

Quick Start Guide

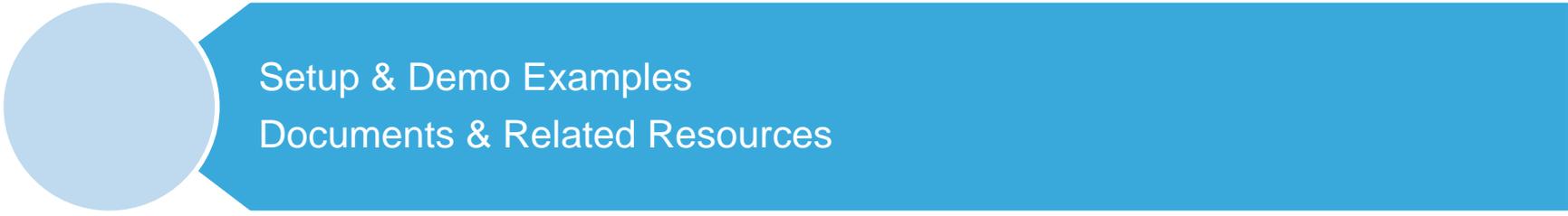
Industrial digital output expansion board based on ISO8200AQ for STM32
Nucleo
(X-NUCLEO-OUT02A1)



Version 1.0 (Nov, 2018)



X-NUCLEO-OUT02A1: Industrial digital output expansion board
Hardware and Software overview



Setup & Demo Examples
Documents & Related Resources



STM32 Open Development Environment: Overview

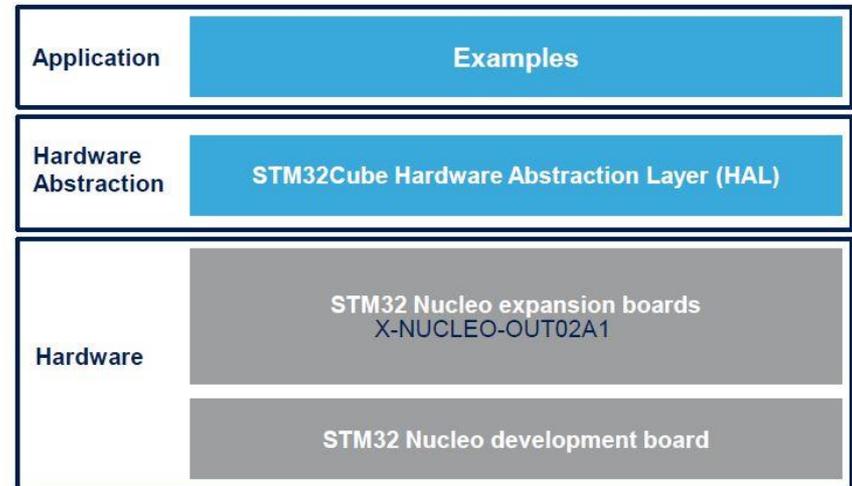
X-CUBE-OUT2 Software Description

- The X-CUBE-OUT2 expansion software package for STM32Cube runs on the STM32 and includes a driver for the ISO8200AQ.
- The software provides an affordable and easy-to-use solution for the development of 8-channel digital output modules, letting you easily evaluate the ISO8200AQ communication and industrial load driving features.
- The expansion is built on STM32Cube software technology to ease portability across different STM32 microcontrollers.
- The software comes with a sample implementation of the driver running on the X-NUCLEO-OUT02A1 expansion board connected to a NUCLEO-F401RE or NUCLEO-F334R8 development board.
- You can also perform evaluation of 16-channel digital output modules by connecting two X-NUCLEO-OUT02A1 and activating the daisy chaining feature.

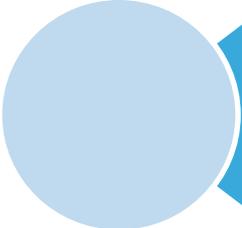
Key features

- Complete software to build applications for the ISO8200AQ galvanic isolated octal high-side smart power solid state-relay
- GPIOs, SPI, PWMs and IRQs configuration
- Fault and power good interrupt handling
- Daisy chaining support
- Sample implementation available on the X-NUCLEO-OUT02A1 expansion board when connected to a NUCLEO-F401RE or NUCLEO-F334R8 development board
- Easy portability across different MCU families, thanks to STM32Cube
- Free, user-friendly license terms

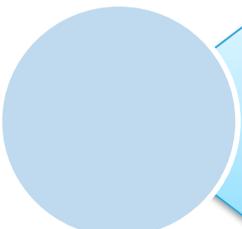
Overall Software Architecture



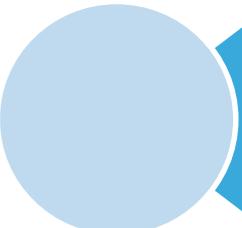
Latest info available at www.st.com
X-CUBE-OUT2



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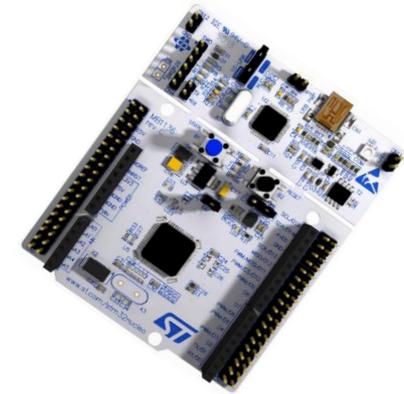
STM32 Open Development Environment: Overview

Setup & Demo Examples

HW prerequisites (1/2)

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- 1x STM32 Nucleo Industrial digital output expansion board (**X-NUCLEO-OUT02A1**)
- 1x STM32 Nucleo development board (**NUCLEO-F401RE or NUCLEO-F334R8**)
- 1x USB type A to Mini-B cable
- 1x Laptop/PC running Microsoft Windows™ 7 or above
- 1x External power supply at 24 V



NUCLEO-F401RE
NUCLEO-F334R8



USB type A to Mini-B cable



X-NUCLEO-OUT02A1 plugged on to a compatible STM32 Nucleo board



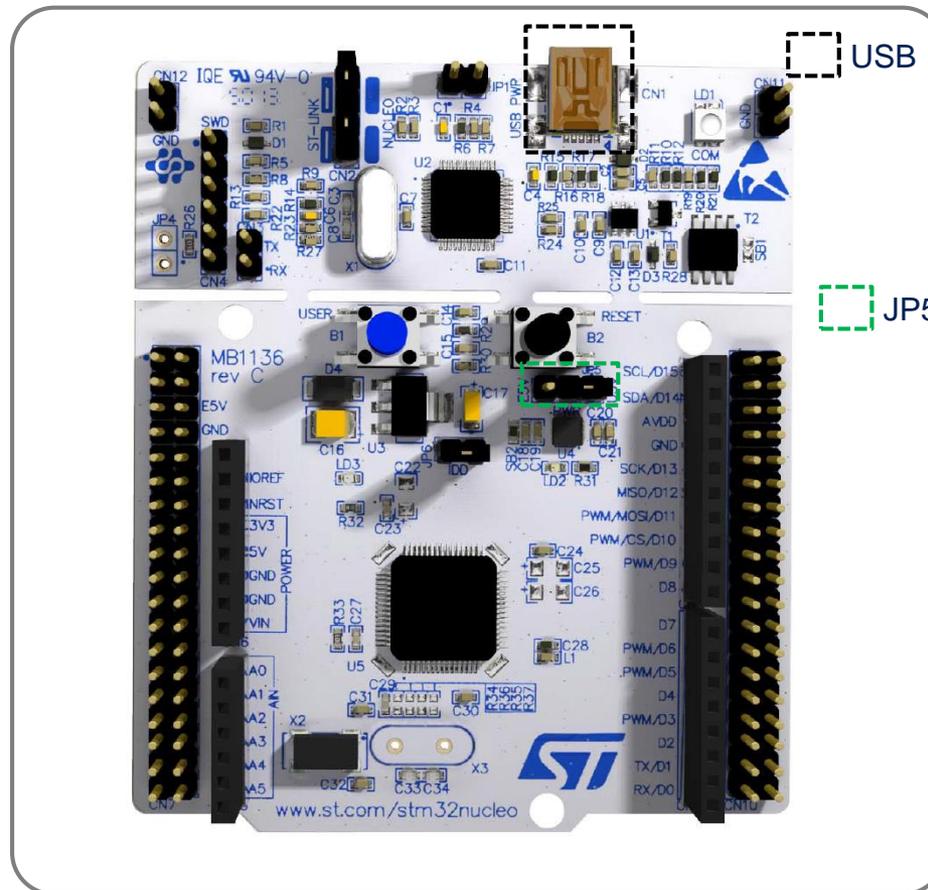
X-NUCLEO-OUT02A1

Setup & Demo Examples

HW prerequisites 2/2

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- The STM32F401RE has to be supplied by USB cable or by external supply connected to X-NUCLEO-OUT02A1:
 1. By USB cable of the STM32 Nucleo development board (DEFAULT)
 - a) CLOSE JP5 to U5V position on the STM32 Nucleo development board
 2. By external supply of the X-NUCLEO-OUT02A1
 - b) Connect the external supply (from 7 to 12V) to CN2 of X-NUCLEO-OUT02A1
 - c) CLOSE JP5 to E5V position on the STM32 Nucleo development board



- **STSW-LINK009:** ST-LINK/V2-1 USB driver
- **STSW-LINK007:** ST-LINK/V2-1 firmware upgrade
- **X-CUBE-OUT2:**
 - Copy the .zip file content into a folder on your PC
 - The package contains the source code example (Keil, IAR, SW4STM32) based on **NUCLEO-F401RE** or **NUCLEO-F334R8**
- **STSW-IFAPGUI** or **STSW-IOLINKGUI**
 - This a GUI designed to drive interface with X-CUBE-OUT2 and to simplify the access to the feature of the X-NUCLEO-OUT02A1.

Quick start-up procedure (see HW and SW prerequisites)

- Install and launch the GUI on your Laptop/PC
- Connect the USB cable to the NUCLEO-F401 or NUCLEO-F334R8 stacked with the X-NUCLEO-OUT02A1.
- USB scanning procedure starts and, after board has been detected, an STM32 blue icon appears on the GUI control window.
- Click on the STM32 blue icon (icon becomes green) to activate the panel of the X-NUCLEO-OUT02A1.
- Supply the X-NUCLEO-OUT02A1 by 24V.
- Start your evaluation.

Start coding in just a few minutes with X-CUBE-OUT2

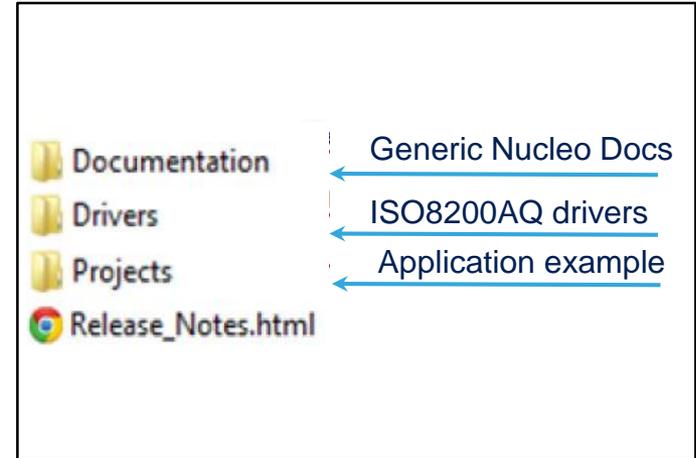


1 Go to www.st.com/x-nucleo

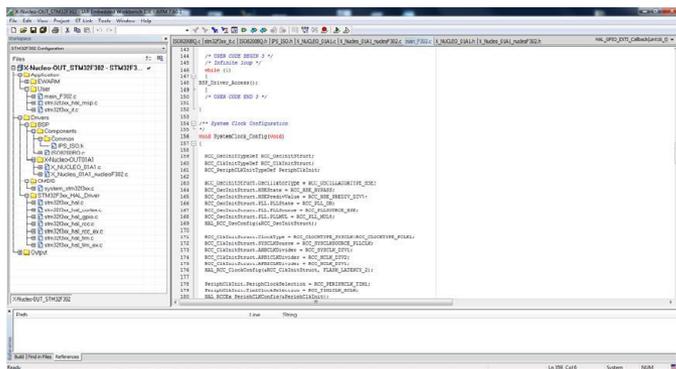


2 Select X-NUCLEO-OUT02A1

3 Download & unpack X-CUBE-OUT2



6 Modify and build application



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Open project example

4 Download and install ST-LINK/V2-1 USB driver



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

X-NUCLEO-OUT02A1:

- **DB3767:** Industrial Digital Output expansion board based on ISO8200AQ for STM32 Nucleo – **Data Brief**
- **UM2507:** Getting Started with X-NUCLEO-OUT02A1 Industrial Digital Output expansion board for STM32 Nucleo – **User Manual**
- Gerber files, BOM, Schematic

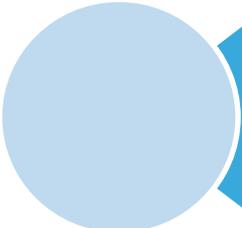
X-CUBE-OUT2:

- **DB3774:** Industrial Digital Output software expansion for STM32Cube – **Data Brief**
- **UMxxxx:** (TBD) – **User Manual**
- Software set-up file

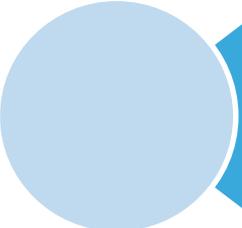
STSW-IFAPGUI:

- **DB3775:** Graphical user interface for the industrial IPS and IO-Link transceiver evaluation boards based on STM32 Nucleo – **Data Brief**
- **UM2509:** Getting started with the GUI for the X-NUCLEO-OUT02A1 expansion board – **User Manual**

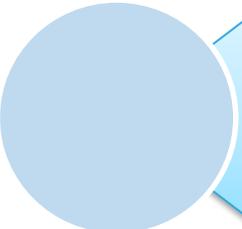
Consult www.st.com for the complete list



X-NUCLEO-OUT02A1: Industrial digital output expansion board
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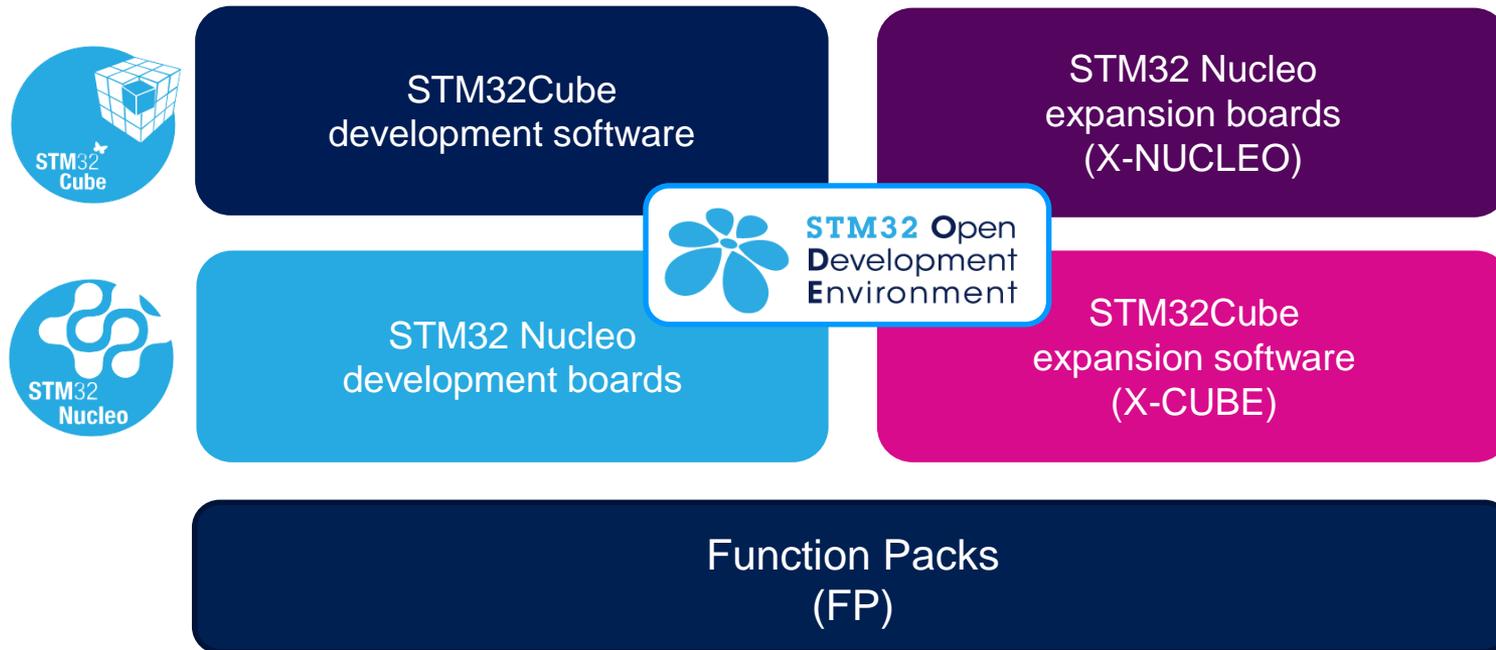


STM32 Open Development Environment: Overview

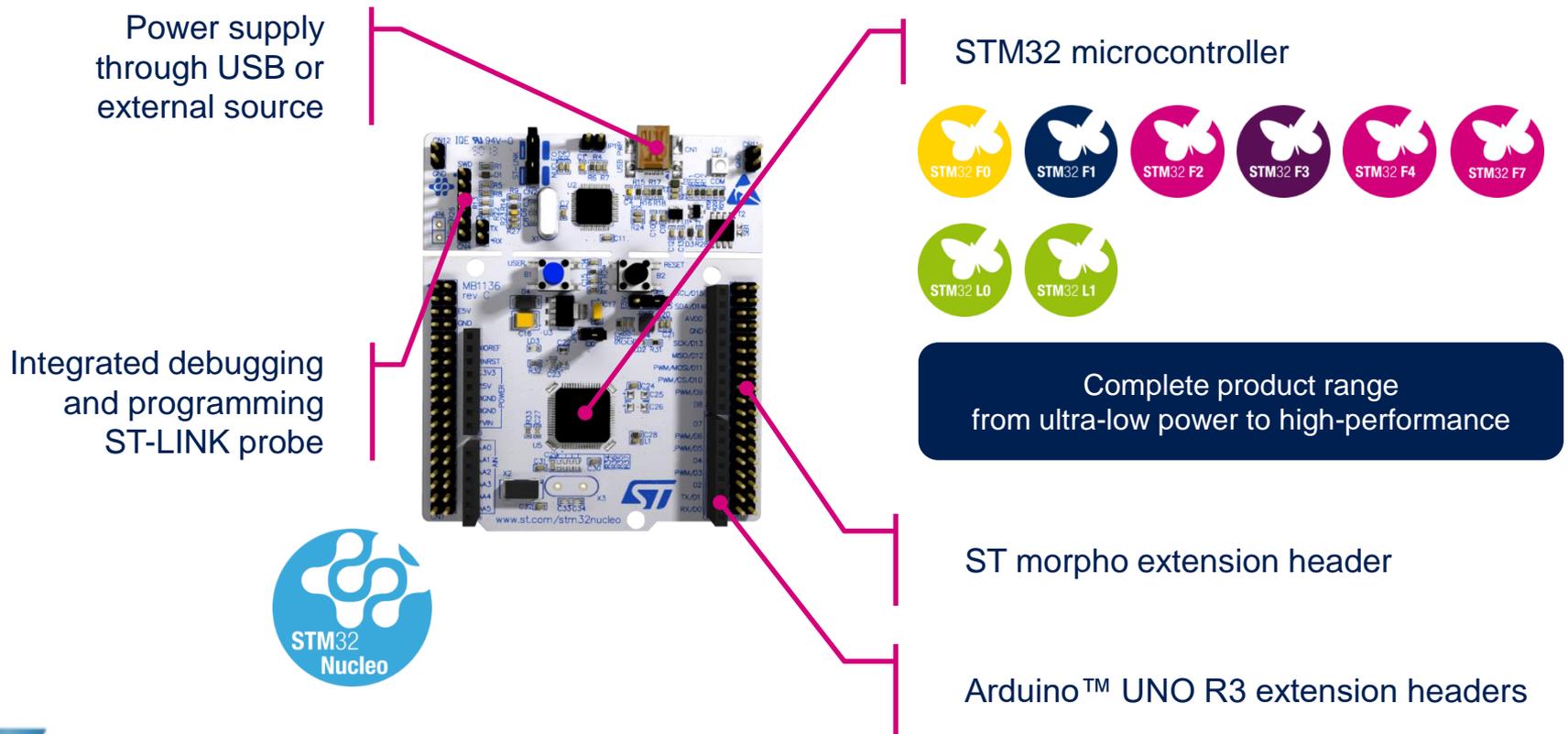
STM32 Open Development Environment

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.

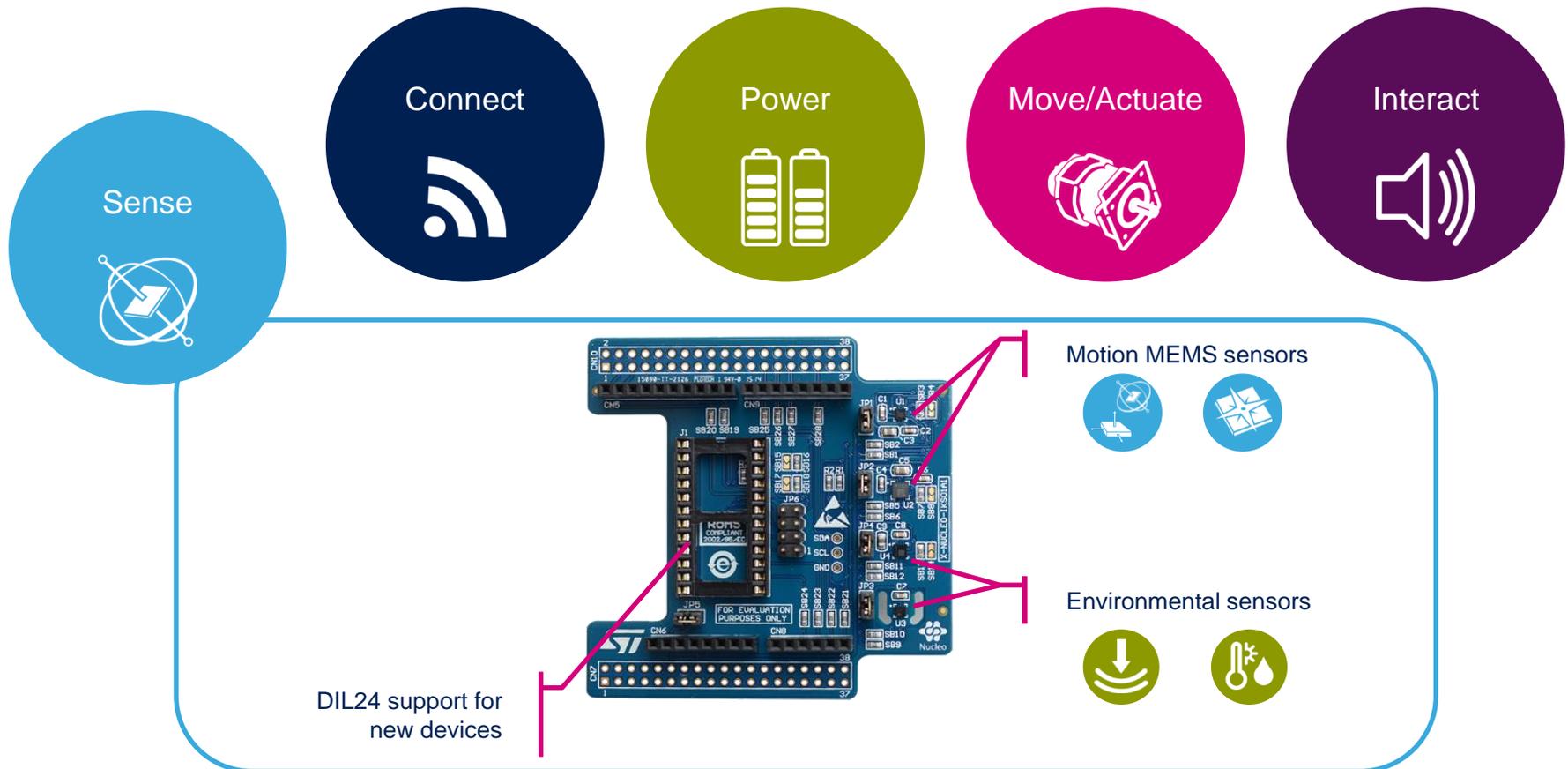


- A comprehensive range of affordable development boards for all the STM32 microcontroller series, with unlimited unified expansion capabilities and integrated debugger/programmer functionality.



STM32 Nucleo Expansion Boards (X-NUCLEO)

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



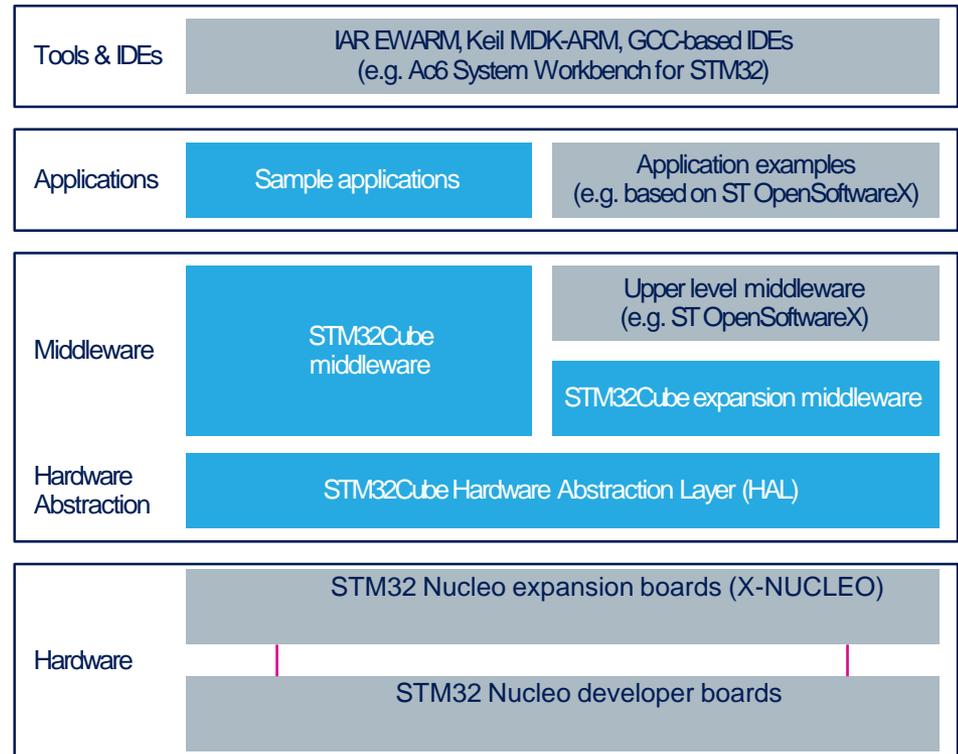
Example of STM32 expansion board (X-NUCLEO-IKS01A1)

STM32 Open Development Environment

Software components

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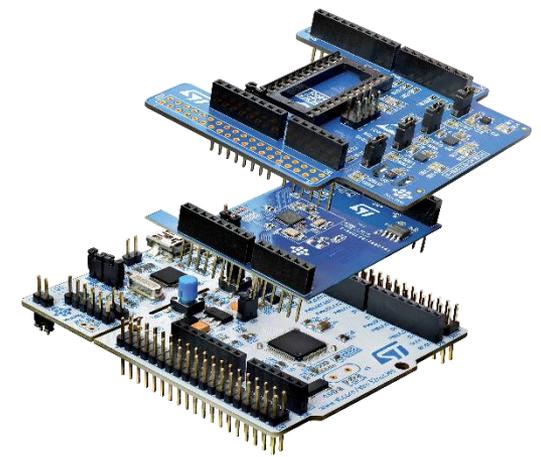
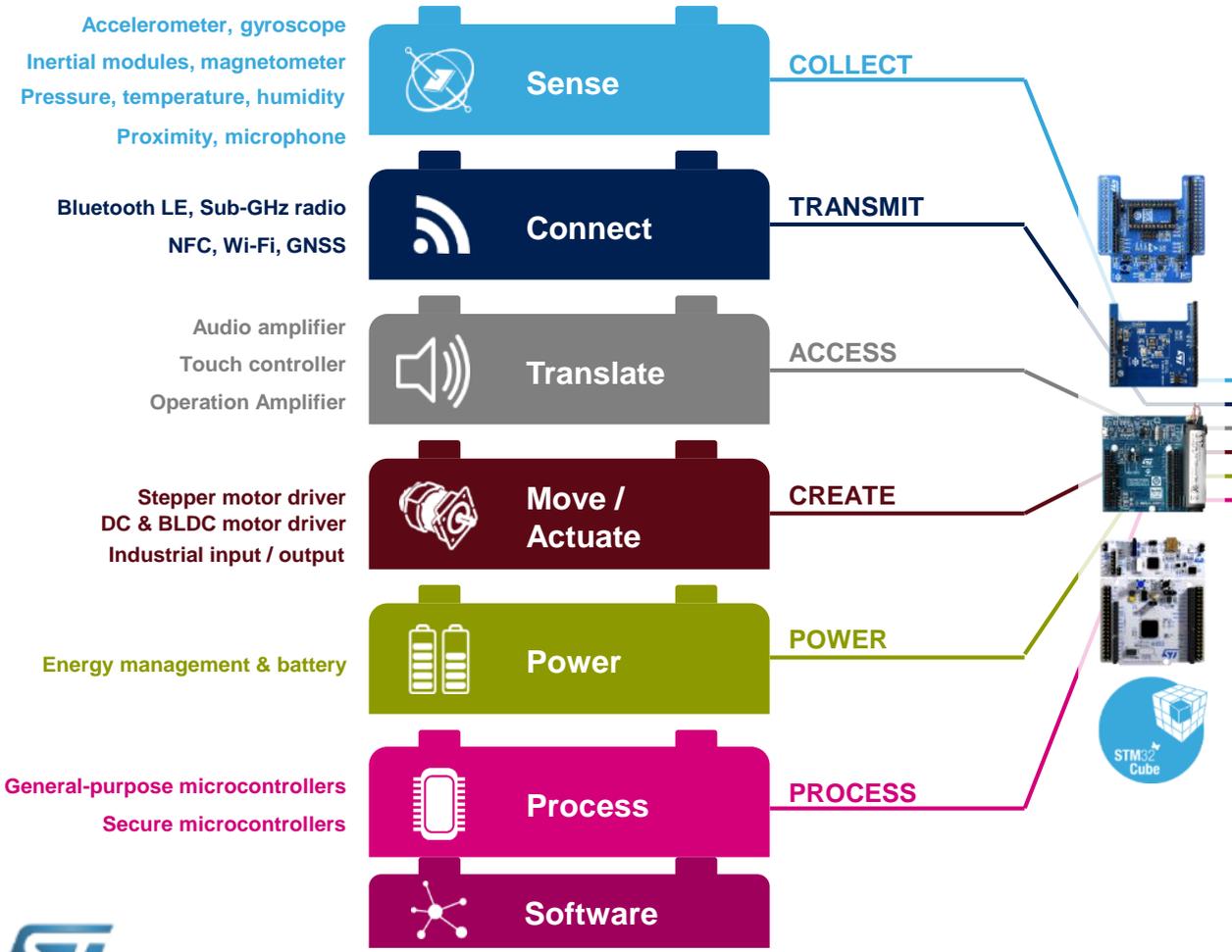
- **STM32Cube software (CUBE)** - A set of free tools and embedded software bricks to enable fast and easy development on the STM32, including a Hardware Abstraction Layer and middleware bricks.
- **STM32Cube expansion software (X-CUBE)** - Expansion software provided free for use with the STM32 Nucleo 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.

STM32 Open Development Environment

Building block approach



www.st.com/stm32code

