Features

- Complete middleware to build applications using temperature and humidity sensors (HTS221), pressure sensor (LPS25HB) and motion sensors (LIS3MDL and LSM6DS0). The package is compatible with the motion sensor LSM6DS3 DIL24 expansion component.
- Very low power Bluetooth Low Energy (BlueNRG) single-mode network processor, compliant with Bluetooth specifications core 4.0 for transmitting information to one client.
- 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 on accelerometer data only.
- osxMotionCP (iNEMOEngine PRO) carry position detection algorithm (under OPEN.MEMS license) based on accelerometer data only.
- Easy portability across different MCU families, thanks to STM32Cube.

Description

BLUEMICROSYS1 is an expansion software package for STM32Cube. The software runs on the STM32 and includes drivers that recognize the Bluetooth Low Energy (BlueNRG) and four sensor devices (HTS221, LPS25HB, LSM6DS0, LIS3MDL). 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 a X-NUCLEO-IKS01A1 plus X-NUCLEO-IDB04A1 or X-NUCLEO-IDB05A1 assembly connected to a NUCLEO-F401RE or NUCLEO-L476RG board.
What is STM32Cube?

STM32Cube™ 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?

The proposed software is based on the STM32CubeHAL, the 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. The osxFusionFX (iNEMOEngine PRO) suite is filtering and predictive software which uses advanced algorithms to intelligently integrate outputs from multiple MEMS sensors, independent of external factors, for optimal performance. Real-time motion sensor data fusion is set to significantly improve the user experience by increasing accuracy, resolution, stability and response time in advanced motion-based applications in the consumer, computer, industrial and medical fields. The osxMotionCP (iNEMOEngine PRO) is real-time software that acquires data from the accelerometer and recognizes where the board is positioned (on desk, on head, near head, shirt pocket, trousers pocket and in swinging arm); osxMotionAR (iNEMOEngine PRO) is real-time software that acquires data from the accelerometer and recognizes 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. Since activity and carry position recognition is performed by specific software packages 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 drivers abstract low-level the low-level hardware information and allow the middleware components and applications to access sensor data 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 was developed to enable sensors data fusion and transmission of sensor data to a Bluetooth Low Energy-enabled device, such as a smartphone (Android or iOS based). Users can run the BlueMS (Version > 2.0.0) Android/iOS application available at the respective application stores for visualizing the results of the osxFusionFX, osxMotionAR and osxMotionCP algorithms and for displaying the values read from accelerometers, magnetos, gyroscopes and temperature, humidity and pressure sensors.
Revision history

Table 1: Document revision history

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<thead>
<tr>
<th>Date</th>
<th>Rev</th>
<th>Changes</th>
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<tbody>
<tr>
<td>10-Feb-2015</td>
<td>1</td>
<td>First release.</td>
</tr>
<tr>
<td>10-Jul-2015</td>
<td>2</td>
<td>Updated features on the cover page.</td>
</tr>
<tr>
<td>25-Sep-2015</td>
<td>3</td>
<td>Updated figure and add feature on the cover page.</td>
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<tr>
<td>12-Nov-2015</td>
<td>4</td>
<td>Changed system architecture image Updated Features and Description Updated How does this software complement STM32Cube?</td>
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