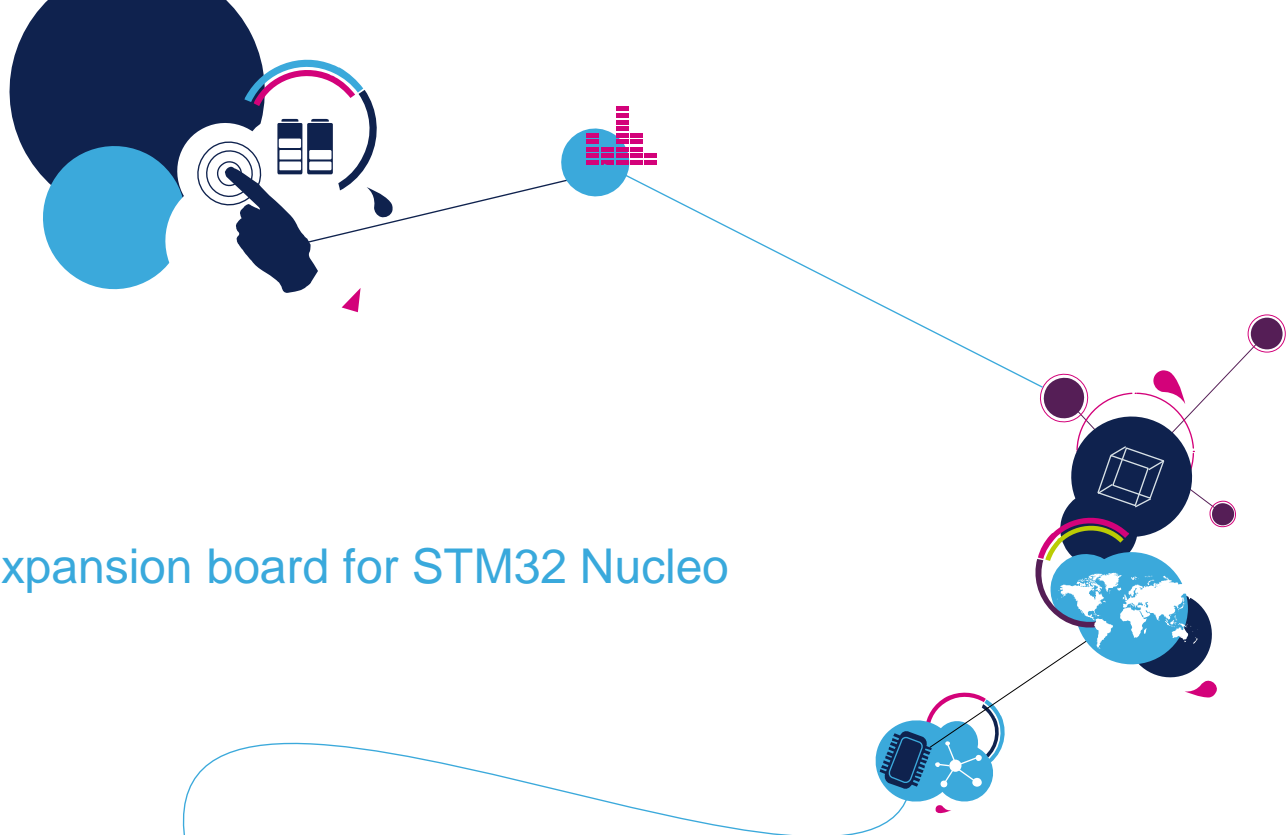


Quick Start Guide

Motor control connector expansion board for STM32 Nucleo
(X-NUCLEO-IHM09M1)



1

Introduction to the STM32 Open Development Environment

2

STM32 Nucleo motor control connector expansion board

- Hardware overview

3

Documents & Related Resources

4

Setup

1

Introduction to the STM32 Open Development Environment

2

STM32 Nucleo motor control connector expansion board

- Hardware overview

3

Documents & Related Resources

4

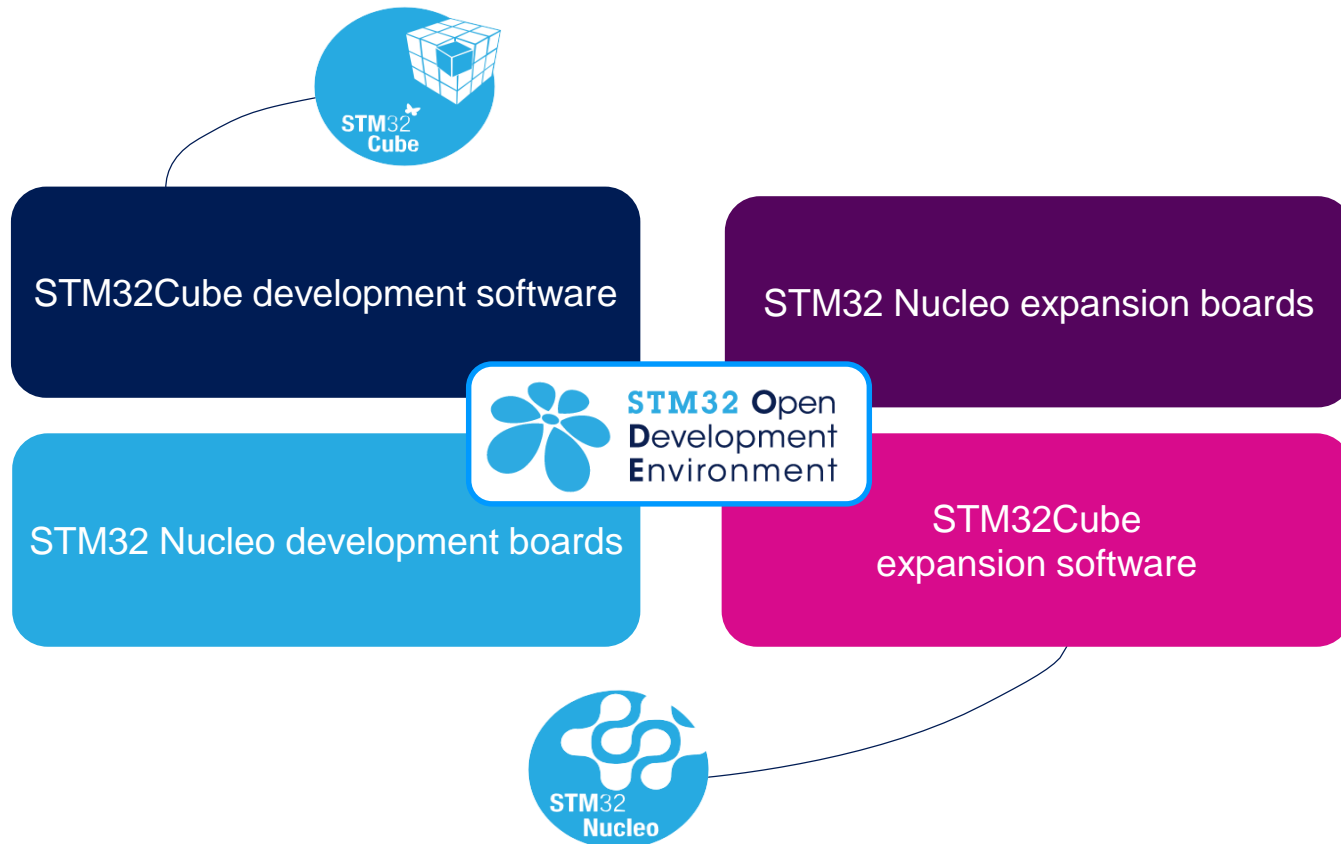
Setup

STM32 Open Development Environment

Fast, affordable Prototyping and Development

4

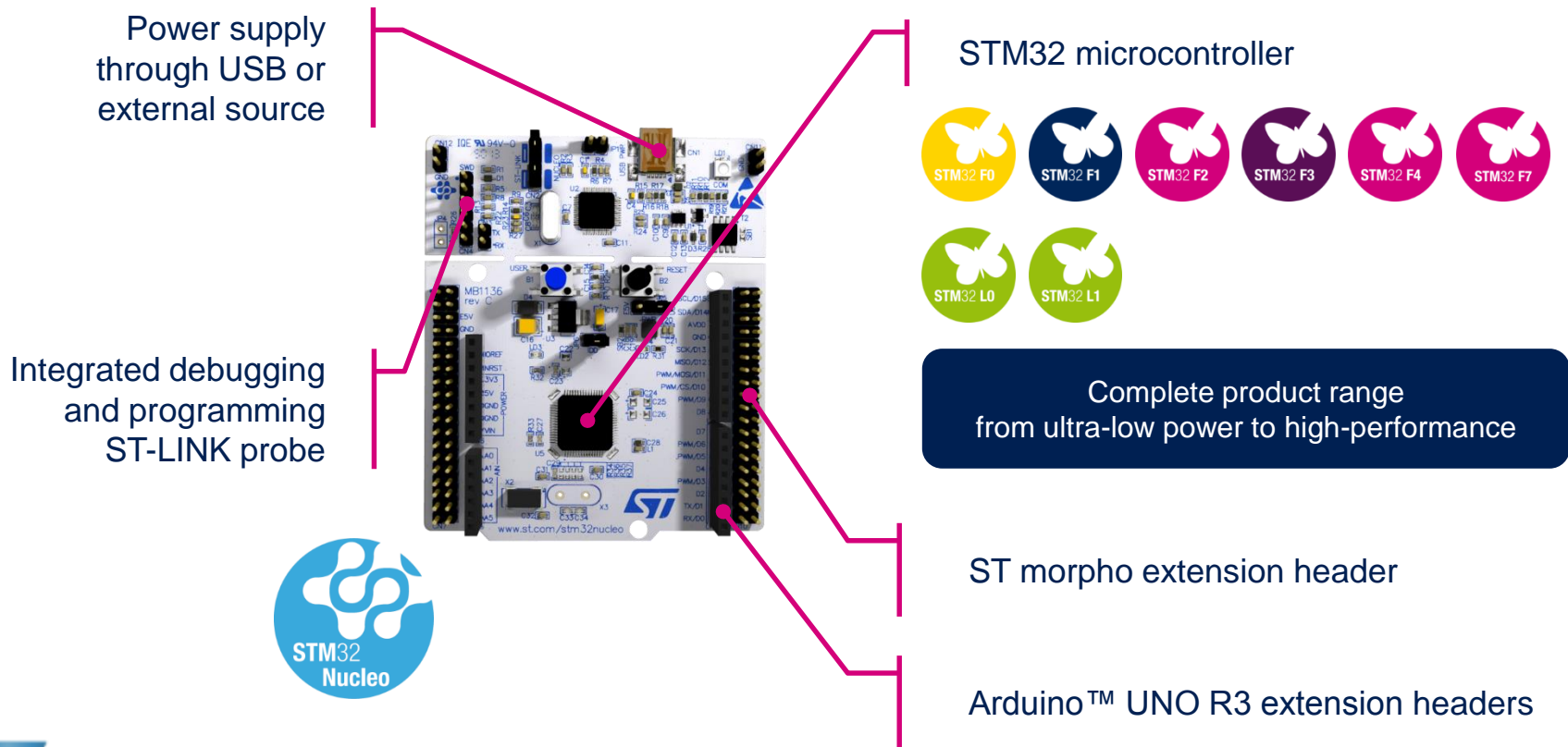
- The STM32 Open Development Environment (ODE) consists of a set of stackable boards and a modular open SW environment designed around the STM32 microcontroller family.



Compatibility with multiple Development environments

STM32 Nucleo Development Boards (NUCLEO)

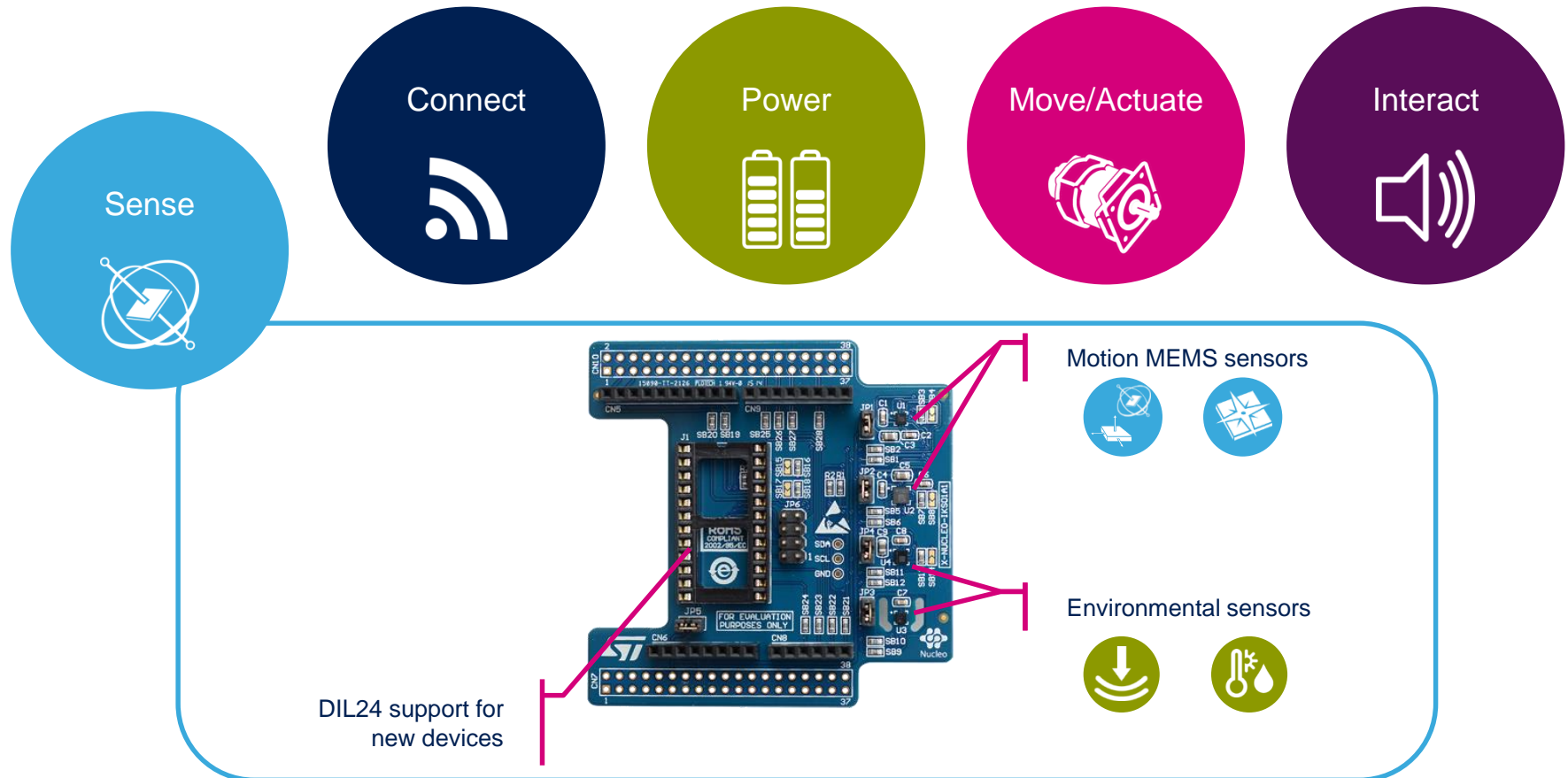
- A comprehensive range of affordable development boards for all the STM32 microcontroller series, with unlimited unified expansion capabilities and integrated debugger/programmer functionality.



STM32 Nucleo Expansion Boards (X-NUCLEO)

6

- Boards with additional functionality that can be plugged directly on top of the STM32 Nucleo development board directly or stacked on another expansion board.



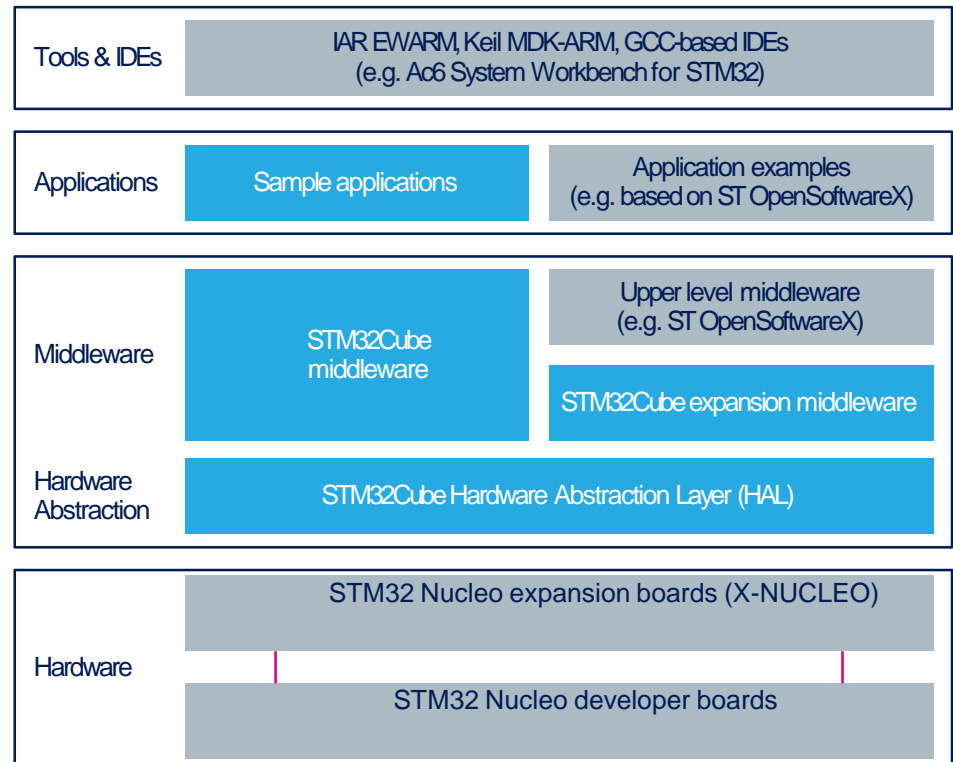
Example of STM32 expansion board (X-NUCLEO-IKS01A1)

STM32 Open Development Environment

Software components

7

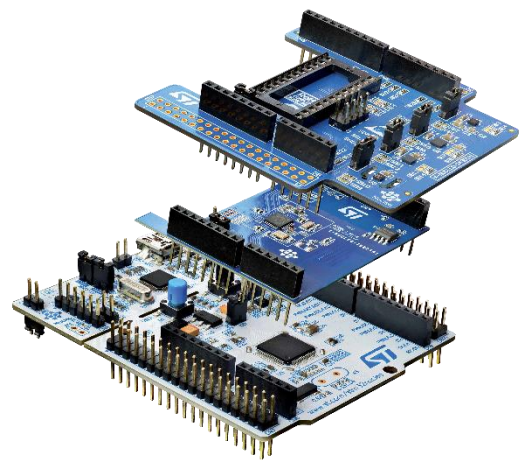
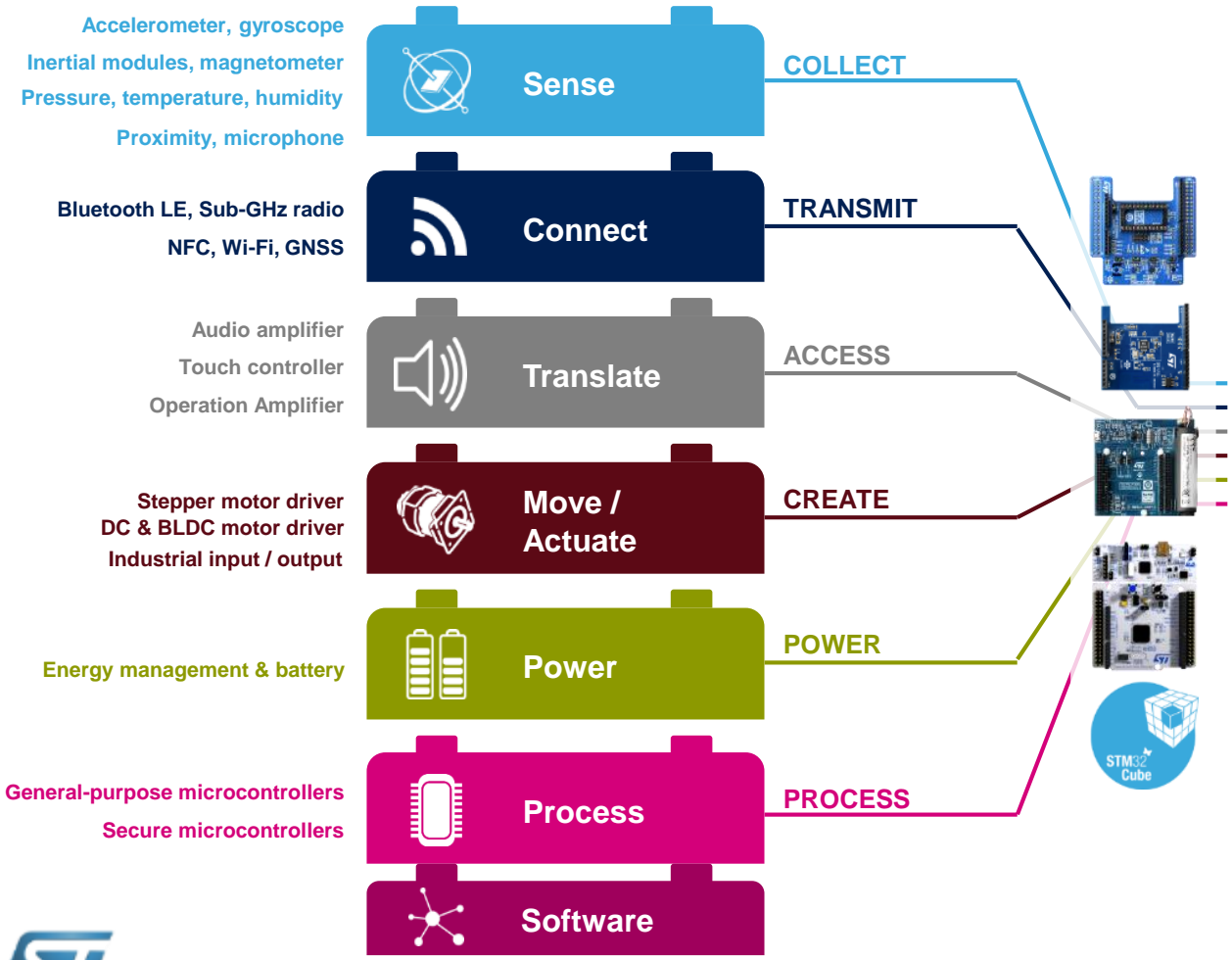
- **STM32Cube software (CUBE)** - A set of free tools and embedded software bricks to enable fast and easy development on the STM32, including a Hardware Abstraction Layer and middleware bricks.
- **STM32Cube expansion software (X-CUBE)** - Expansion software provided free for use with the STM32 Nucleo expansion board and fully compatible with the STM32Cube software framework. It provides abstracted access to expansion board functionality through high-level APIs and sample applications.



- **Compatibility with multiple Development Environments** - The STM32 Open Development Environment is compatible with a number of IDEs including IAR EWARM, Keil MDK, and GCC-based environments. Users can choose from three IDEs from leading vendors, which are free of charge and deployed in close cooperation with ST. These include Eclipse-based IDEs such as Ac6 System Workbench for STM32 and the MDK-ARM environment.

STM32 Open Development Environment

Building block approach



1

Introduction to the STM32 Open Development Environment

2

STM32 Nucleo motor control connector expansion board

- Hardware overview

3

Documents & Related Resources

4

Setup

Motor control connector expansion board

Hardware Overview

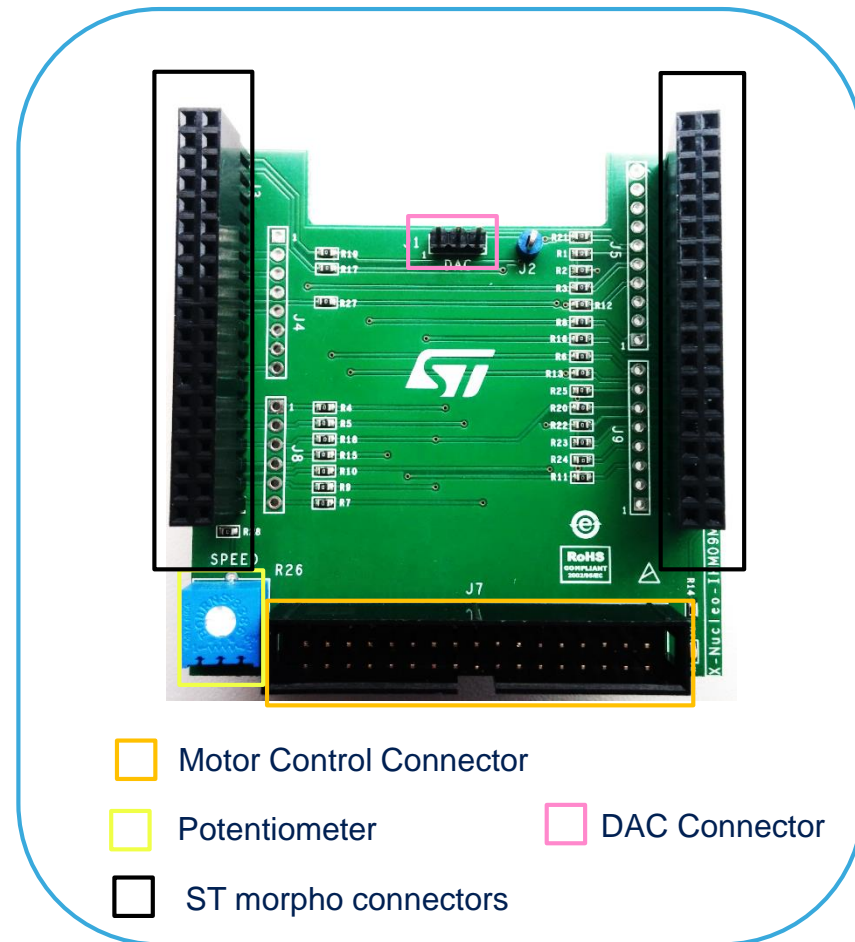
10

X-NUCLEO-IHM09M1 Hardware description

- The X-NUCLEO-IHM09M1 is a motor control connector expansion board for STM32 Nucleo. It provides an easy way to evaluate motor control solutions for three-phase motors by adapting the STM32 Nucleo board with an external ST motor control power board, thanks to ST morpho and motor control connector. The 34-pin motor control connector is compatible with all major ST motor control power boards, requiring an external digital section (MCU) to drive a three-phase motor. The DAC connector supports user code development and testing with easy access to the MCU peripherals. An LED is available for fault condition signaling or status indication. A potentiometer is available for speed reference.

Main features:

- ST motor control connector (34 pins) compatible with major ST motor control power boards
- STM32 Nucleo support, thanks to ST morpho connectors
- Compatible with six-step and FOC motor control firmware library by ST
- Debug connector for DAC, GPIOs, etc.
- Fully populated board conception with test points
- LED for fault signaling or status indication
- Potentiometer available (i.e. for speed reference)
- RoHS compliant



Order Code: X-NUCLEO-IHM09M1

Latest info available at
[X-NUCLEO-IHM09M1](#)

1

Introduction to the STM32 Open Development Environment

2

STM32 Nucleo motor control connector expansion board

- Hardware overview

3

Documents & Related Resources

4

Setup

All documents are available in the Design Resources tab of the motor control connector expansion board webpage

X-NUCLEO-IHM09M1: Product webpage ([Link](#))

- **Gerber files, BOM, Schematic**
- **DB2721:** Motor control connector expansion board for STM32 Nucleo – **Data Brief**
- **UM1970:** Getting started with X-NUCLEO-IHM09M1 motor control connector expansion board for STM32 Nucleo – **User Manual**

The screenshot shows the 'Design Resources' page for the X-NUCLEO-IHM09M1. It features a 'Quick Links' dropdown menu set to 'Product Specifications'. The page is organized into several sections:

- Technical Documentation:** Contains a table for 'Product Specifications' with columns for 'Description', 'Version', and 'Size'. It lists 'DB2721: Motor control connector expansion board for STM32 Nucleo' with version 1.0 and a size of 498 KB.
- User Manual:** Contains a table for 'User Manual' with columns for 'Description', 'Version', and 'Size'. It lists 'UM1970: Getting started with the X-NUCLEO-IHM09M1 motor control connector expansion board for STM32 Nucleo' with version 1.0 and a size of 1,462 KB.
- Hardware Resources:** Contains a table for 'Board Manufacturing Specification' with columns for 'Description', 'Version', and 'Size'. It lists 'X-NUCLEO-IHM09M1 gerber files' with version 1.0 and a size of 119 KB.
- Bill of Materials:** Contains a table for 'Bill of Materials' with columns for 'Description', 'Version', and 'Size'. It lists 'X-NUCLEO-IHM09M1 BOM' with version 1.0 and a size of 24 KB.
- Schematic Pack:** Contains a table for 'Schematic Pack' with columns for 'Description', 'Version', and 'Size'. It lists 'X-NUCLEO-IHM09M1 schematic' with version 1.0 and a size of 95 KB.

1

Introduction to the STM32 Open Development Environment

2

STM32 Nucleo motor control connector expansion board

- Hardware overview

3

Documents & Related Resources

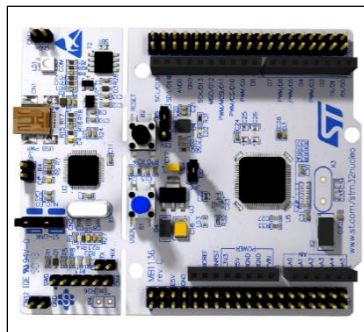
4

Setup

A generic motor control system can be schematized in three major blocks

- **Control block** - its main task is to accept user commands and provide motor control signals to drive a motor. The X-NUCLEO-IHM09M1 is an adapter usefully to connect a STM32 Nucleo board with power board that required an external digital section
- **Power block** - it is normally based on 3-phase inverter topology and it is the heart of the power which contains all the necessary active power and analog components to perform a low voltage PMSM/BLDC motor control.
- **Motor** - 3 phase brushless motor.

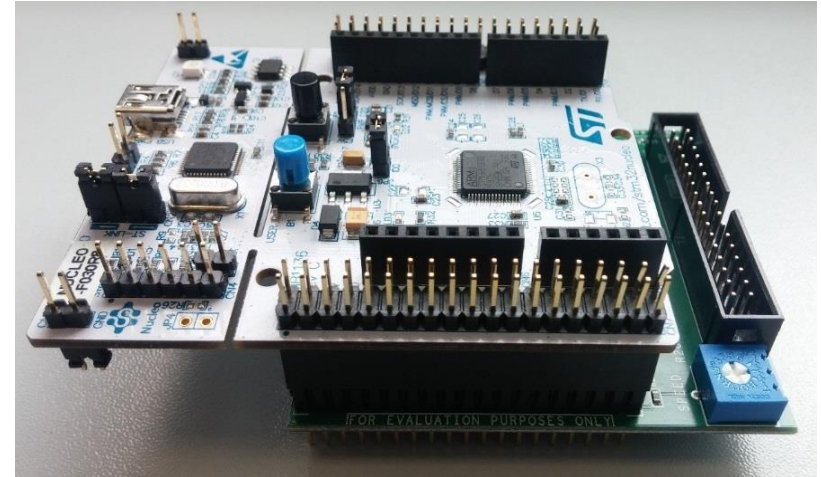
Control block

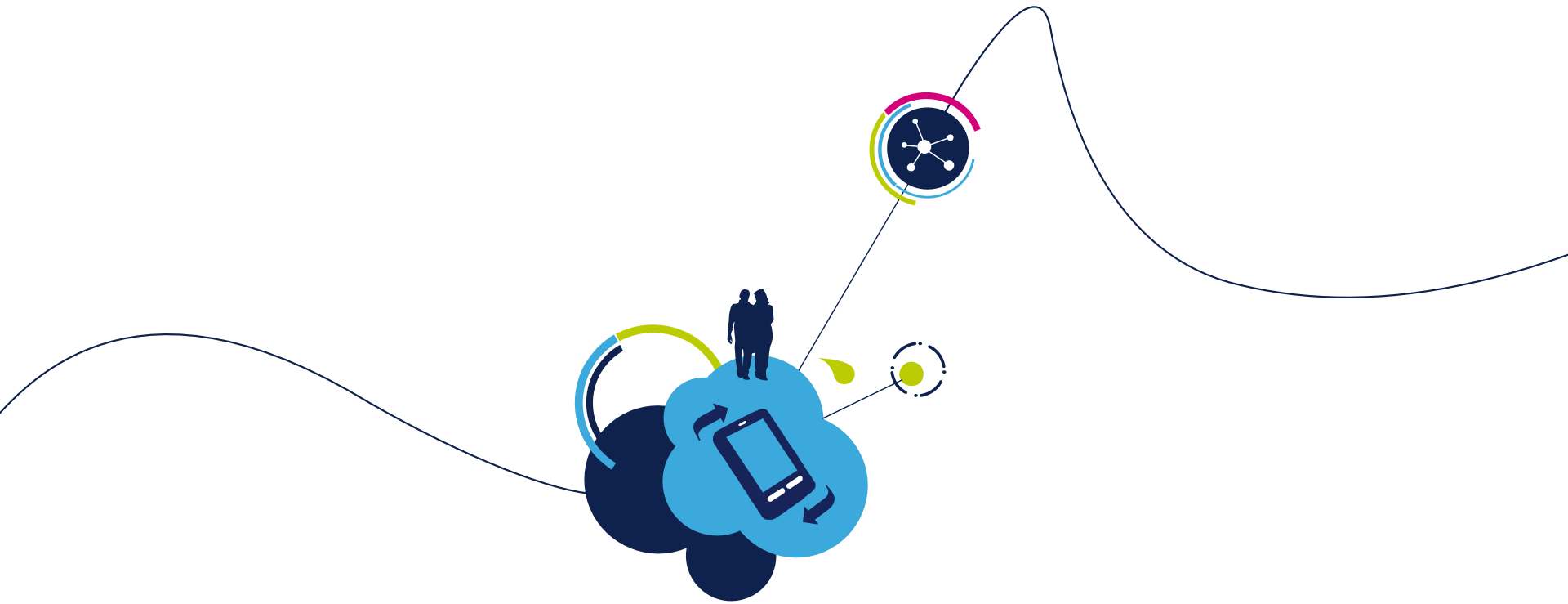
Motor control
connector

X-NUCLEO-IHM09M1

Motor Control
Power block

- The X-NUCLEO-IHM09M1 adapts the STM32 Nucleo to the ST motor control power boards requiring an external digital section to perform a three-phases PMSM/BLDC Motor control. For a regular board operating, it must be plugged on a STM32 Nucleo board (Control block) through the ST morpho connector
- The interconnection between the STM32 Nucleo board and the X-NUCLEO-IHM09M1 expansion board has been designed for a full-compatibility with a lot of STM32 Nucleo boards and no modification of solder bridges is required. The solution stacked is ready to be operating with the connection of power board compatible with a standard 34 pins flat cable.





www.st.com/stm32ode