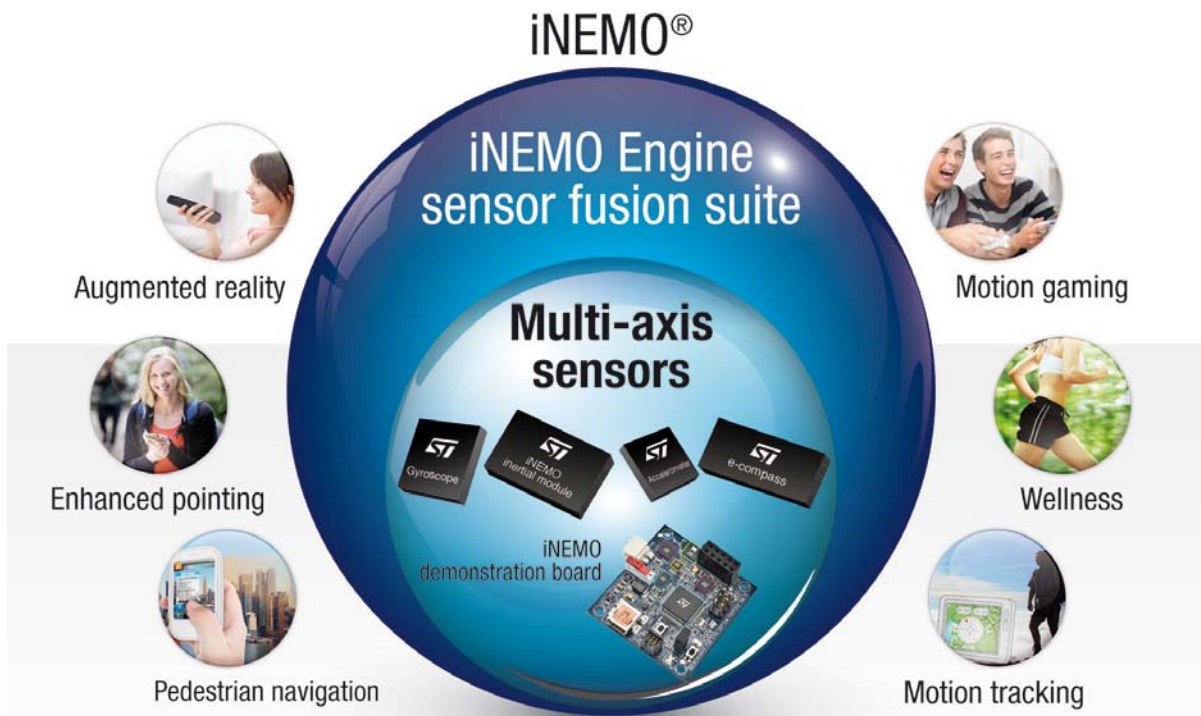


iNEMO Engine Lite

Overview and download instructions



iNEMO software libraries



- iNEMO software libraries, based on the Kalman filter theory applied to MEMS sensor fusion, are divided into two categories:
 - **iNEMO Engine Lite**, a free source code software library
 - **iNEMO Engine Pro**, a compiled software library
- These engines fuse accelerometer, gyroscope and magnetometer data to deliver accurate and reliable motion-sensing information that is easy to integrate into smart consumer devices

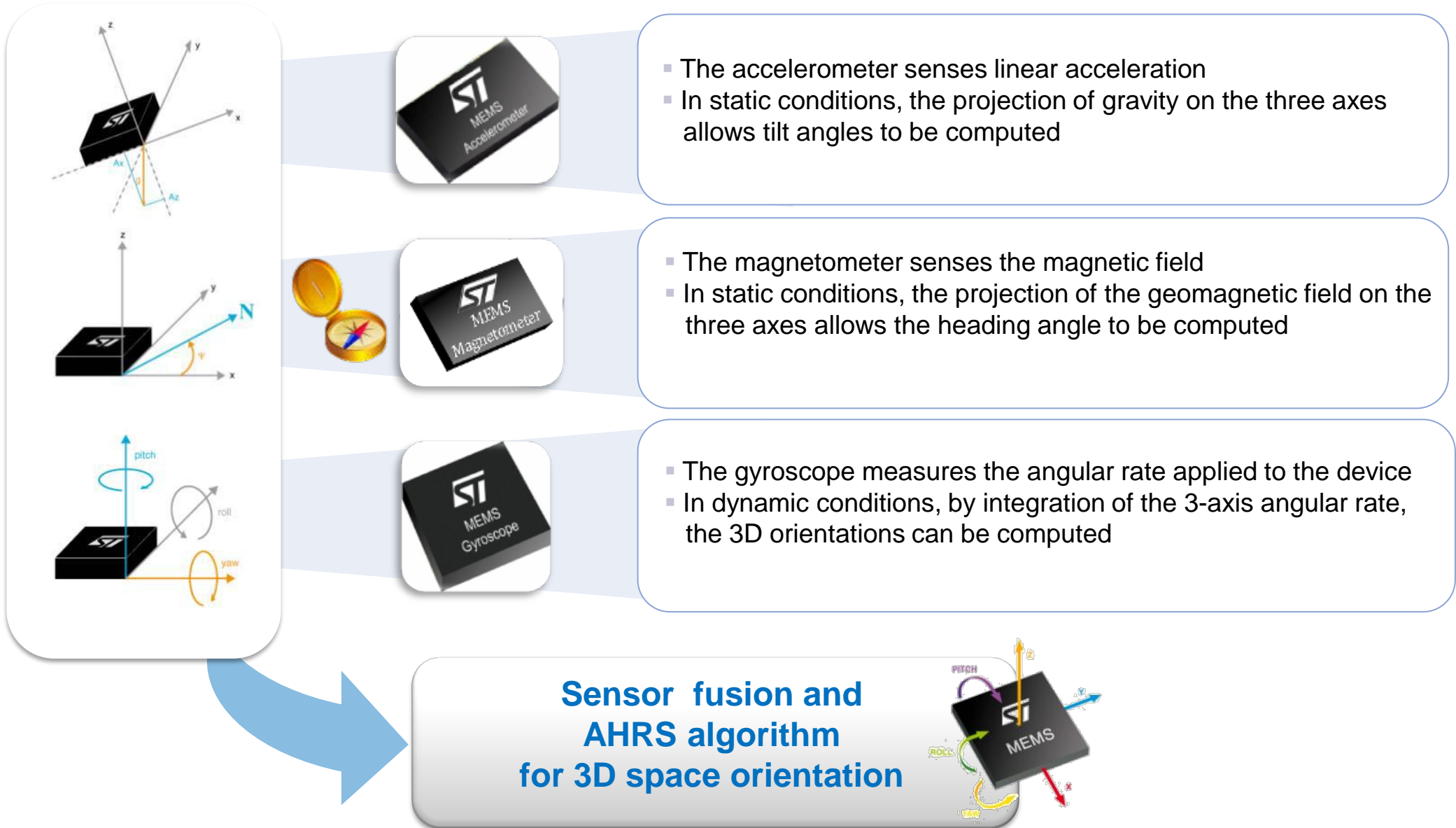
Both software are based on data-fusion algorithms for multiple-sensor output processing and address motion-detection applications

This presentation focuses on **iNEMO Lite**.

Part number	Description
iNEMOEngine_LI3	iNEMO Engine Lite, source code for STM32
iNEMOEngine_PAAP	iNEMO Engine Pro, Android platform ARMEABI
iNEMOEngine_PI3P	iNEMO Engine Pro, platform independent, for STM32
iNEMOEngine_PW8	iNEMO Engine Pro, platform independent, for STM32 (Supported by Windows 8 sensor class)

www.st.com/inemo-engine

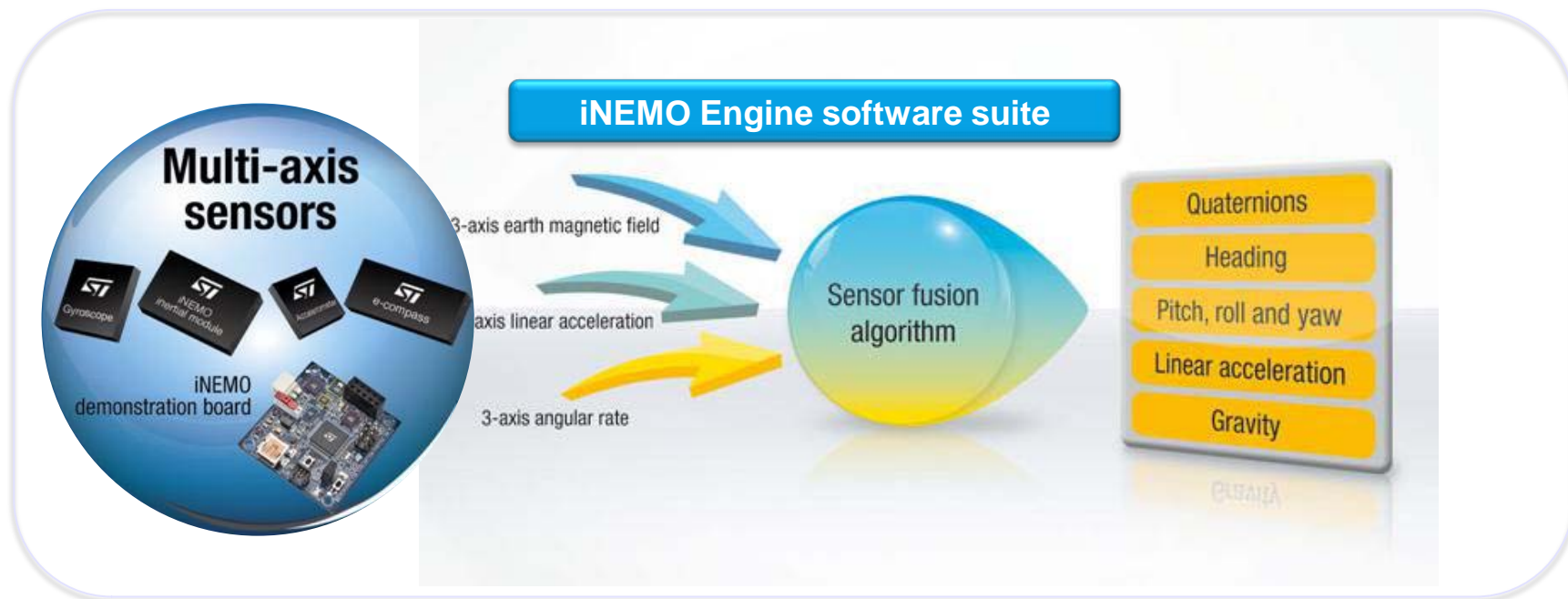
Sensor fusion for 3D space orientation



iNEMO Engine Lite



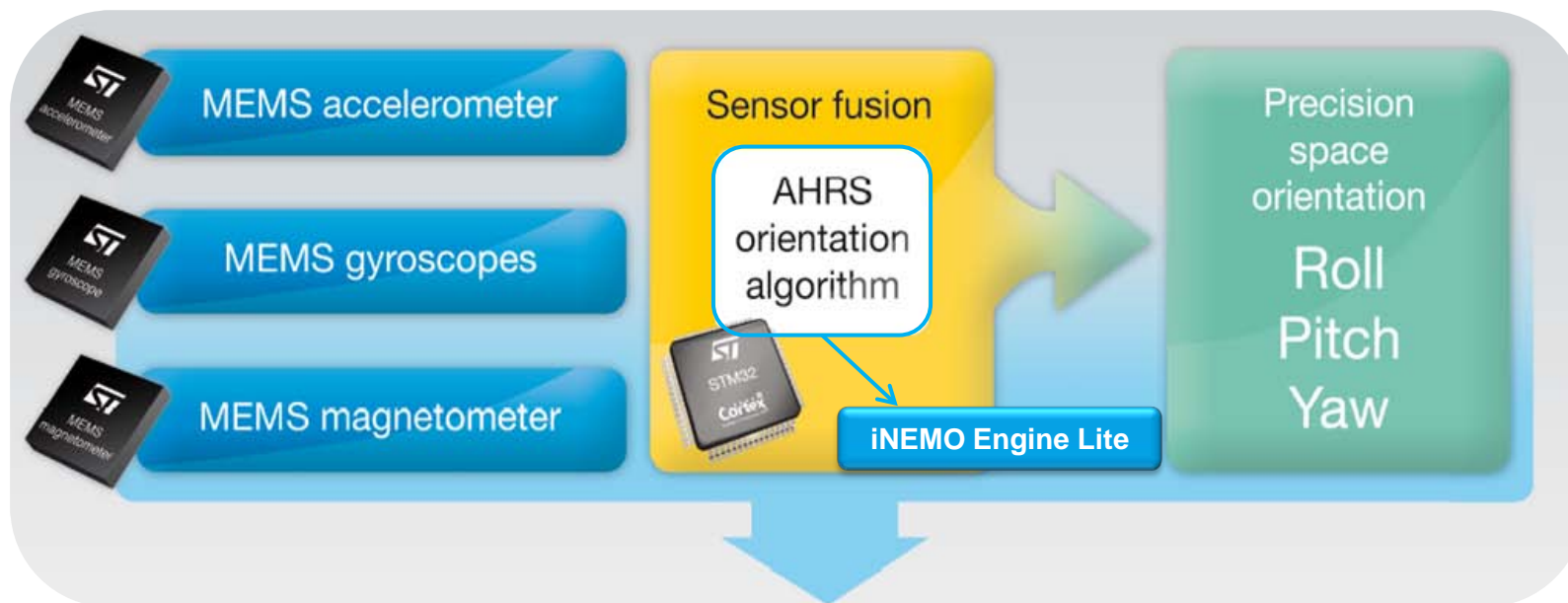
- Based on the Kalman filter theory, ST's iNEMO Engine Lite sensor fusion software was developed to integrate readings from multiple sensors (3x gyroscopes, 6x geomagnetic modules) mounted on the STEVAL-MKI062V2 iNEMO demonstration board and processed by on board STM32 microcontroller
- ST today offers an open source version of iNEMO Lite that can be used with the STEVAL-MKI062V2 demonstration board, but can also be adapted to your own application using ST's multi-axis sensors (iNEMO inertial modules or a combination of accelerometer, gyroscope and magnetometer)



iNEMO enables new applications



- The combination of software (iNEMO Engine Lite) and hardware (STEVAL-MKI062V2 or other MEMS sensors) guarantees the high accuracy required by the most demanding applications, such as augmented-reality, image stabilization, human machine interfaces, body movement recognition and robotics



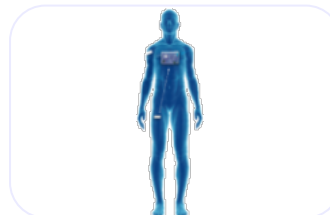
Augmented reality



3D tagging



Movement recognition



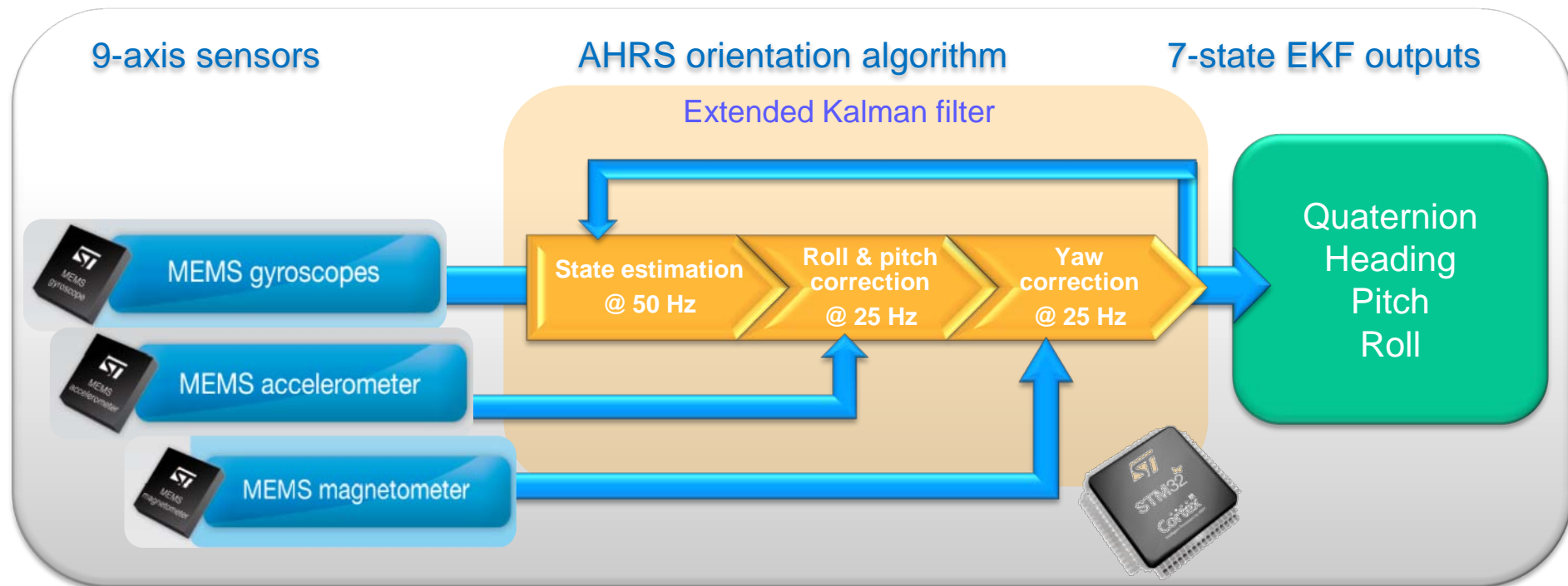
POI and location-based services



Extended Kalman Filter (EKF)



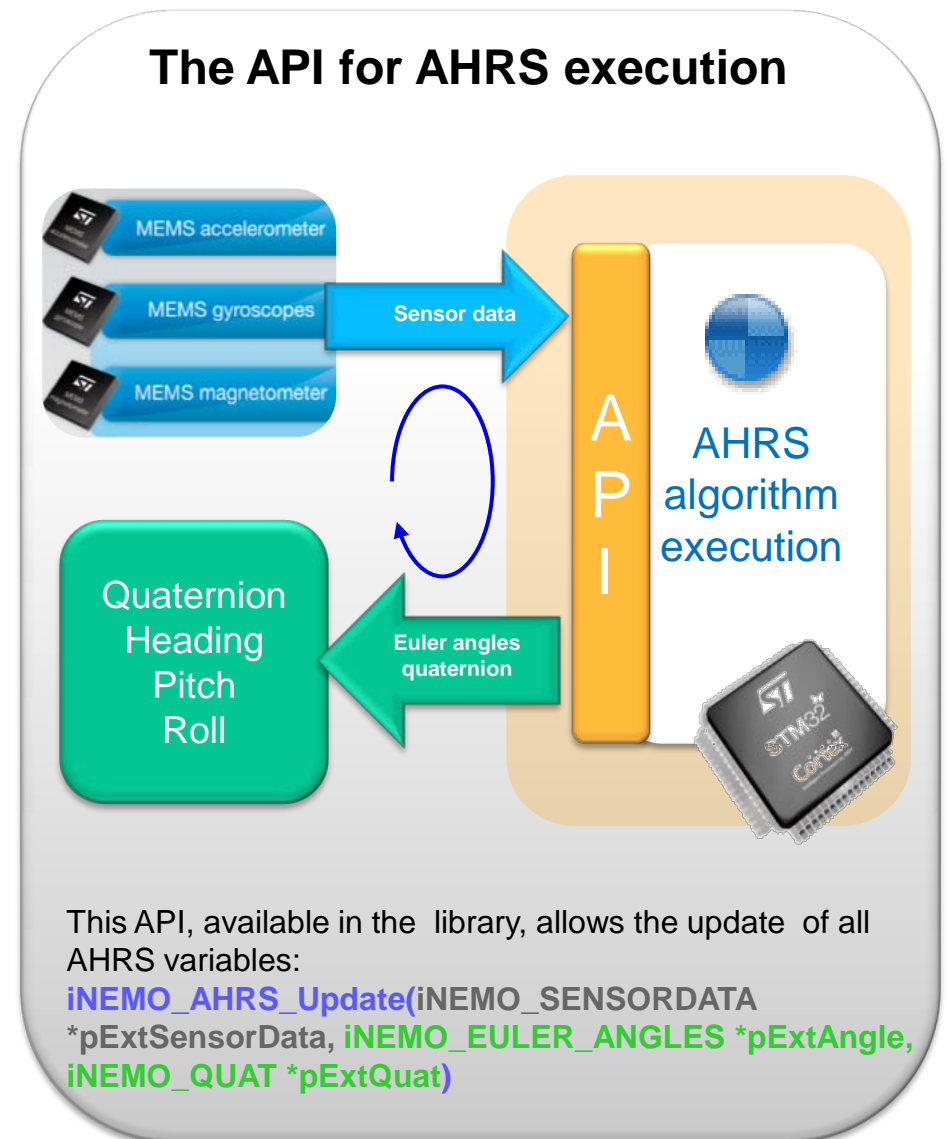
- Sensor fusion is implemented using an embedded extended Kalman filter (EKF) to provide drift-free 3D space orientation running on STM32 microcontroller
- The EKF weights the three sources of data (gyro, accelerometer, magnetometer) to fuse them in the best way
- The EKF estimates the four quaternion and the three gyro biases (7-state EKF)
- Acceleration data is used to correct roll and pitch angles and magnetic field data improves yaw angle



iNEMO Engine Lite – key features



- Accurate motion tracking
- Reliable compass heading for accurate navigation
- 7-state extended Kalman filter
- Outputs:
 - Quaternion
 - Heading, pitch and roll
- Max ODR (EKF frequency) up to 100 Hz
- System requirements:
 - 7-Kbyte Flash memory
 - 5-Kbyte RAM (dynamically allocated)
- Source code for STM32F103 microcontrollers
- Double option for memory allocation, with or without FreeRTOS



The iNEMO demonstration board



- iNEMO Engine Lite was developed around the STEVAL-MKI062V2 demo board as the embedded AHRS algorithm for the on-board STM32F103 microcontroller
- The library is compatible with all STM32 hardware platforms


10 Degrees of freedom

3x Accelerometer

3x Gyroscope

Pressure Sensor

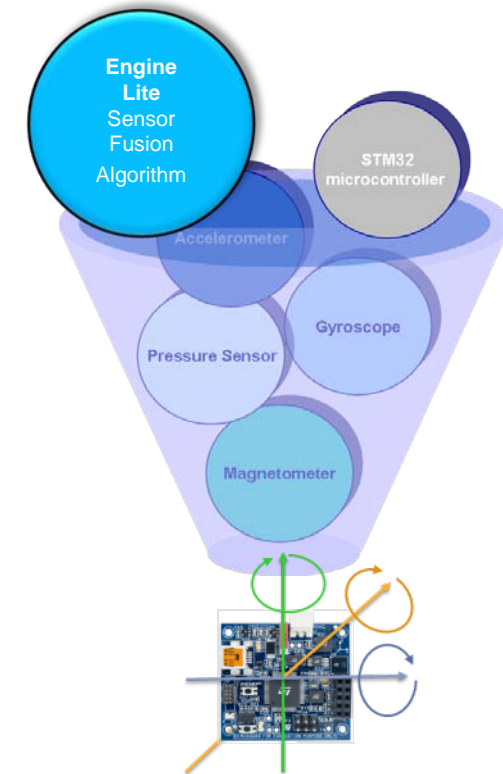
3x Magnetometer



STMicroelectronics

iNEMO™

iNEMO demo board, STEVAL-MKI062V2, combines accelerometers, gyroscopes and magnetometers with pressure and temperature sensors. The system provides 3-axis sensing of linear, angular and magnetic motion, complemented with temperature and barometer/altitude readings, representing ST's new 10 degrees of freedom platform.



Awards won by STEVAL-MKI062V2

The Wall Street Journal Technology Innovation Award 2010

Computerworld Honors Program 2011 Emerging Technology Laureate



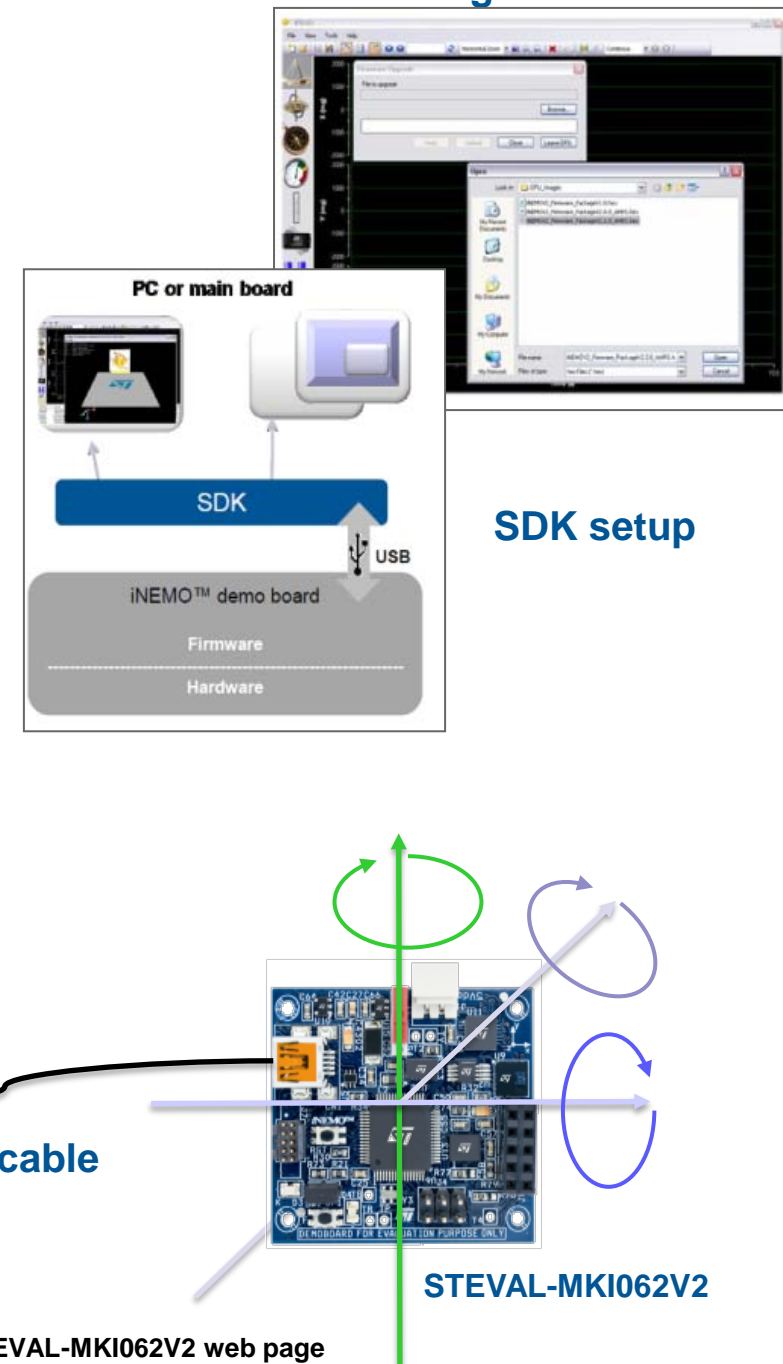
iNEMO Engine Lite inside Suite 2.3.0



Integrated DFU

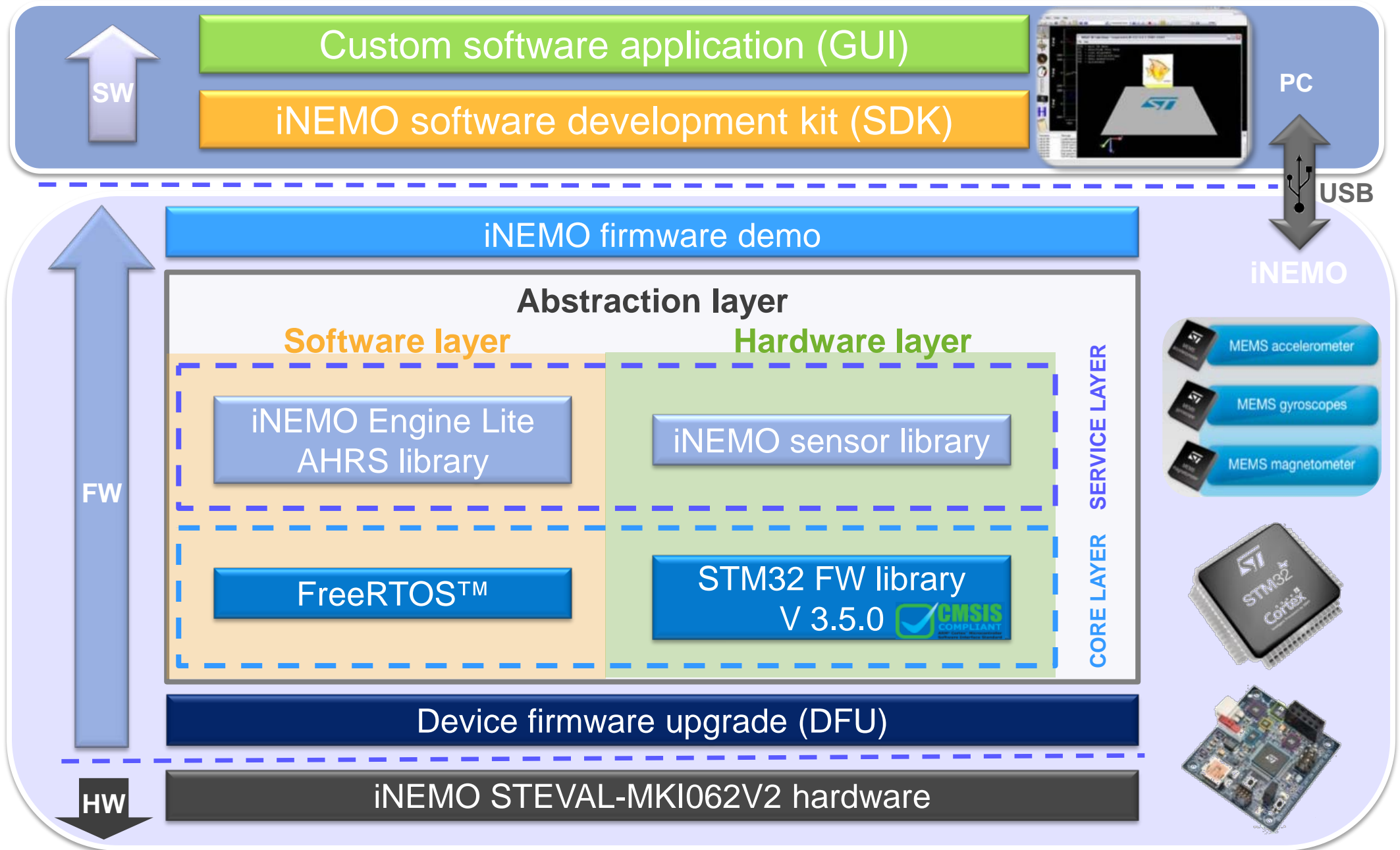
iNEMO Engine Lite is included inside the iNEMO Suite 2.3.0* as the source code of the AHRS library. This suite includes:

- GUI (graphical user interface) for smart interaction with the board and display of sensor data
- DFU (device firmware upgrade) for firmware upgrading
- SDK (software development kit) for high communication level
- TCP/IP integrated protocol for remote connection



*Suite 2.2.0 with compiled AHRS algorithm, as reference version for running projects, is still available on the STEVAL-MKI062V2 web page

FW/SW architecture of Suite 2.3.0



Suite 2.3.0 and Engine Lite download



Dear Customer,

your download request for iNemo Lite has been approved

You may download the software following [this link](#)

Please note that this link is personalized and is valid for one download only. Make sure to create a backup copy of the installation package once downloaded. When installing and before using the software you will have to accept the [licence agreement](#).

Thank you very much for your interest in our products.

Yours sincerely,
STMicroelectronics

Confirmation
mail with
download link

Download

iNEMO Suite 2.3.0
+
AHRS Engine Lite
sensor fusion source code

Registration
form

Confirmation mail
after submission

Dear Customer,

you have submitted a download request for iNEMO Lite. Your request is pending approval.

The iNemo fusion engine allows you to improve the accuracy and reliability of motion-sensing information using ST's [accelerometers](#), [gyroscopes](#) and [magnetometers](#).

Thank you very much for your interest in our products.

Yours sincerely,
STMicroelectronics

Read and
accept the
License
Agreement

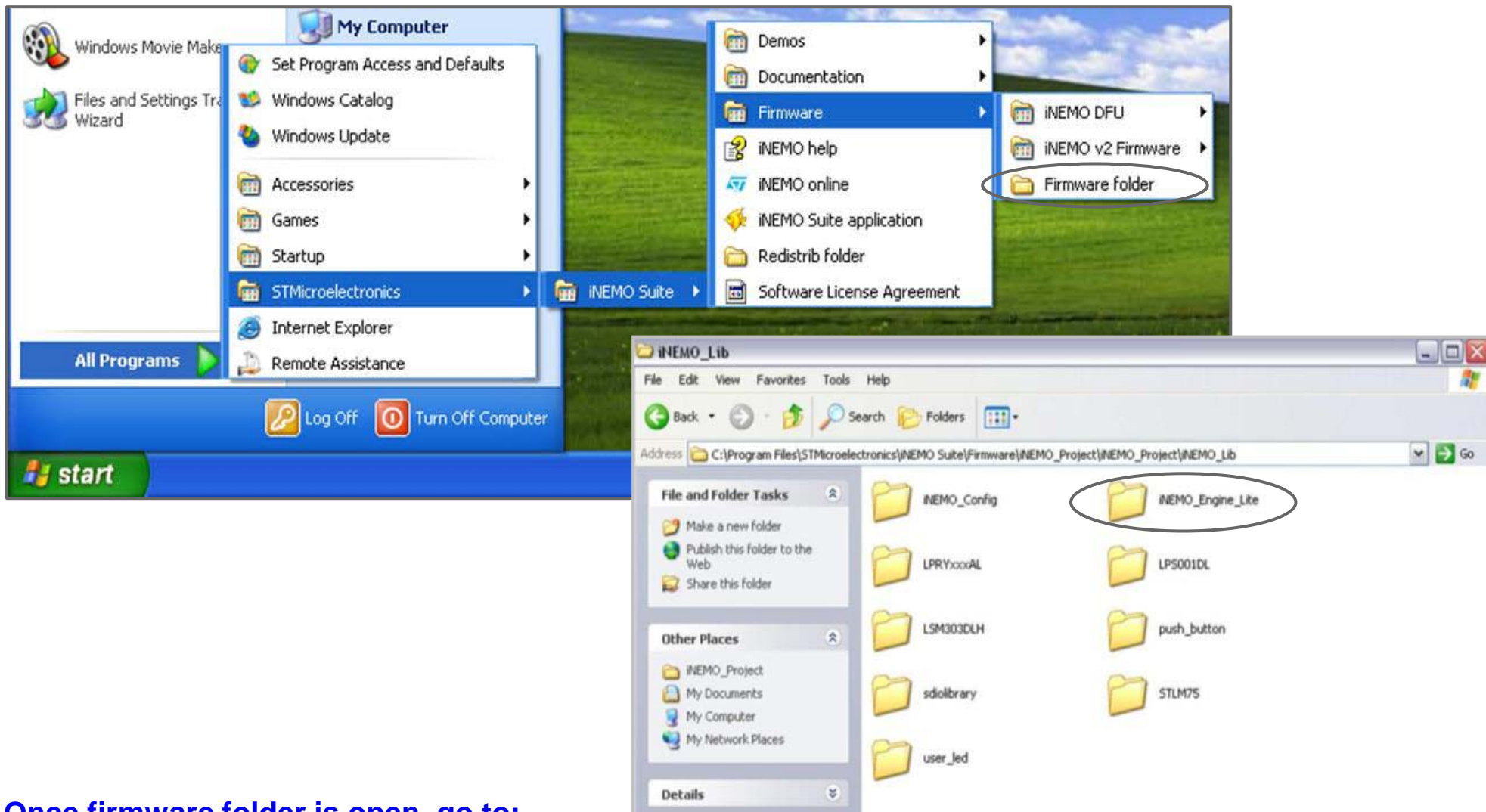
How to find iNEMO Engine Lite



After installation, Engine Lite source code is available inside the Suite 2.3.0. at:

STMicroelectronics\iNEMO Suite\Firmware\iNEMO_Project\iNEMO_Project\iNEMO_Lib\iNEMO_Engine_Lite

or directly from Windows Start under Programs/STMicroelectronics/ iNEMO Suite/ Firmware/ Firmware folder



Once firmware folder is open, go to:

iNEMO_Project\iNEMO_Project\iNEMO_Lib\iNEMO_Engine_Lite

Further information



Web pages and technical support

iNEMO Engine Lite (iNEMOEngine_LI3) SW download: <http://www.st.com/inemo-enginelite>

iNEMO demonstration board (STEVAL-MKI062V2): <http://www.st.com/internet/evalboard/product/250367.jsp>

For technical support, click on green icon available in the product folders:

[ONLINE SUPPORT](#)

Videos

iNEMO Engine – Real sensor fusion:

<http://www.st.com/internet/com/support/edemoroom.jsp?id=51&next=current>

iNEMO demonstration board (STEVAL-MKI062V2):

<http://www.st.com/internet/com/support/edemoroom.jsp?id=23&next=current>

Communities and FAQ at myST.com

STe2e communities:

<https://my.st.com/public/STe2ecomunities/mcu/Lists/STM32F%20MEMS%20%20iNEMO/AllItems.aspx>

FAQs: <https://my.st.com/public/FAQ/faq.aspx?level=3&objectid=1116&type=product>

www.st.com/inemo-enginelite



or with your smartphone:

