

STM32Cube function pack for ultra-low power IoT node with BLE connectivity, digital microphone, environmental and motion sensors

Application	FP-SNS-ALLMEMS2		
Middleware	BLE	USB Device	Audio PDM to PCM
	FatFs	MotionFX/AR/CP/GR	AcousticSLBF
Hardware Abstraction	BlueVoiceADPCM	Meta Data Manager	FreeRTOS
	STM32Cube Hardware Abstraction Layer (HAL)		
Hardware	STM32 Nucleo expansion boards X-NUCLEO-IDB05A1 (Connect) X-NUCLEO-IKS01A2 (Sense) X-NUCLEO-CCA02M1 (Sense)		STEVAL-BCNKT01V1 or STEVAL-STLKT01V1 evaluation board
	STM32 Nucleo development board		

Features

- Complete firmware to develop an IoT node with BLE connectivity, digital microphone, environmental and motion sensors
- Middleware libraries for sensor data fusion and accelerometer-based real-time activity recognition, acoustic source localization and beam forming, audio processing and streaming over BLE communication profile, and SD card data logging
- Compatible with BlueMS application for Android/iOS, to perform sensor data reading, audio and motion algorithm feature demo, and firmware update over the air (FOTA)
- Implementation based on the use of an RTOS, targeting ultra-low power consumption use cases with battery operated devices
- Sample implementation available for [STEVAL-BCNKT01V1](#) and [STEVAL-STLKT01V1](#) evaluation boards and for [X-NUCLEO-CCA02M1](#), [X-NUCLEO-IKS01A2](#) and [X-NUCLEO-IDB05A1](#) connected to a [NUCLEO-F446RE](#) or [NUCLEO-L476RG](#) board
- Easy portability across different MCU families, thanks to [STM32Cube](#)
- Free, user-friendly license terms



Description

[FP-SNS-ALLMEMS2](#) is an [STM32Cube](#) function pack which lets you connect your IoT node to a smartphone via BLE and use a suitable Android™ or iOS™ application, like the [BlueMS](#) app, to view real-time environmental and motion sensor data, digital microphone and battery levels.

It provides features similar to the [FP-SNS-ALLMEMS1](#) function pack, but with a different implementation for ultra-low power consumption.

The package also enables advanced functions 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, audio data logging and MEMS sensor data logging on SD card.

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, where ultra-low power consumption is a key requirement.

The software runs on the STM32 microcontroller and includes all the necessary drivers to recognize the devices on the [STM32 Nucleo](#) development board and expansion boards, as well as on the [STEVAL-BCNKT01V1](#) and [STEVAL-STLKT01V1](#) evaluation boards.

Product summary	
STM32Cube function pack for ultra-low power IoT node with BLE connectivity, digital microphone, environmental and motion sensors	FP-SNS-ALLMEMS2
Bluetooth low energy expansion board based on SPBTLE-RF module for STM32 Nucleo	X-NUCLEO-IDB05A1
Motion MEMS and environmental sensor expansion board	X-NUCLEO-IKS01A2
BlueCoin starter kit	STEVAL-BCNKT01V1
SensorTile development kit	STEVAL-STLKT01V1

1 Detailed description

1.1 What can you do with STM32Cube function packs?

The [STM32Cube](#) function packs leverage the modularity and interoperability of STM32 Nucleo and X-NUCLEO boards, and STM32Cube and X-CUBE software, to create function examples, embodying some of the most common use cases, for each application area.

These software function packs are designed to exploit as much as possible the underlying [STM32 ODE](#) hardware and software components to best fit the requirements of final users' applications.

Moreover, function packs may include additional libraries and frameworks which do not present the original X-CUBE packages, thus enabling new functionalities and creating a real and usable system for developers.

1.2 What is STM32Cube?

STM32Cube™ is designed by STMicroelectronics to reduce development effort, time and cost across the entire STM32 portfolio.

STM32Cube version 1.x includes:

- STM32CubeMX, a graphical software configuration tool that allows the generation of C initialization code using graphical wizards.
- A comprehensive embedded software platform specific to each series (such as the STM32CubeF4 for the STM32F4 series), which includes:
 - the STM32Cube HAL embedded abstraction-layer software, ensuring maximized portability across the STM32 portfolio
 - a consistent set of middleware components such as RTOS, USB, TCP/IP and graphics
 - all embedded software utilities with a full set of examples

1.3 How does this STM32Cube function pack complement STM32Cube?

This software is based on the STM32CubeHAL. It extends [STM32Cube](#) by providing a board support package (BSP) for the [BlueNRG-MS](#), sensor expansion board and middleware components for communication with other BLE devices, for sensor data fusion, real-time audio library, voice communication over BLE and SD card data logging.

Moreover this package contains protocols and libraries useful for sensing applications based on BLE communication: MotionFX, MotionAR, MotionCP, MotionGR, Acoustic SL, AcousticBF (for further details, refer to the related web pages on www.st.com).

Revision history

Table 1. Document revision history

Date	Version	Changes
05-Jul-2018	1	Initial release.

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