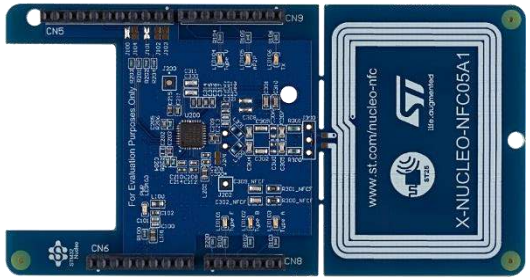
Quick Start Guide

NFC card reader expansion board based on ST25R3911B for STM32 Nucleo (X-NUCLEO-NFC05A1)



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Version 1.0.0 (July 14th, 2017)

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NFC card reader expansion board
Hardware Overview

X-NUCLEO-NFC05A1 Hardware description

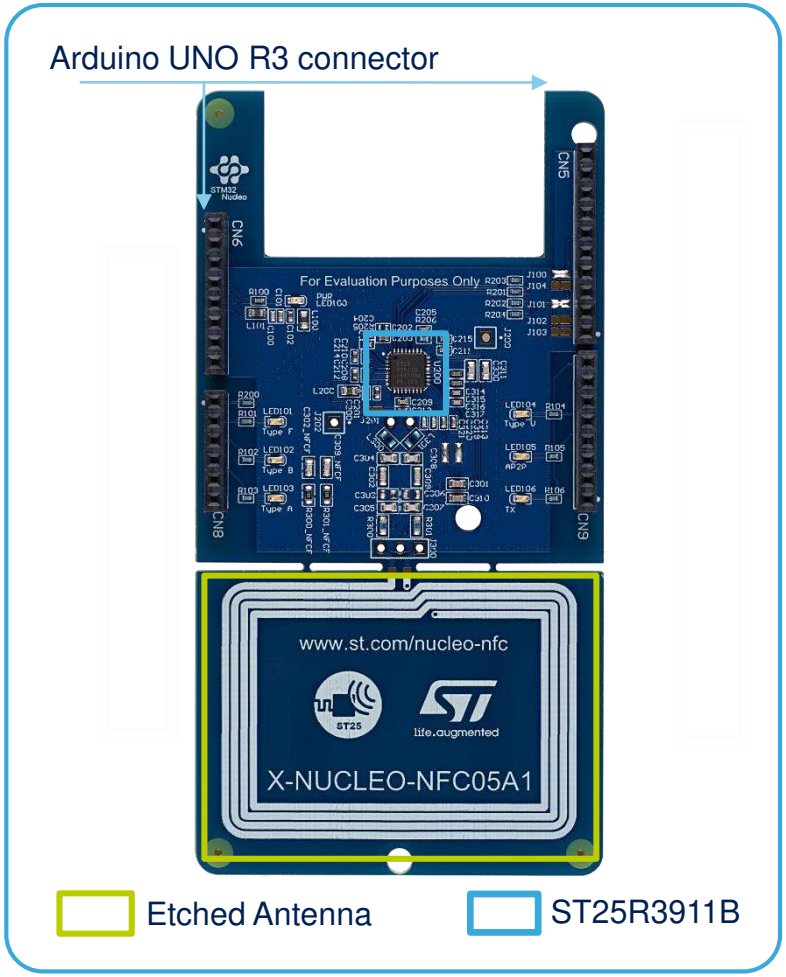
- The X-NUCLEO-NFC05A1 is an NFC card reader expansion board based on the ST25R3911B. The expansion board is configured to support ISO14443A/B, ISO15693, FeliCa™ and AP2P communication. By default, a VHBR compatible matching is populated to achieve bit rates up to 3.4 Mbps.
- The ST25R3911B manages frame coding and decoding in reader mode for standard applications, such as NFC, proximity and vicinity HF RFID standards
- Furthermore, the automatic antenna tuning (AAT) technology enables operations close to metallic parts and/or in changing environments.

Main Features

- Six general purpose LEDs
- ISO 18092 (NFCIP-1) active P2P
- ISO 14443A and ISO14443B
- ISO 15693
- FeliCa™
- VHBR
- Up to 1.4 W output power with differential antenna
- Compatible with Arduino™ UNO R3 connectors
- Compatible with STM32 Nucleo boards

Key Product on board

ST25R3911B
Highly integrated NFC Initiator / HF Reader IC



Latest info available at www.st.com
X-NUCLEO-NFC05A1

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NFC card reader expansion board
Software Overview

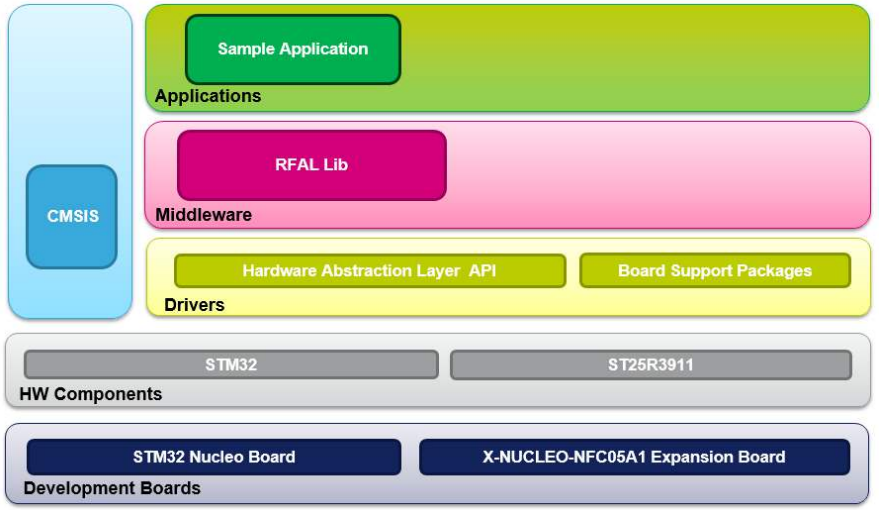
X-CUBE-NFC5 Software Description

- The X-CUBE-NFC5 software expansion for STM32Cube provides a complete middleware for STM32 to control applications using ST25R3911B (HF reader/NFC initiator IC).
- The software is based on STM32Cube technology and expands STM32Cube based packages. It is built on top of STM32Cube software technology to ease portability across different STM32 microcontrollers.
- The software comes with sample implementations of the drivers running on the XNUCLEO-NFC05A1 expansion board plugged on top of a NUCLEO-F401RE or NUCLEOL476RG board.

Key features

- Complete middleware to build applicationsusing the ST25R3911B high performanceHF reader/NFC initiator with 1.4 Wsupporting VHBR and AAT
- Easy portability across different MCUfamilies, thanks to STM32Cube
- Sample application to detect several NFCtag types and mobile phones supportingP2P
- Free, user-friendly license terms
- Sample implementation available on theX-NUCLEO-NFC05A1 expansion board,plugged into one NUCLEO-F401RE orNUCLEO-L476RG board
- Complete RF/NFC abstraction (RFAL) for allmajor technologies including complete ISO-DEP and NFC-DEP layers

Overall Software Architecture



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X-CUBE-NFC5

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X-NUCLEO-NFC05A1: NFC card reader expansion board
Hardware and Software overview

Setup & Demo Examples
Documents & Related Resources

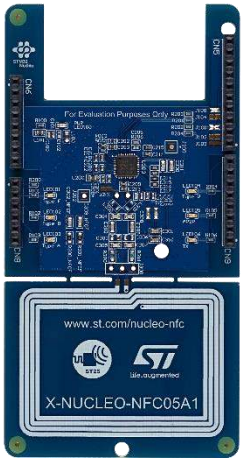
STM32 Open Development Environment: Overview

Setup & Demo Examples
HW prerequisites

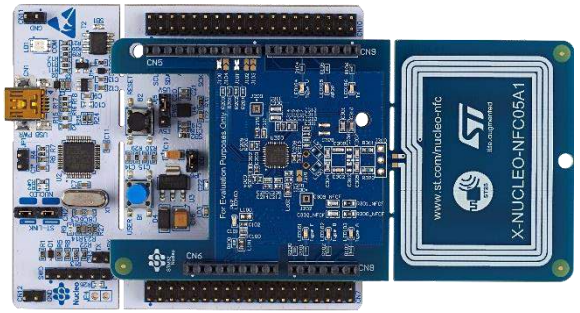
- 1x NFC card reader expansion board (**X-NUCLEO-NFC05A1**)
- 1x STM32 Nucleo development board (**NUCLEO-F401RE or NUCLEO-L476RG**)
- 1x USB type A to Mini-B USB cable
- 1x Laptop/PC for logging output (optional)

NUCLEO-F401RE
NUCLEO-L476RG

Mini USB Cable



X-NUCLEO-NFC05A1



X-NUCLEO-NFC05A1 plugged on a compatible STM32 Nucleo development board

SW prerequisites

- **STSW-LINK008**: ST-LINK/V2-1 USB driver

- **X-CUBE-NFC5**
  - 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-L476RG**.

Start coding in just a few minutes with X-CUBE-NFC5

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

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2 Select X-NUCLEO-NFC05A1

3 Download & unpack X-CUBE-NFC5

X-CUBE-NFC5 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

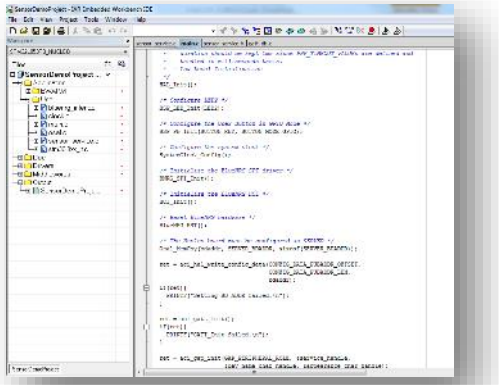
5 Open project example Polling Application

KEIL Tools by ARM

IAR SYSTEMS

AC6 Assistance Conseil Systèmes

6 Modify, build application



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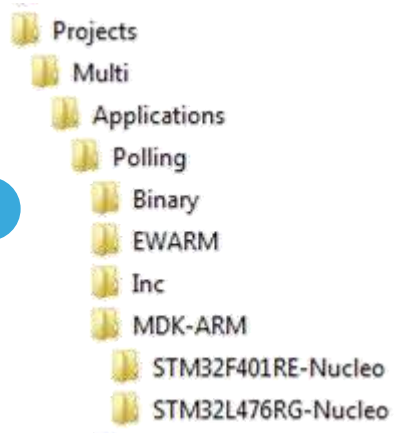
Evaluate using X-CUBE-NFC5



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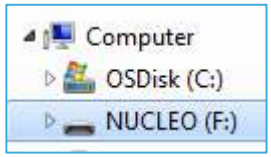
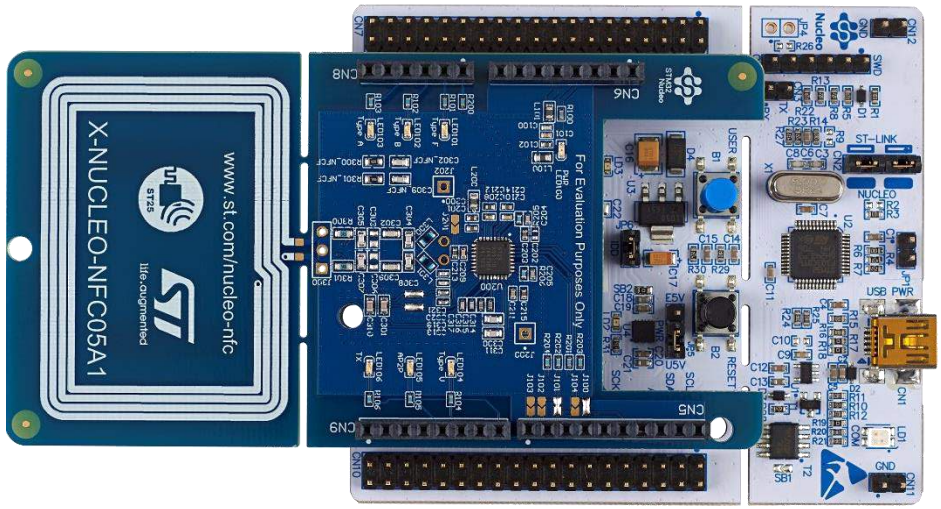
From X-CUBE-NFC5 SW resource package
Drag and drop
STM32L476RG-Nucleo.bin
on STM32 Nucleo drive



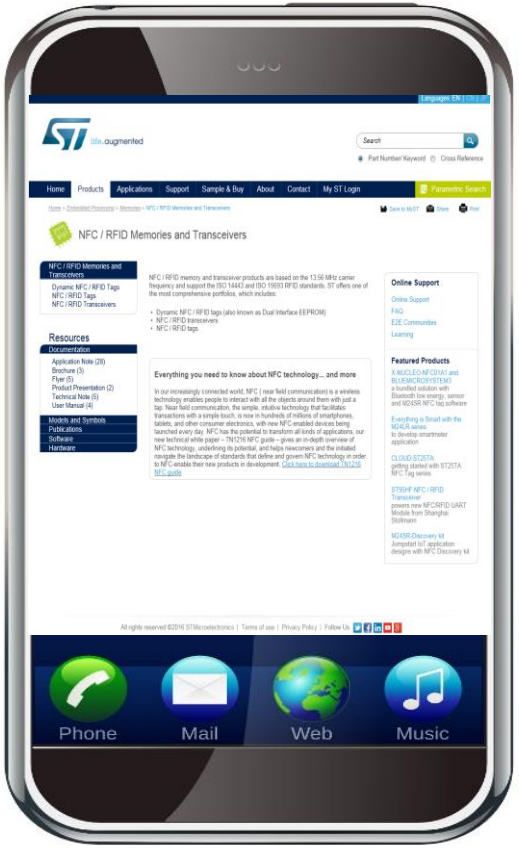
8 Connect power supply (USB cable)



X-CUBE-NFC5
Evaluate using X-CUBE-NFC5

9 Approach with a NFC tag

10 When the expansion board detects the presence of the tag, it will poll and identify its UID and show the type of technology by lighting up the propper LED



Documents & Related Resources

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

X-NUCLEO-NFC05A1:

- Gerber files, BOM, Schematic
- **DB3333**: NFC card reader expansion board based on ST25R3911B for STM32 Nucleo – **data brief**
- **UM2252:** Getting started with the X-NUCLEO-NFC05A1 NFC card reader expansion board based on ST25R3911B for STM32 Nucleo **– user manual**

X-CUBE-NFC5:

- **DB3341:** High performance HF reader/NFC initiator IC software expansion for STM32Cube – **data brief**
- **UM2253:** Getting started with the X-CUBE-NFC5 high performance HF reader / NFC initiator IC software expansion for STM32Cube – **user manual**
- Software setup file

Consult www.st.com for the complete list

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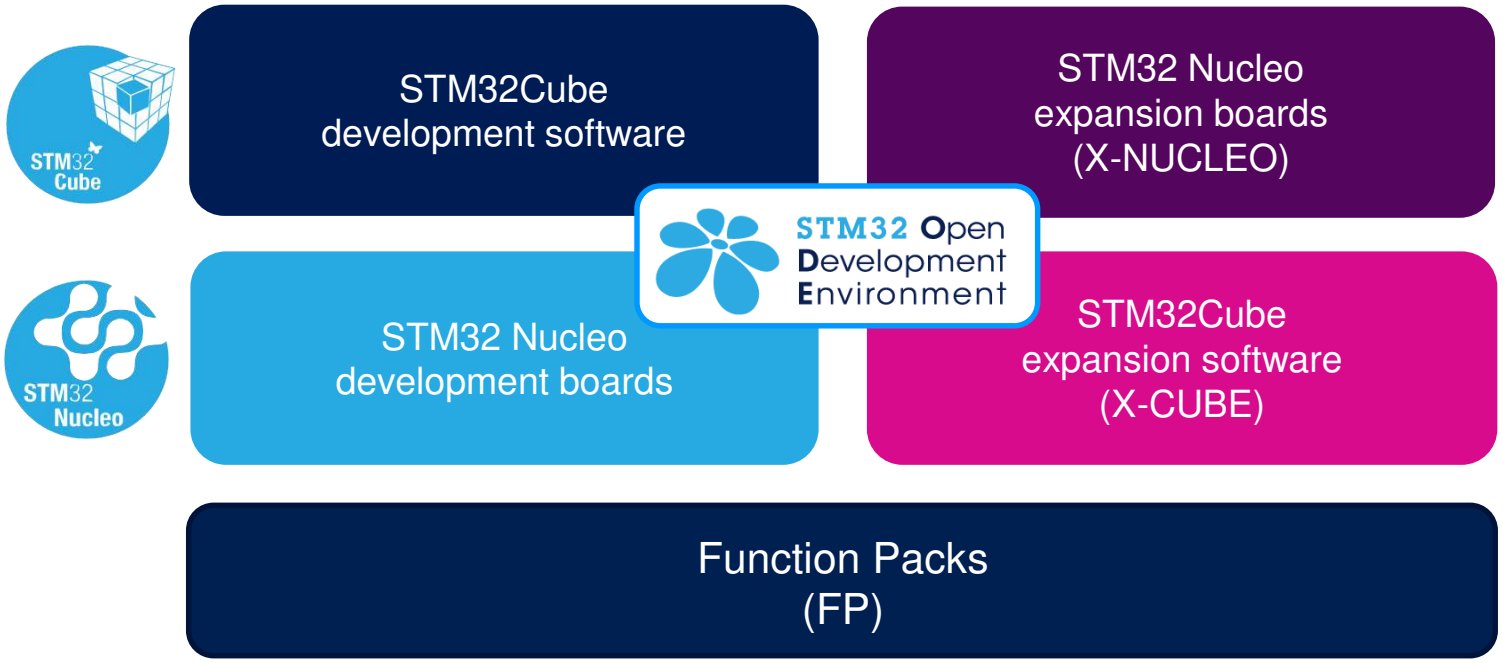
STM32 Open Development Environment: Overview

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.



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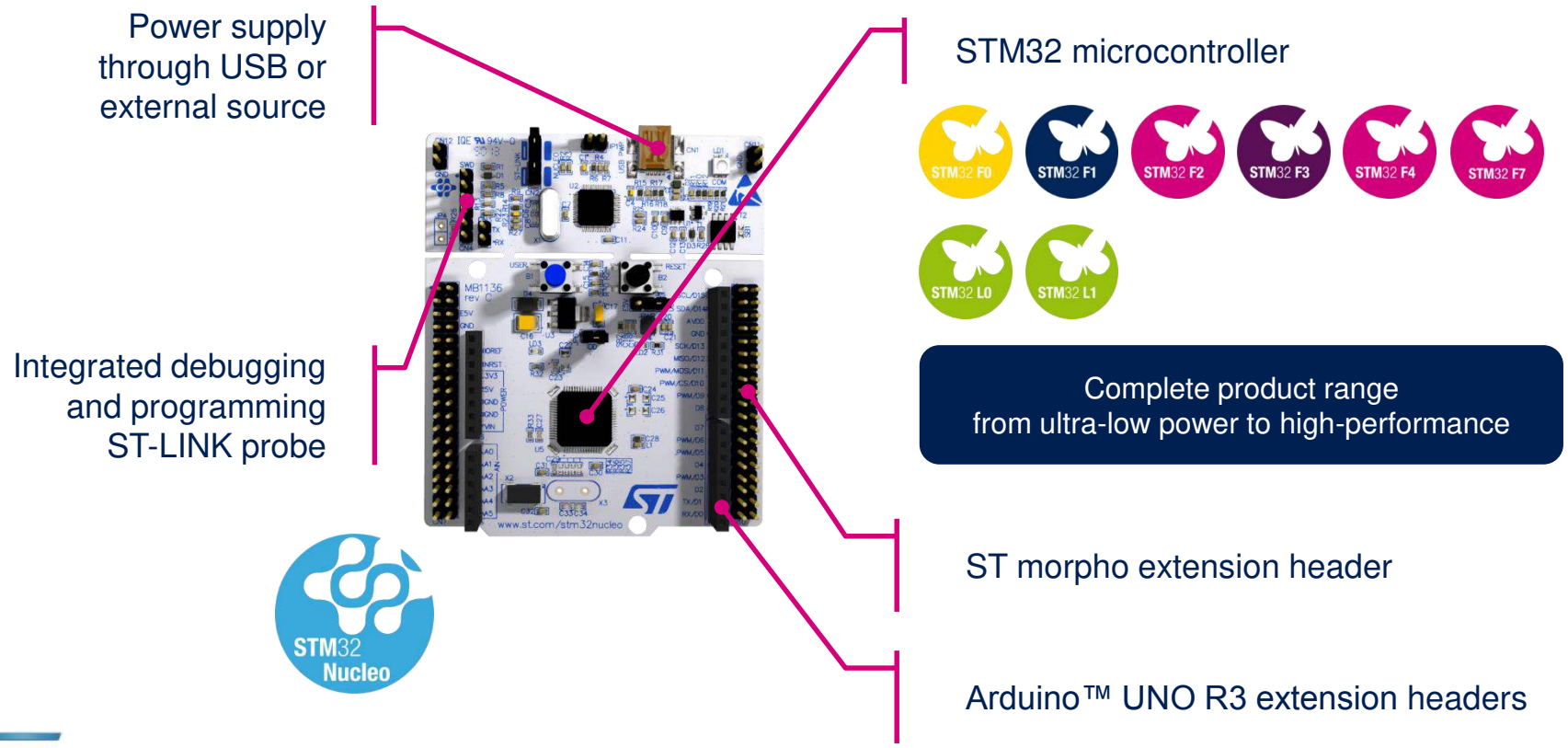
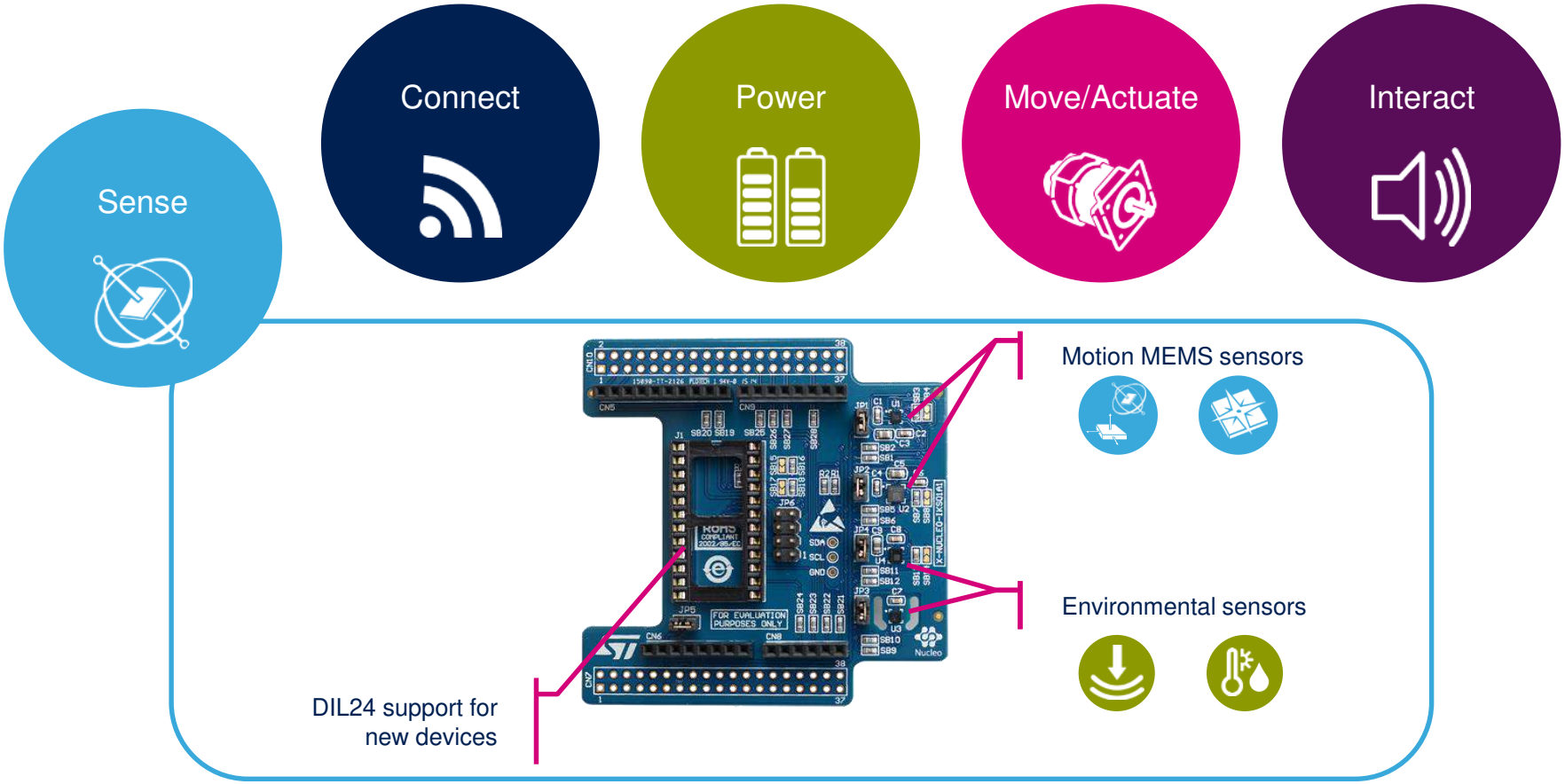
Development Boards (NUCLEO)

- 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.

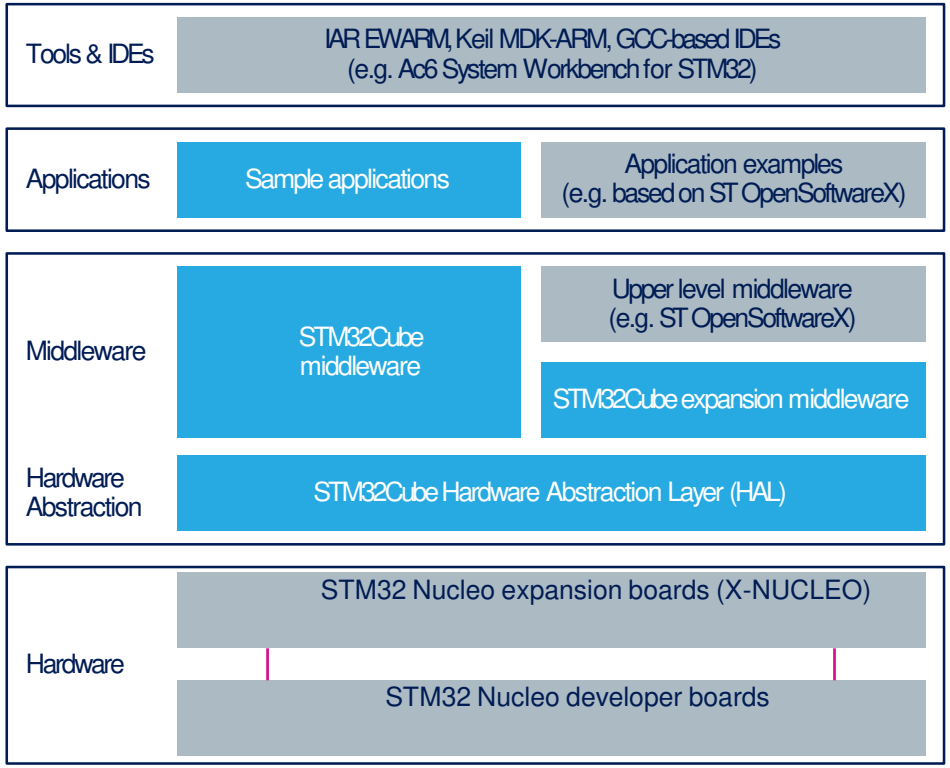


Example of STM32 expansion board (X-NUCLEO-IKS01A1)

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

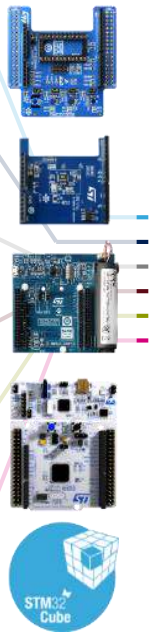
Energy management & battery

Power — POWER

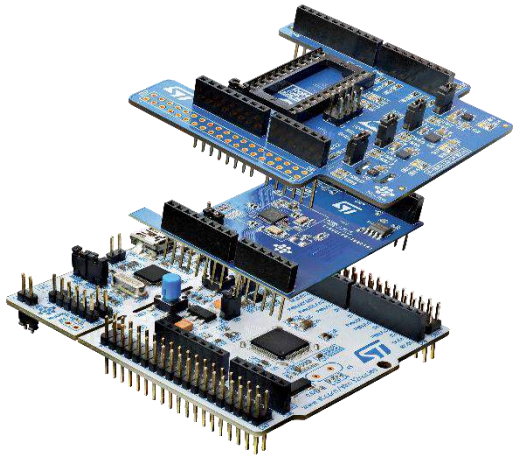
General-purpose microcontrollers
Secure microcontrollers

Process — PROCESS

Software



STM32 Open Development Environment



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