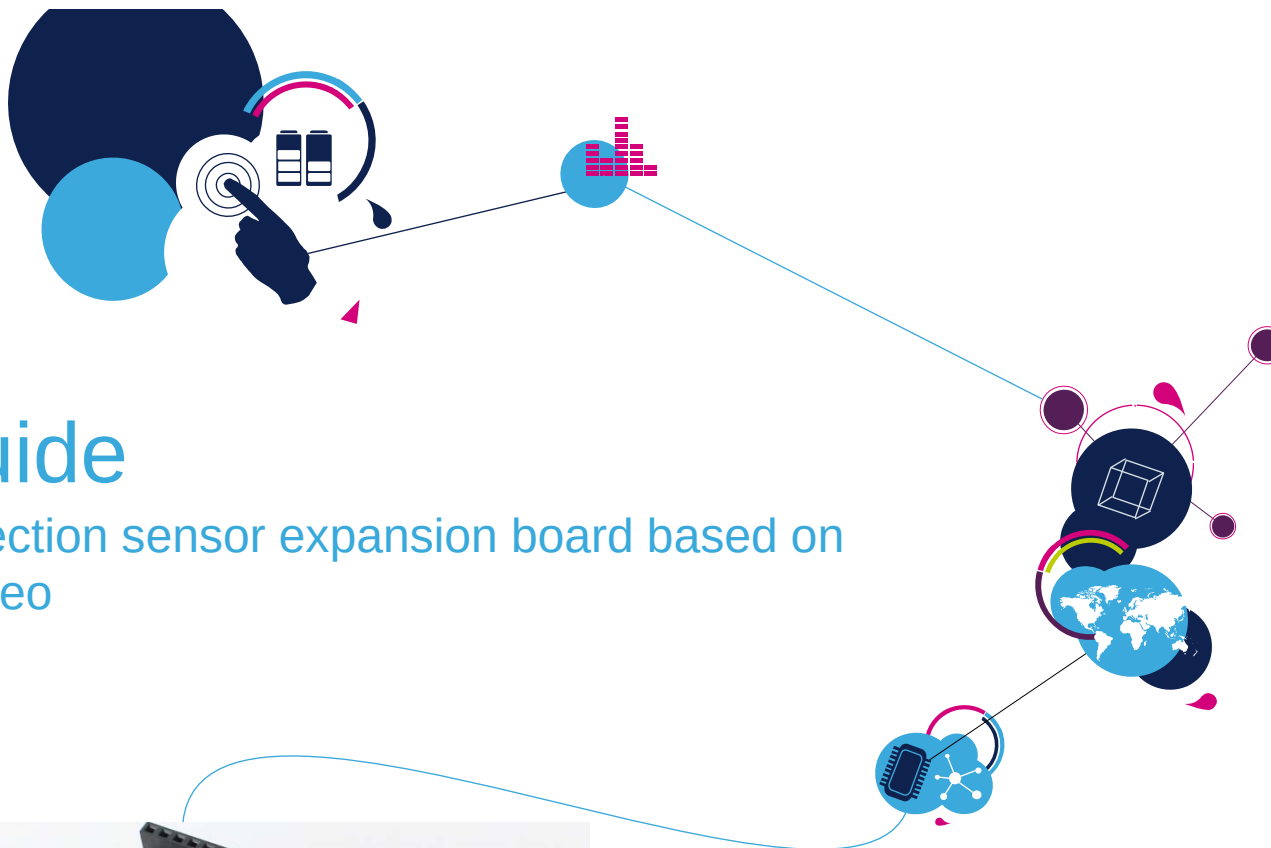
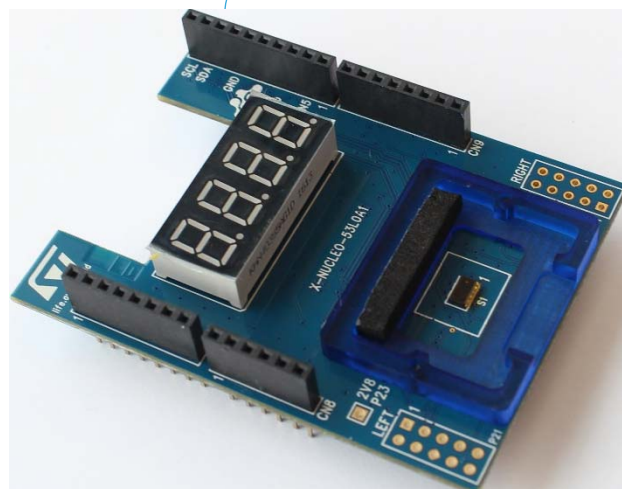




Quick Start Guide

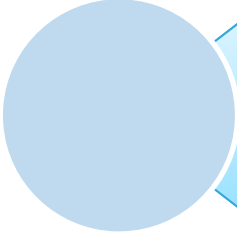
Ranging and gesture detection sensor expansion board based on VL53L0X for STM32 Nucleo (X-NUCLEO-53L0A1)



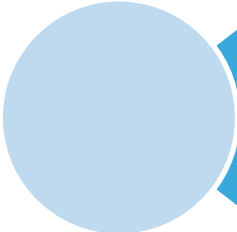
Version 1.0 (May 30, 2016)

Quick Start Guide Contents

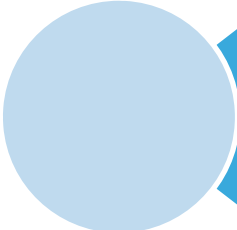
2



X-NUCLEO-53L0A1: Ranging and gesture detection sensor expansion board
Hardware and Software overview



Setup & Demo Examples
Documents & Related Resources



STM32 Open Development Environment: Overview

Ranging and gesture detection sensor expansion board

Hardware Overview (1/2)

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X-NUCLEO-53L0A1 Hardware Description

- The X-NUCLEO-53L0A1 is a ranging and gesture detection sensor evaluation and development board system, designed around VL53L0X, a device based on ST's FlightSense™, Time-of-Flight technology.
- The VL53L0X communicates with STM32 Nucleo developer board host microcontroller through an I²C link available on the Arduino UNO R3 connector.

Key Products on board

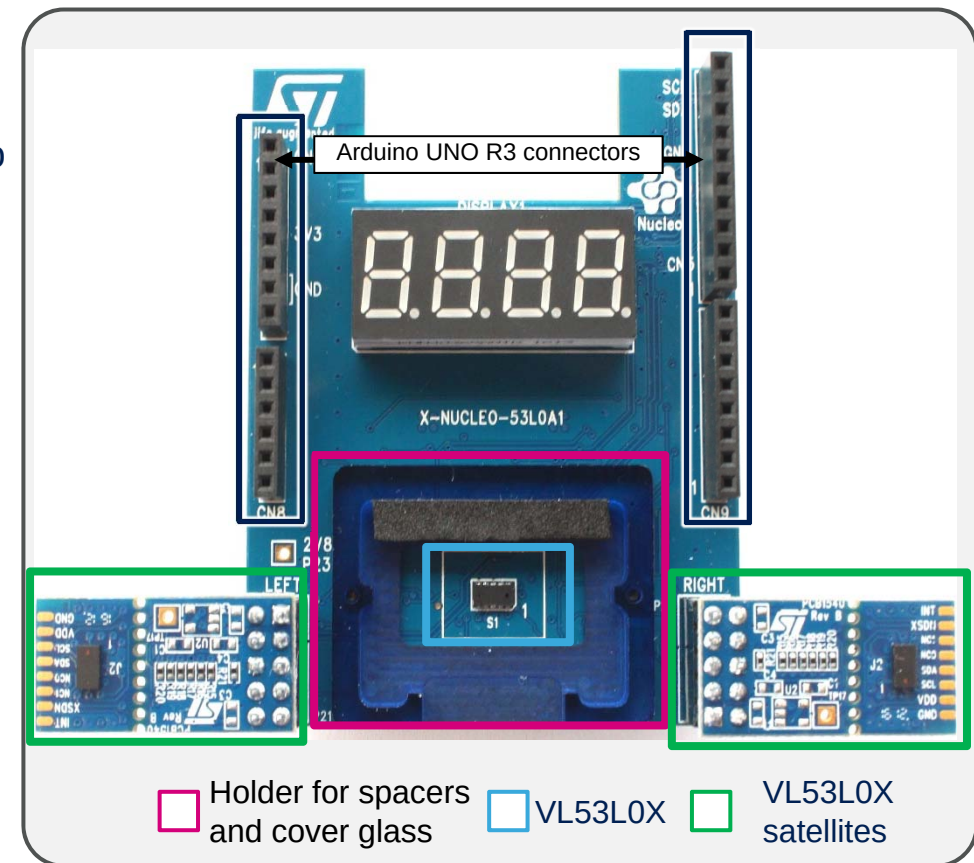
VL53L0X proximity and gesture detection sensor module.

4-digit display, displaying the distance of a target from the ranging sensor.

0.25, 0.5 and 1mm spacers to simulate air gaps.

Cover glass

2x VL53L0X satellite boards

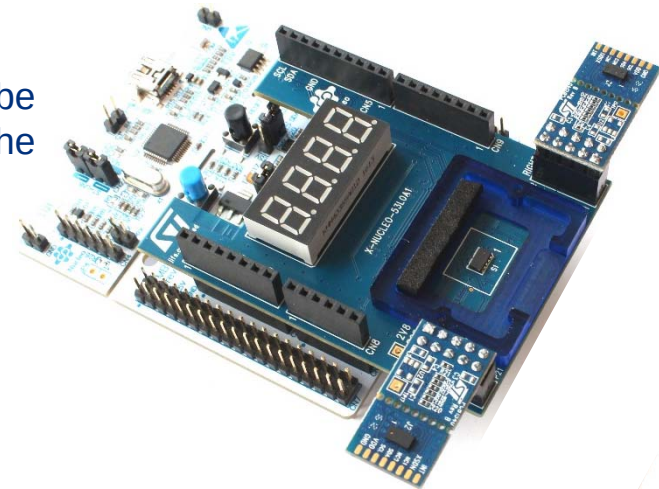
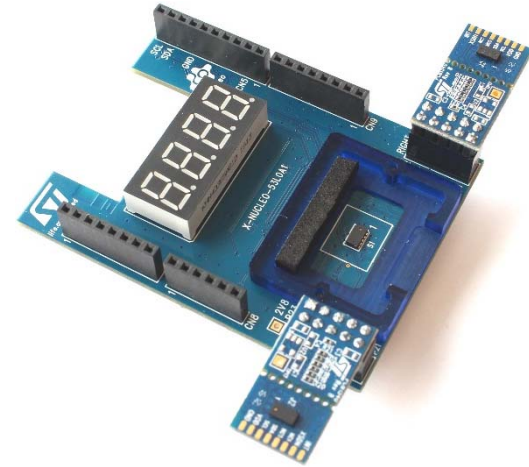


Ranging and gesture detection sensor expansion board

Hardware Overview (2/2)

4

- X-NUCLEO-53L0A1 expansion board
 - In order to easily integrate multiple VL53L0X's into customer devices, up to 2 external satellite VL53L0X boards can be connected to the expansion board.
 - These satellites are delivered with the X-NUCLEO-53L0A1.
- X-NUCLEO-53L0A1 also available as a Nucleo pack (P-NUCLEO-53L0A1)
 - The X-NUCLEO-53L0A1 expansion board can also be ordered on www.st.com as a Nucleo pack, combining the expansion board and the STM32 Nucleo board:
 - Order code: **P-NUCLEO-53L0A1**:
X-NUCLEO-53L0A1 expansion board and NUCLEO-F401RE full features board.



Ranging and gesture detection sensor software expansion

STM32Cube Software Overview

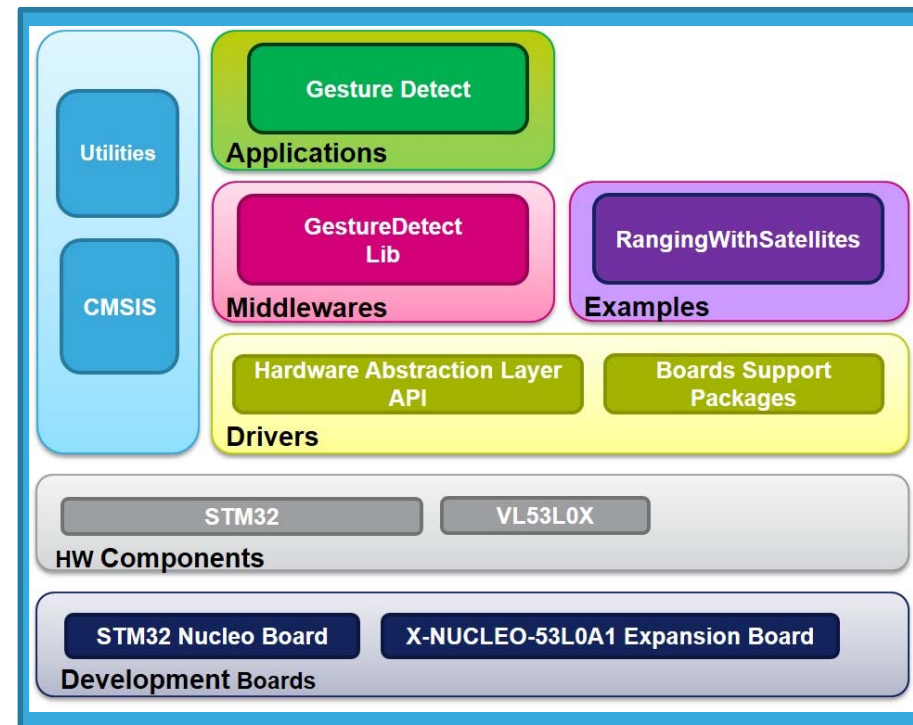
5

X-CUBE-53L0A1 Software Description

- The X-CUBE-53L0A1 software package is an expansion for STM32Cube, associated with the X-NUCLEO-53L0A1 expansion board for STM32. The source code of this package is based on STM32Cube to ease portability and code sharing across different STM32 MCU families. Implementation examples are available for the STM32 Nucleo ranging and gesture detection sensor expansion board (X-NUCLEO-53L0A1) plugged on top of an STM32 Nucleo development board (NUCLEO-F401RE or NUCLEO-L476RG).

Key features

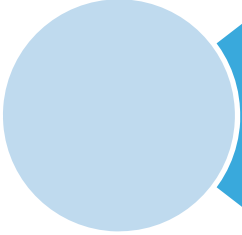
- Driver layer (VL53L0X API) for complete management of the VL53L0X ranging and gesture detection sensor integrated in the X-NUCLEO-53L0A1 expansion board.
- Easy portability across different MCU families, thanks to STM32Cube.
- Free, user-friendly license terms.
- Example code for ranging measurement.
- Example code for ranging with multiple VL53L0X sensors. Up to 3x VL53L0X devices can be controlled using the X-NUCLEO-53L0A1 expansion board.
- Tap and swipe examples code of gesture detection with one or two VL53L0X sensors.



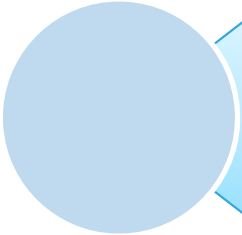
Latest SW available at www.st.com
X-CUBE-53L0A1

Quick Start Guide Contents

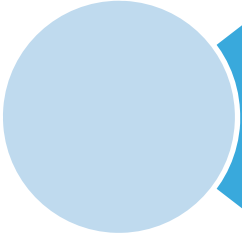
6



X-NUCLEO-53L0A1: Ranging and gesture detection sensor expansion board
Hardware and Software overview



Setup & Demo Examples
Documents & Related Resources



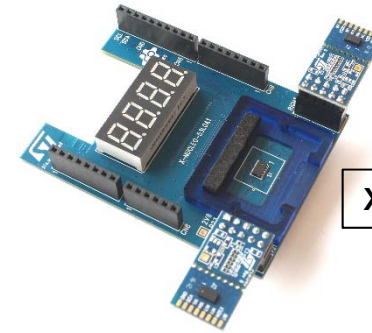
STM32 Open Development Environment: Overview

Setup & Demo Examples

HW prerequisites

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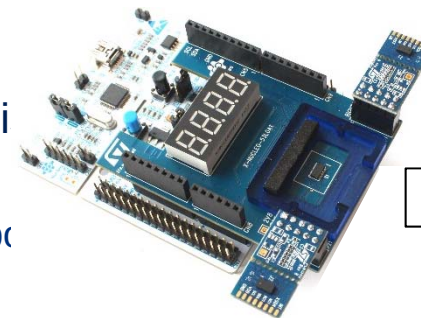
- 1x Ranging and gesture detection expansion board based on VL53L0X (**X-NUCLEO-53L0A1**).
- 1x STM32 Nucleo development board (**NUCLEO-F401RE** or **NUCLEO-L476RG**)
- 1x Laptop/PC with MS Windows supported
- 1x USB type A to Mini-B USB cable
- If user has no STM32 Nucleo development board, it is possible to order the Nucleo pack.
 - **P-NUCLEO-53L0A1** : X-NUCLEO-53L0A1 expansion board and NUCLEO-F401RE full features board.



X-NUCLEO-53L0A1



NUCLEO-F401RE
or
NUCLEO-L476RG



P-NUCLEO-53L0A1

Setup & Demo Examples

SW prerequisites

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- **STSW-LINK009:** ST-LINKV2-1 USB driver
- **STSW-LINK007:** ST-LINKV2-1 firmware upgrade
- **X-CUBE-53L0A1:** P-NUCLEO-53L0A1 software expansion, copy the .zip file content into a folder on your PC, the package will contain source code examples (Keil, IAR, System Workbench) based on NUCLEO-F401RE or NUCLEO-L476RG for STM32Cube
- **STSW-IMG006:** P-NUCLEO-53L0A1 Graphical User Interface (GUI) on Windows 7, 8 and 10

Ranging and gesture detection sensor expansion board

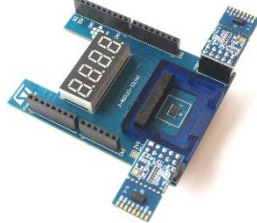
Start coding with X-CUBE-53L0A1 in six steps

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



2 Select
X-NUCLEO-53L0A1



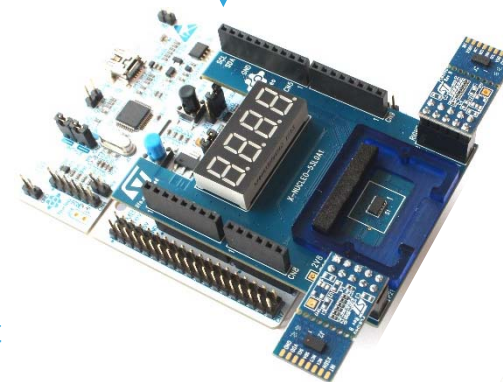
3
Download & unpack
X-CUBE-53L0A1

X-CUBE-53L0A1 package

_htmresc	Generic Nucleo & package docs
Documentation	VL53L0X API driver
Drivers	Gesture detection library
Middlewares	VL53L0X examples projects
Projects	
Release_Notes.html	

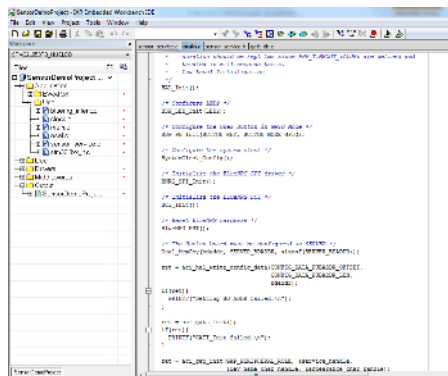
4

Download & install STM32
Nucleo **ST-LINK/V2-1** USB driver
(STSW-LINK009 and STSW-LINK007)



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Modify, build application



5

Open project example
RangingWithSatellites or GestureDetect



Ranging and gesture detection sensor expansion board

Evaluate using X-CUBE-53L0A1 and a NUCLEO board

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STM32CubeExpansion_VL53L0X_Vx.y.z

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Documentation

Drivers

Middlewares

Projects

Multi

Applications

VL53L0X

GestureDetect

Binary

1

VL53L0X_GestureDetect_F401.bin

VL53L0X_GestureDetect_L476.bin

Examples

VL53L0X

RangingWithSatellites

Binary

VL53L0X_Ranging_F401.bin

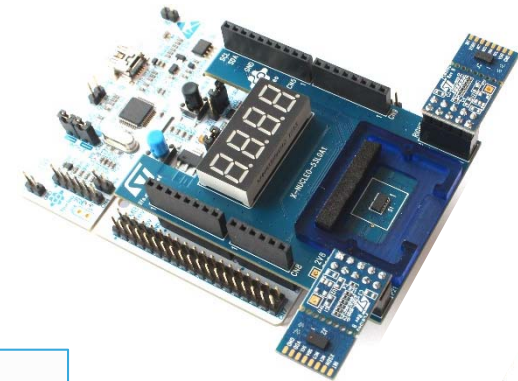
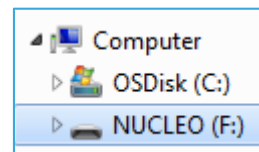
VL53L0X_Ranging_L476.bin

2

Open: UM2046: Getting started with VL53L0X ranging, gesture detection sensor software expansion for STM32Cube and follow the instructions

3

Drag and drop to



Documents & Related Resources

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

X-NUCLEO-53L0A1: Product Folder

- BOM and schematic included in UM2047
- **DB2901**: Ranging and gesture detection sensor expansion board based on VL53L0X for STM32 Nucleo – **data brief**
- **UM2047**: Getting started with the X-NUCLEO-53L0A1; ranging and gesture detection sensor expansion board based on VL53L0X for STM32 Nucleo – **user manual**

X-CUBE-53L0A1: Product Folder

- **DB2902**: VL53L0X Time-of-Flight (TOF) ranging and gesture detection sensor software expansion for STM32Cube – **data brief**
- **UM2046**: Getting started with X-CUBE-53L0A1; ranging and gesture detection sensor software expansion for STM32Cube – **user manual**
- **Software setup file**

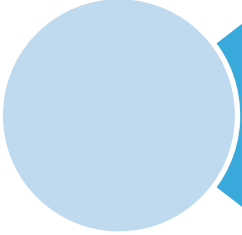
STSW-IMG006: Product Folder

- **DB2904**: P-NUCLEO-53L0A1 pack PC graphical user interface (GUI) – **data brief**
- **Software setup file**

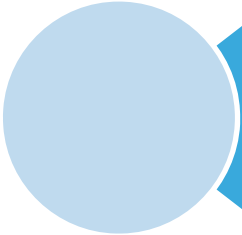
Consult www.st.com for the complete list

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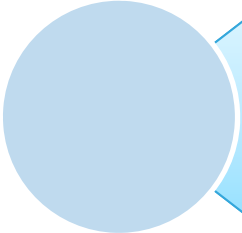
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X-NUCLEO-53L0A1: Ranging and gesture detection sensor expansion board
Hardware and Software overview



Setup & Demo Examples
Documents & Related Resources



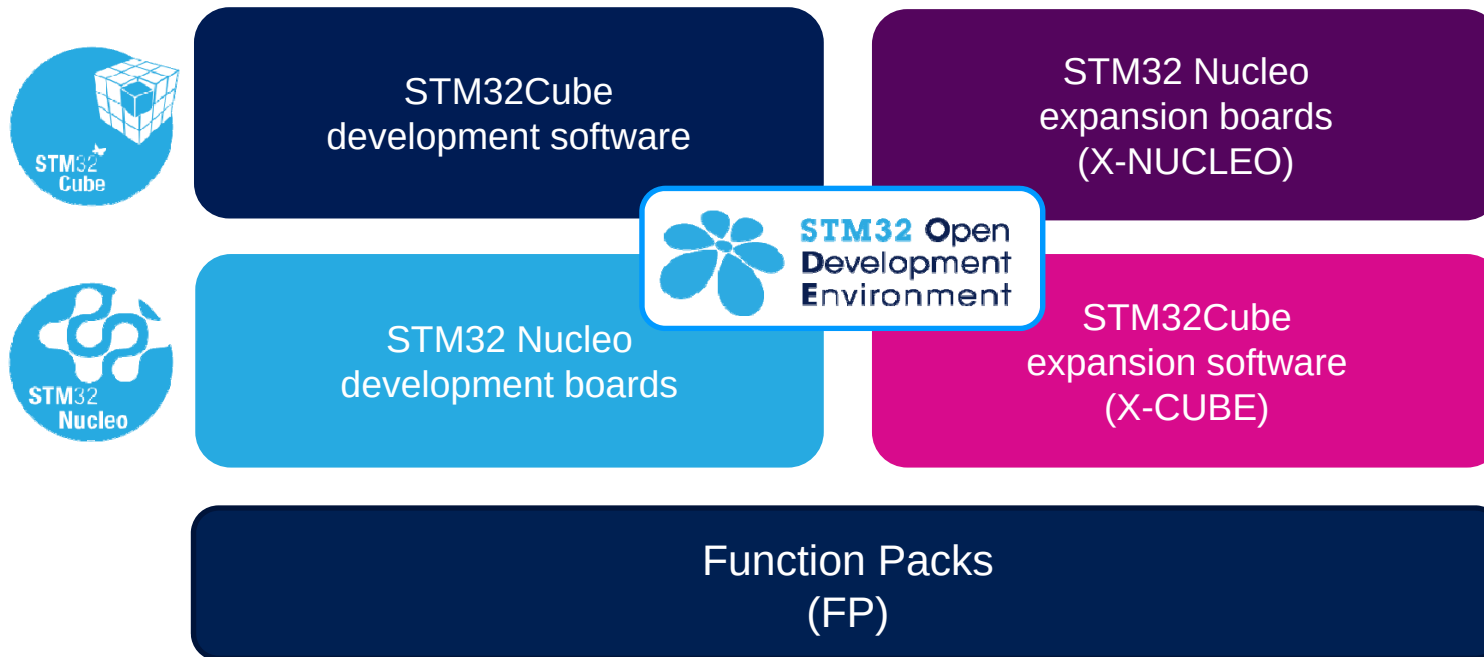
STM32 Open Development Environment: Overview

STM32 Open Development Environment

Fast, affordable Prototyping and Development

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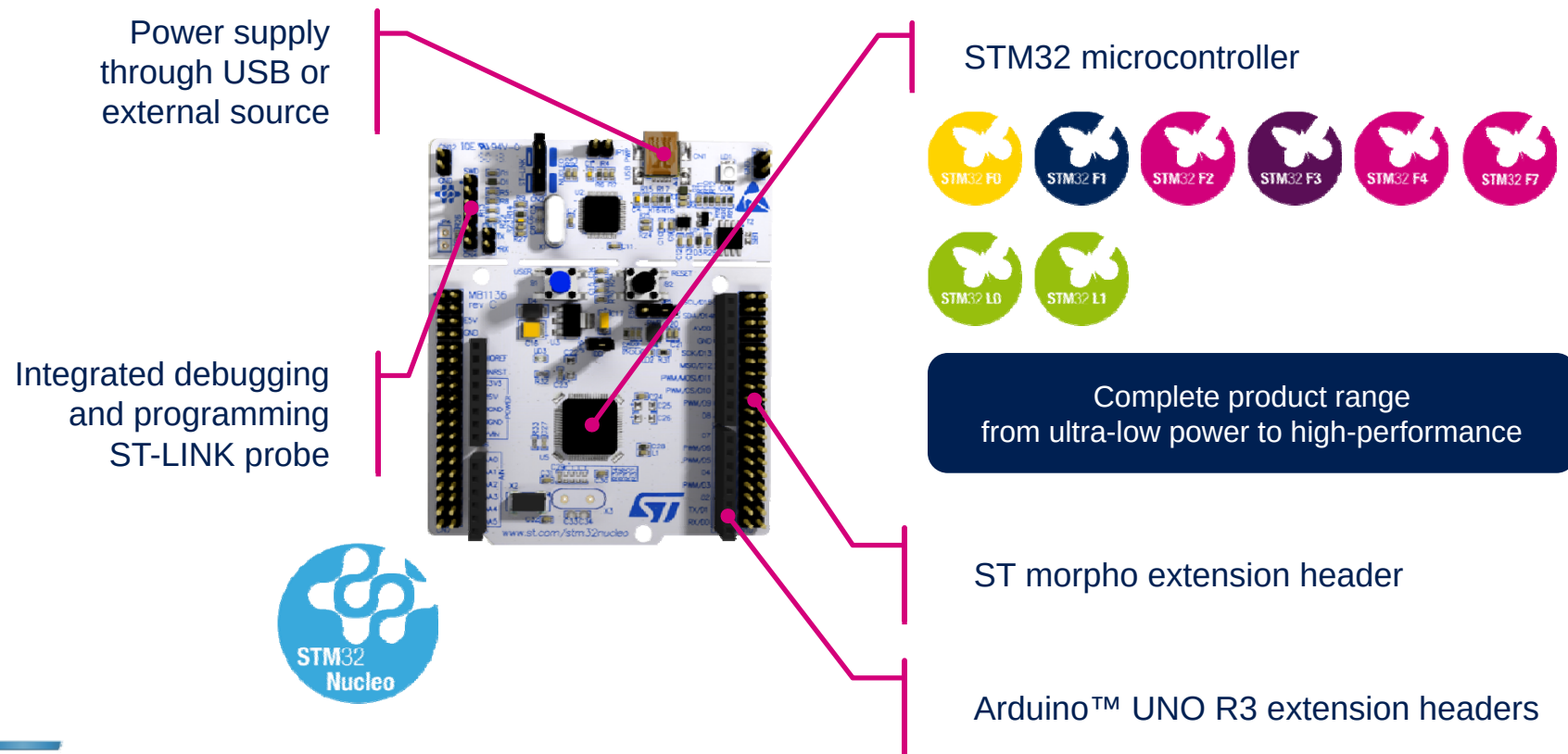
- The STM32 Open Development Environment (ODE) consists of a set of stackable boards and a modular open SW environment designed around the STM32 microcontroller family.



STM32 Nucleo Development Boards (NUCLEO)

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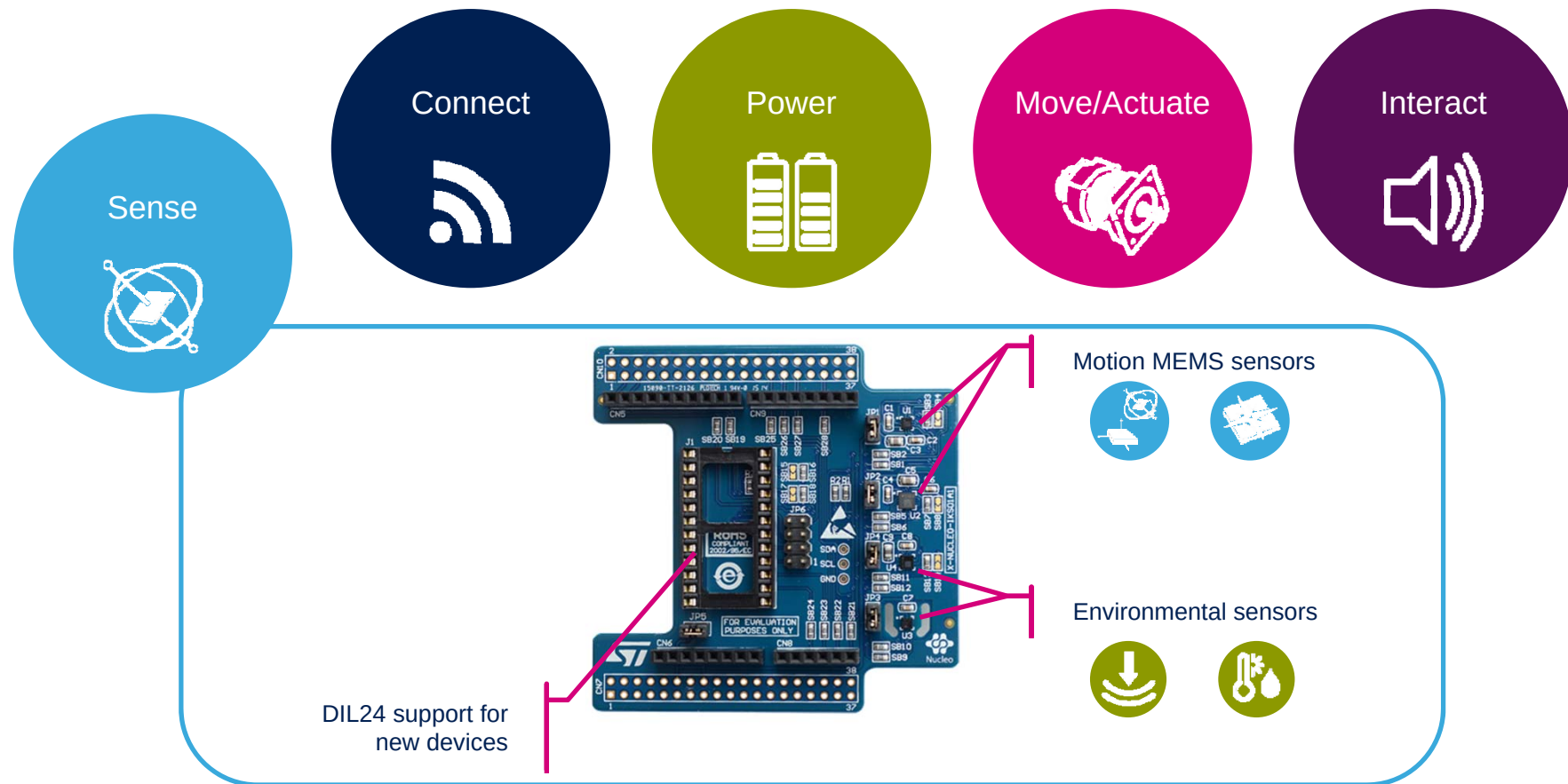
- A comprehensive range of affordable development boards for all the STM32 microcontroller series, with unlimited unified expansion capabilities and integrated debugger/programmer functionality.



STM32 Nucleo Expansion Boards (X-NUCLEO)

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



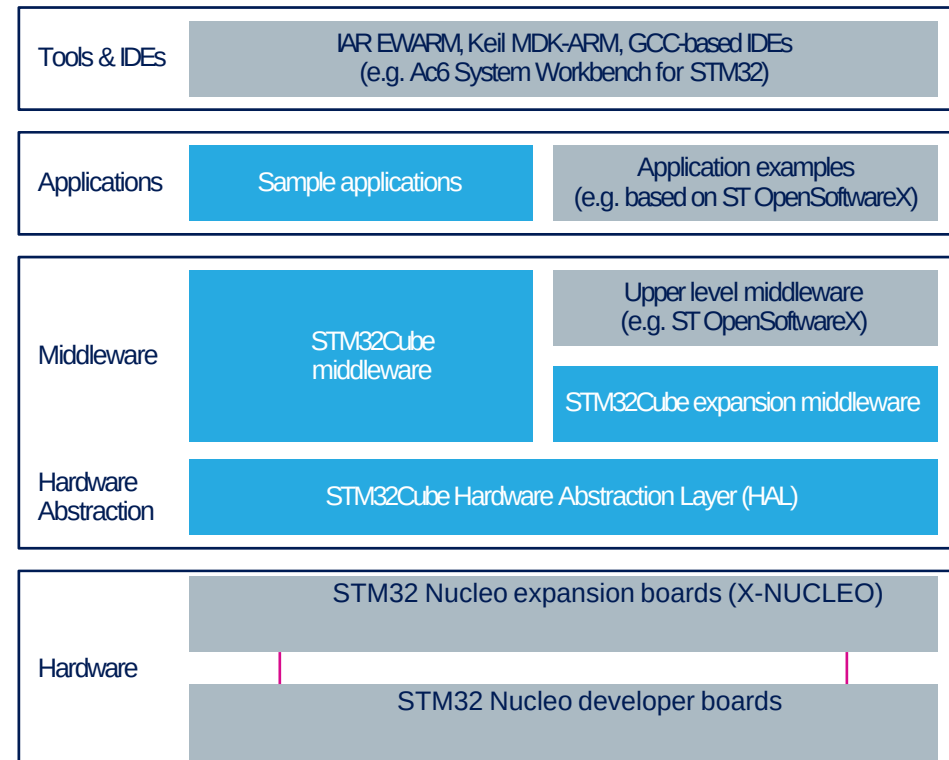
Example of STM32 expansion board (X-NUCLEO-IKS01A1)

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

www.st.com/x-cube

STM32 Open Development Environment

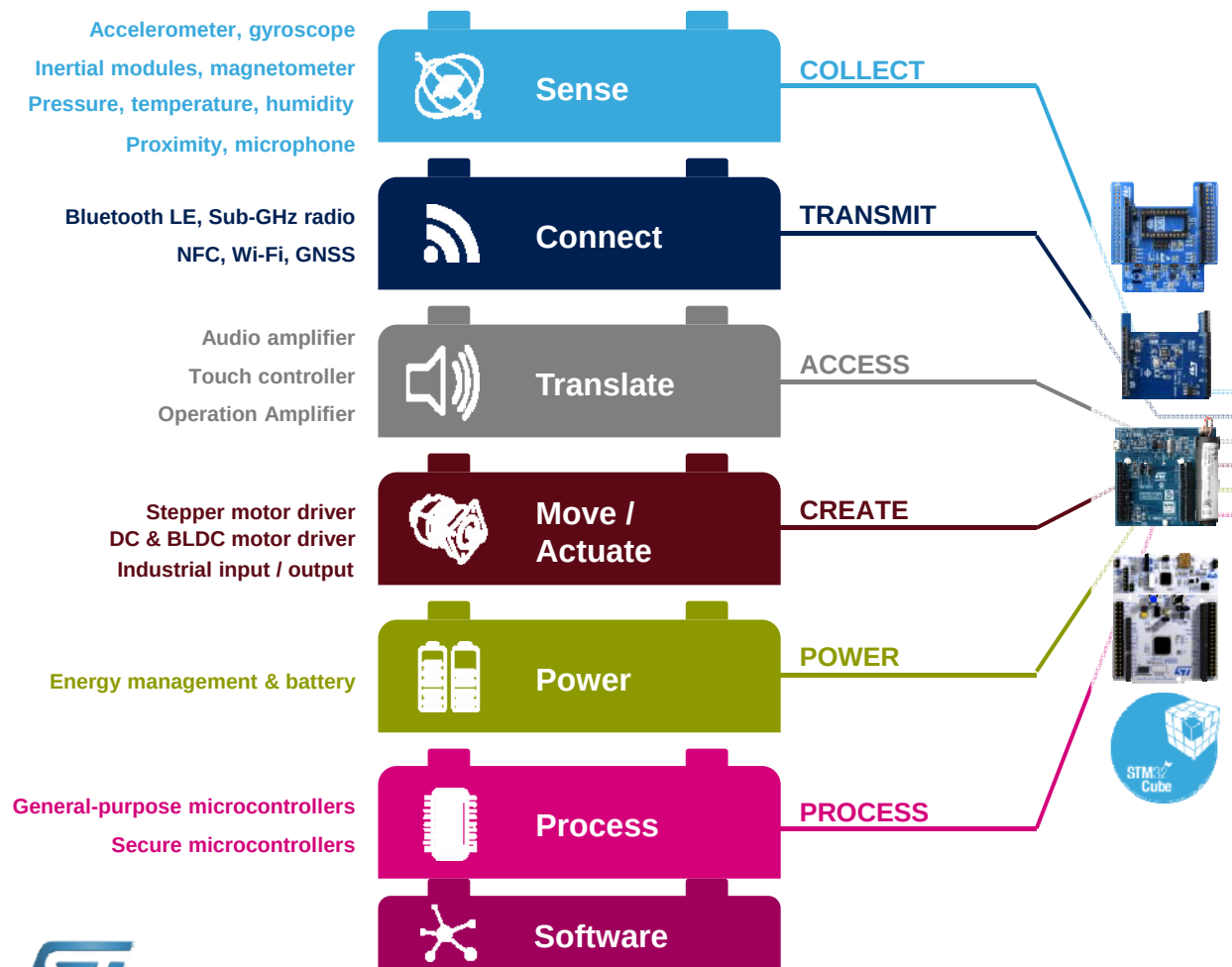
Building block approach

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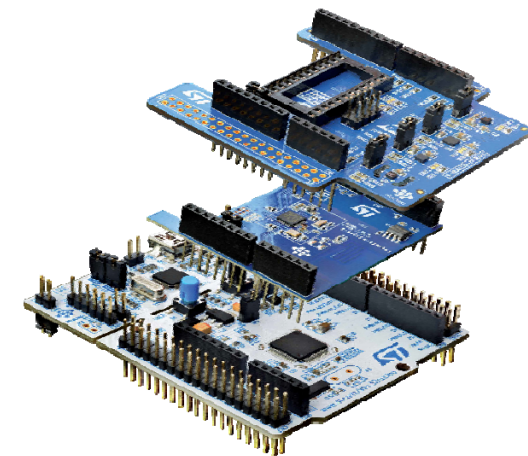
The building blocks

Your need

Our answer



 **STM32 Open Development Environment**



www.st.com/stm32code