



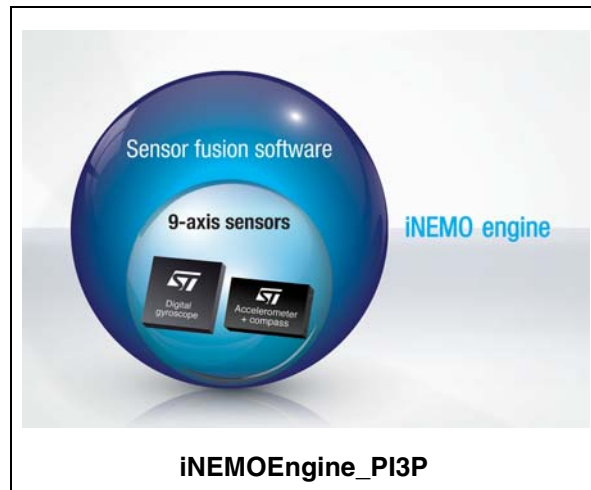
# iNEMOEngine\_PI3P

## 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.

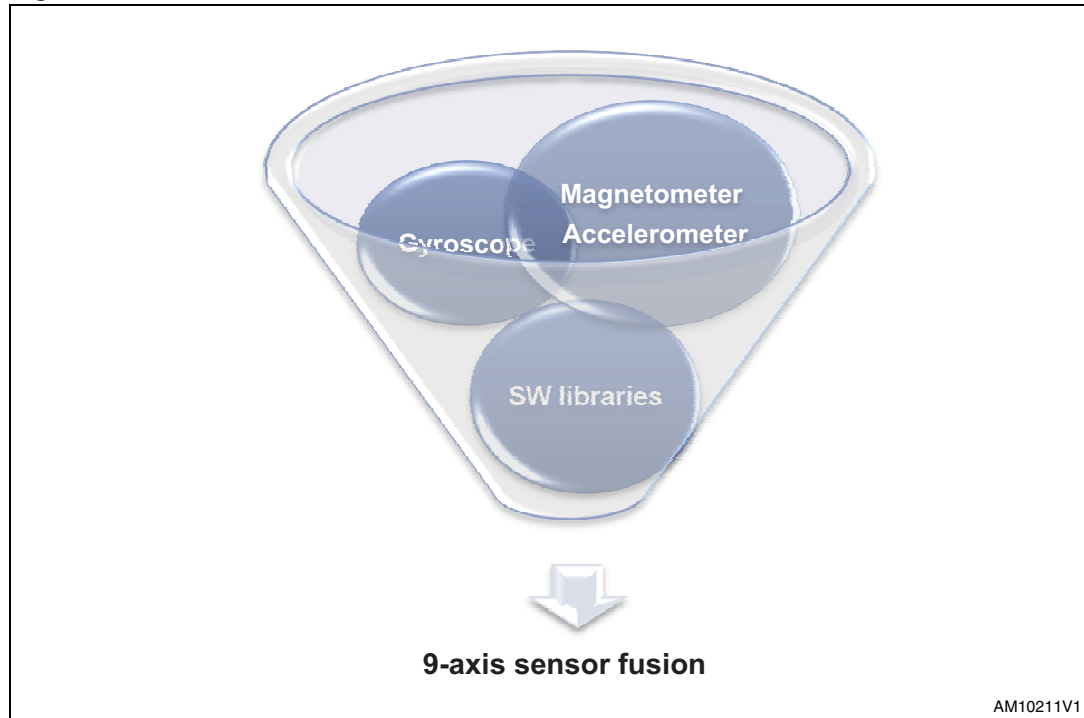
The iNEMOEngine\_PI3P software pack comes with the iNEMO Engine as a precompiled library for STM32F103 microcontrollers and with API example code for algorithm setup and tuning.

# 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

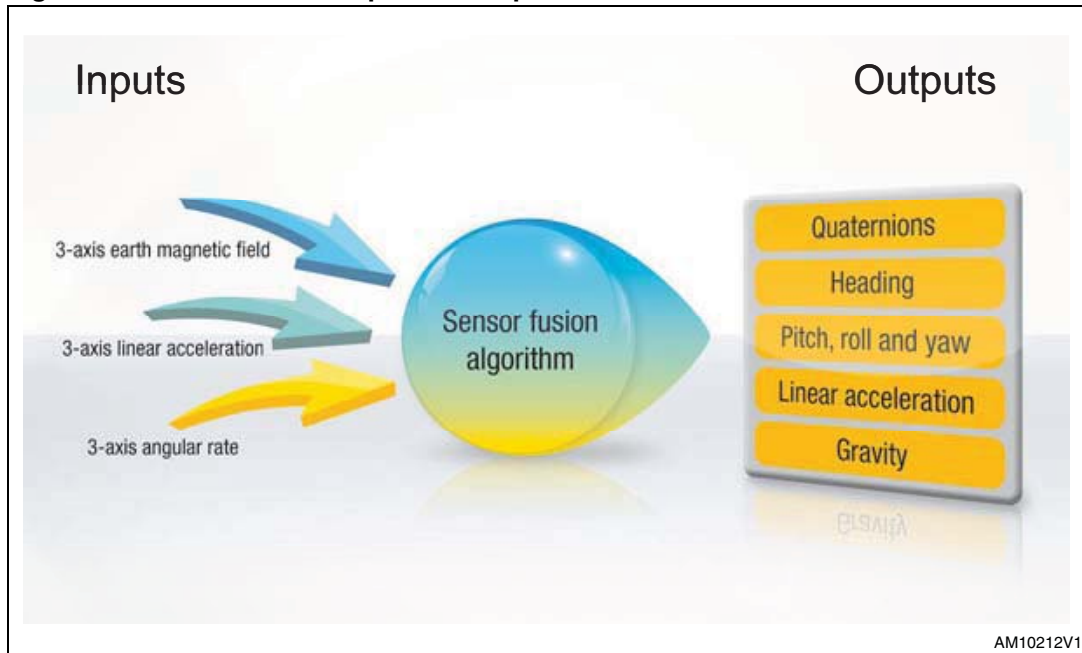
The iNEMO engine integrates all 9 inertial axes plus compass with complex fusion algorithms, so the output of the sensor cluster is optimized.

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 <i>Section 2: Input and output data</i> and <i>Section 3: System specifications and settings</i> . Minor text changes.

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