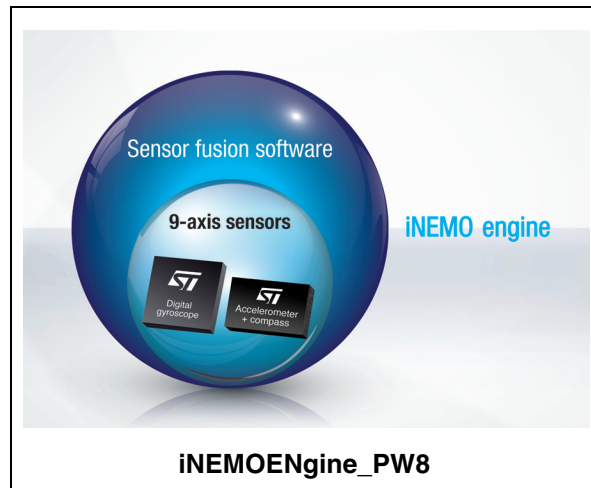# iNEMOENgine_PW8

iNEMO Engine Pro
Sensor Fusion algorithm

Data brief

Features

- Absolute point tracking and motion tracking accuracy

- Immunity to magnetic interference for high performance in real-world conditions

- Few user-calibration interruptions, enabling innovative and longer game play

- Reliable compass heading for accurate navigation

- Accurate direction, enabling true augmented reality applications

- Support for STEVAL-MKI119V1 MEMS demonstration kit

- Support for STEVAL-MKI108V2 and STEVAL-MKI109V2 MEMS demonstration kits

- Embedded calibration

- Supported by Win8 sensor class

iNEMOENgine_PW8

Description

The iNEMO Engine is a new, advanced software engine that fuses accelerometer, gyroscope and magnetometer data to deliver accurate and reliable motion-sensing information that is easy to integrate into smart consumer devices.

The iNEMOENgine_PW8 software pack comes with the iNEMO Engine as a precompiled library for STM32F103 microcontrollers and the device firmware upgrade tool.

www.st.com

1   iNEMO sensor fusion

1.1   Overview

The iNEMO engine is a new, advanced software engine that fuses accelerometer, gyroscope and magnetometer data to deliver accurate and reliable motion-sensing information that is easy to integrate into smart consumer devices.
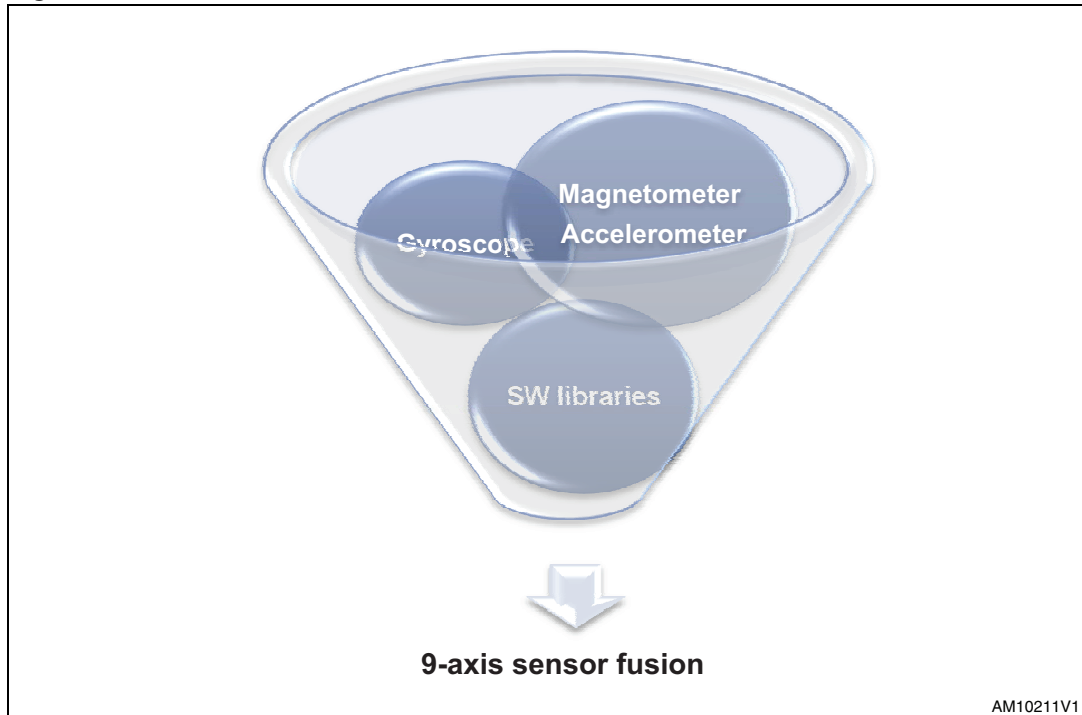
Figure 1.   9-axis sensor fusion

AM10211V1

1.2   How the iNEMO engine works

The iNEMO engine fuses data from the integrated 9-axis sensor suite with advanced algorithms that use true high-number-of-states adaptive Kalman filtering.

The iNEMO engine's adaptive filters converge so that correct heading data overrides magnetic distortions and anomalies, resulting in more accurate and reliable data.

iNEMO allows the correction of:

● magnetic distortions registered on the magnetometers

● dynamic distortion measured by the accelerometers

● inherent drift of the gyroscope over time

The iNEMO engine integrates all 9 inertial axes plus compass with complex fusion algorithms, so the output of the sensor cluster is optimized.

This allows for faster, easier integration into smart consumer devices and higher performance of the solution as a whole.

The library can be configured to achieve the best trade-off between performance and power-saving to match application requirements.

2   Input and output data

Figure 2.   Sensor fusion input and output

AM10212V1
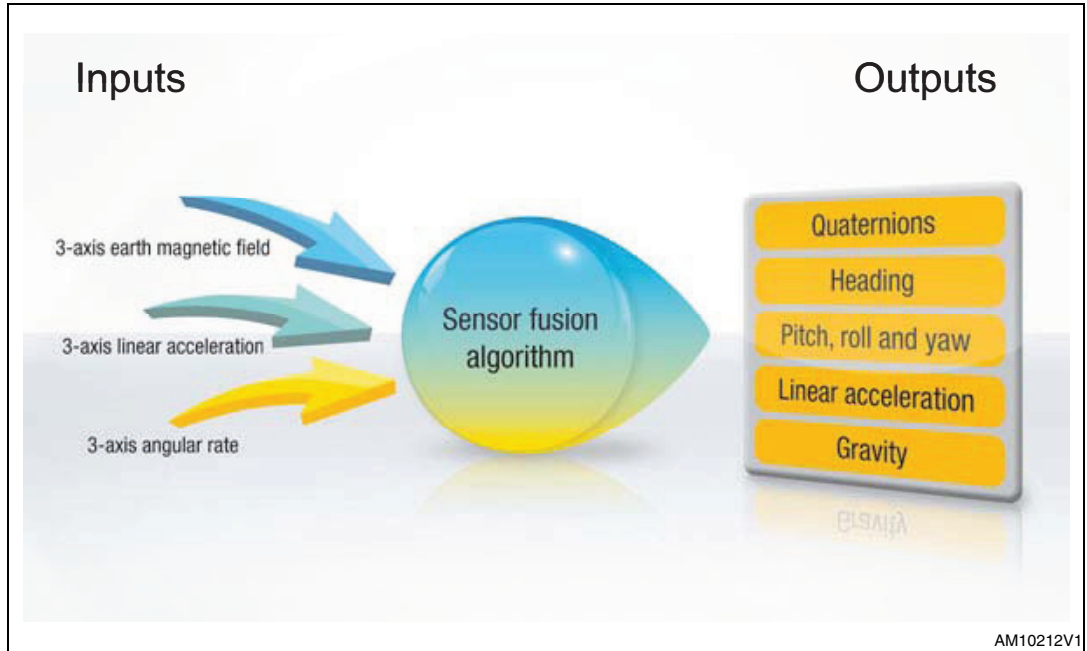
2.1   Sensor fusion algorithm input

The iNEMO engine API is based on the 9-axis sensor fusion suite.

Required input:

● Accelerometer output data: x, y, z

● Gyroscope output data: yaw, pitch, roll

● Magnetic sensor output data x, y, z

● LIbrary configuration parameters

2.2   Output

The iNEMO engine software libraries fuse data from the integrated 9-axis sensor suite with an advanced algorithm based on a true adaptive Kalman filter to obtain precise error modeling, outstanding accuracy prediction and magnetic distortion correction.

Library output:

● Quaternions four number hpr system

● Rotation: heading, pitch, and roll

● Linear acceleration: device frame linear accelerations

● Gravity: device frame gravity acceleration

3 System specifications and settings

3.1 Typical sensor settings

3.1.1 Sensor full scales

- Accelerometer: 4 *g*
- Gyroscope: 2000 dps
- Magnetometer: 2.5 gauss

4   Revision history

Table 1.   Document revision history

Date	Revision	Changes
02-Nov-2011	1	Initial release.

Please Read Carefully:

Information in this document is provided solely in connection with ST products. STMicroelectronics NV and its subsidiaries ("ST") reserve the right to make changes, corrections, modifications or improvements, to this document, and the products and services described herein at any time, without notice.

All ST products are sold pursuant to ST's terms and conditions of sale.

Purchasers are solely responsible for the choice, selection and use of the ST products and services described herein, and ST assumes no liability whatsoever relating to the choice, selection or use of the ST products and services described herein.

No license, express or implied, by estoppel or otherwise, to any intellectual property rights is granted under this document. If any part of this document refers to any third party products or services it shall not be deemed a license grant by ST for the use of such third party products or services, or any intellectual property contained therein or considered as a warranty covering the use in any manner whatsoever of such third party products or services or any intellectual property contained therein.

UNLESS OTHERWISE SET FORTH IN ST'S TERMS AND CONDITIONS OF SALE ST DISCLAIMS ANY EXPRESS OR IMPLIED WARRANTY WITH RESPECT TO THE USE AND/OR SALE OF ST PRODUCTS INCLUDING WITHOUT LIMITATION IMPLIED WARRANTIES OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE (AND THEIR EQUIVALENTS UNDER THE LAWS OF ANY JURISDICTION), OR INFRINGEMENT OF ANY PATENT, COPYRIGHT OR OTHER INTELLECTUAL PROPERTY RIGHT.

UNLESS EXPRESSLY APPROVED IN WRITING BY TWO AUTHORIZED ST REPRESENTATIVES, ST PRODUCTS ARE NOT RECOMMENDED, AUTHORIZED OR WARRANTED FOR USE IN MILITARY, AIR CRAFT, SPACE, LIFE SAVING, OR LIFE SUSTAINING APPLICATIONS, NOR IN PRODUCTS OR SYSTEMS WHERE FAILURE OR MALFUNCTION MAY RESULT IN PERSONAL INJURY, DEATH, OR SEVERE PROPERTY OR ENVIRONMENTAL DAMAGE. ST PRODUCTS WHICH ARE NOT SPECIFIED AS "AUTOMOTIVE GRADE" MAY ONLY BE USED IN AUTOMOTIVE APPLICATIONS AT USER'S OWN RISK.

Resale of ST products with provisions different from the statements and/or technical features set forth in this document shall immediately void any warranty granted by ST for the ST product or service described herein and shall not create or extend in any manner whatsoever, any liability of ST.

STMicroelectronics group of companies

Australia - Belgium - Brazil - Canada - China - Czech Republic - Finland - France - Germany - Hong Kong - India - Israel - Italy - Japan - Malaysia - Malta - Morocco - Philippines - Singapore - Spain - Sweden - Switzerland - United Kingdom - United States of America

www.st.com