

# Quick Start Guide

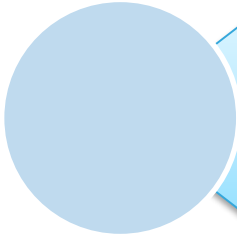
Low voltage dual brush DC motor driver expansion board  
based on STSPIN240 for STM32 Nucleo

(X-NUCLEO-IHM12A1)



Version 1.0.0 (Oct 6, 2016)

# Quick Start Guide Contents



X-NUCLEO-IHM12A1: Low voltage dual brush DC motor driver expansion board

Hardware and Software overview



Setup & Demo Examples

Documents & Related Resources



STM32 Open Development Environment: Overview

# Low voltage dual brush DC motor driver expansion board

## X-NUCLEO-IHM12A1 hardware description

- The X-NUCLEO-IHM12A1 is a low voltage dual brush DC motor driver expansion board based on the STSPIN240 for STM32 Nucleo. It provides an affordable and easy-to-use solution for the implementation of portable motor driving applications such as thermal printers, robotics and toys. Thanks to its programmable current limiter and its complete set of protection features, it offers high levels of performance and robustness.
- The X-NUCLEO-IHM12A1 is compatible with the Arduino UNO R3 connector and most STM32 Nucleo boards.

## Key features

- Low voltage range from 1.8 V to 10 V
- Current up to 1.3 A<sub>RMS</sub>
- Current control with adjustable off-time
- Full protection overcurrent and short-circuit protection
- Low RDS(ON) power stage (HS + LS = 0.4 Ω typ.)
- Thermal shutdown
- Compatible with Arduino UNO R3 connector
- Compatible with STM32 Nucleo boards
- Connection for two independent DC motors
- RoHS compliant

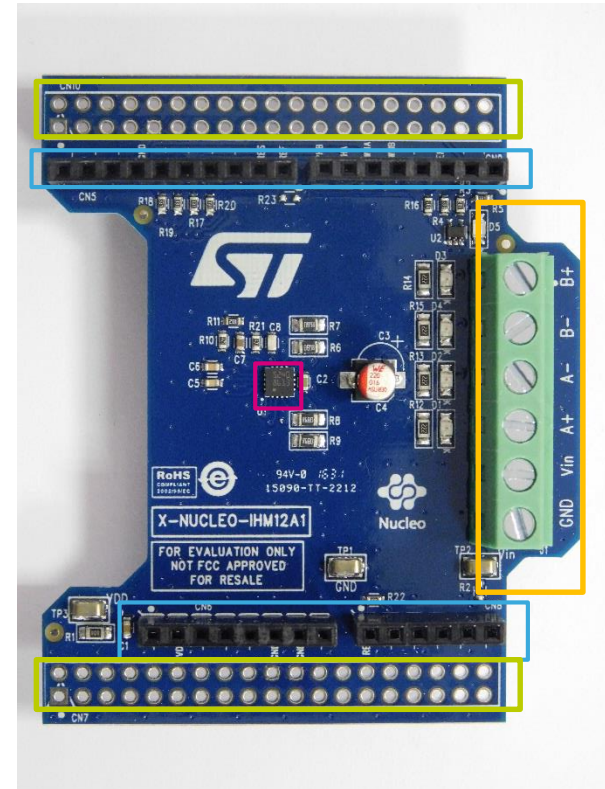
## Key product on board

**STSPIN240:** low voltage dual brush DC motor driver



## Hardware overview

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- STSPIN240
- Supply and motor connector
- Arduino UNO R3 connector
- ST morpho connector\*

(\* ) Not mounted

Latest info available at [www.st.com](http://www.st.com)  
**X-NUCLEO-IHM12A1**

# Low voltage dual brush DC motor driver expansion board

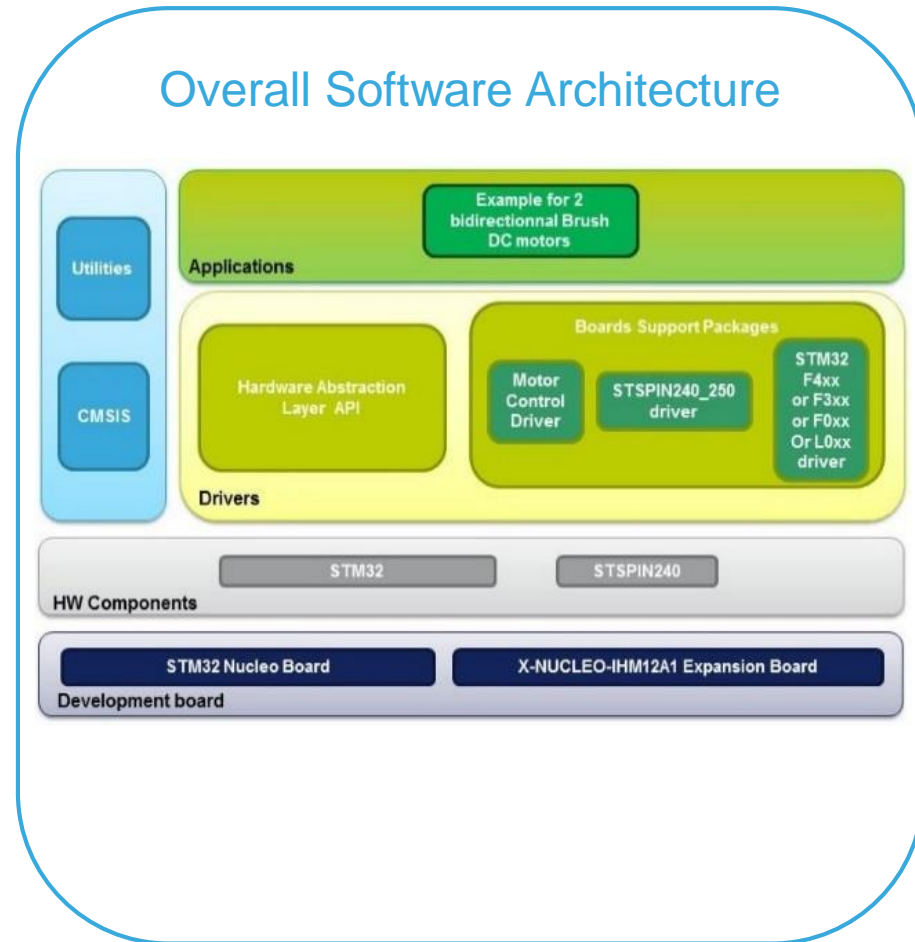
## Software overview

### X-CUBE-SPN12 software description

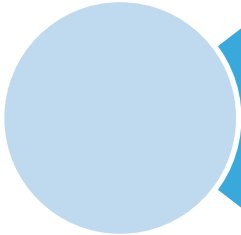
- The X-CUBE-SPN12 is an expansion software package for STM32Cube. The software runs on the STM32 Nucleo providing management of STSPIN240 to control low voltage dual brush DC motors. The expansion is built on STM32Cube software technology to ease portability across different STM32 microcontrollers. It is compatible with the NUCLEO-F401RE, NUCLEO-F334R8, NUCLEO-F030R8 or NUCLEO-L053R8 boards connected to an X-NUCLEO-IHM12A1 expansion board. The software comes with a sample implementation driving two bidirectional low voltage dual brush DC motors.

### Key features

- Driver layer for complete management of the STSPIN240 low voltage dual brush DC motor driver
- Example implementation to control up to two bidirectional brush DC motors, available on NUCLEO-F401RE, NUCLEO-F334R8, NUCLEO-F030R8 or NUCLEO-L053R8 when connected to one X-NUCLEO-IHM12A1 expansion board
- Easy portability across different MCU families, thanks to STM32Cube
- Free, user-friendly license terms

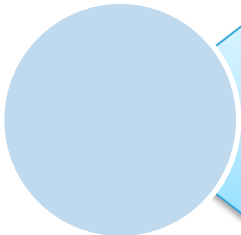


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# Setup & Demo Examples

## HW prerequisites

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- 1x Low voltage dual brush DC motor driver expansion board (**X-NUCLEO-IHM12A1**)
- 1x STM32 Nucleo development board (**NUCLEO-F401RE** or **NUCLEO-F334R8** or **NUCLEO-F030R8** or **NUCLEO-L053R8**)
- 1 to 2 low voltage dual brush DC motors
- An external DC power supply with two electric cables (\*)
- Laptop/PC with Microsoft Windows™ 7 and above
- 1x USB type A to mini-B USB cable



NUCLEO-F401RE  
NUCLEO-L053R8  
NUCLEO-F334R8  
NUCLEO-F030R8



Mini USB Cable



Low voltage dual brush  
DC motor



X-NUCLEO-IHM12A1

# Setup & demo examples

## SW prerequisites

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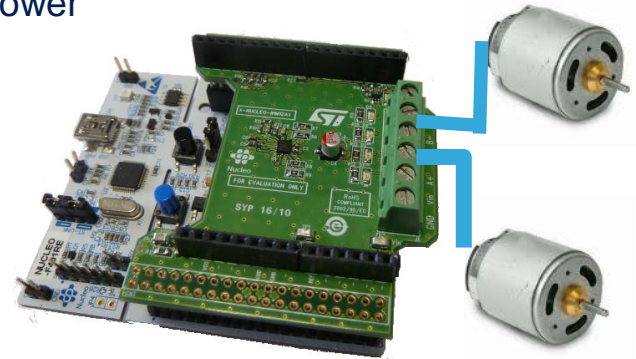
- **STSW-LINK009:** ST-LINK/V2-1 USB driver
- **STSW-LINK007:** ST-LINK/V2-1 firmware upgrade
- A Windows PC with one of the supported development toolchains:
  - KEIL: MDK-ARM
  - IAR: EWARM
  - GCC-based IDE: System Workbench for STM32
- **X-CUBE-SPN12:** expansion software for STM32Cube

# Low voltage dual brush DC motor driver expansion board

## Start coding in just a few minutes with X-CUBE-SPN12

### Driving two bidirectional brush DC motors with X-NUCLEO-IHM12A1 and X-CUBE-SPN12

- 1 Stack the X-NUCLEO-IHM12A1 on the STM32 Nucleo board using the Arduino UNO R3 connector and connect the power supply (VIN\GND) to the CN1 connector.
- 2 Connect one brush DC motor to A+/- and the second one to B+/-.
- 3 Connect the STM32 Nucleo board to the PC through the USB cable.





# Low voltage dual brush DC motor driver expansion board

## Start coding in just a few minutes with X-CUBE-SPN12

- 4 Depending on your STM32 Nucleo board, from the examples folder (`\stm32_cube\Projects\Multi\Examples\MotionControl\NHM12A1_ExampleFor2BiDirMotors`) open the software project from:
  - `\YourToolChainName\STM32F401RE-Nucleo` for Nucleo based on **STM32F401**
  - `\YourToolChainName\STM32F334R8-Nucleo` for Nucleo based on **STM32F334**
  - `\YourToolChainName\STM32F030R8-Nucleo` for Nucleo based on **STM32F030**
  - `\YourToolChainName\STM32L053R8-Nucleo` for Nucleo based on **STM32L053**
- 5 Open the file:  
`stm32_cube\Drivers\BSP\Components\stspin240_250\stspin240_250_target_config.h`.  
and modify the according to your target configuration.
- 6 Build the project and download it into the STM32 memory.
- 7 Run the example. Press the user button to start the demo and to switch from one sequence to the following one (see `main.c` for a detailed demo sequence).

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

## X-NUCLEO-IHM12A1:

- Gerber files, BOM, and schematics
- **DB3037:** Low voltage dual brush DC motor driver expansion board based on STSPIN240 for STM32 Nucleo – **Data brief**
- **UM2112:** Getting started with the X-NUCLEO-IHM12A1, low voltage dual brush DC motor driver expansion board based on STSPIN240 for STM32 Nucleo – **User manual**

## X-CUBE-SPN12:

- **DB3036:** Low voltage dual brush DC motor driver software expansion for STM32Cube – **Data brief**
- **UM2110:** Getting started with the X-CUBE-SPN12, low voltage dual brush DC motor driver software expansion for STM32Cube – **User manual**
- Software setup file

Consult [www.st.com](http://www.st.com) for the complete list



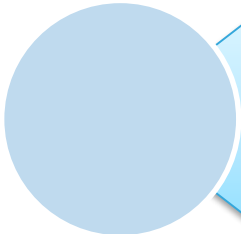
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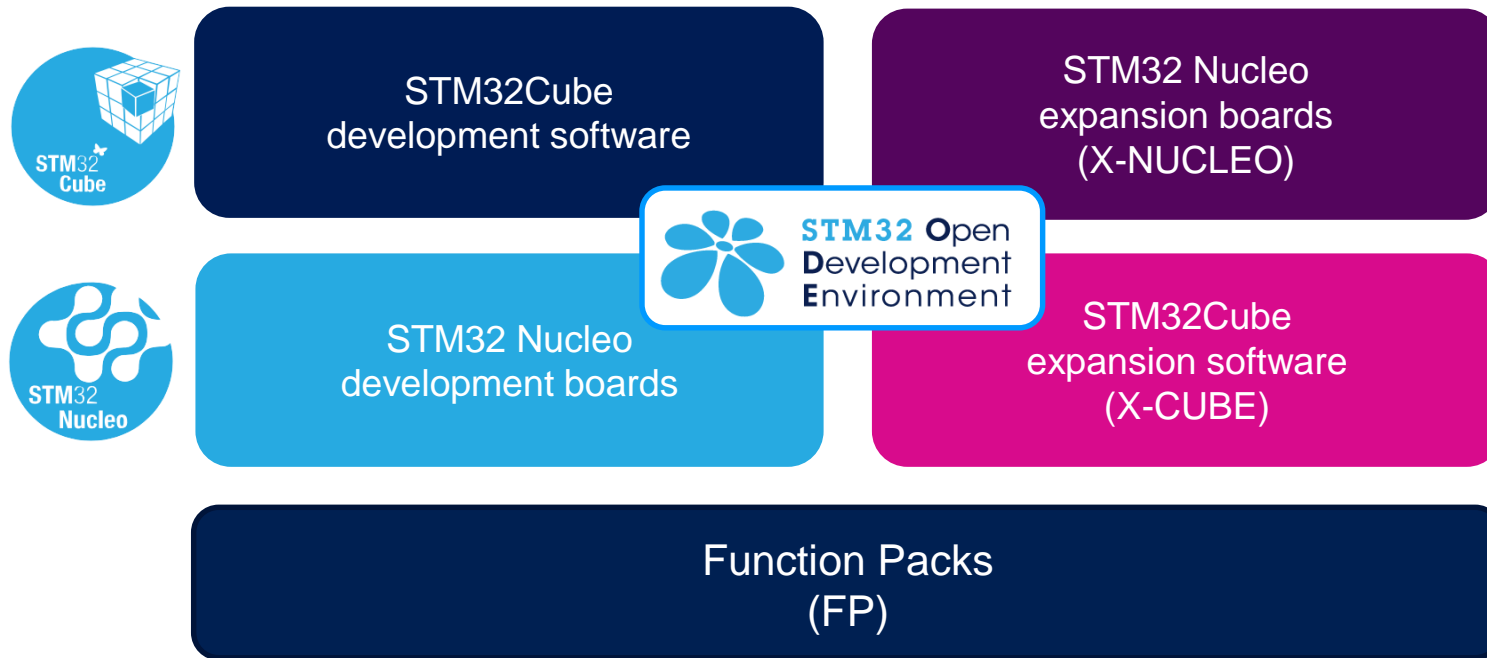


STM32 Open Development Environment: Overview

# 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.

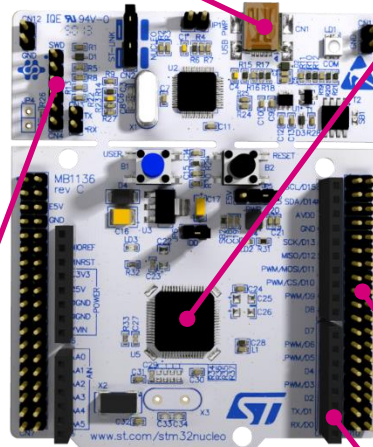


## Development Boards (NUCLEO)

- 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



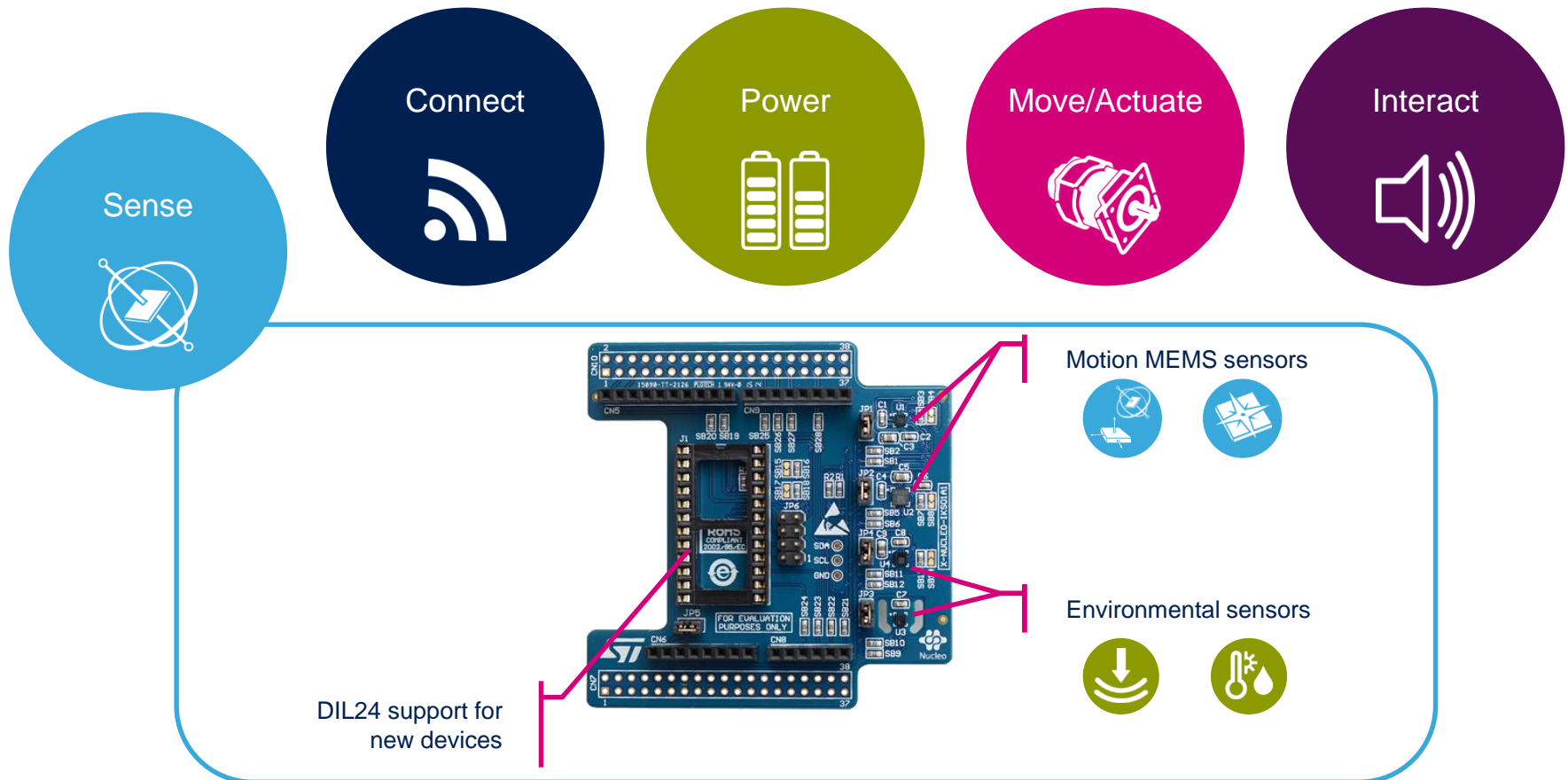
Complete product range from ultra-low power to high-performance

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.



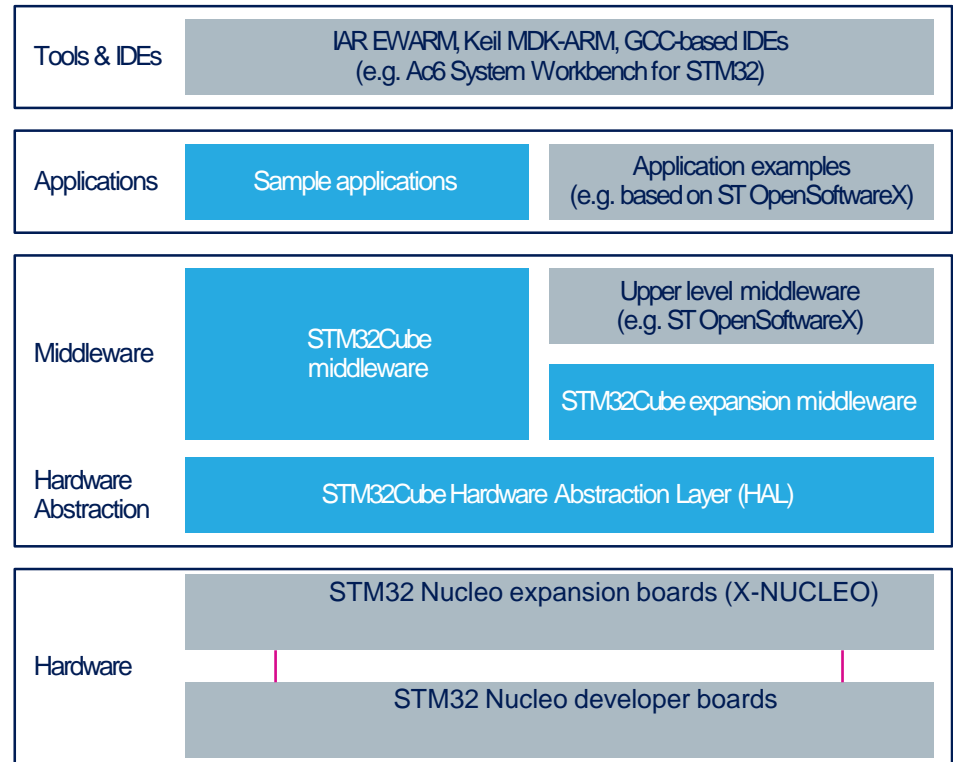
Example of STM32 expansion board (X-NUCLEO-IKS01A1)

# 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.



**OPEN LICENSE MODELS:** STM32Cube software and sample applications are covered by a mix of fully open source BSD license and ST licenses with very permissive terms.

[www.st.com/stm32cube](http://www.st.com/stm32cube)

[www.st.com/x-cube](http://www.st.com/x-cube)

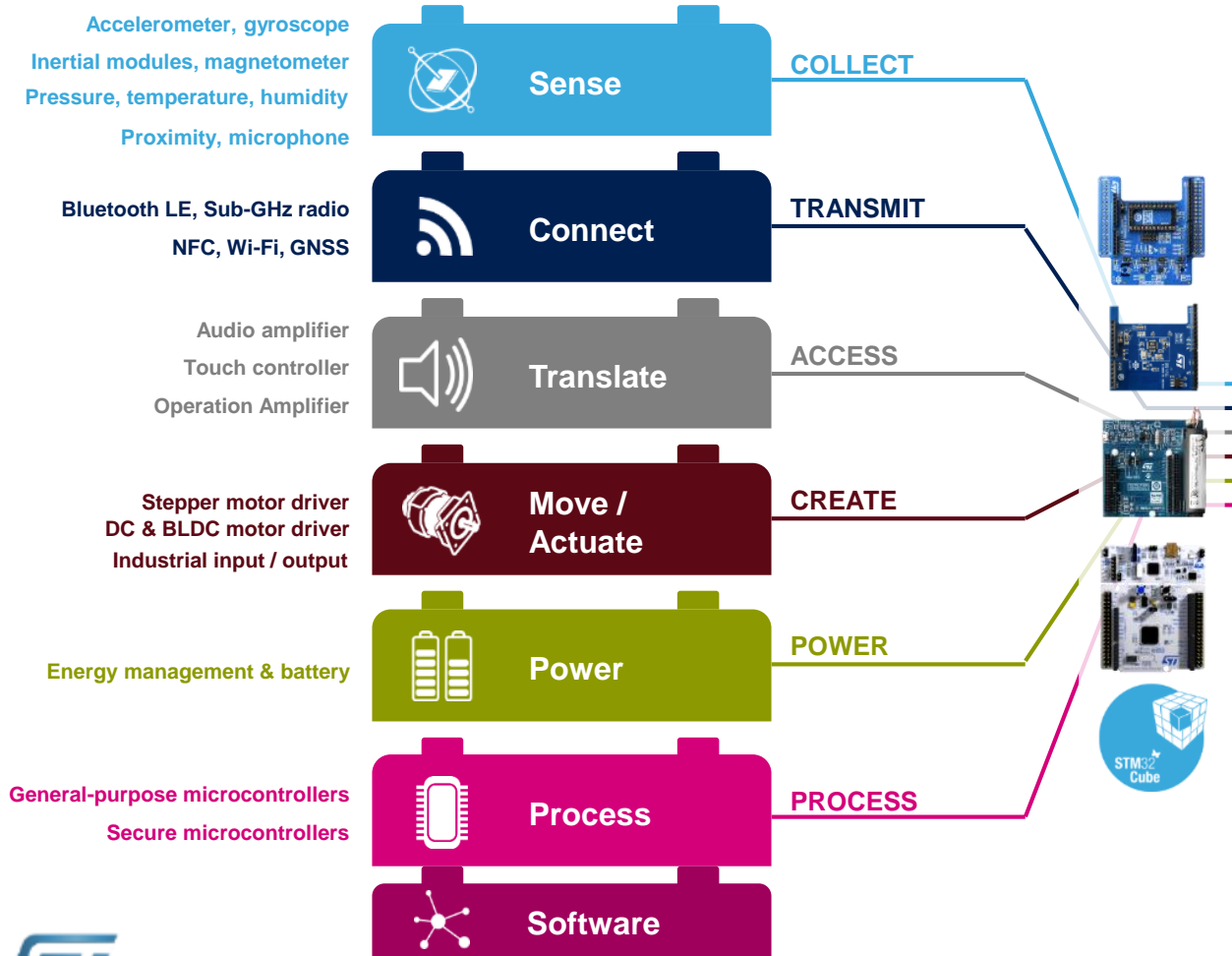
# STM32 Open Development Environment

## Building block approach

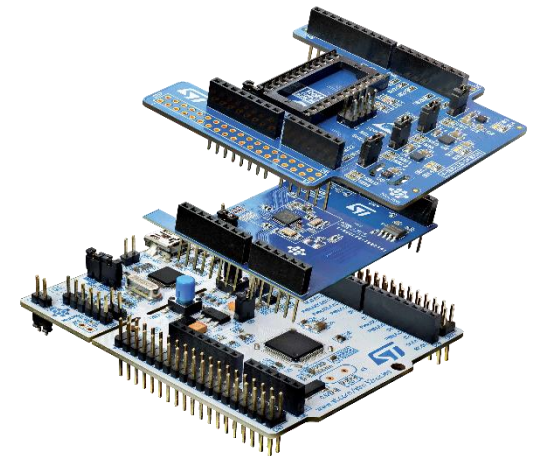
The building blocks

Your need

Our answer



 **STM32** Open Development Environment



[www.st.com/stm32code](http://www.st.com/stm32code)