BLUEMICROSYSTEM3

Bluetooth low energy, sensor and NFC tag software expansion for STM32Cube

Data brief
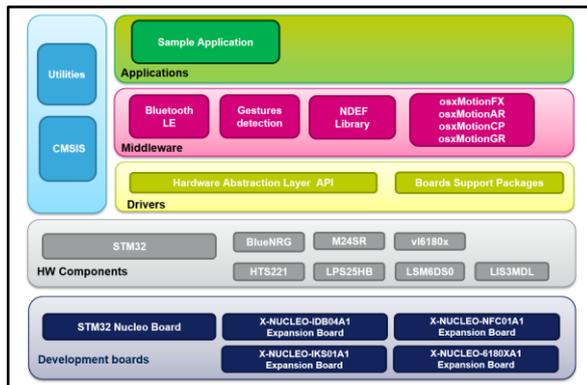
- Very low power Bluetooth low energy (BlueNRG) single-mode network processor, compliant with Bluetooth specifications core 4.1 for transmitting information to one client
- Easy portability across different MCU families, thanks to STM32Cube
- Compatible with BlueMS application for Android/iOS (Version 2.1.0 or higher) available on respective online markets (Play store/iTunes)
- Free, user-friendly license terms
- Sample implementation available on board X-NUCLEO-NFC01A1, X-NUCLEO-IKS01A1, X-NUCLEO-6180XA1 and X-NUCLEO-IDB04A1 (or X-NUCLEO-IDB05A1) when connected to NUCLEO-F401RE or NUCLEO-L476RG

Features

- osxMotionFX (iNEMOEngine PRO) real-time motion sensor data fusion (under OPEN.MEMS license) to combine the output from multiple MEMS sensors
- osxMotionAR (iNEMOEngine PRO) real-time activity-recognition algorithm (under OPEN.MEMS license) based only on accelerometer data
- osxMotionCP (iNEMOEngine PRO) carry position detection algorithm (under OPEN.MEMS license) based only on accelerometer data
- osxMotionGR (iNEMOEngine PRO) gesture recognition middleware (under OPEN.MEMS license) based on VL6180X proximity sensors
- Proximity-based hand gesture recognition middleware
- Complete middleware to build applications using temperature and humidity sensors (HTS221), pressure sensor (LPS25HB), motion sensors (LIS3MDL and LSM6DS0), VL6180X proximity and ambient light sensing module and M24SR64-Y Dynamic NFC/RFID tag (using the NDEF standard)
- The package is compatible with the motion sensor LSM6DS3 DIL24 expansion component

Description

BLUEMICROSYSTEM3 is an expansion software package for STM32Cube. The software runs on the STM32 and includes drivers that recognize the Bluetooth low energy (BlueNRG), Dynamic NFC tag, four sensor devices (HTS221, LPS25HB, LSM6DS0, LIS3MDL) and proximity and ambient light sensing module (VL6180X). It uses the NDEF standard for writing the information for simple and secure Bluetooth pairing by storing the information on the NFC tag.

The expansion is built on STM32Cube software technology to ease portability across different STM32 microcontrollers. The software comes with sample implementations of the drivers running on the X-NUCLEO-NFC01A1, X-NUCLEO-IKS01A1, X-NUCLEO-6180XA1 and the X- NUCLEO-IDB04A1 (or X-NUCLEO-IDB05A1), when connected to a NUCLEO-F401RE or NUCLE0-L476RG.

www.st.com

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, sensor expansion board, proximity and ambient light sensing module and the dynamic NFC tag expansion boards, and some middleware components for communication with other Bluetooth low energy devices, and to enable data exchange with an NFC-ready device using the NDEF standard.

The osxFusionFX (iNEMOEngine PRO) suite filtering and predictive software 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 osxMotionCP (iNEMOEngine PRO) real-time software acquires data from the accelerometer to recognize board positions (on desk, on head, near head, shirt pocket, trousers pocket and in swinging arm).

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

Activity and carry position recognition is performed by specific algorithms developed for mobile and wearable applications. The exclusive use of the accelerometer in osxMotionAR and osxMotionCP facilitates the implementation of low power consumption strategies suitable for this application segment, compliant with Bluetooth specifications core 4.0.

The gesture recognition software library uses the X-NUCLEO-6180XA1 on-board sensor plus two additional satellites to detect tap and swipe (from left to right and from right to left) gestures.

The implementation makes use of low-power consumption strategies suitable for this application segment, compliant with the Bluetooth specifications core 4.0 (X-NUCLEO-IDB04A1) or 4.1 (X-NUCLEO-IDB05A1). The drivers abstract low-level details of the hardware, which allows middleware and application access to Dynamic NFC tag and all the other sensors in a hardware-independent manner. The package also includes a sample application that the developer can use to start experimenting with the code. For this

purpose, the sample application is developed to enable NFC pairing and for transmitting the values read from all the sensors (temperature, humidity, pressure, luminosity, proximity, accelerometer, magnetometer and gyroscope) to a Bluetooth low energy-enabled device, such as a smartphone (Android or iOS based). Users can download the BlueMS (Version 2.1.0 or higher) Android/iOS application, available from the respective application store, to visualize the results of the osxMotionFX, osxMotionAR, osxMotionCP and gesture recognition algorithms and display the values read from the accelerometer, magneto, gyroscope, temperature, humidity, pressure, luminosity and proximity sensors.

Revision history

Table 1: Document revision history

Date	Version	Changes
17-Nov-2015	1	Initial release.
25-Jan-2015	2	Updated cover image Updated cover page Features updated section How does this software complement STM32Cube?
09-Sep-2016	3	Updated cover image Updated cover page Features and Description

IMPORTANT NOTICE – PLEASE READ CAREFULLY

STMicroelectronics NV and its subsidiaries ("ST") reserve the right to make changes, corrections, enhancements, modifications, and improvements to ST products and/or to this document at any time without notice. Purchasers should obtain the latest relevant information on ST products before placing orders. ST products are sold pursuant to ST's terms and conditions of sale in place at the time of order acknowledgement.

Purchasers are solely responsible for the choice, selection, and use of ST products and ST assumes no liability for application assistance or the design of Purchasers' products.

No license, express or implied, to any intellectual property right is granted by ST herein.

Resale of ST products with provisions different from the information set forth herein shall void any warranty granted by ST for such product.

ST and the ST logo are trademarks of ST. All other product or service names are the property of their respective owners.

Information in this document supersedes and replaces information previously supplied in any prior versions of this document.