osxMotionPE
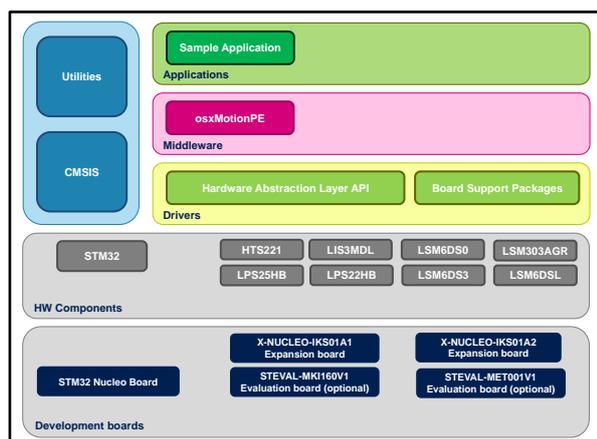
Real-time pose estimation software expansion for STM32Cube

Description

osxMotionPE is an add-on software package for X-CUBE-MEMS1. The software runs on the STM32 and includes drivers that recognize ST inertial sensors LSM6DS0, LSM6DS3 or LSM6DSL.

The pose estimation algorithm differentiates between stationary user poses like standing, sitting and lying down, so you can build applications that may, for example, signal the user to stand up after prolonged sitting, activate sleep monitoring if the user is lying down, and even calorie consumption when used in conjunction with activity detection algorithms like osxMotionAW.

The algorithm manages the data acquired exclusively from the accelerometer at the low sampling frequency of 16 Hz to reduce host platform power consumption.

The software comes with sample implementations of the drivers, exploiting STM32Cube software technology and running on X-NUCLEO-IKS01A2 board or X-NUCLEO-IKS01A1 with optional STEVAL-MKI160V1 board, mounted on a NUCLEO-F401RE or NUCLEO-L476RG development board.

Features

- Real-time pose estimation (under OpenSoftwareX license) based exclusively on accelerometer data, for wrist applications.
- Complete middleware to build applications on top of X-CUBE-MEMS1.
- Libraries for ARM Cortex-M3 and ARM Cortex-M4 MCU cores.
- Easy portability across different MCU families, thanks to STM32Cube.
- PC-based Windows application to log data.
- Sample implementations available on X-NUCLEO-IKS01A2 and X-NUCLEO-IKS01A1 (with optional STEVAL-MKI160V1 board) expansion boards, mounted on a NUCLEO-F401RE or NUCLEO-L476RG development board.

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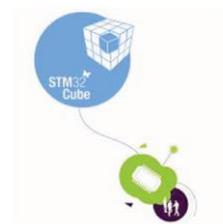
What is STM32Cube?

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?

The software is based on the STM32CubeHAL, the hardware abstraction layer for the STM32 microcontroller. osxMotionPE is an add-on software package for X-CUBE-MEMS1. The X-CUBE-MEMS1 package extends STM32Cube by providing a Board Support Package (BSP) for the sensor expansion boards and some middleware components for serial communication with a PC.

The osxMotionPE is a real-time software, specifically developed for wrist devices, that acquires data from the accelerometer and recognizes the pose of the user during stationary activity.

The software can be also joined with other human motion recognition algorithms for wrist, such as the activity recognition for wrist (osxMotionAW) to significantly improve user experience in advanced motion-based applications in the consumer, computer, industrial and medical fields.

Since the pose estimation for wrist is a specific software for wearable applications, the exclusive use of the accelerometer in osxMotionPE facilitates the implementation of the low power consumption strategies suitable for this application segments.

The osxMotionPE package includes a sample application that developers can use to experiment with the code. Once the pose has been recognized, the relative code and an associated time tag are logged on the MCU memory. The last recognized pose may be displayed by means of an on-board LED, in which the blinking varies according to the pose. Moreover, the complete acquisition may be transferred to a PC with a specific GUI for further offline analysis.

Alternatively, the sample application may work in GUI-driven mode, i.e. acquired sensors data and detected pose may be shown in real-time by means of the same GUI.

Revision history

Table 1: Document revision history

Date	Version	Changes
08-Nov-2016	1	Initial release.

IMPORTANT NOTICE – PLEASE READ CAREFULLY