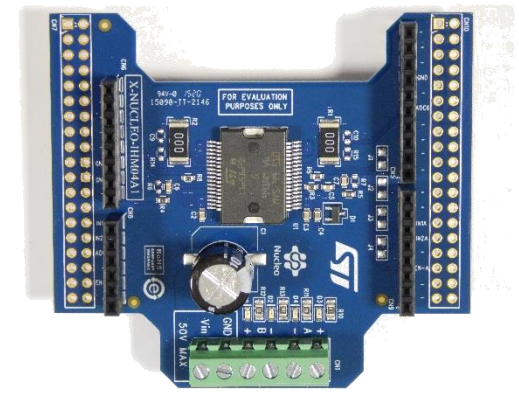
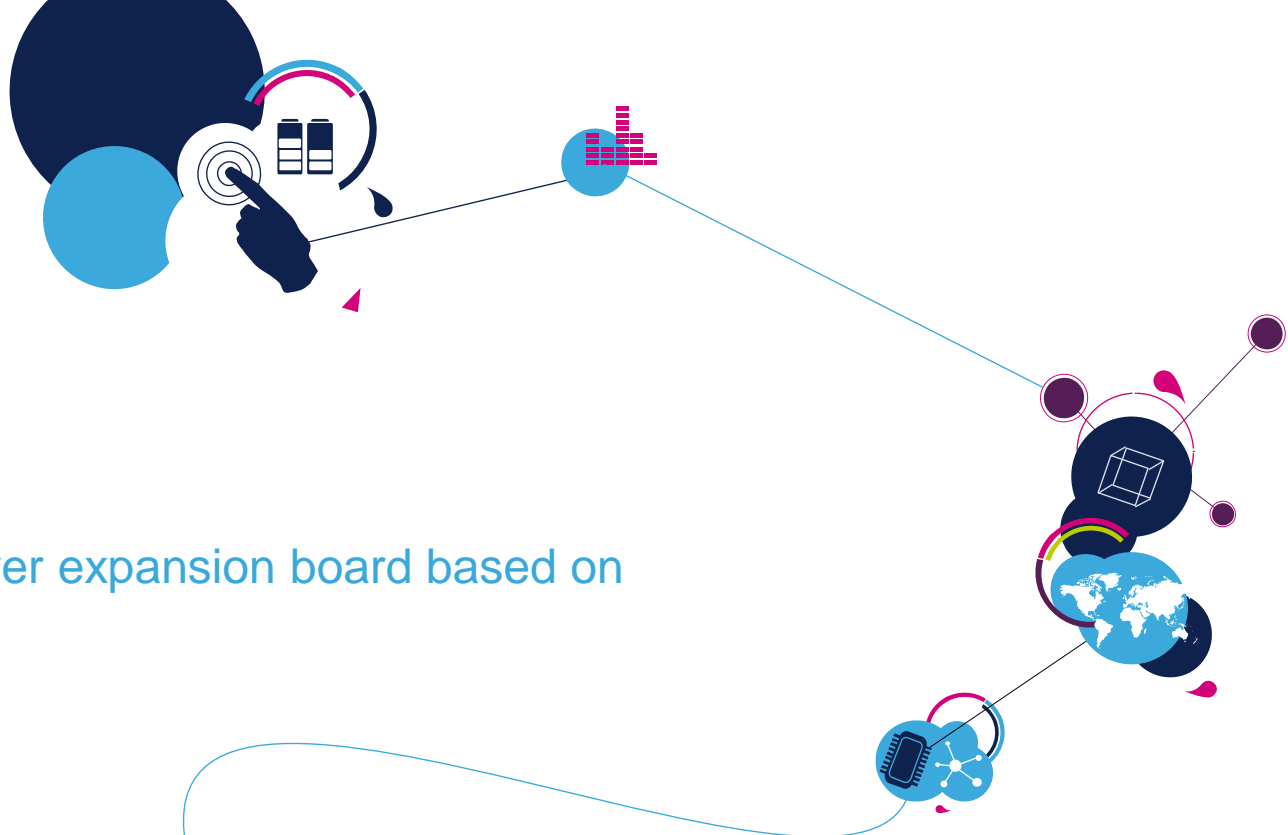


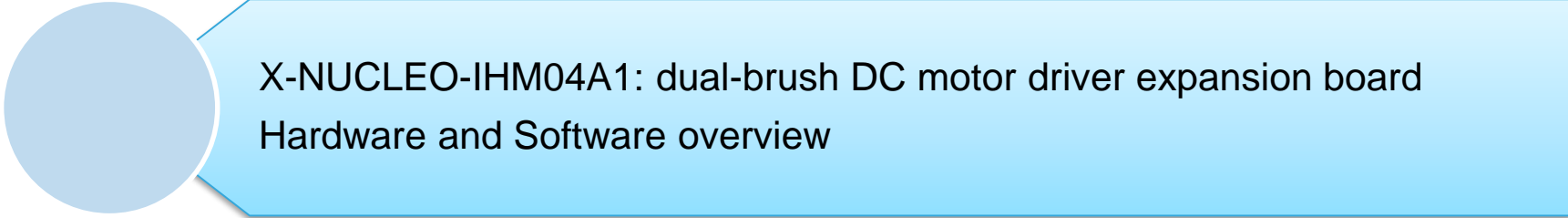
Quick start guide

Dual-brush DC motor driver expansion board based on L6206 for STM32 Nucleo (X-NUCLEO-IHM04A1)




Version 1.1.0 (May 16, 2016)

Quick Start Guide Contents



X-NUCLEO-IHM04A1: dual-brush DC motor driver expansion board
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Hardware overview

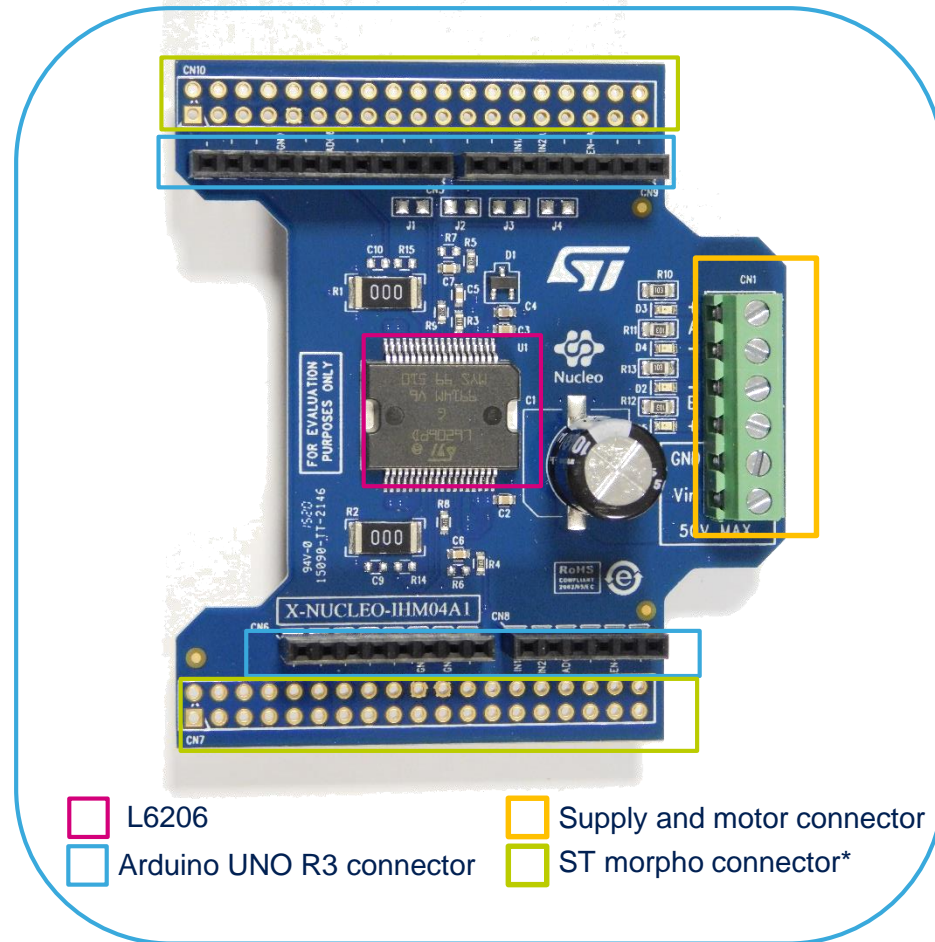
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X-NUCLEO-IHM04A1 Hardware Description

- The X-NUCLEO-IHM04A1 is a dual full-bridge for a dual-bipolar DC or quad-unipolar DC motor driver expansion board based on the L6206 for STM32 Nucleo.
- It provides an affordable and easy-to-use solution for driving dual-brush DC motors in your STM32 Nucleo project.
- The X-NUCLEO-IHM04A1 is compatible with the Arduino UNO R3 connector, and supports the addition of other expansion boards with a single STM32 Nucleo board.

Key Products on board

L6206
DMOS dual full-bridge driver



Latest info available at www.st.com
X-NUCLEO-IHM04A1

(* Not mounted)

Dual-brush DC motor driver expansion board

Software overview

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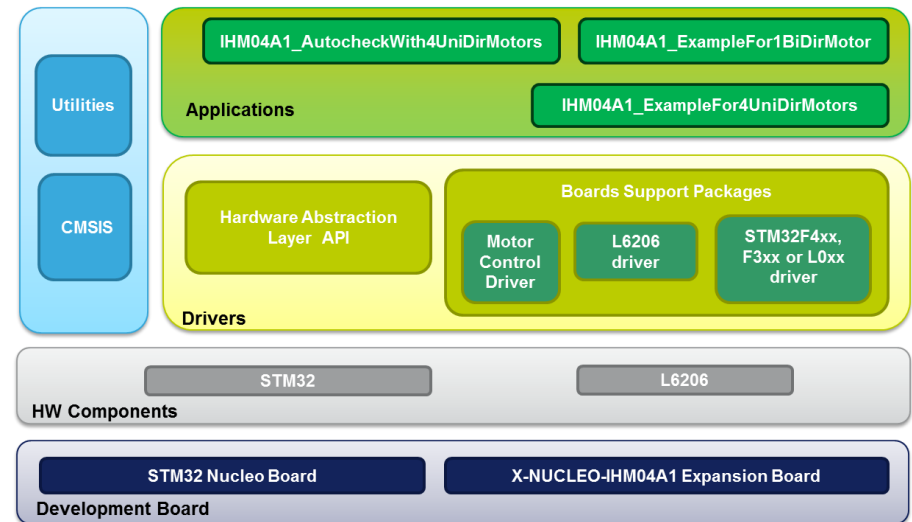
X-CUBE-SPN4 Software Description

- This software running on the STM32 completely manages the L6206 for the control of dual-brush DC motors. It is built on top of the STM32Cube software technology that eases portability across different STM32 microcontrollers.

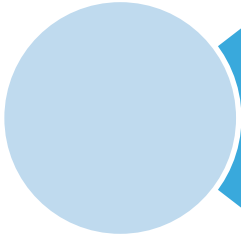
Key features

- Driver layer for complete management of the L6206 (DMOS dual full bridge driver) which is integrated on the X-NUCLEO-IHM04A1 expansion board
- Examples to control one bidirectional brush DC motor or 4 unidirectional brush DC motors
- Easy portability across different MCU families thanks to STM32Cube

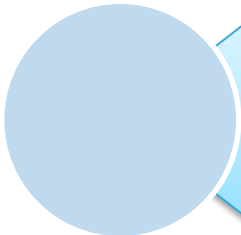
Overall Software Architecture



Latest info available at www.st.com
X-CUBE-SPN4



X-NUCLEO-IHM04A1: dual-brush DC motor driver expansion board
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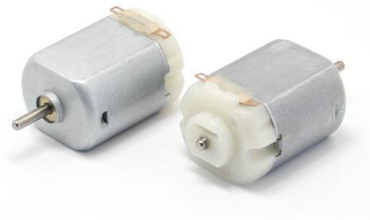
- 1 x STM32 Nucleo development board
(**NUCLEO-F401RE** or **NUCLEO-F334R8** or **NUCLEO-L053R8**)
- 1 x Dual-brush DC motor driver expansion board
(**X-NUCLEO-IHM04A1**)
- 1 x One or four dual-brush DC motors according to the target setup
- 1x Laptop/PC with MS Windows 7 or 8
- 1 x external DC power supply with two electric cables (*)
- 1 x USB type A to mini-B USB cable



NUCLEO-F401RE
NUCLEO-F334R8
NUCLEO-L053R8



Mini USB Cable



Dual-brush DC motor



X-NUCLEO-IHM04A1

Setup & demo examples

Software prerequisites

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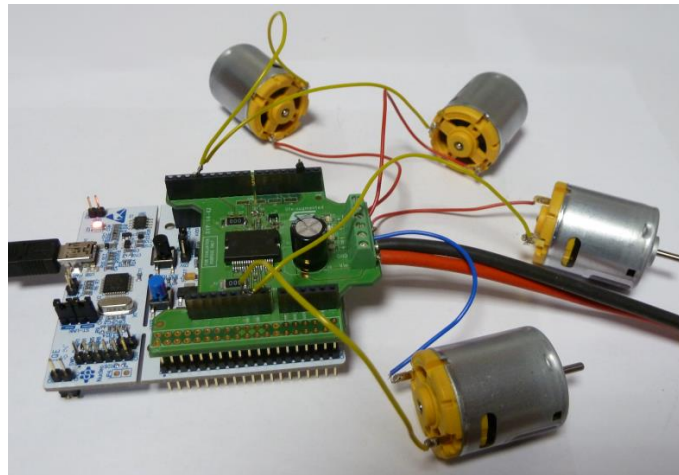
- **STSW-LINK008:** ST-LINK/V2-1 USB driver
- **STSW-LINK007:** ST-LINK/V2-1 firmware upgrade
- A Windows PC with one of the supported development tool chains:
 - KEIL: MDK-ARM
 - IAR: EWARM
 - AC6 System Workbench for STM32 : SW4STM32
- A Linux or Mac OSX computer with the supported development tool chains:
 - AC6 System Workbench for STM32 : SW4STM32
- **X-CUBE-SPN4:** firmware

Dual-brush DC motor driver expansion board

Start coding in just a few minutes with X-CUBE-SPN4

Driving a four-brush DC motor with X-NUCLEO-IHM04A1 and X-CUBE-SPN4

- 1 Set the X-NUCLEO-IHM04A1 configuration jumpers as follows:
 - J1, J2, J3 and J4 → Open
- 2 Plug the X-NUCLEO-IHM04A1 on the STM32 Nucleo board through the Arduino UNO R3 connector and connect the each brush DC motor between one of the power outputs (A+/- and B+/-) and ground. Connect the power supply (Vin\Gnd) to the CN1 connector.
- 3 Connect the STM32 Nucleo board to the PC through the USB cable.



Dual-brush DC motor driver expansion board

Start coding in just a few minutes with X-CUBE-SPN4

- 4 Depending on the STM32 Nucleo board, from the examples folder (`\stm32_cube\Projects\Multi\Examples\MotionControl\NHM04A1_ExampleFor4UniDirMotors`) open the software project from:
 - `\YourToolChainName\STM32F401RE-Nucleo` for Nucleo based on **STM32F401RE**
 - `\YourToolChainName\STM32F334R8-Nucleo` for Nucleo based on **STM32F334R8**
 - `\YourToolChainName\STM32L053R8-Nucleo` for Nucleo based on **STM32L053R8**
- 5 Open the file: `stm32_cube\Drivers\BSP\Components\I6206\I6206_target_config.h`. and modify the parameters according your target configuration.
- 6 Build the project and download it into the STM32 memory.
- 7 Run the example. The motor automatically starts. (See main.c file for the detailed demo sequence.)

Dual-brush DC motor driver expansion board

Start coding in just a few minutes with X-CUBE-SPN4

Driving a one-brush DC motor in Parallel mode with X-NUCLEO-IHM04A1 and X-CUBE-SPN4

- 1 Set the X-NUCLEO-IHM04A1 configuration jumpers as following:
 - J1 → Closed (1A and 2A in parallel)
 - J2 → Closed (1B and 2B in parallel)
 - J3 and J4 → Open
- 2 Plug the X-NUCLEO-IHM04A1 on the STM32 Nucleo board through the Arduino UNO R3 connector and connect the the brush DC motor between one of the A+/- and B+/- power outputs. Connect the power supply (Vin\Gnd) to the CN1 connector.
- 3 Connect the STM32 Nucleo board to the PC through the USB cable.

Dual-brush DC motor driver expansion board

Start coding in just a few minutes with X-CUBE-SPN4

- 4 Depending on the STM32 Nucleo board, from the examples folder (`\stm32_cube\Projects\Multi\Examples\MotionControl\NHM04A1_ExampleFor1BiDirMotor`) open the software project from:
 - \YourToolChainName\STM32F401RE-Nucleo for Nucleo based on **STM32F401RE**
 - \YourToolChainName\STM32F334R8-Nucleo for Nucleo based on **STM32F334R8**
 - \YourToolChainName\STM32L053R8-Nucleo for Nucleo based on **STM32L053R8**
- 5 Open the file: `stm32_cube\Drivers\BSP\Components\I6206\I6206_target_config.h`. and modify the parameters according your target configuration.
- 6 Build the project and download it into the STM32 memory.
- 7 Run the example. The motor automatically starts. (See main.c file for the detailed demo sequence.)

Documents & related design resources

All documents are available in the DESIGN tab of the related products webpage

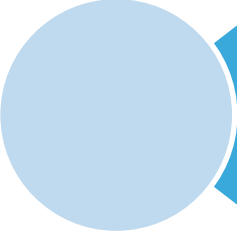
X-NUCLEO-IHM04A1:

- Gerber files, BOM, and schematics
- **DB2633**: Dual-brush DC motor driver expansion board based on L6206 for STM32 Nucleo – **Data brief**
- **UM1925**: Getting started with the X-NUCLEO-IHM04A1 dual-brush DC motor driver expansion board for STM32 Nucleo – **User manual**

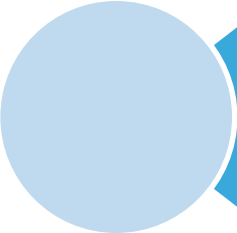
X-CUBE-SPN4:

- **DB2636**: Dual-brush DC motor driver software expansion for STM32Cube – **Data brief**
- **UM1929**: Getting started with the X-CUBE-SPN4 dual-brush DC motor driver software expansion for STM32Cube – **User manual**
- Software setup file

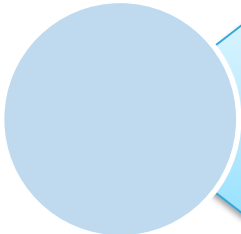
Consult www.st.com for the complete list



X-NUCLEO-IHM04A1: dual-brush DC motor driver expansion board
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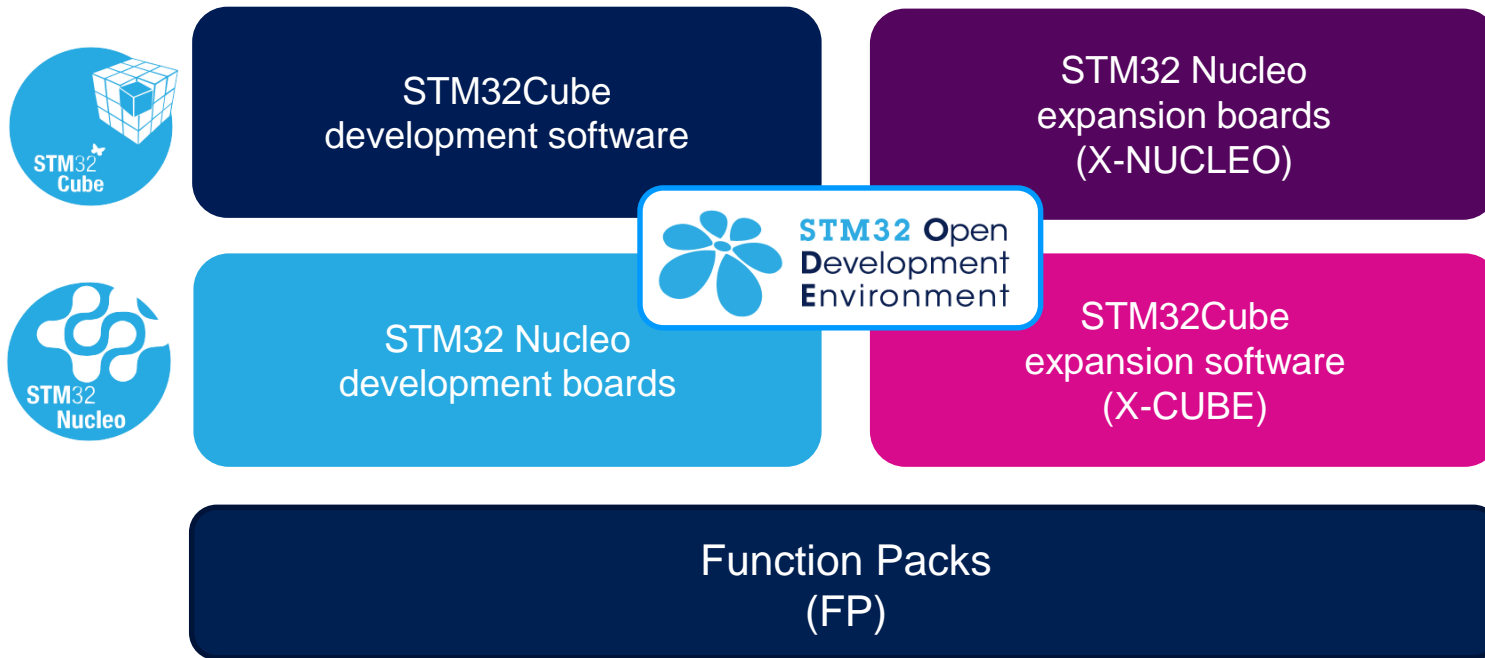


STM32 Open Development Environment: Overview

STM32 Open Development Environment

Fast, affordable Prototyping and Development

- 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.

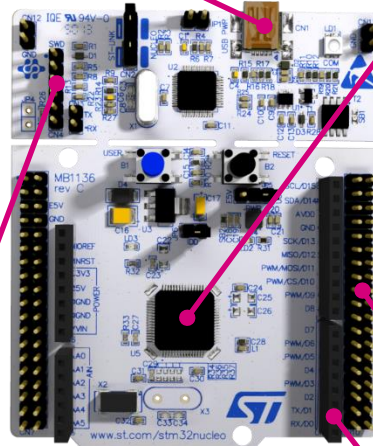


Development Boards (NUCLEO)

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

Power supply through USB or external source

Integrated debugging and programming ST-LINK probe



STM32 microcontroller



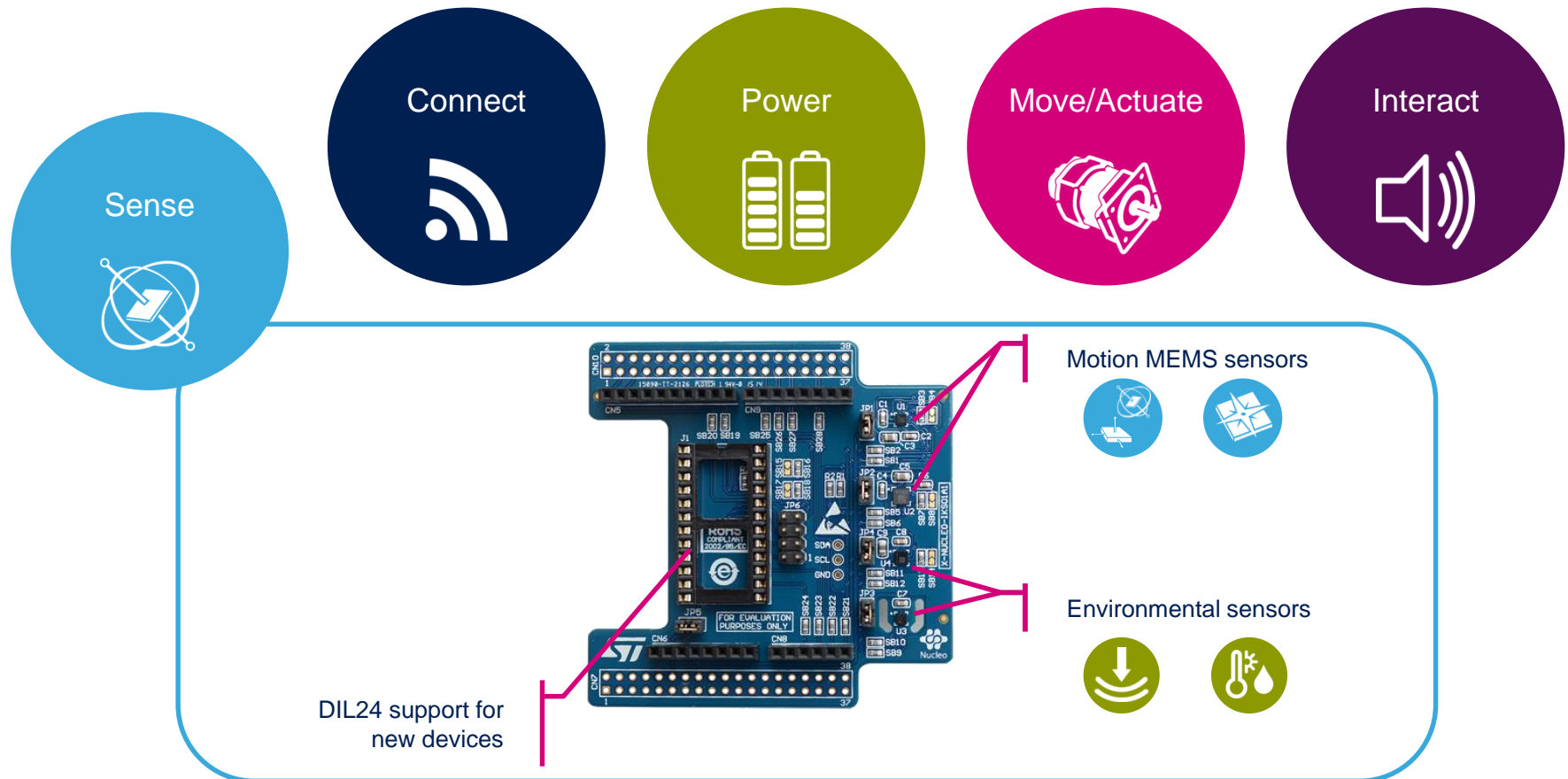
Complete product range from ultra-low power to high-performance

ST morpho extension header

Arduino™ UNO R3 extension headers

Expansion Boards (X-NUCLEO)

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



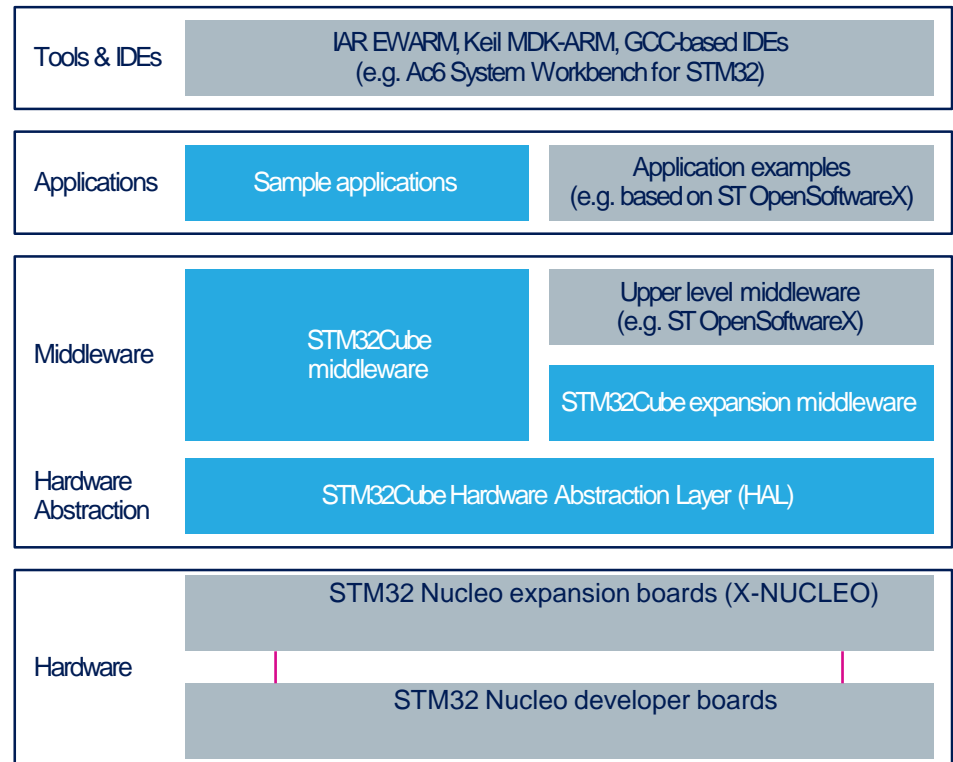
Example of STM32 expansion board (X-NUCLEO-IKS01A1)

STM32 Open Development Environment

Software components

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- **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.



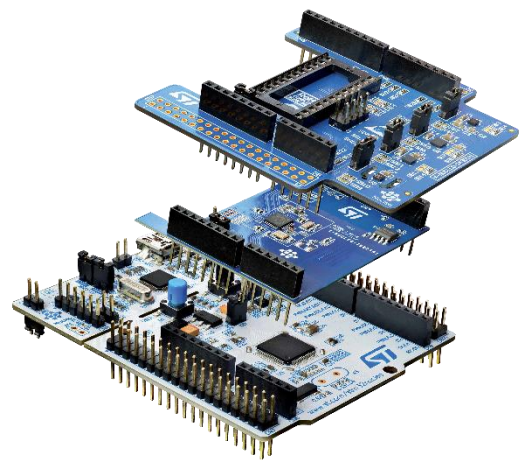
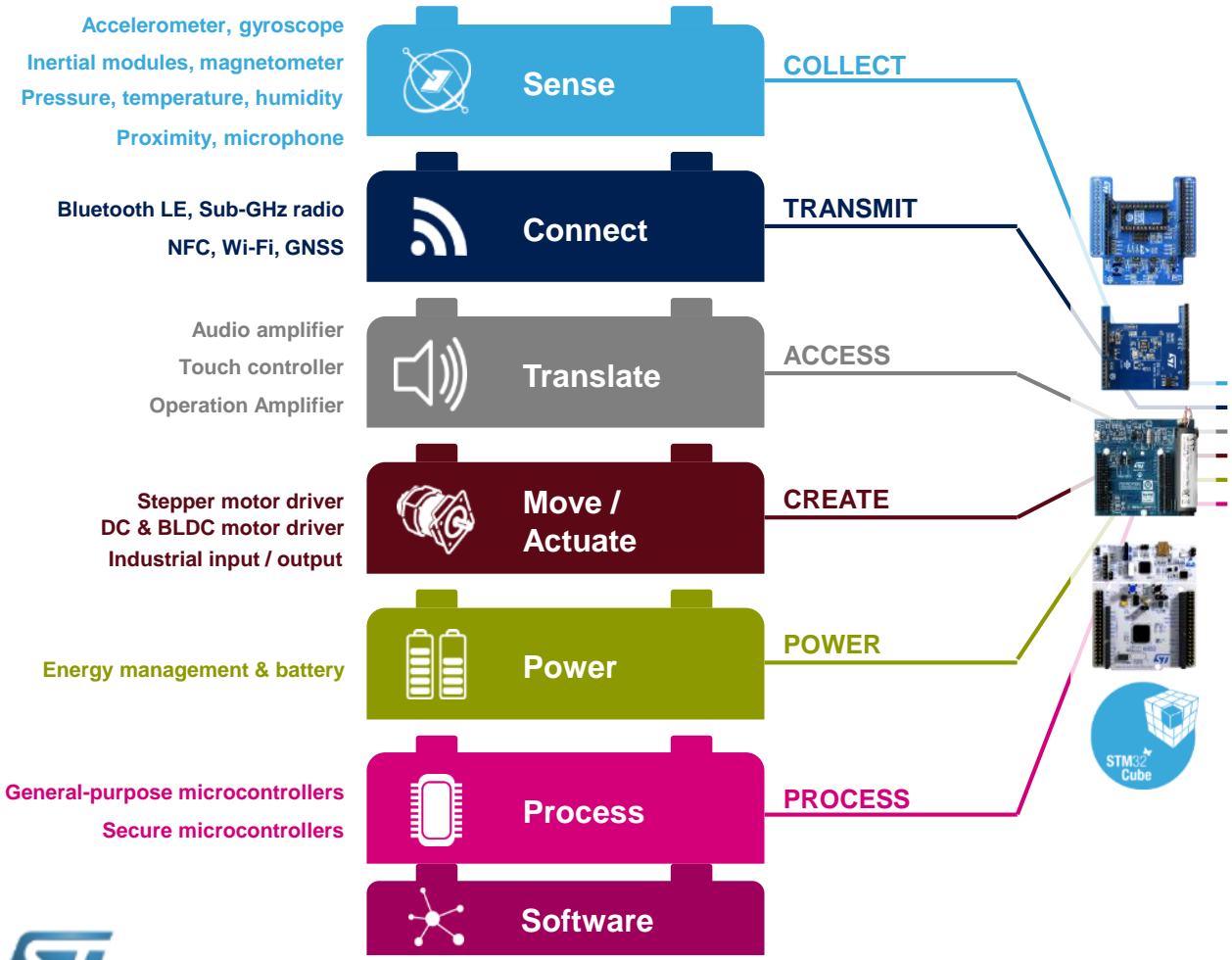
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STM32 Open Development Environment

Building block approach



www.st.com/stm32code

