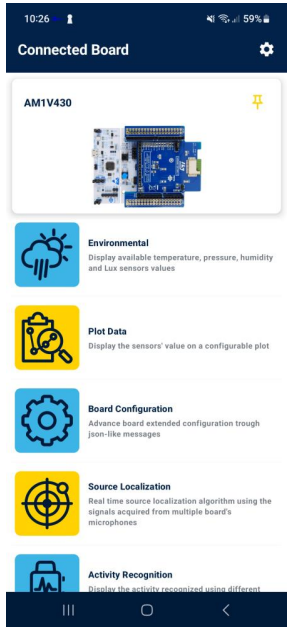
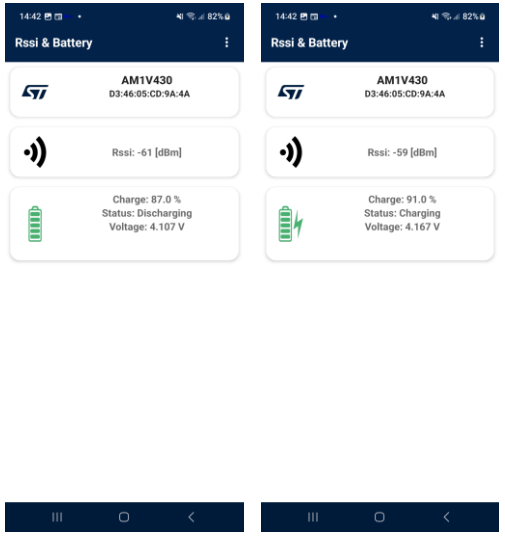
2.4- Demo Examples
ST BLE Sensor Application Overview

Demo Examples

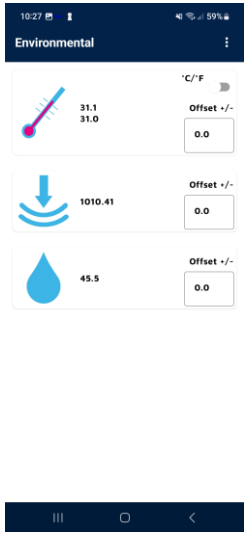
ST BLE Sensor Application for Android/iOS (1/7)

Hardware Features – Android Version

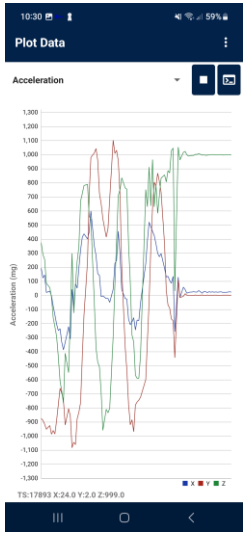




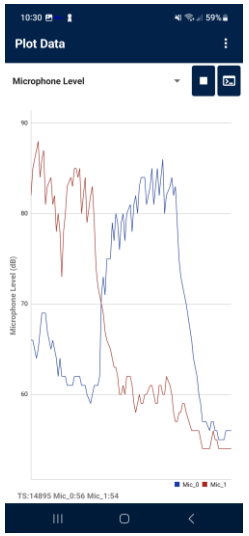
RSS & Battery Page



Environmental page

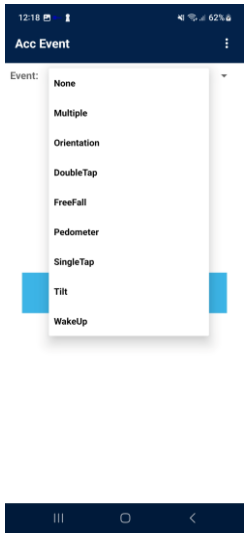


Accelerometer plot

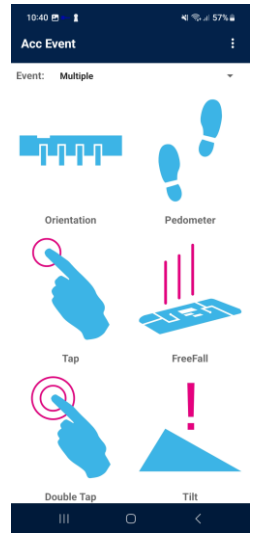


Microphones level plot

Acc Event

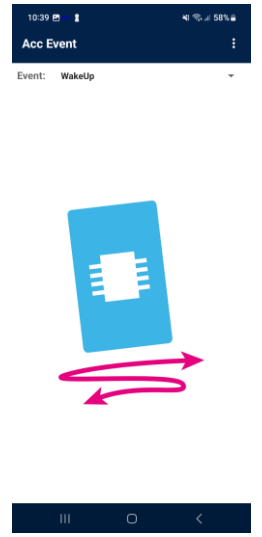


Menu Events

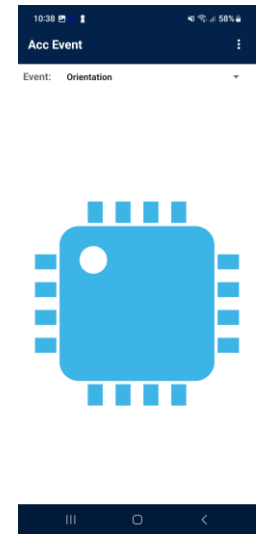


Multiple events page

Pedometer



Wake Up



Orientation

KNOWN LIMITATION

For NUCLEO-F446RE boards, there is a hardware conflict between the boards:

- X-NUCLEO-IKS4A1 and the X-NUCLEO-CCA02M2.
- X-NUCLEO-IKS01A3 and the X-NUCLEO-CCA02M2.

The hardware features of the LSM6DSV16X / LSM6DSO are disabled.

NOTE

For the STEVAL-MKSBOX1V1, when the Android/iOS device is not connected for more than fixed range time, the board go on shutdown mode. The accelerometer event can be used to wake-up the.

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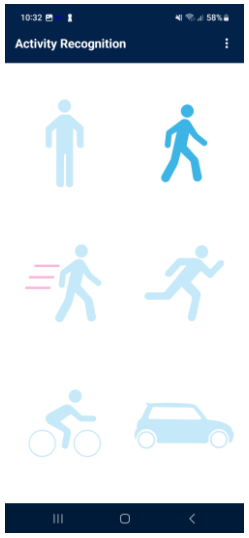
Demo Examples

ST BLE Sensor Application for Android/iOS (2/7)

Middlewares – Android Version

MotionFX sensor fusion page

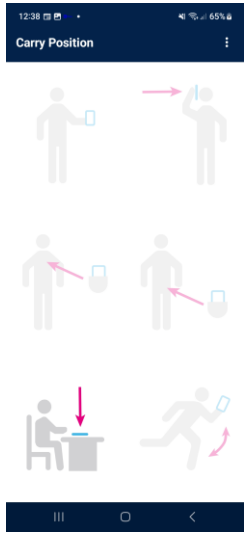
MotionAR activity recognition page



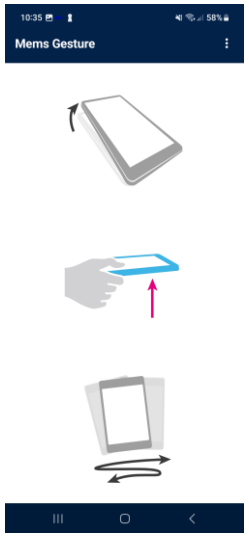
MotionFA (1) fitness activity page

(1) Feature not available on NUCLEO-F446RE and STEVAL-BCNKT01V1
(2) Feature not available on STEVAL-MKSBOX1V1
(3) Feature available on STEVAL-BCNKT01V1

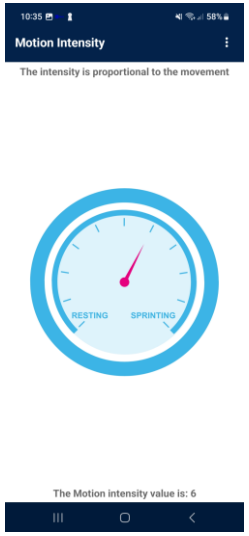
MotionCP (1) carry position recognition page



MotionGR (1) gesture recognition page

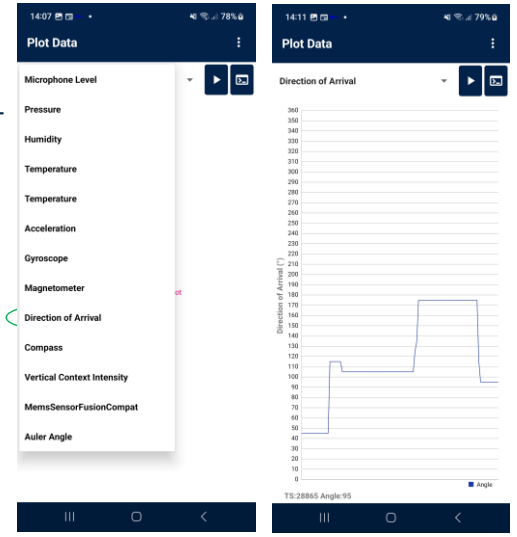


MotionID (1) intensity detection page

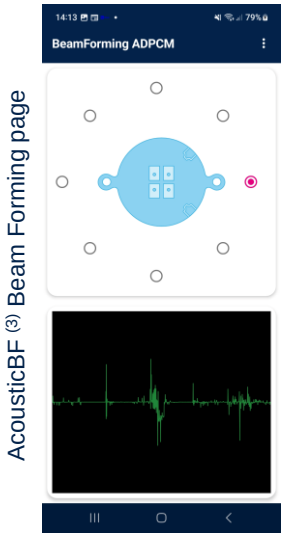


AcousticSL (2) audio source localization page

AcousticSL (2) audio source localization plot value



AcousticBF (3) Beam Forming page



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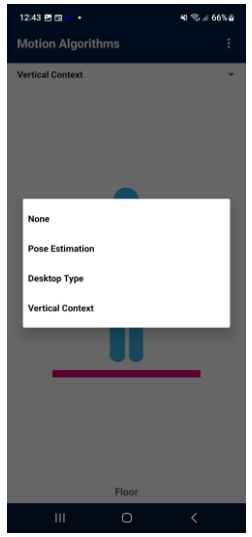
Demo Examples

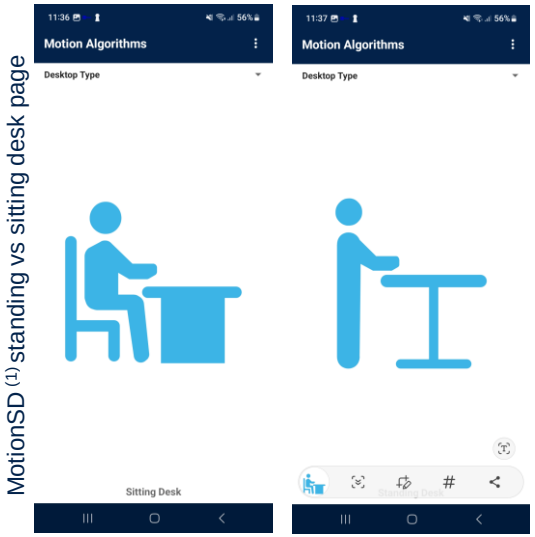
ST BLE Sensor Application for Android/iOS (3/7)

Middlewares – Android Version



Motion algorithm menu (1)

MotionSD (1) standing vs sitting desk page



MotionPE (1) pose estimation page

MotionVC (1) vertical context page

(1) Feature not available on NUCLEO-F446RE and STEVAL-BCNKT01V1

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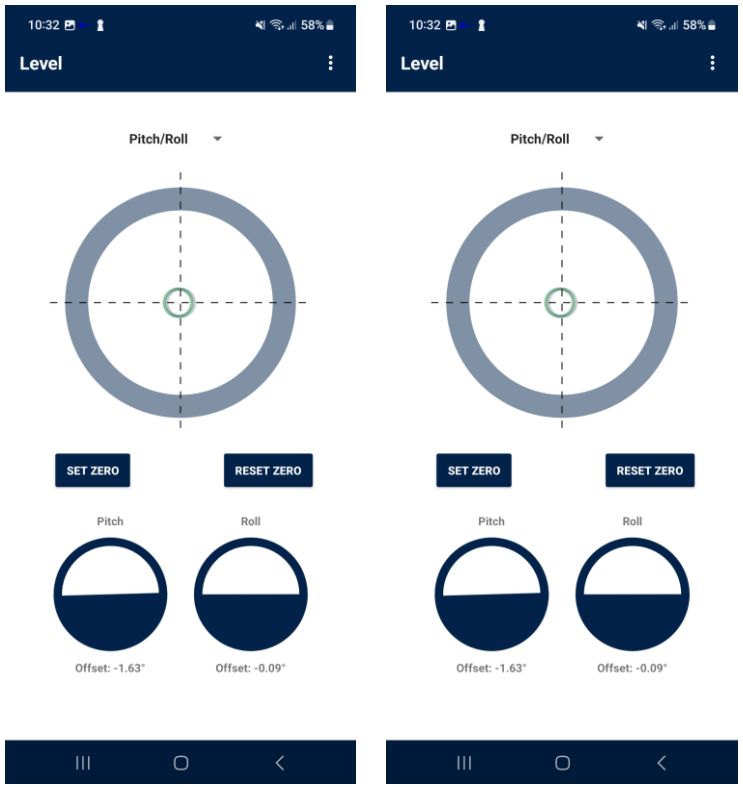
Demo Examples

ST BLE Sensor Application for Android/iOS (4/7)

Middlewares – Android Version

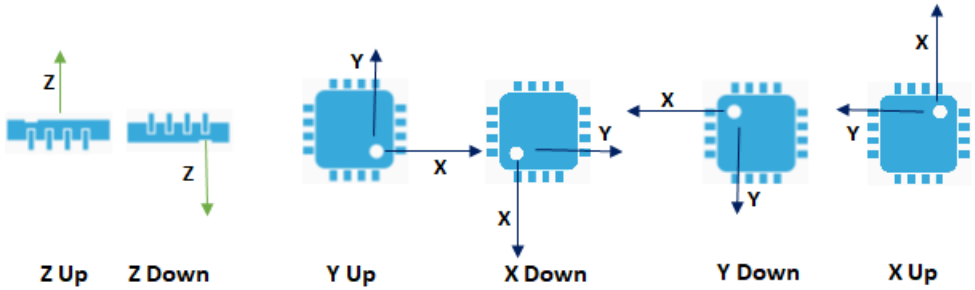
MotionTL (1) tilt measurement page



To perform accelerometer 6-position calibration the debug console must be used and send these commands:

- TLcalibstart: to start the accelerometer
- TLcalibstop: to stop the calibration (the process fails)

When the calibration starts, place the board at the position 1 and sending the command "next" and so for all 6 position calibration.
At last, when the calibration of the position 6 is executed, the FW replies if the calibration is being done or it is being failed.
For the accelerometer calibration is need to place the board in the correct place sequence as the figure shows below:

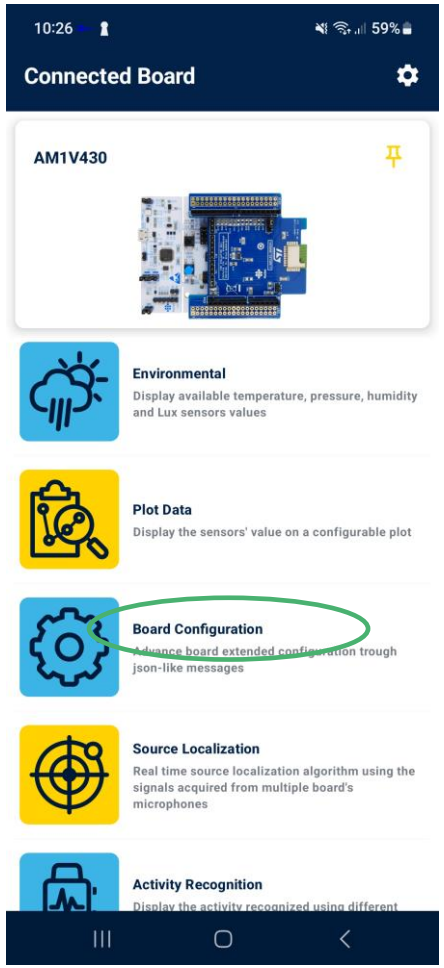


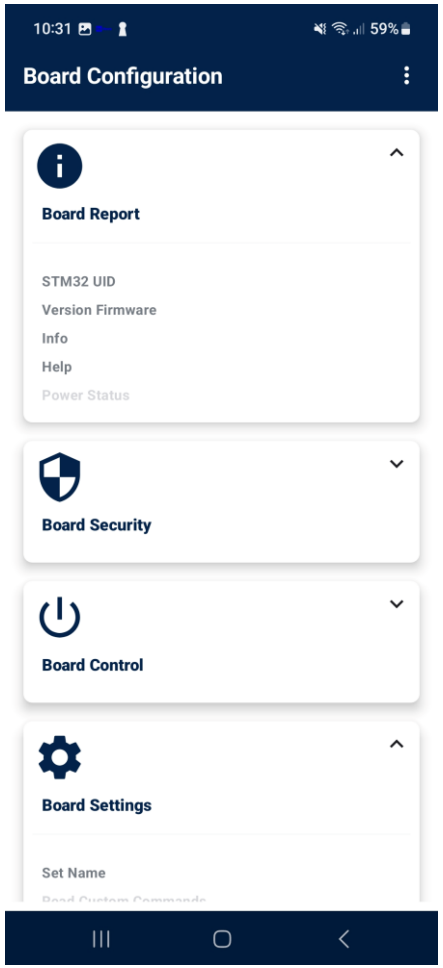
(1) Feature not available on NUCLEO-F446RE and STEVAL-BCNKT01V1

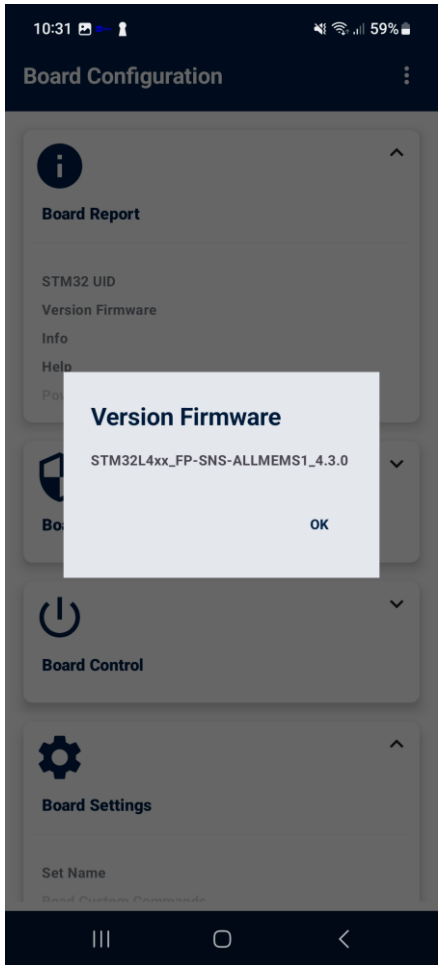
Demo Examples

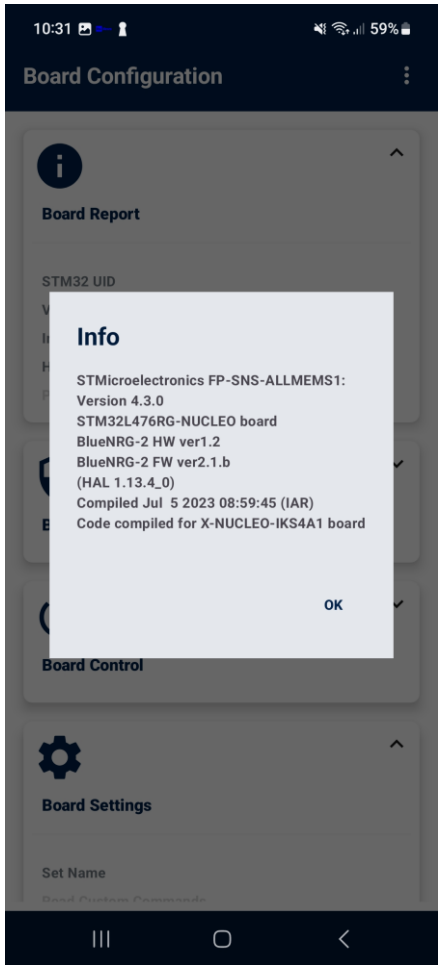
ST BLE Sensor Application for Android/iOS (5/7)

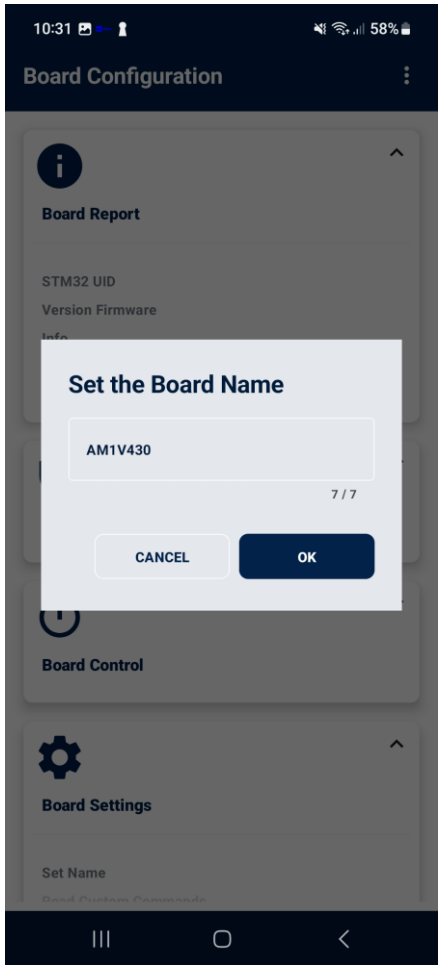
Board Configuration – Android version









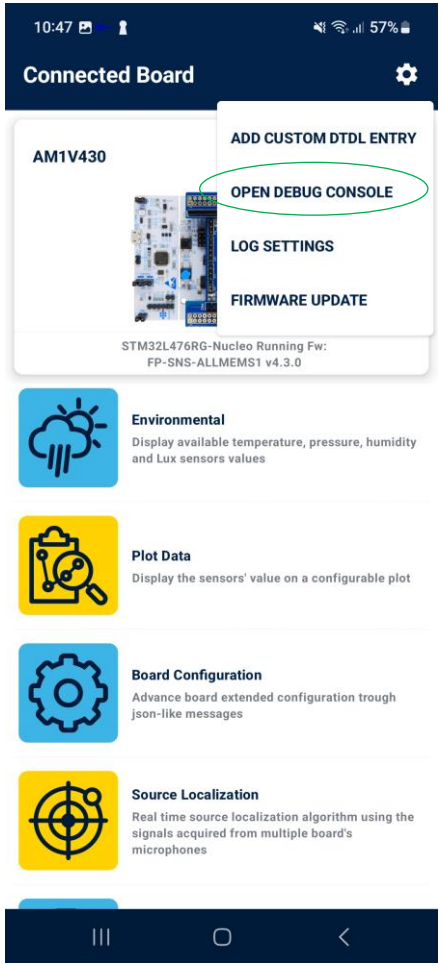


Feature not available on STEVAL-BCNKT01V1

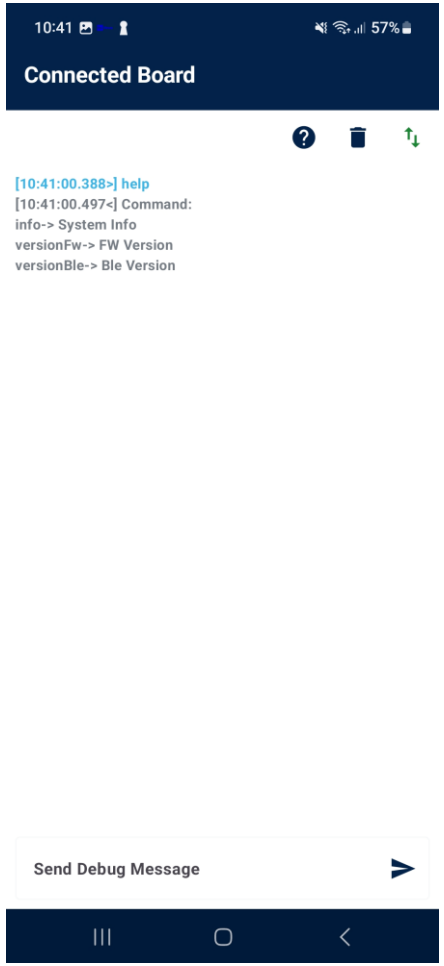
Demo Examples

ST BLE Sensor Application for Android/iOS (6/7)

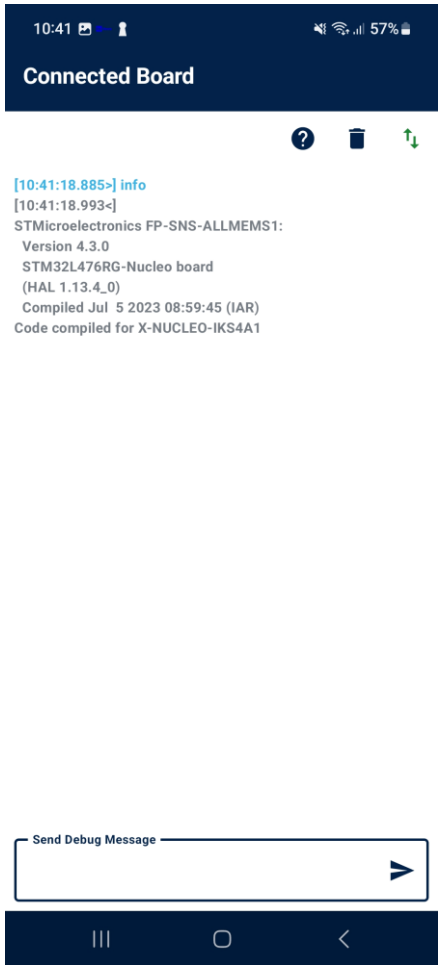
Debug Console – Android version



Menu option



Command Help



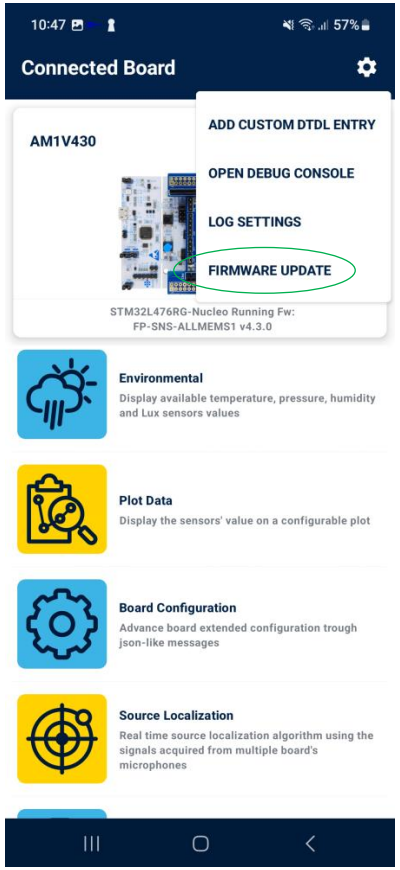
Command Info

Not Recognized Command

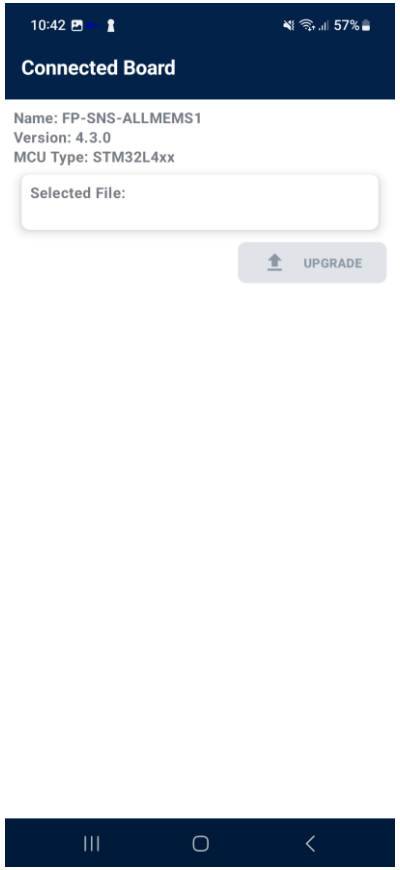
Demo Examples

ST BLE Sensor Application for Android/iOS (7/7)

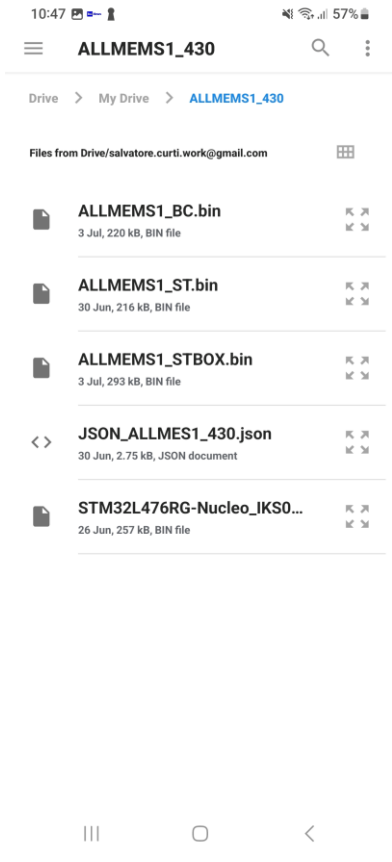
Firmware Upgrade – Android version



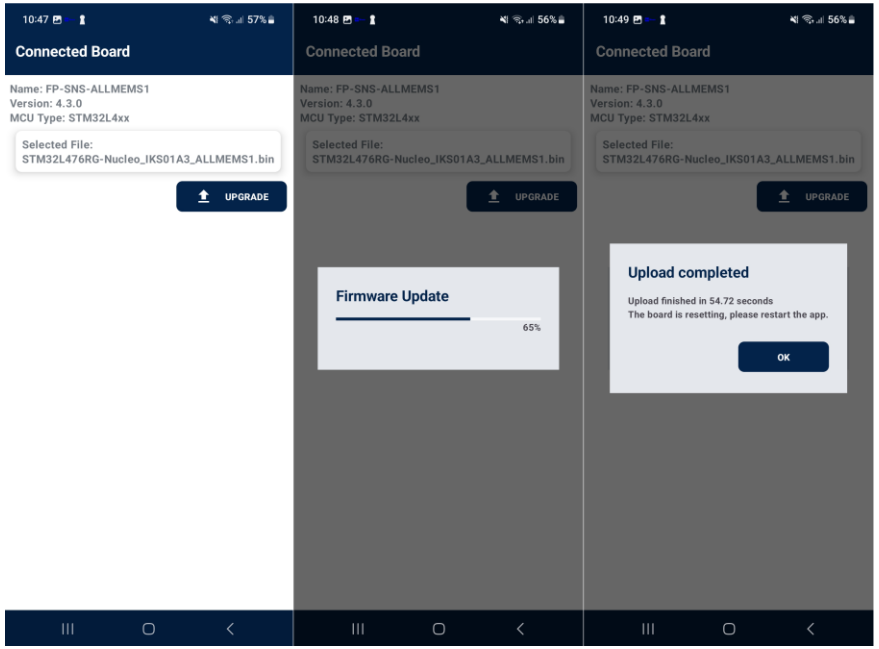
Menu option



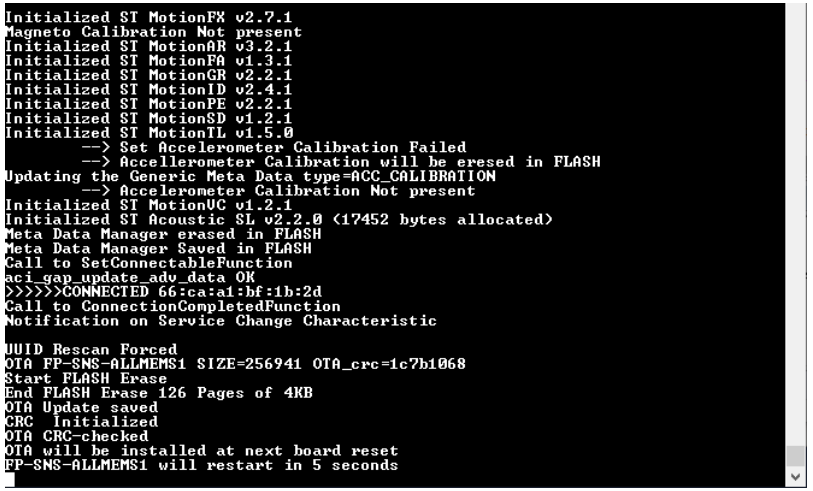
Firmware upgrade page



Firmware update file selection



Application page during FOTA and on completion



Terminal window information during FOTA

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3- Documents & Related Resources

Documents & Related Resources (1/2)

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

FP-SNS-ALLMEMS1

- **DB2915:** STM32Cube function pack for IoT node with BLE connectivity, digital microphone, environmental and motion sensors – **data brief**
- **UM2059:** Getting started with the STM32Cube function pack for IoT node with BLE connectivity, digital microphone, environmental and motion sensors – **user manual**
- **Software setup file**

X-NUCLEO-CCA02M2

- **Gerber files, BOM, Schematics**
- **DB4016:** Digital MEMS microphone expansion board based on MP34DT06J for STM32 Nucleo – **data brief**
- **UM2631:** Getting started with the digital MEMS microphone expansion board based on MP34DT06J for STM32 Nucleo – **user manual**

X-NUCLEO-BNRG2A1

- **Gerber files, BOM, Schematic**
- **DB4086:** Bluetooth Low Energy expansion board based on the BLUENRG-M2SP module for STM32 Nucleo – **data brief**
- **UM2667:** Getting started with the X-NUCLEO-BNRG2A1 BLE expansion board based on BLUENRG-M2SP module for STM32 Nucleo – **user manual**

X-NUCLEO-IKS4A1

- **Gerber files, BOM, Schematic**
- **DB5091:** Motion MEMS and environmental sensor expansion board for STM32 Nucleo – **data brief**
- **UM3250:** Getting started with motion MEMS and environmental sensor expansion board for STM32 Nucleo – **user manual**

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Consult www.st.com for the complete list

Documents & Related Resources (2/2)

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

X-NUCLEO-IKS01A3

- **Gerber files, BOM, Schematic**
- **DS3851**: Motion MEMS and environmental sensor expansion board for STM32 Nucleo – **data brief**
- **UM2559**: Getting started with motion MEMS and environmental sensor expansion board for STM32 Nucleo – **user manual**

STEVAL-BCNKT01V1

- **Gerber files, BOM, Schematic**
- **DB3258**: BlueCoin Starter kit – **data brief**
- **UM2240**: Getting started with the STEVAL-BCNKT01V1 BlueCoin starter kit: augmented acoustics, motion sensing development and prototyping platform – **user manual**

STEVAL-MKSBOX1V1

- **Gerber files, BOM, Schematic**
- **DB3903**: SensorTile.box wireless multi sensor development kit with user friendly app for IoT and wearable sensor applications – **data brief**
- **UM2580**: How to use the wireless multi sensor development kit with customizable app for IoT and wearable sensor applications – **user manual**

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Consult www.st.com for the complete list

4- STM32 Open Development Environment: Overview

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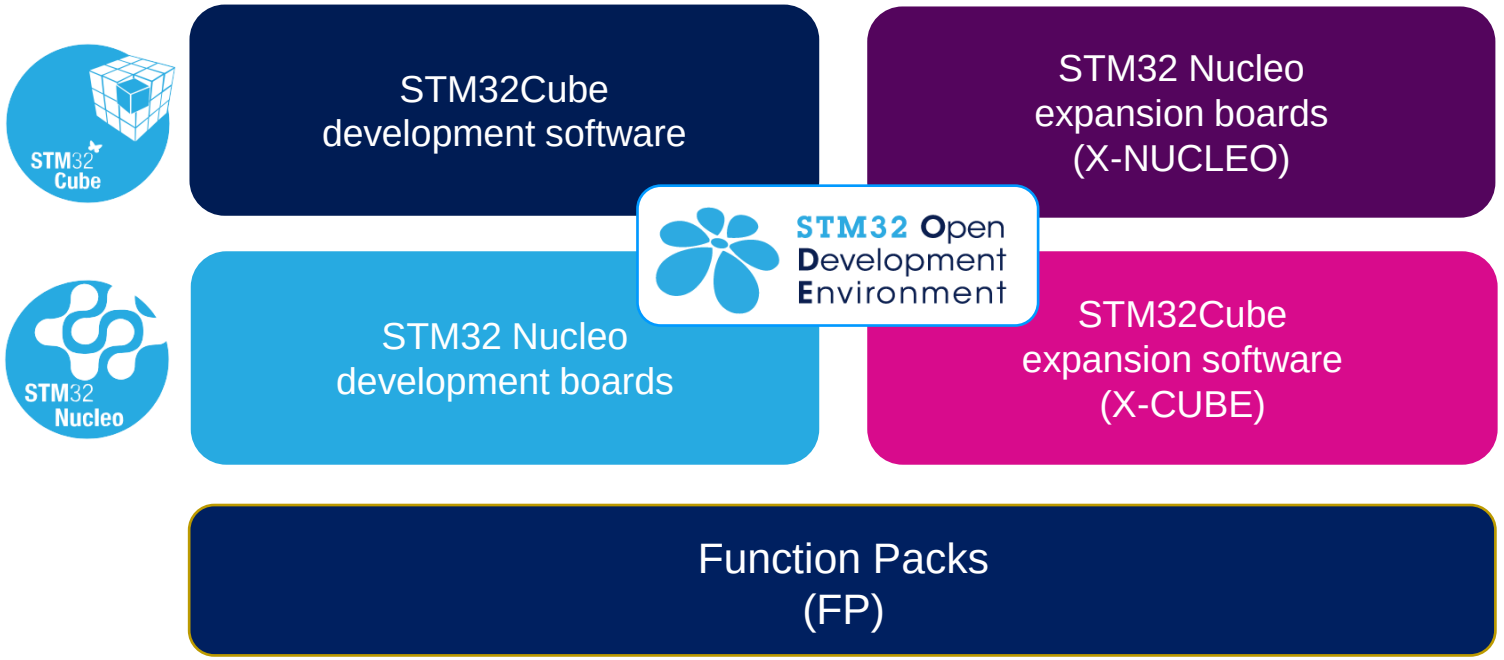
STM32 Open Development Environment
Fast, affordable Prototyping and Development

- 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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