Quick Start Guide

Dynamic NFC tag expansion board based on M24LR04E for STM32 Nucleo (X-NUCLEO-NFC02A1)

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Version 1.1.0 (May 30th, 2016)

Quick Start Guide Contents

Dynamic NFC tag – Type V expansion board
Hardware Overview

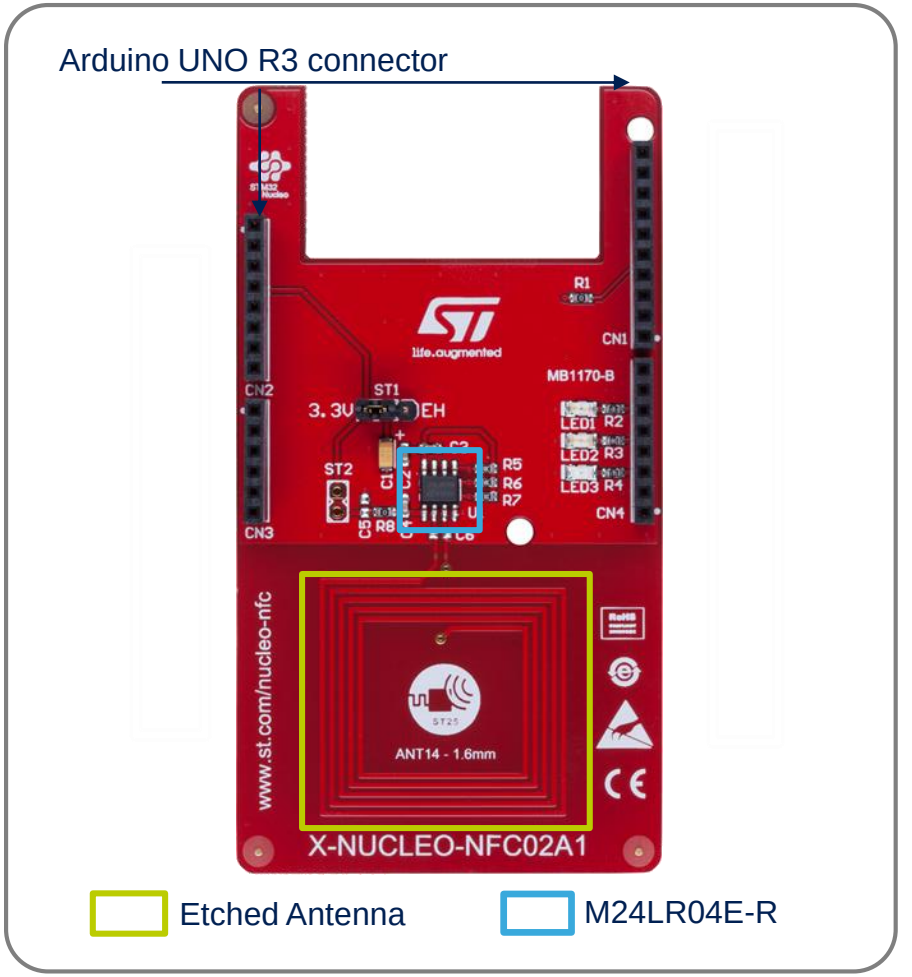
X-NUCLEO-NFC02A1 Hardware description

- The X-NUCLEO-NFC02A1 is a dynamic NFC tag – Type V expansion board based on M24LR04E-R for STM32 Nucleo. The expansion board is equipped with a dynamic NFC Type V/RFID tag contactless EEPROM featuring an I^2C interface.

- **Main Features**
  - NFC Forum Tag Type V and I^2C interface
  - Up to 4-Kbit memory with NDEF support
  - Analog output for Energy Harvesting
  - Digital Open Drain output to indicate Work in Progress or RF Busy
  - Compatible with Arduino™ UNO R3 connectors
  - Compatible with STM32 Nucleo boards

Key Product on board

M24LR04E-R
M24LR04E-R Dynamic NRC/RFID tag IC



Latest info available at www.st.com
X-NUCLEO-NFC02A1

Dynamic NFC tag – Type V expansion software

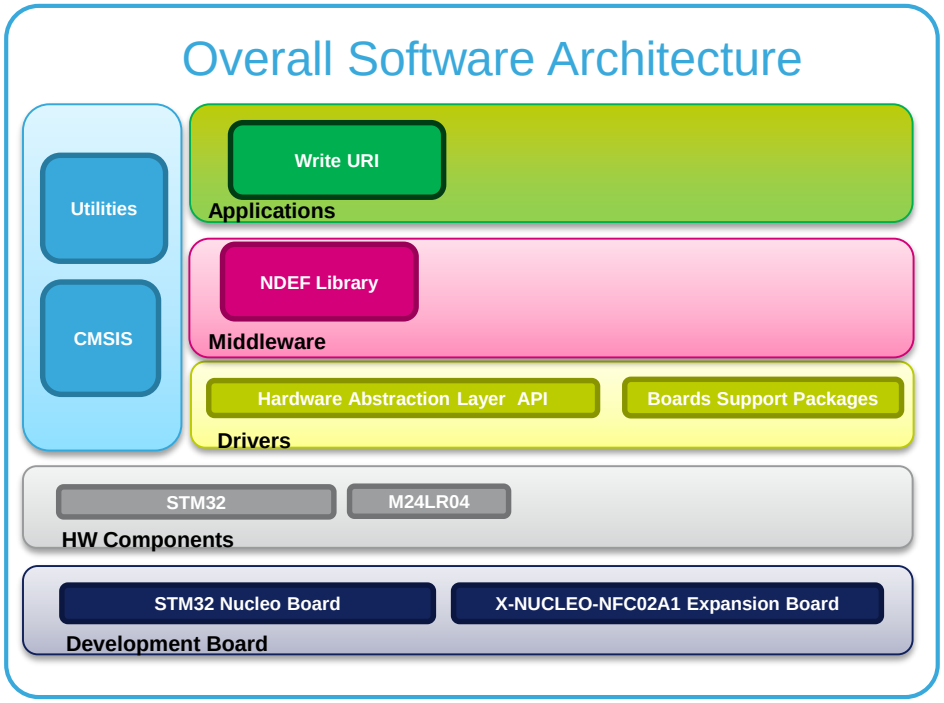
Software Overview

X-CUBE-NFC2 Software Description

- The software runs on the STM32 microcontroller and includes drivers for controlling an RFID/NFC Type V tag. The expansion is built on STM32Cube software technology to ease portability across different STM32 microcontrollers.
- The software comes with sample implementations of drivers running on the X-NUCLEO-NFC02A1 plugged on NUCLEO-F401RE or NUCLEO-L053R8.

Key features

- Cube driver to operate M24LR04E-R
- Complete middleware to build applications using NDEF message for type V tags.
- Easy portability across different MCU families thanks to the STM32Cube
- Sample applications that the developer can use to start experimenting with the code
- Free user-friendly license terms



Latest info available at www.st.com
X-CUBE-NFC2

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X-NUCLEO-NFC02A1: Dynamic NFC tag expansion board
Hardware and Software overview

Setup & Demo Examples
Documents & Related Resources

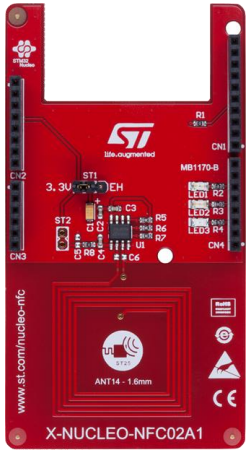
STM32 Open Development Environment: Overview

Setup & Demo Examples
HW prerequisites

- 1x Dynamic NFC tag IC expansion board (**X-NUCLEO-NFC02A1**)
- 1x STM32 Nucleo development board (**NUCLEO-F401RE or NUCLEO-L053R8**)
- 1x Laptop/PC with Microsoft Windows 7 or 8 installed
- 1x USB type A to Mini-B USB cable

NUCLEO-F401RE
NUCLEO-L053R8

Mini USB Cable



X-NUCLEO-NFC02A1

X-NUCLEO-NFC02A1 plugged on a compatible STM32 Nucleo development board

Setup & Demo Examples
SW prerequisites

- **STSW-LINK008**: ST-LINK/V2-1 USB driver
- **STSW-LINK007**: ST-LINK/V2-1 firmware upgrade
- **X-CUBE-NFC2**
  - copy the .zip file content into: “c:\Program Files (x86)\STMicroelectronics\” folder on your Laptop/PC. The package will contain source code example (Keil, IAR, True Studio) based on **NUCLEO-F401RE** or **NUCLEO-L053R8**.

Start coding in just a few minutes with X-CUBE-NFC2

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

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2 Select X-NUCLEO-NFC02A1

3 Download & unpack X-CUBE-NFC2

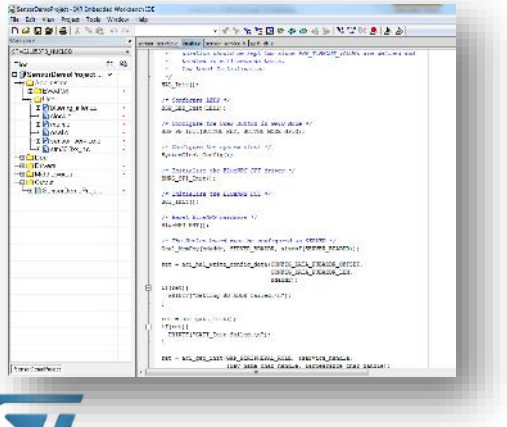
X-CUBE-NFC2 package

- _htmresc
- Documentation ← **Generic Nucleo docs & Driver porting**
- Drivers ← Drivers
- Middlewares ← Serial Utility
- Projects ← **Application examples**
- package.xml
- Release_Notes.html

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

5 Open project example WriteUri Application

6 Modify, build application



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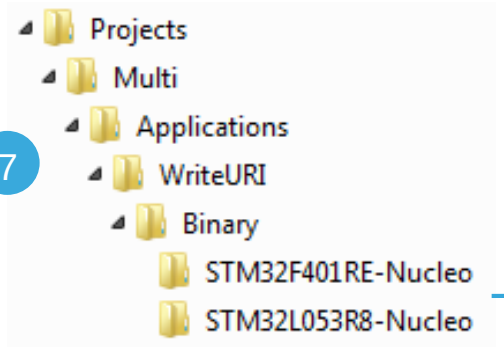
Evaluate using X-CUBE-NFC2



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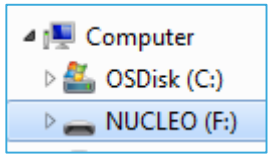
From X-CUBE-NFC2 SW resource package
Drag and drop
STM32L053R8-Nucleo.bin
on STM32 Nucleo drive



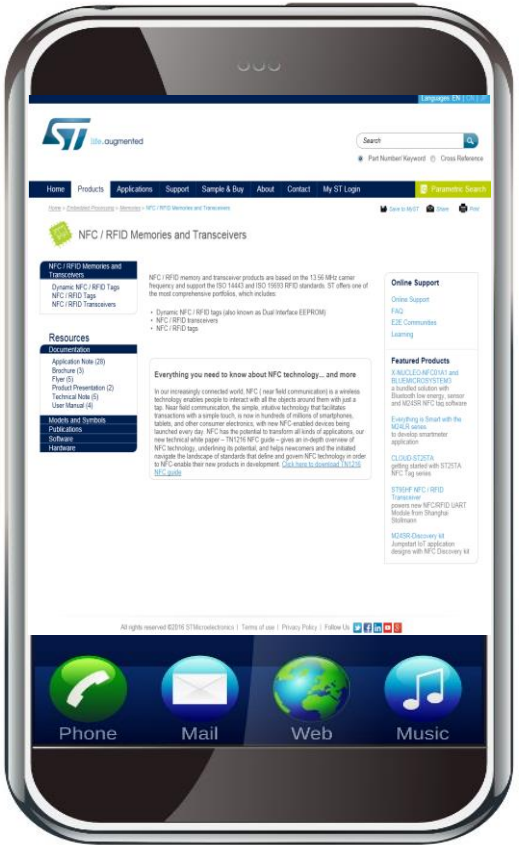
8 Connect power supply (USB cable)

Evaluate using X-CUBE-NFC2

9 Enable NFC on your phone and make sure it is also connected to the internet.

10 Bring the phone close to the X-NUCLEO-NFC02A1 Antenna.

You are directly redirected to st.com/st25 webpage.



Documents & Related Resources

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

X-NUCLEO-NFC02A1:

- **Gerber files, BOM, Schematic**
- **DB2383:** Dynamic NFC tag expansion board based on M24LR for STM32 Nucleo – **data brief**
- **UM1800:** Getting started with X-NUCLEO-NFC02A1 dynamic NFC/RFID tag IC expansion board based on M24LR04E-R for STM32 Nucleo – **user manual**

X-CUBE-NFC2:

- **DB2809:** Dynamic NFC/RFID tag IC software expansion for STM32Cube – **data brief**
- **UM2008:** Getting started with the X-CUBE-NFC2 Dynamic NFC/RFID tag IC software expansion for STM32Cube – **user manual**
- Software setup file

Consult www.st.com for the complete list

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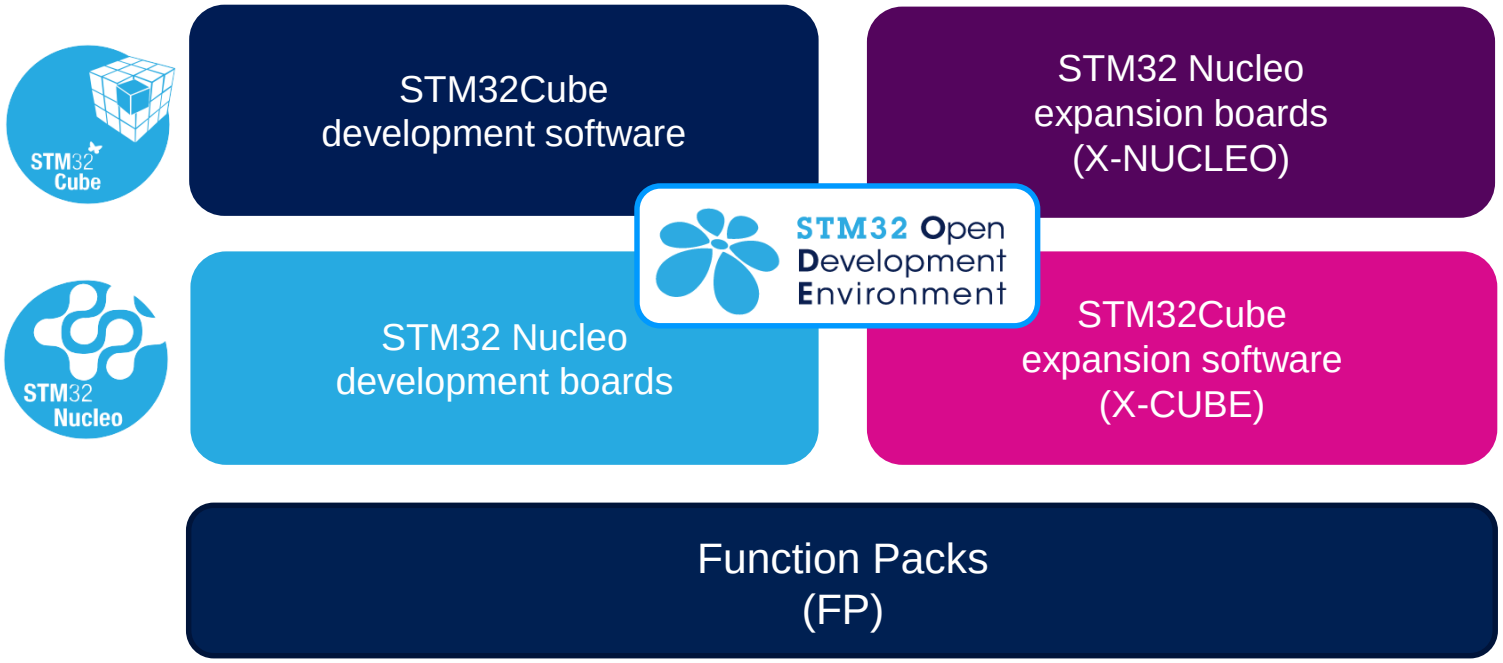
STM32 Open Development Environment: Overview

STM32 Open Development Environment
Fast, affordable Prototyping and Development

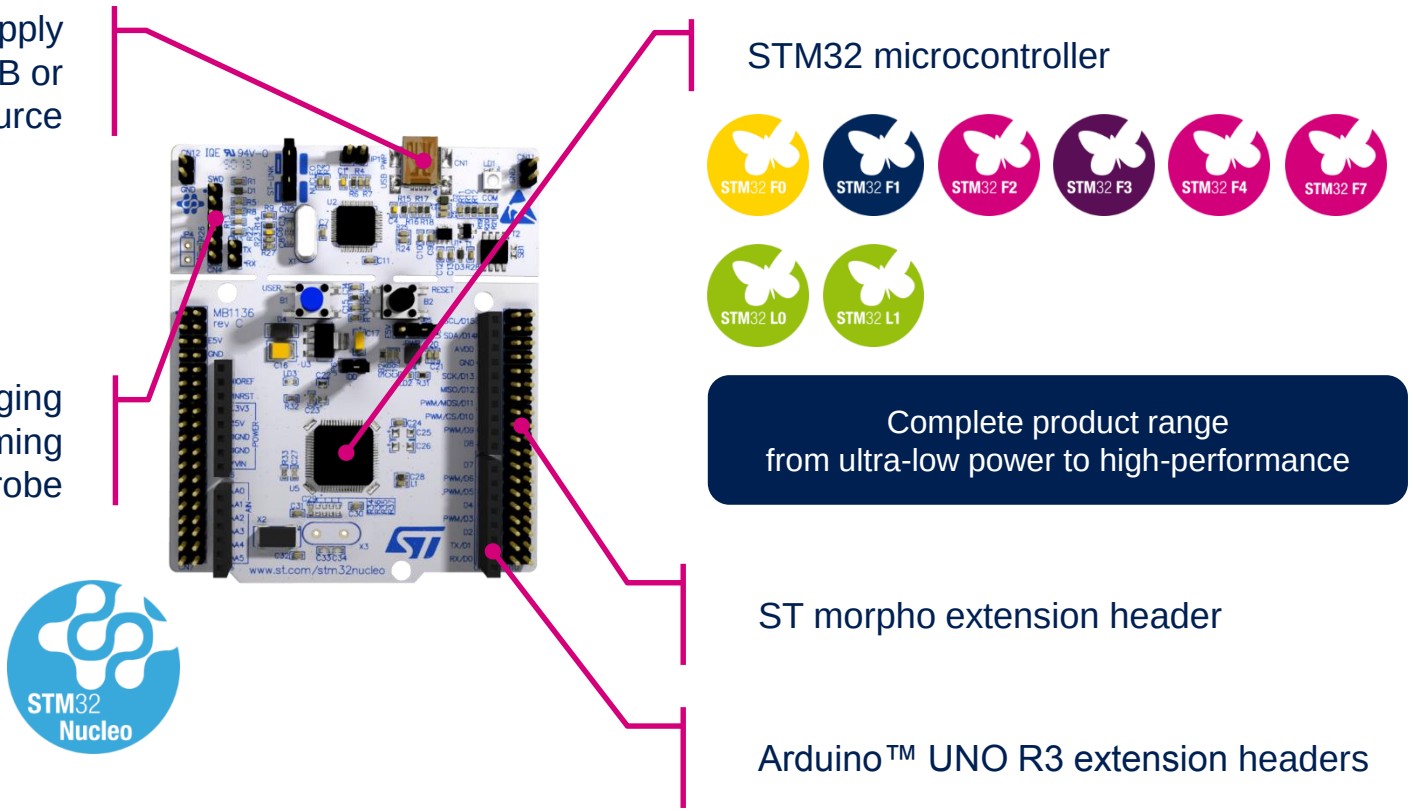
- The STM32 Open Development Environment (ODE) consists of a set of stackable boards and a modular open SW environment designed around the STM32 microcontroller family.



www.st.com/stm32ode

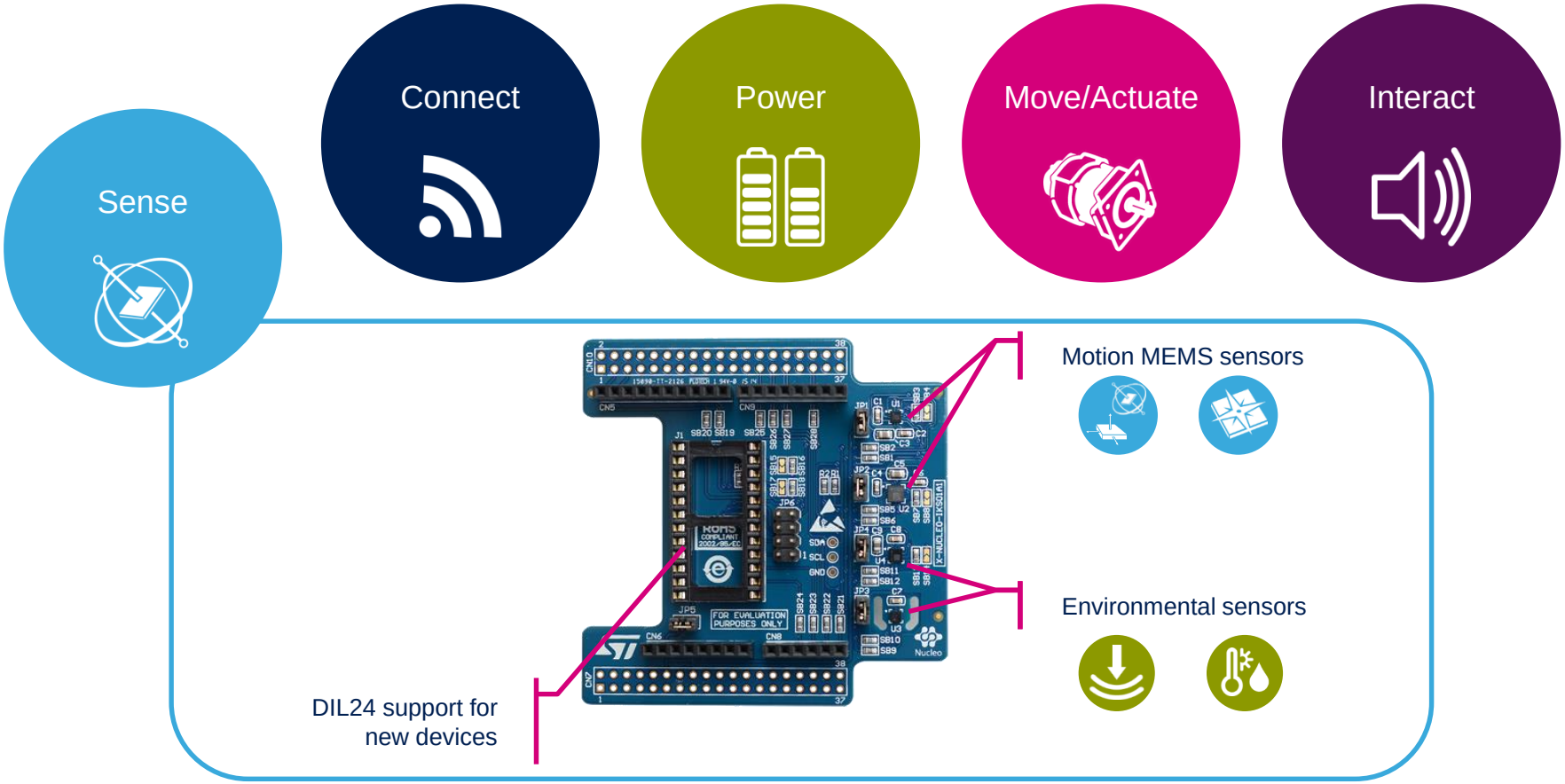
Development Boards (NUCLEO)

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



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.

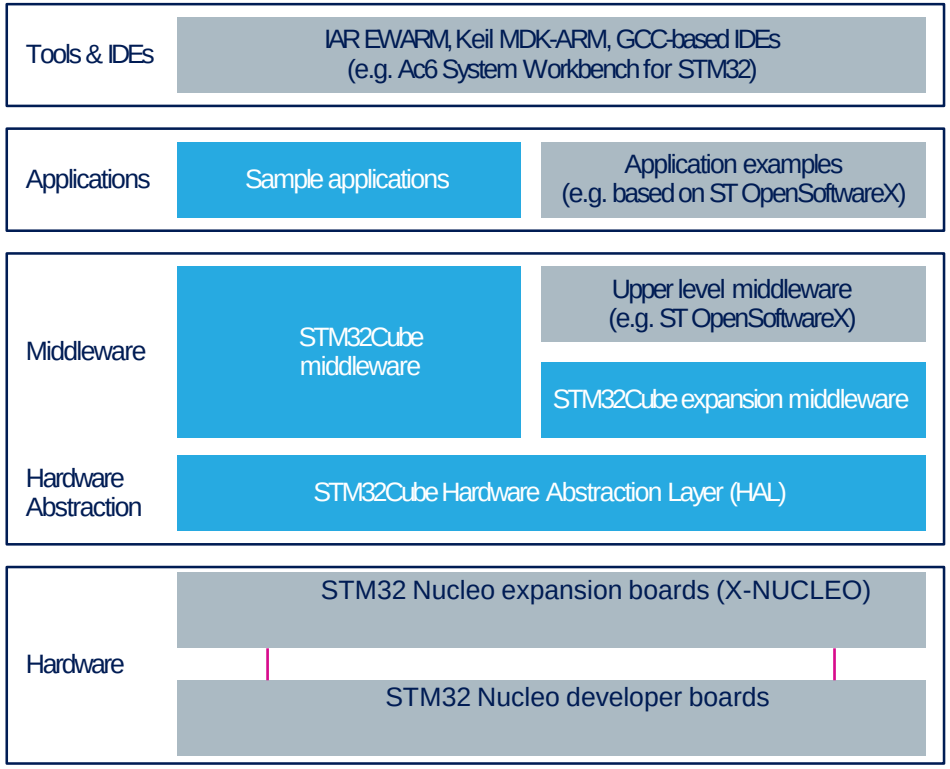


Example of STM32 expansion board (X-NUCLEO-IKS01A1)

STM32 Open Development Environment
Software components

- **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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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

STM32 Open Development Environment
Building block approach

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

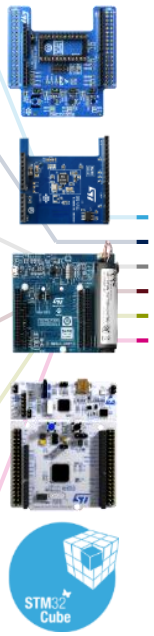
Energy management & battery

Power — POWER

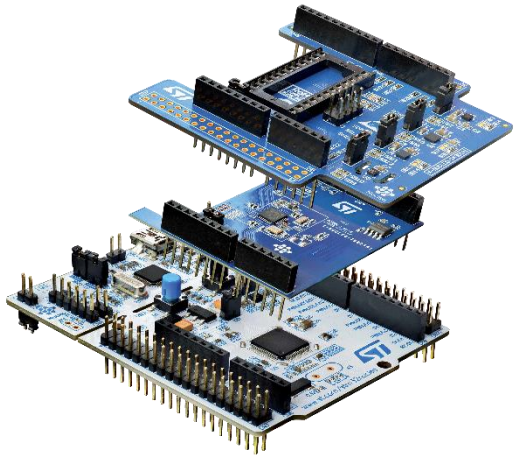
General-purpose microcontrollers
Secure microcontrollers

Process — PROCESS

Software



STM32 Open Development Environment



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