Quick Start Guide
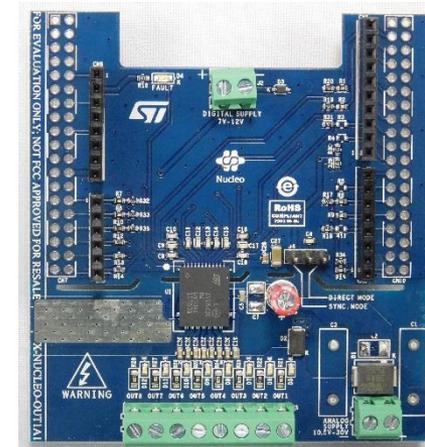
Industrial Digital Output expansion board based on ISO8200BQ
for STM32 Nucleo
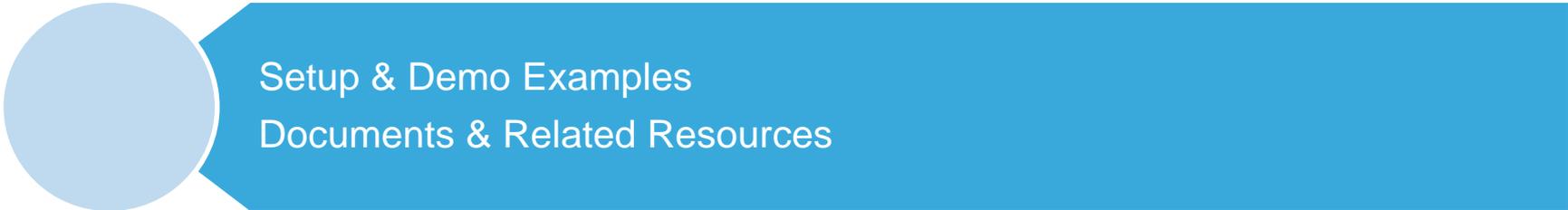
(X-NUCLEO-OUT01A1)

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Version 1 (Jun 3, 2017)

Quick Start Guide Contents

X-NUCLEO-OUT01A1: Industrial Digital Output expansion board

Hardware and Software overview

Setup & Demo Examples

Documents & Related Resources

STM32 Open Development Environment: Overview

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Hardware Description

- The X-NUCLEO-OUT01A1 is an Industrial Digital output expansion board based on ISO8200BQ for STM32 Nucleo boards. It provides an affordable and easy-to-use solution involving galvanic insulation embedded in industrial power switch driver applications.

- Wireless communication capabilities can be added with the X-NUCLEO-IDW01M1, which establishes communication on a smart device to manage the PLC remotely. A dedicated ST-PLC app is available for Android™ and iOS™ systems for this purpose.

Main Features:

- Enables industrial programmable logic controller (PLC) capabilities on STM32 Nucleo
- ISO8200BQ galvanic isolated octal high-side smart power solid state-relay
- Compatible with Arduino® UNO R3 connector
- Free development firmware library and examples, compatible with STM32Cube
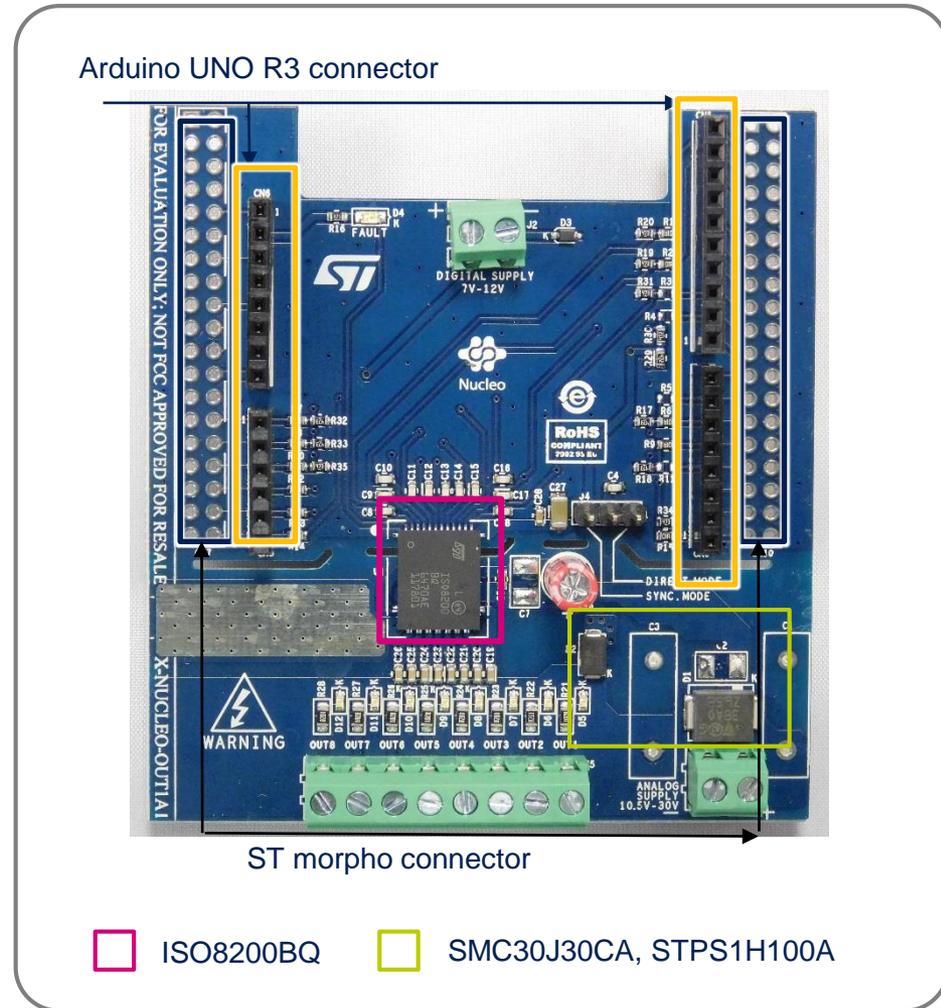- RoHS compliant

Key Products on board:

ISO8200BQ
Galvanic isolated octal high-side smart power solid state-relay

SMC30J30CA
Transil™ protection diode (3000 W TVS in SMC package)

STPS1H100A
High Voltage Power Schottky Rectifier

Arduino UNO R3 connector

ST morpho connector

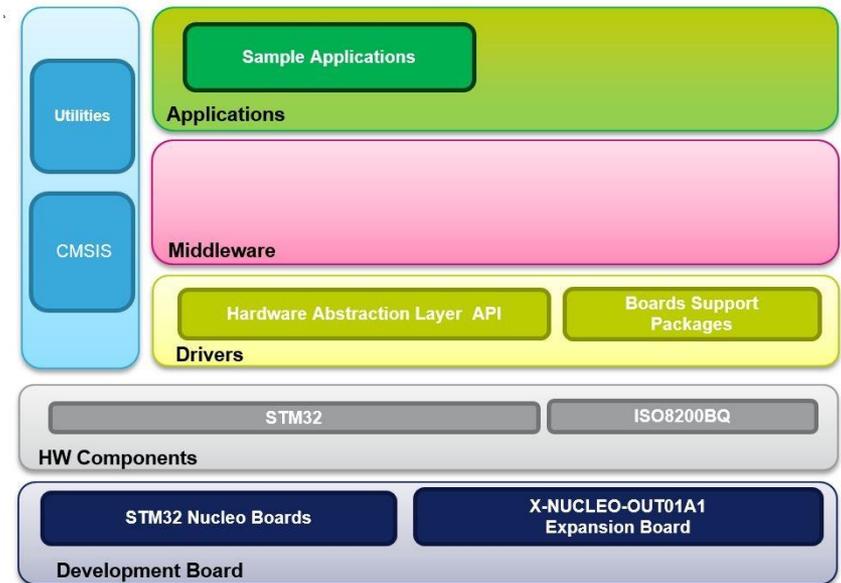☐ ISO8200BQ   ☐ SMC30J30CA, STPS1H100A

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X-CUBE-OUT1 software description

- The X-CUBE-OUT1 expansion software for STM32Cube runs on STM32 with drivers for the ISO8200BQ galvanic isolated octal high-side smart power solid state-relay.

- The software comes with sample implementations of the drivers running on the X-NUCLEO-OUT01A1 expansion board connected to a NUCLEO-F103RB, NUCLEO-F302R8 or NUCLEO-F401RE development board to kick-start development.

- The expansion is built on STM32Cube software technology to ease portability across different STM32 microcontrollers.

Key features:

- Complete software package to build industrial digital output applications cases based on the ISO8200BQ device

- Driver layer for easy management of the ISO8200BQ device

- Easy portability across different MCU families thanks to STM32Cube

- Free user-friendly license terms

- Sample implementation available on the X-NUCLEO-OUT01A1 expansion board when connected on NUCLEO-F103RB or NUCLEO-F302R8 or NUCLEO-F401RE
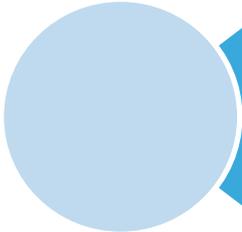
Software Architecture

Utilities	CMSIS	Sample Applications
		Applications
		Middleware
		Hardware Abstraction Layer API / Boards Support Packages
		Drivers

STM32	ISO8200BQ

HW Components

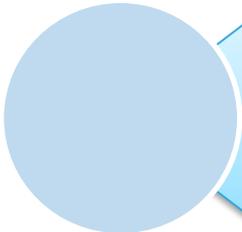| STM32 Nucleo Boards	X-NUCLEO-OUT01A1 Expansion Board

Development Board

Latest info available at www.st.com
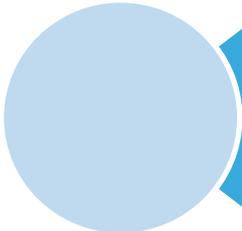**X-CUBE-OUT1**

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- 1x STM32 Nucleo Industrial Digital Output expansion board (**X-NUCLEO-OUT01A1**)

- 1x STM32 Nucleo development board
  (**NUCLEO-F103RB** or **NUCLEO-F302R8** or **NUCLEO-F401RE**)

- 1x USB type A to Mini-B cable

- 1x Windows 7 or above, Laptop/PC
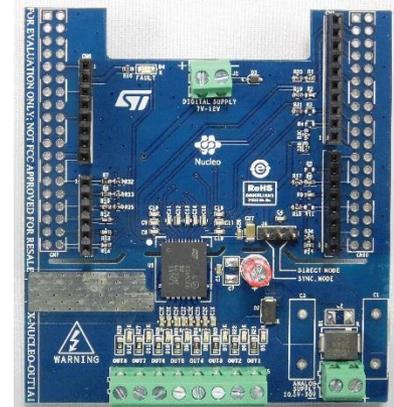
- 1x external power supply at 24 V

NUCLEO-F401RE
NUCLEO-F302R8
NUCLEO-F103RB

Mini-USB Cable

X-NUCLEO-OUT01A1 plugged on to a
compatible STM32Nucleo board

X-NUCLEO-OUT01A1

Setup & demo examples
Software prerequisites

- **STSW-LINK009:** ST-LINK/V2-1 USB driver

- **STSW-LINK007:** ST-LINK/V2-1 firmware upgrade

- **X-CUBE-OUT1:**
  - Copy the .zip file content into a folder on your PC
  - The package contains the source code example (Keil, IAR, SW4STM32) based on **NUCLEO-F103RB** or **NUCLEO-F302R8** or **NUCLEO-F401RE**

Industrial Digital Output expansion board
Start coding in just a few minutes with X-CUBE-OUT1

Use NUCLEO-F103RB or NUCLEO-F302R8 or NUCLEO-F401RE with X-CUBE-OUT1 package

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

2 Select X-NUCLEO-OUT01A1

3 Download and unpack X-CUBE-OUT1

6 Modify and build application

X-CUBE-OUT1 package

Documentation ← **Generic Nucleo docs**

Drivers ← **ISO8200BQ driver**

Projects ← **Application examples**

Release_Notes.html

4 Download and install STM32 Nucleo ST-LINK/V2-1 USB driver

KEIL™ Tools by ARM

IAR SYSTEMS

Open STM32 Tools
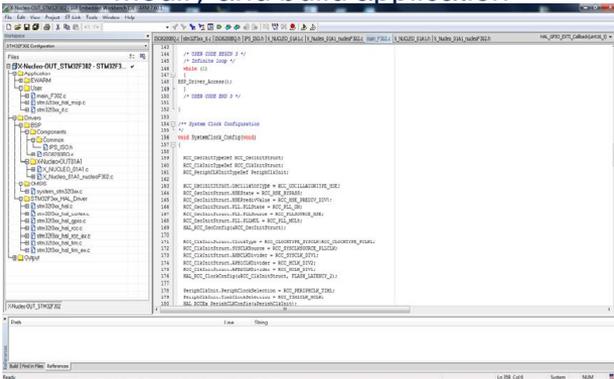
5 Open project example

Documents & related design resources

All documents are available in the DESIGN tab of the related products webpage
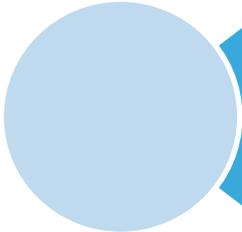
X-NUCLEO-OUT01A1:

- Gerber files, BOM and schematics
- **DB3267**: Industrial Digital output expansion board based on ISO8200BQ for STM32 Nucleo – **Data brief**
- **UM2209**: Getting Started with X-NUCLEO-OUT01A1 industrial digital output expansion board for STM32 Nucleo – **User manual**

X-CUBE-OUT1:

- **DB3268**: Industrial digital output software expansion for STM32Cube – **Data brief**
- **UM2210**: Getting started with the X-CUBE-OUT1 firmware package on X-NUCLEO-OUT01A1 for STM32Cube – **User manual**
- Software setup file

Consult www.st.com for the complete list

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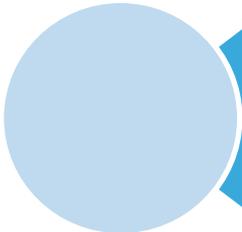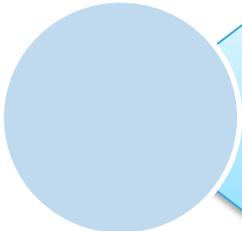
- The STM32 Open Development Environment (ODE) consists of a set of stackable boards and a modular open SW environment designed around the STM32 microcontroller family.

STM32Cube development software

STM32 Nucleo expansion boards (X-NUCLEO)

STM32 Nucleo development boards

STM32Cube expansion software (X-CUBE)

Function Packs (FP)

www.st.com/stm32ode
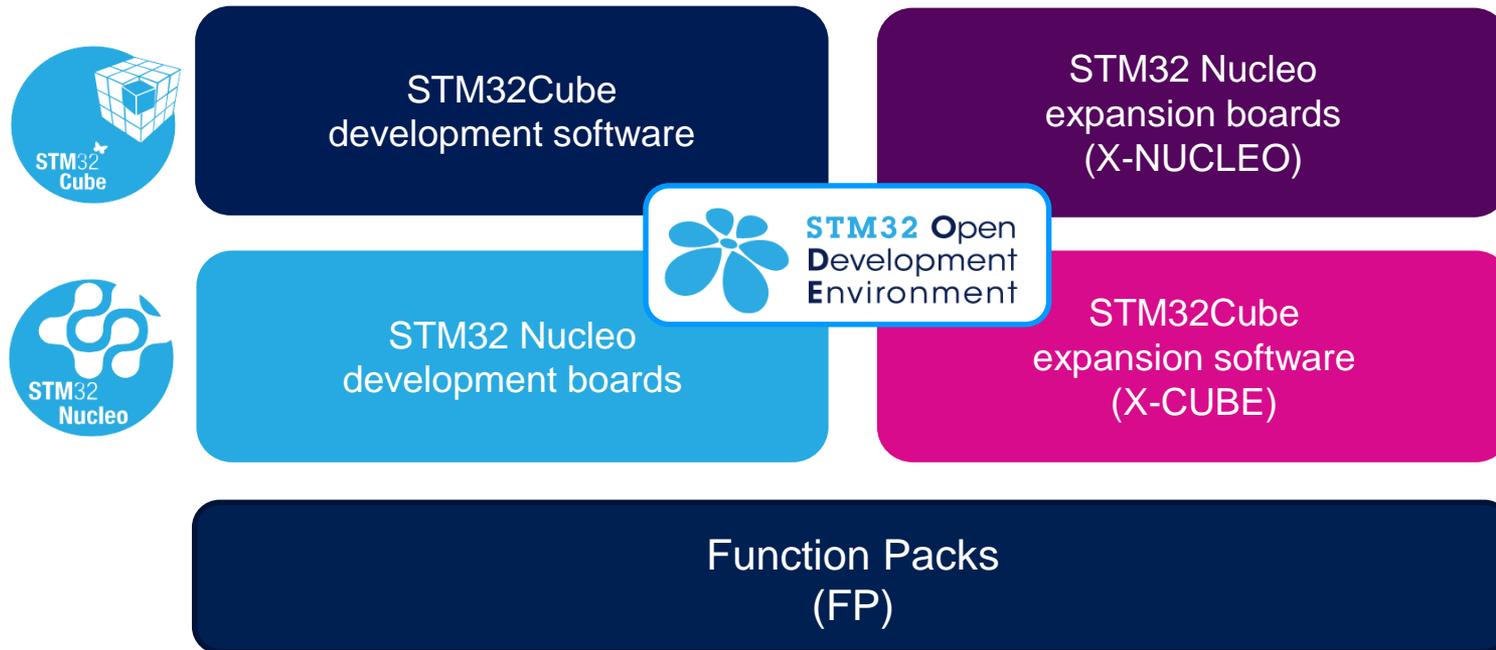
- A comprehensive range of affordable development boards for all the STM32 microcontroller series, with unlimited unified expansion capabilities and integrated debugger/programmer functionality.

Power supply through USB or external source

STM32 microcontroller

Integrated debugging and programming ST-LINK probe

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

ST morpho extension header

Arduino™ UNO R3 extension headers
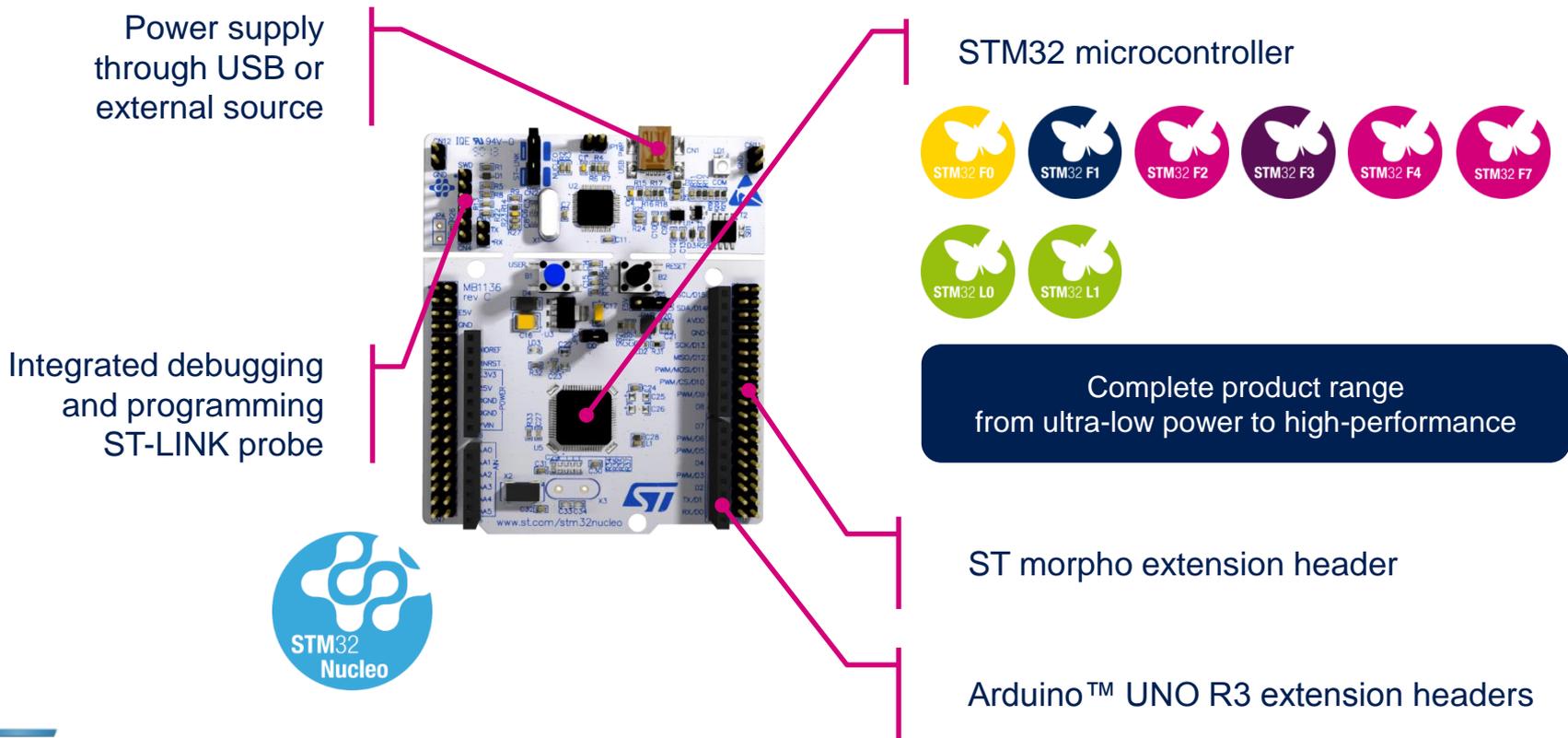
- Boards with additional functionality that can be plugged directly on top of the STM32 Nucleo development board directly or stacked on another expansion board.

Sense

Connect

Power

Move/Actuate

Interact

Motion MEMS sensors

Environmental sensors

DIL24 support for new devices
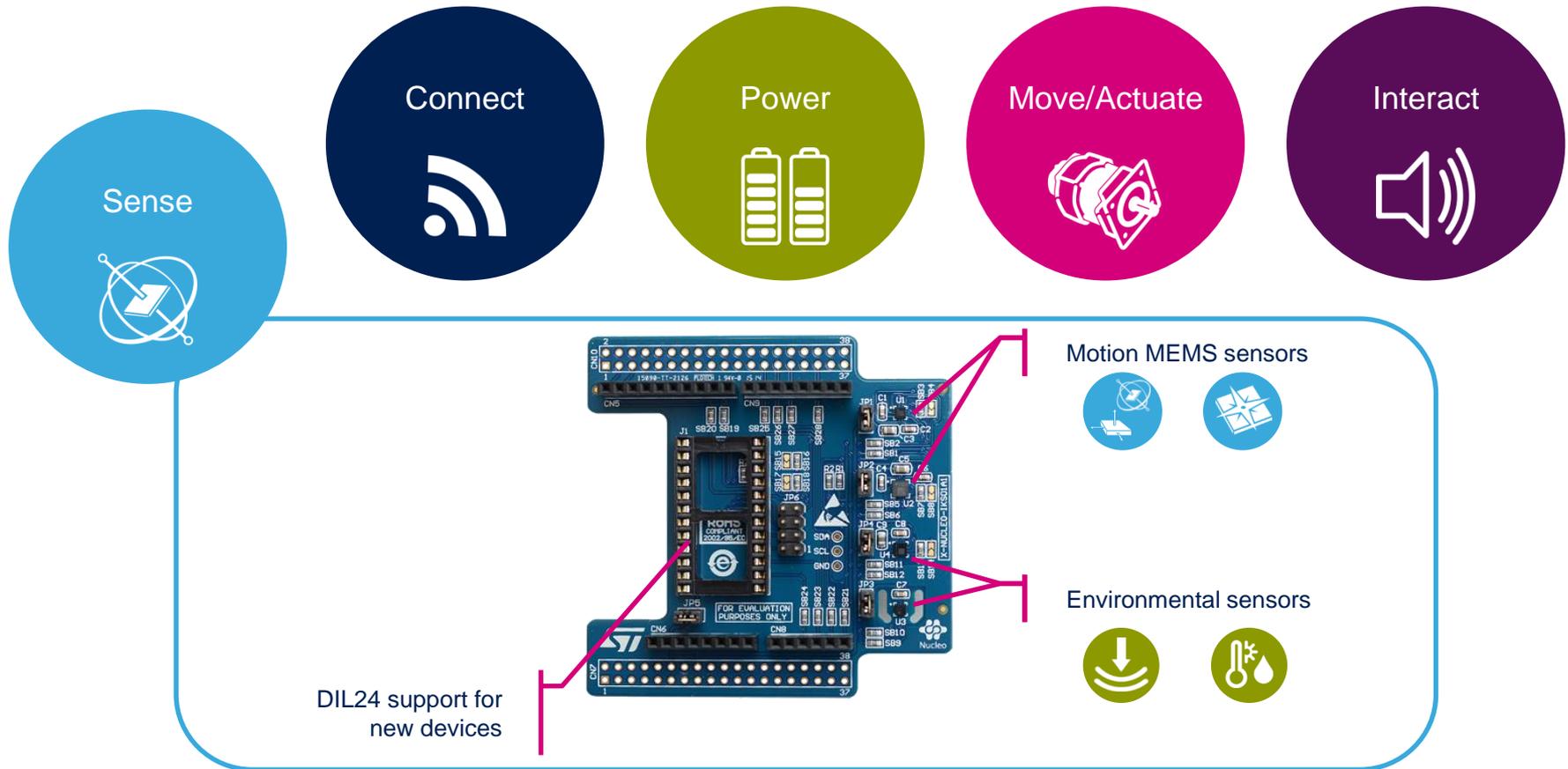
Example of STM32 expansion board (X-NUCLEO-IKS01A1)

www.st.com/x-nucleo

STM32 Open Development Environment
Software components

- **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.
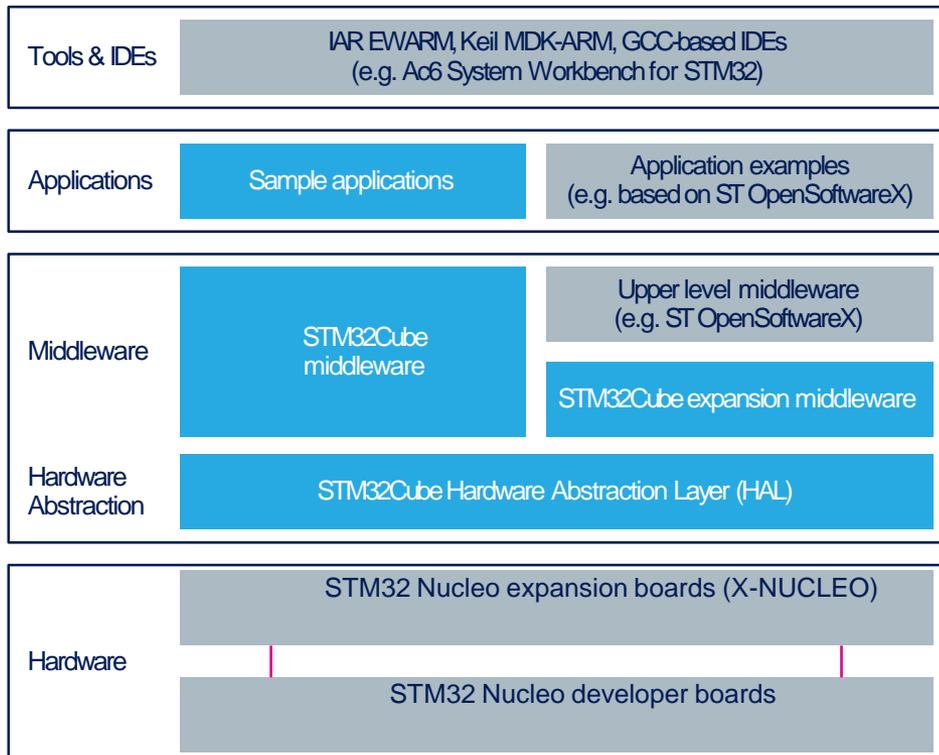
- **STM32Cube expansion software (X-CUBE)** - Expansion software provided free for use with the STM32 Nucleo expansion board and fully compatible with the STM32Cube software framework. It provides abstracted access to expansion board functionality through high-level APIs and sample applications.

Tools & IDEs	IAR EWARM, Keil MDK-ARM, GCC-based IDEs (e.g. Ac6 System Workbench for STM32)	
Applications	Sample applications	Application examples (e.g. based on ST OpenSoftwareX)
Middleware	STM32Cube middleware	Upper level middleware (e.g. ST OpenSoftwareX) / STM32Cube expansion middleware
Hardware Abstraction	STM32Cube Hardware Abstraction Layer (HAL)	
Hardware	STM32 Nucleo expansion boards (X-NUCLEO) / STM32 Nucleo developer boards	

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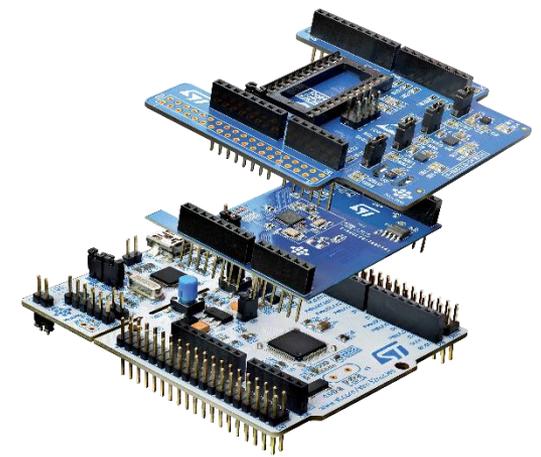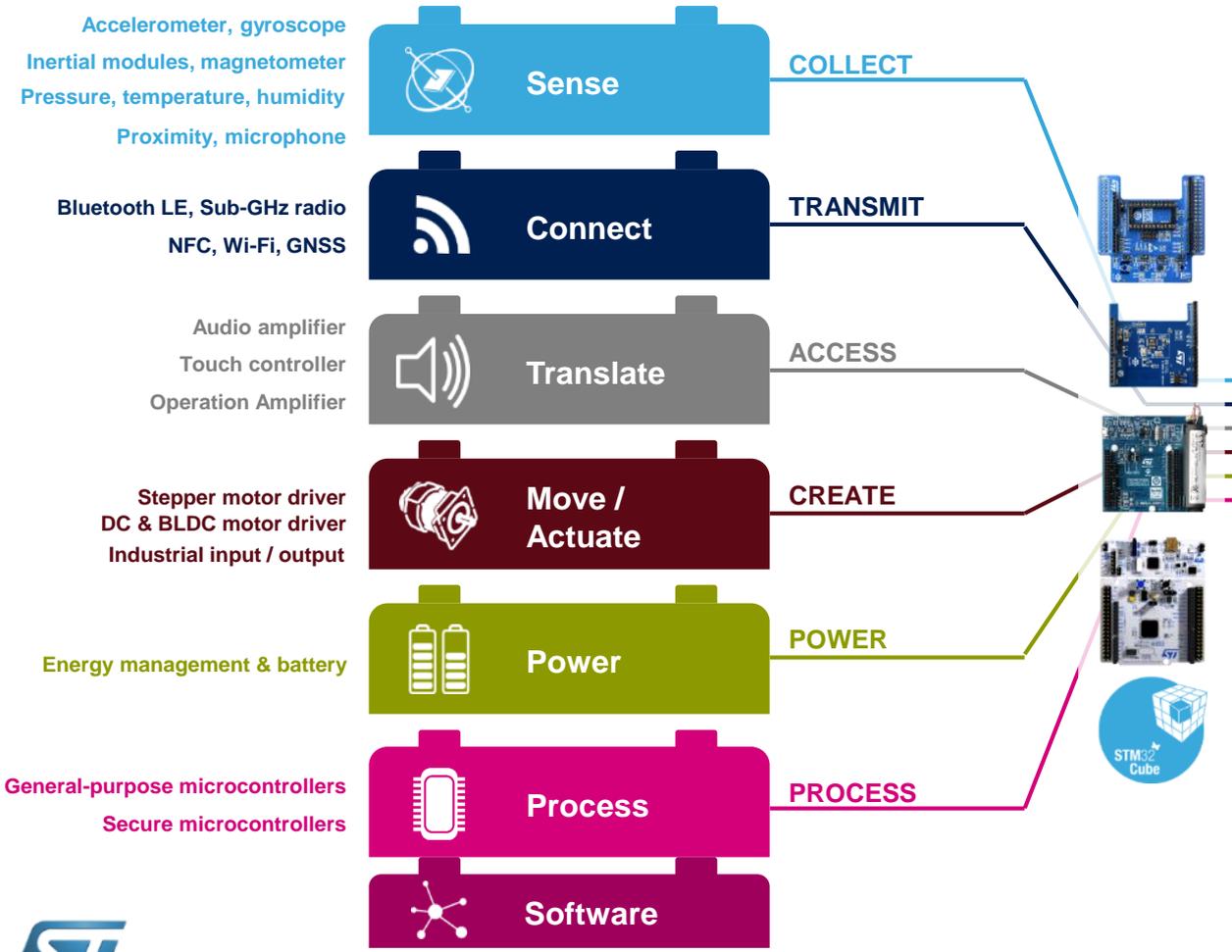
OPEN LICENSE MODELS: STM32Cube software and sample applications are covered by a mix of fully open source BSD license and ST licenses with very permissive terms.

www.st.com/stm32cube

www.st.com/x-cube

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The building blocks	Your need	Our answer

Accelerometer, gyroscope
Inertial modules, magnetometer
Pressure, temperature, humidity
Proximity, microphone

Sense — COLLECT

Bluetooth LE, Sub-GHz radio
NFC, Wi-Fi, GNSS

Connect — TRANSMIT

Audio amplifier
Touch controller
Operation Amplifier

Translate — ACCESS

Stepper motor driver
DC & BLDC motor driver
Industrial input / output

Move / Actuate — CREATE

Energy management & battery

Power — POWER

General-purpose microcontrollers
Secure microcontrollers

Process — PROCESS

Software

STM32 **O**pen
Development
Environment

STM32 Cube

www.st.com/stm32ode

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