



The AHRS firmware is only a demonstrator and it is used to run the 3D Demo Cube of the Discovery-M1 iNEMO Suite.

### Features

- AHRS library in .lib format for iNEMO Suite 3D Demo Cube
- Outputs:
  - Quaternions
  - Headings, pitch and roll
- Max ODR of 50 Hz
- System requirements:
  - 11 Kbyte Flash memory
  - 6 Kbyte RAM

### Description

The STEVAL-MKI121CD1 is a CD which includes the AHRS algorithm as a pre-compiled library (in .lib format) for Discovery-M1 (order code STEVAL-MKI121V1).

The AHRS algorithm provides 3D orientation, combining data from 3x gyroscope and 6x e-Compass sensors.

The outputs of all sensors are processed by the STM32F103 microcontroller in the INEMO-M1, and fused in a Kalman filter to compensate for drift and provide stable orientation.

# 1 AHRS lib package description

The CD includes the following directory structure:

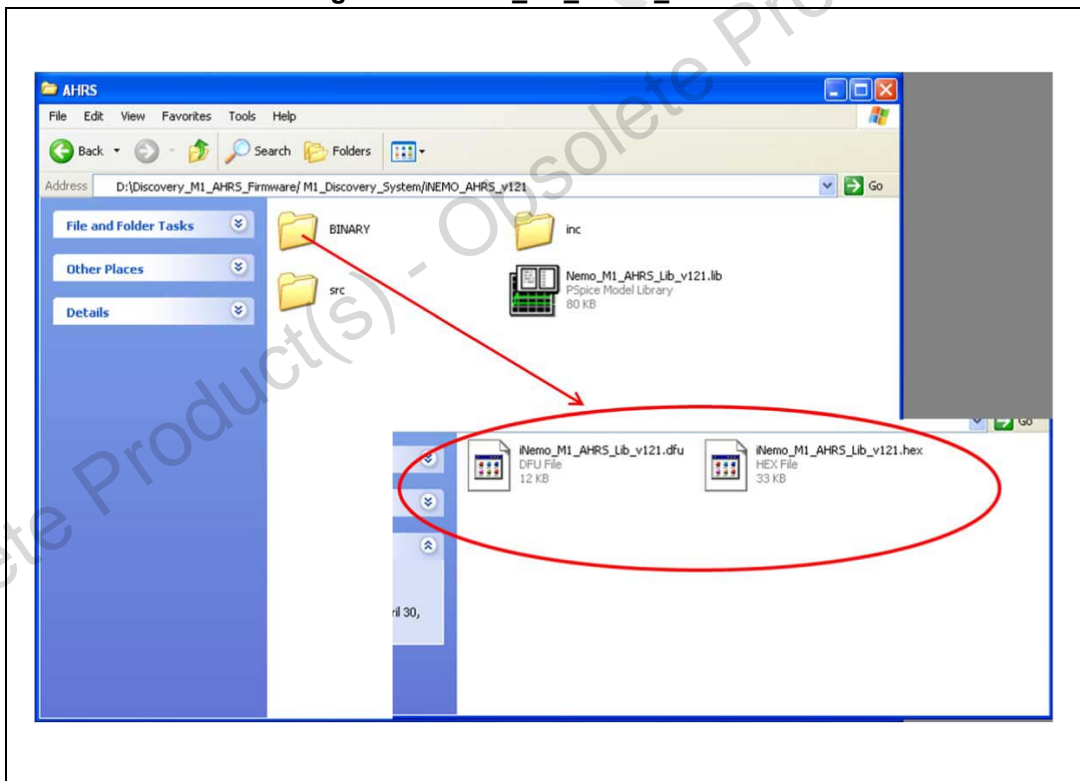
- iNemo Suite
- Discovery\_M1\_AHRS\_Firmware

The iNemo Suite folder includes the setup for the iNemo Suite GUI.

The Discovery\_M1\_AHRS\_Firmware folder contains the AHRS firmware. Specifically, it includes a complete IAR project example for Discovery-M1 in the "M1\_Discovery\_System/IAR" folder, and the AHRS library in the "M1\_Discovery\_System/iNEMO\_AHRS\_v121" folder.

In the iNEMO\_AHRS\_v121 folder, the AHRS library is available in \*.lib format (iNemo\_M1\_AHRS\_Lib\_v121.lib) and in \*.dfu and \*.hex file format contained in the BINARY folder (*Figure 1*).

Figure 1. iNEMO\_M1\_AHRS\_lib folder



The AHRS algorithm can be included in the user firmware using the pre-compiled library in \*.lib format. or it can be downloaded to the board using the binary file \*.dfu or \*.hex.

The algorithm is preloaded in the Discovery-M1 Flash memory, but it is not included in the Discovery-M1 kit. The binary files, available on the STEVAL-MKI121CD1 CD, can be used to recover the AHRS algorithm, in case of Flash memory erasure.

The binary files can be loaded using an in-circuit programmer (like the ST-Link/V2 hardware tool) or through DFU (device firmware upgrade) via the USB interface.

In the first case, using the ST-Link/V2 tool, the user must install the ST-Link Utility tool and load the \*.hex file, following these steps:

- Connect the ST-Link/V2 tool to the Discovery-M1
- Power the Discovery-M1 through a USB cable
- Open the ST-Link Utility
- Select Target/Connect
- Select Target/Program & Verify...
- Browse the \*.hex and click start

In the second case, to load the binary file via the USB interface enter DFU mode<sup>(a)</sup> on the Discovery-M1 and upgrade the firmware using the \*.dfu using:

- DfuSe Demonstration software
- iNEMO Suite GUI

To upgrade the firmware with the iNEMO Suite GUI, select "Tools/Communication/Firmware upgrade..." from the main toolbar.

*Note:* Refer to UM0412 for more information on DfuSe Demonstration. ST-Link Utility and DfuSe. Demonstration drivers are available on [www.st.com](http://www.st.com). The iNEMO Suite is also available on [www.st.com](http://www.st.com), as well as in the STEVAL-MKI121V1 kit.

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a. The DFU firmware is preloaded in the Discovery-M1 Flash memory. If the INEMO-M1 Flash memory is erased, the DFU firmware must be downloaded again to enter DFU mode. The DFU firmware is included in the Discovery-M1 Firmware package available on the ST web site.

## 2 Revision history

Table 1. Document revision history

Date	Revision	Changes
24-May-2013	1	Initial release.

Obsolete Product(s)  
**DRAFT**  
Obsolete Product(s)

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