



iNEMOEngine_PI3P

iNEMO Engine Pro Sensor Fusion algorithm and API for STM32

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 STM32F103 microcontrollers
- Full tunability
- Embedded calibration



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.

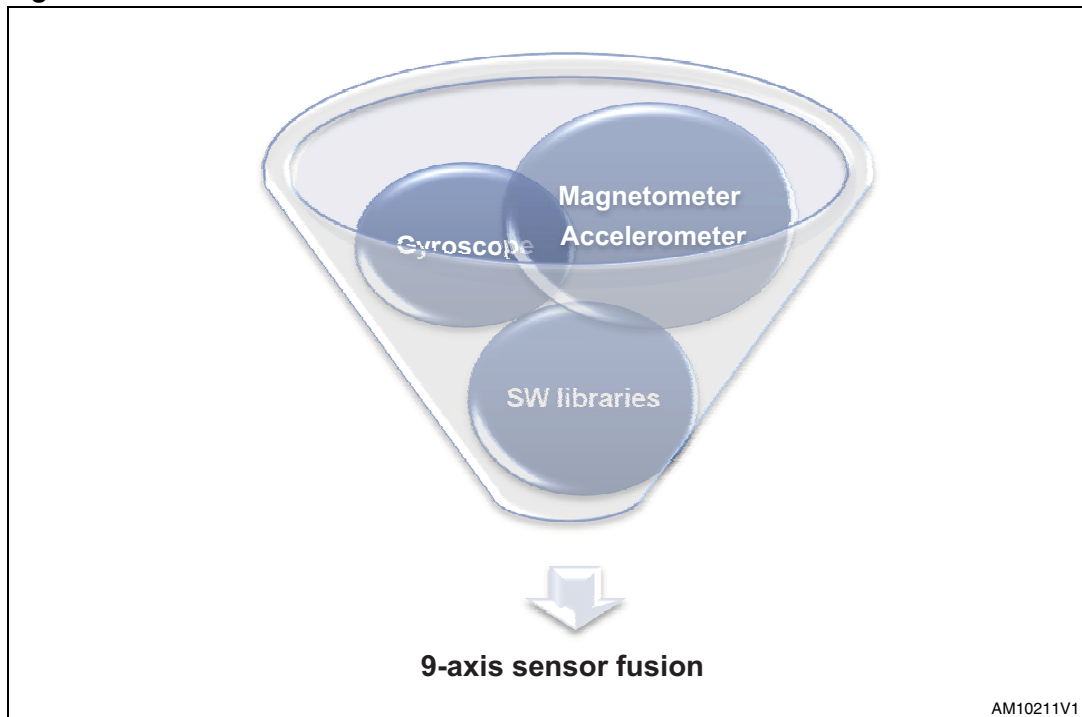
The iNEMOEngine_PI3P software pack comes with the iNEMO Engine as a precompiled library for STM32F103 microcontrollers and with API example code for algorithm setup and tuning.

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



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 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

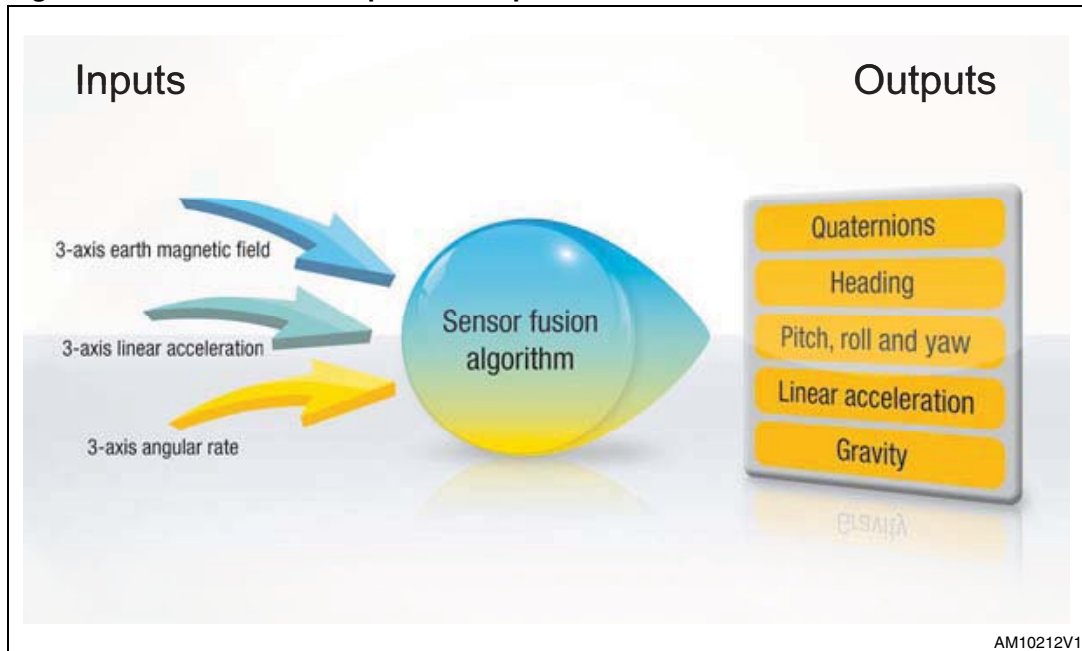
The iNEMO engine integrates all 9 inertial axes plus compass with complex fusion algorithms, so the output of the sensor cluster is optimized.

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 tradeoff between performance and power-saving to match application requirements.

2 Input and output data

Figure 2. Sensor fusion input and output



2.1 Sensor fusion algorithm input

The iNEMO engine API is based on 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

2.1.1 Sensor orientation

iNEMO engine API sensor orientation is compatible with the reference system defined by Android (east, north, up).

2.2 Output

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

Libraries 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: 2 *g*
- Gyroscope: 2000 dps
- Magnetometer: 8.1 gauss

3.1.2 Sensor ODR

- Gyroscope: 100 Hz
- Accelerometer: 100 Hz
- Magnetometer: 75 Hz

4 Revision history

Table 1. Document revision history

Date	Revision	Changes
09-Sep-2011	1	Initial release.
26-Oct-2011	2	Added Section 2: Input and output data and Section 3: System specifications and settings . Minor text changes.

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.

ST and the ST logo are trademarks or registered trademarks of ST in various countries.

Information in this document supersedes and replaces all information previously supplied.

The ST logo is a registered trademark of STMicroelectronics. All other names are the property of their respective owners.

© 2011 STMicroelectronics - All rights reserved

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