BLUEMICROSYSTEM1

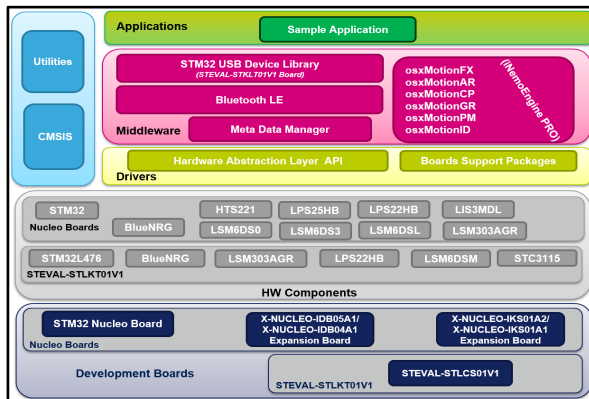## IoT node with BLE connectivity, environmental and motion sensors, and motion middleware libraries

Features

- For STM32 Nucleo expansion boards, complete middleware to build apps using:
  - temperature/humidity sensor (HTS221)
  - temperature/pressure sensors (LPS25HB/LPS22HB)
  - motion sensors (LIS3MDL/LSM303AGR and LSM6DS0/LSM6DSL)
  - compatible with the motion sensor LSM6DS3 DIL24 expansion
- For the STEVAL-STLKT01V1:
  - temperature and pressure sensor (LPS22HB)
  - motion sensors (LSM303AGR and LSM6DSM)
  - Gas Gauge (STC3115)
- Very low power BLE (BlueNRG) single-mode network processor for transmitting information to one client.
- osxMotionFX real-time motion sensor data fusion (OPEN.MEMS license) to combine the output from multiple MEMS sensors.
- Accelerometer-only real-time recognition algorithms:
  - osxMotionARactivity
  - osxMotionCP carry position
  - osxMotionGR gesture
  - osxMotionPM pedometer
  - osxMotionID motion intensity

- Free, user-friendly license terms
- BlueMS compatible application for Android/iOS (version 2.0.0 or above) for visualizing information sent via Bluetooth.
- OTA firmware update (for X-NUCLEO-IDB05A1 Bluetooth board only) using the BlueMS application (Ver. 3.0.0 or higher)
- Option to request and enable the OPEN.MEMS license using the BlueMS application (Ver. 3.0.0 and above)
- Gas Gauge STEVAL-STLKT01V1 visible using BlueMS application (Ver. 3.2.0 and above)
- Separate sample implementations for X-NUCLEO-IKS01A2 (or X-NUCLEO-IKS01A1) and X-NUCLEO-IDB05A1 (or X-NUCLEO-IDB04A1) boards on a NUCLEO-F401RE or NUCLEO-L476RG board and for a STEVAL-STLKT01V1 board

Description

The BLUEMICROSYSTEM1 expansion software package for STM32Cube lets you read and display real-time inertial and environmental sensor data through an Android™/iOS™ app.

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

The software runs on the STM32 microcontroller and includes drivers that recognize the Bluetooth low energy (BlueNRG) hardware and sensor devices. The expansion is built on the STM32Cube framework for STM32 microcontrollers and comes with a sample implementation to kick-start development.

For further information contact your local STMicroelectronics sales office

What is STM32Cube?

STMCube™ represents the STMicroelectronics initiative to make developers' lives easier by reducing development effort, time and cost. STM32Cube covers the 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 (under OPEN.MEMS license) acquires data from the accelerometer to recognize user activities.

The osxMotionID (iNEMOEngine Pro) real-time software (under OPEN.MEMS license) acquires data from the accelerometer to recognize user motion intensity. These softwares can 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 (under OPEN.MEMS license) 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 (under OPEN.MEMS license) acquires data from the accelerometer and recognizes user gestures (pick up, glance, and wake up).

The osxMotionPM (iNEMOEngine PRO) real-time software (under OPEN.MEMS license) acquires data from accelerometer and counts the number of steps and related frequency.

Activity recognition, motion intensity recognition, carry position and gesture recognition are governed by specific software for mobile and wearable applications, and the exclusive use of the accelerometer by osxMotionAR, osxMotionID, osxMotionCP, osxMotionGR and osxMotionPM facilitates the low power consumption required in this field of application, in compliance with Bluetooth specifications core 4.0.

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

Revision history

Table 1: Document revision history

Date	Rev	Changes
10-Feb-2015	1	First release.
10-Jul-2015	2	Updated features on the cover page.
25-Sep-2015	3	Updated figure and add feature on the cover page.
12-Nov-2015	4	Changed system architecture image Updated Features and Description Updated How does this software complement STM32Cube?
05-Jul-2016	5	Text edits Updated cover page image Updated cover page Features and Description
27-Sep-2016	6	Updated cover page image Updated cover page Features and Description
06-Dec-2016	7	Updated cover page image Updated cover page Features and Description Updated: How does this software complement STM32Cube?

IMPORTANT NOTICE – PLEASE READ CAREFULLY