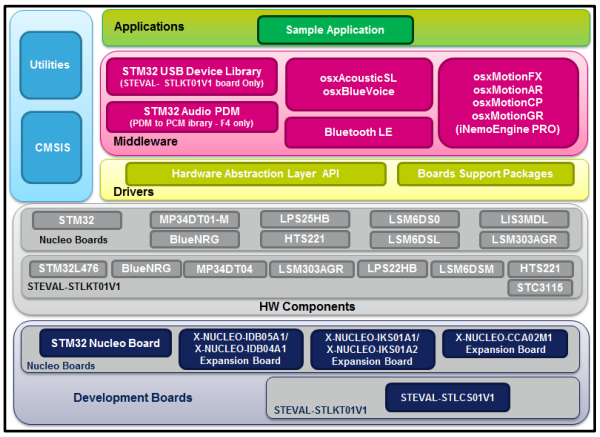
BLUEMICROSYSTEM2

IoT node with BLE connectivity, digital microphone, environmental and motion sensors, motion and audio middleware libraries

Data brief



Features

- For STM32 Nucleo expansion boards, middleware to build applications using:
  - environmental (HTS221, LPS25HB), motion (LIS3MDL, LSM6DS0, LSM6DS3 mounted on DIL24) and microphone (2 x MP34DT01-M) sensor
  - environmental (HTS221, LPS22HB), motion (LSM303AGR, LSM6DSL) and microphone (2 x MP34DT01-M) sensor.
- For STEVAL-STLKT01V1 development kit, complete middleware to build applications using pressure sensor (LPS22HB), motion sensors (LSM303AGR and LSM6DSM), microphone sensor (MP34DT04) and Gas Gauge IC level (STC3115) sensors.
- BLE for sending information to one client.
- Real-time motion sensor data fusion and real-time recognition algorithms (activity, carry-position and gesture for accelerometer-only), under the Open.MEMS license.
- Real-time sound source localization and voice communication over Bluetooth low energy, under the Open.Audio license.
- View information sent via BLE in the app BlueMS (v2.0.0 or higher).
- Over-the-air firmware update (X-NUCLEO-IDB05A1 only) and option to request and enable Open.MEMS and Open.Audio licenses through BlueMS (v 3.0.0 or higher).
- Gas Gauge on STEVAL-STLKT01V1 with BlueMS (ver. 3.2.0 or higher).
- Based on STM32Cube framework.
- Free, user-friendly license terms.
- Separate sample implementations for X-NUCLEO-CCA02M1, X-NUCLEO-IKS01A1 or X-NUCLEO-IKS01A2 and X-NUCLEO-IDB04A1 or X-NUCLEO-IDB05A1 expansion boards connected to a NUCLEO-F401RE or NUCLEO-L476RG development board, and for STEVAL-STLKT01V1 development kit.

Description

The BLUEMICROSYSTEM2 expansion software package for STM32Cube lets you read and display real-time environmental sensor data, digital microphone levels, battery level (STEVAL-STLKT01V1 only), voice communication over Bluetooth low energy and acoustic source localization information with a dedicated BlueMS App for Android/iOS.

The package implements application level functions based on the BLE protocol and enables communication with Android and iOS devices. Developers can use it to prototype applications with Android or iOS services and transmit real-time sensor data.

The software includes the drivers for the embedded STM32 Nucleo expansion board and STEVAL-STLKT01V1 development kit devices, and comes with a sample solution to kick-start development.

What is STM32Cube?

STMCube™ 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

How does this software complement STM32Cube?

This 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 BlueNRG and the sensor expansion boards and some middleware components for communication with other Bluetooth low energy devices and for sensor data fusion.

BlueNRG is a very low power Bluetooth low energy (BLE) single-mode network processor.

The osxFusionFX (iNEMOEngine PRO) filtering and predictive suite uses advanced algorithms to intelligently integrate outputs from multiple MEMS sensors, independent of environmental conditions, to achieve optimal performance. Real-time motion sensor data fusion is set to significantly improve user experience, increasing accuracy, resolution, stability and response time in advanced motion-based applications in the consumer, computer, industrial and medical fields.

The osxMotionAR (iNEMOEngine PRO) real-time software acquires data from the accelerometer to recognize user activities. The software can also be combined with other human motion recognition algorithms to significantly improve user experience in advanced motion-based applications in the consumer, computer, industrial and medical fields.

The osxMotionCP (iNEMOEngine PRO) real-time software acquires data from the accelerometer and recognizes where the board is positioned (on desk, on head, near head, shirt pocket, trouser pocket and swinging arm).

The osxMotionGR (iNEMOEngine PRO) real-time software acquires data from the accelerometer and recognizes user gestures (pick up, glance and wake up).

The osxAcousticSL real-time sound source localization software estimates the direction of arrival of audio sources using data acquired by two digital MEMS microphones.

The OSXBLUEVOICE software enables real-time voice communication over Bluetooth low energy. It includes one characteristic for audio transmission and one for synchronization and is responsible for server side audio encoding and data transmission and client side decoding of received voice data.

Activity recognition, carry position and gesture recognition are managed through special software designed for mobile and wearable applications; the respective algorithms are strictly limited to working with accelerometer data only, to facilitate low power consumption strategies commonly required in these applications, in compliance with Bluetooth

specifications core 4.0 for X-NUCLEO-IDB04A1 and 4.2 for X-NUCLEO-IDB05A1 and STEVAL-STLKT01V1.

The drivers abstract low-level hardware details, so middleware components and applications can access the sensors in a hardware-independent manner and low-power strategies reduce system power consumption to a few µA.

The package includes a sample application developed to transmit the values read from all the sensors (temperature, humidity, pressure, accelerometer, magnetometer, gyroscope, microphone levels and Gas Gauge battery Information) to an Android or iOS device that supports the Bluetooth low energy protocol. You can use the BlueMS Android/iOS application (version 3.2.0 or higher), from the respective Play™ and iTunes™ stores to view osxMotionFX, osxMotionAR, osxMotionCP, osxMotionGR, osxAcousticSL and OSXBLUEVOICE algorithm outputs and to display accelerometer, magneto, gyroscope, temperature, humidity, pressure, Gas Gauge battery information and microphone sensor data.

Revision history

Table 1: Document revision history

Date	Version	Changes
12-Apr-2016	1	Initial release.
06-May-2016	2	Minor text edits.
17-May-2016	3	Minor text edits.
02-Aug-2016	4	Text edits Updated cover image Updated STM32 Nucleo board compatibility information Added STEVAL-STLKT01V1 board compatibility information.
12-Oct-2016	5	Added reference to OSXBLUEVOICE software real-time voice communication over Bluetooth low energy Added Gas Gauge IC level information
03-Jan-2017	6	Updated cover page image, features and description. Minor text edits.

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