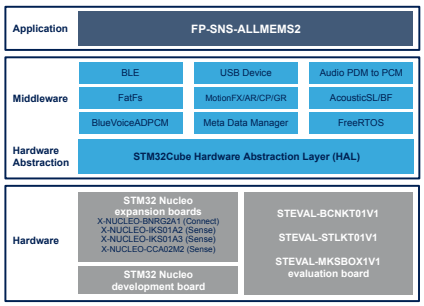
FP-SNS-ALLMEMS2

Data brief

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



STM32 Open Development Environment

STM32 Cube

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 STBLESensor 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, STEVAL-MKSBOX1V1 and STEVAL-STLKT01V1 evaluation boards and for X-NUCLEO-CCA02M2, X-NUCLEO-IKS01A2 (or X-NUCLEO-IKS01A3) and X-NUCLEO-BNRG2A1 connected to a NUCLEO-F446RE or NUCLEO-L476RG board
- Easy portability across different MCU families, thanks to STM32Cube
- Free, user-friendly license terms

Product summary	
STM32Cube function pack for ultra-low power IoT node with BLE connectivity, digital microphone, environmental and motion sensors	FP-SNS-ALLMEMS2
BLE expansion board based on the BLUENRG-M2SP module for STM32 Nucleo	X-NUCLEO-BNRG2A1
Motion MEMS and environmental sensor expansion board	X-NUCLEO-IKS01A2/X-NUCLEO-IKS01A3
Digital MEMS microphone expansion board based on MP34DT06J for STM32 Nucleo	X-NUCLEO-CCA02M2
BlueCoin starter kit	STEVAL-BCNKT01V1
Multisensor kit with portable sensor box and smart sensor app	STEVAL-MKSBOX1V1
SensorTile development kit	STEVAL-STLKT01V1

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 STBLESensor 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, STEVAL-MKSBOX1V1 and STEVAL-STLKT01V1 evaluation boards.

1 Detailed description

1.1 What can you do with STM32Cube function packs?

STM32Cube function packs leverage the modularity and interoperability of STM32 Nucleo and X-NUCLEO boards together with STM32Cube and X-CUBE software to create function examples for some of the most common use cases of different application technologies.

These software function packs are designed to exploit the underlying STM32 ODE hardware and software components as much as possible to best satisfy the requirements of final user applications.

Moreover, function packs may include additional libraries and frameworks that are not present in the original X-CUBE packages, thus enabling new functionalities allowing real and usable system for developers.

1.2 What is STM32Cube?

STM32Cube is a combination of a full set of PC software tools and embedded software blocks running on STM32 microcontrollers and microprocessors:

- STM32CubeMX configuration tool for any STM32 device; it generates initialization C code for Cortex-M cores and the Linux device tree source for Cortex-A cores
- STM32CubeIDE integrated development environment based on open-source solutions like Eclipse or the GNU C/C++ toolchain, including compilation reporting features and advanced debug features
- STM32CubeProgrammer programming tool that provides an easy-to-use and efficient environment for reading, writing and verifying devices and external memories via a wide variety of available communication media (JTAG, SWD, UART, USB DFU, I2C, SPI, CAN, etc.)
- STM32CubeMonitor family of tools (STM32CubeMonRF, STM32CubeMonUCPD, STM32CubeMonPwr) to help developers customize their applications in real-time
- STM32Cube MCU and MPU packages specific to each STM32 series with drivers (HAL, low-layer, etc.), middleware, and lots of example code used in a wide variety of real-world use cases
- STM32Cube expansion packages for application-oriented solutions

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 BLE 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.

The package contains audio libraries (AcousticBF, AcousticSL and BlueVoiceADPCM) and motion sensor libraries (MotionFX, MotionAR, MotionCP and MotionGR) useful for sensing applications based on BLE communication.

RELATED LINKS

Visit the X-CUBE-MEMS1 web page on www.st.com for further information on the motion sensor libraries

Visit the X-CUBE-MEMSMIC1 web page on www.st.com for further information on AcousticBF and AcousticSL audio libraries

Visit the FP-AUD-BVLINK1 web page on www.st.com for further information on BlueVoiceADPCM audio library

Revision history

Table 1. Document revision history

Date	Version	Changes
05-Jul-2018	1	Initial release.
19-Aug-2019	2	Added STEVAL-MKSBOX1V1 evaluation kit and X-NUCLEO-IKS01A3 expansion board compatibility information.
21-May-2020	3	Updated cover page image, product summary table, features and Section 1.3 How does this STM32Cube function pack complement STM32Cube?. Added X-NUCLEO-BNRG2A1 and X-NUCLEO-CCA02M2 expansion board compatibility information.