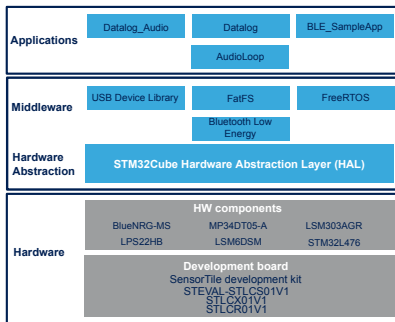# Embedded software samples for SensorTile, including sensor data streaming via USB and BLE, data logging on SD card, audio acquisition via USB and on SD card, and playback

Features

- Embedded STM32L4 series software samples for SensorTile:
  - sensor data streaming via USB and logging on SD card
  - sensor data transfer via Bluetooth Low Energy
  - audio acquisition, playback and streaming via USB and on SD card
- Based on STM32Cube, the consistent and complete embedded software for STM32 MCU that maximizes portability across the entire STM32 series and avoids dependency issues
- DataLog_Audio application which allows the user to save the audio captured by the on-board microphone on SD card as a common .wav file
- A DataLog application which allows the real-time transmission of all sensor data to a PC via serial port or to save/log sensor data to file on an SD card
- An AudioLoop application which sends audio signals acquired by the microphone to an on-board DAC via an I²S interface and to the PC via USB
- A BLE_SampleApp which provides an example of Bluetooth Low Energy configuration
- A third party FAT file system module for small embedded systems
- Source code freely available from the ST website with developer-friendly license terms
- A third party RTOS (real-time operating system) kernel for embedded devices

Description

The STSW-STLKT01 firmware package for SensorTile provides sample projects for the development of custom applications.

Built on STM32Cube software technology, it includes all the low level drivers to manage the on-board devices and system-level interfaces.

The package comes with the DataLog_Audio, DataLog, AudioLoop and BLE_SampleApp applications.

The DataLog_Audio application allows the user to save the audio captured by the on-board microphone on SD card as a common .wav file.

The DataLog application features raw sensor data streaming via USB (Virtual COM Port class) and sensor data storage on an SD card exploiting RTOS features.

The AudioLoop application sends audio signals acquired by the microphone via I²S and USB interfaces, allowing the user to play the sound on loudspeakers/headphones or record it on an host PC.

The BLE_SampleApp provides an example of Bluetooth Low Energy configuration that enables SensorTile to stream environmental sensor data; it is compatible with the STBLESensor app available for Android and iOS.

Product summary

Embedded software samples for SensorTile	STSW-STLKT01
SensorTile development kit	STEVAL-STLKT01V1
BLE network processor supporting Bluetooth 4.2 core specification	BlueNRG-MS
e-Compass with 3D digital linear acceleration sensor and 3D digital magnetic sensor	LSM303AGR
Ultra-compact piezoresistive absolute pressure sensor	LPS22HB
iNEMO 6DoF inertial measurement unit	LSM6DSM
Applications	Sensing
	Wearable
	IoT for Smart Things

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1 Detailed description

1.1 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

1.1.1 How does this software complement STM32Cube?

The proposed software is based on the STM32CubeHAL hardware abstraction layer for the STM32 microcontroller. The package extends STM32Cube by providing a board support package (BSP) for the SensorTile kit boards (STEVAL-STLKT01V1).

Interaction with all the on-board sensors is guaranteed by the abstract low-level drivers that allow developers to communicate with them in a hardware independent fashion. The package also includes a data logger application that the developer can use to start experimenting with the code. This application provides a tool for acquiring data from different kind of sensors. The varying nature of the acquired data represents an opportunity to implement a wide variety of algorithms.

The USB device audio class in the middleware provides standard multichannel USB microphone device recognition. Any freeware or commercial audio recording software may be used to record and save the audio stream.

Revision history

Table 1. Document revision history

Date	Version	Changes
07-Jun-2016	1	Initial release.
09-Jan-2017	2	Updated cover image, features and description.
01-Jun-2017	3	Updated cover image. Updated DataLog and AudioLoop descriptions.
04-Mar-2019	4	Updated all content to reflect firmware V2.0.0 release.
27-Mar-2020	5	Updated cover page image, product summary table and Section 1.1 What is STM32Cube?.

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