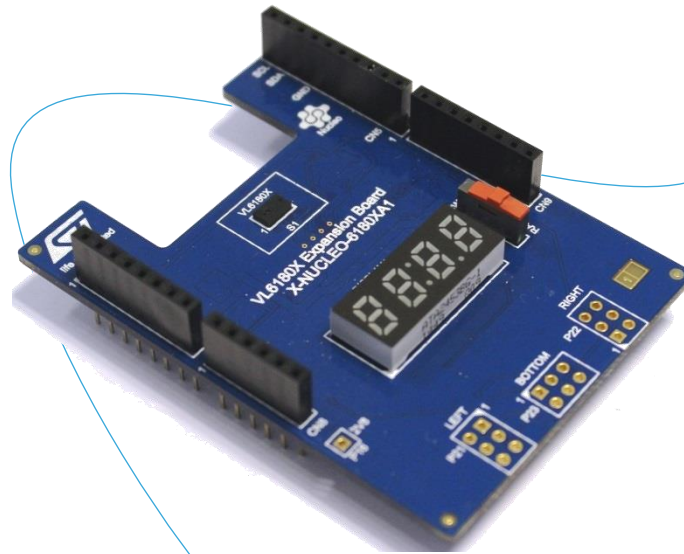


Quick Start Guide

Proximity, gesture and ambient light sensor expansion board based on VL6180X for STM32 Nucleo (X-NUCLEO-6180XA1)



Version 2.0 (July 30, 2015)

1

Introduction to the STM32 Open Development Environment

2

STM32 Nucleo proximity, gesture and ambient light expansion board

- Hardware overview
- Software overview

3

Documents & Related Resources

4

Setup & Demo Examples

1

Introduction to the STM32 Open Development Environment

2

STM32 Nucleo proximity, gesture and ambient light expansion board

- Hardware overview
- Software overview

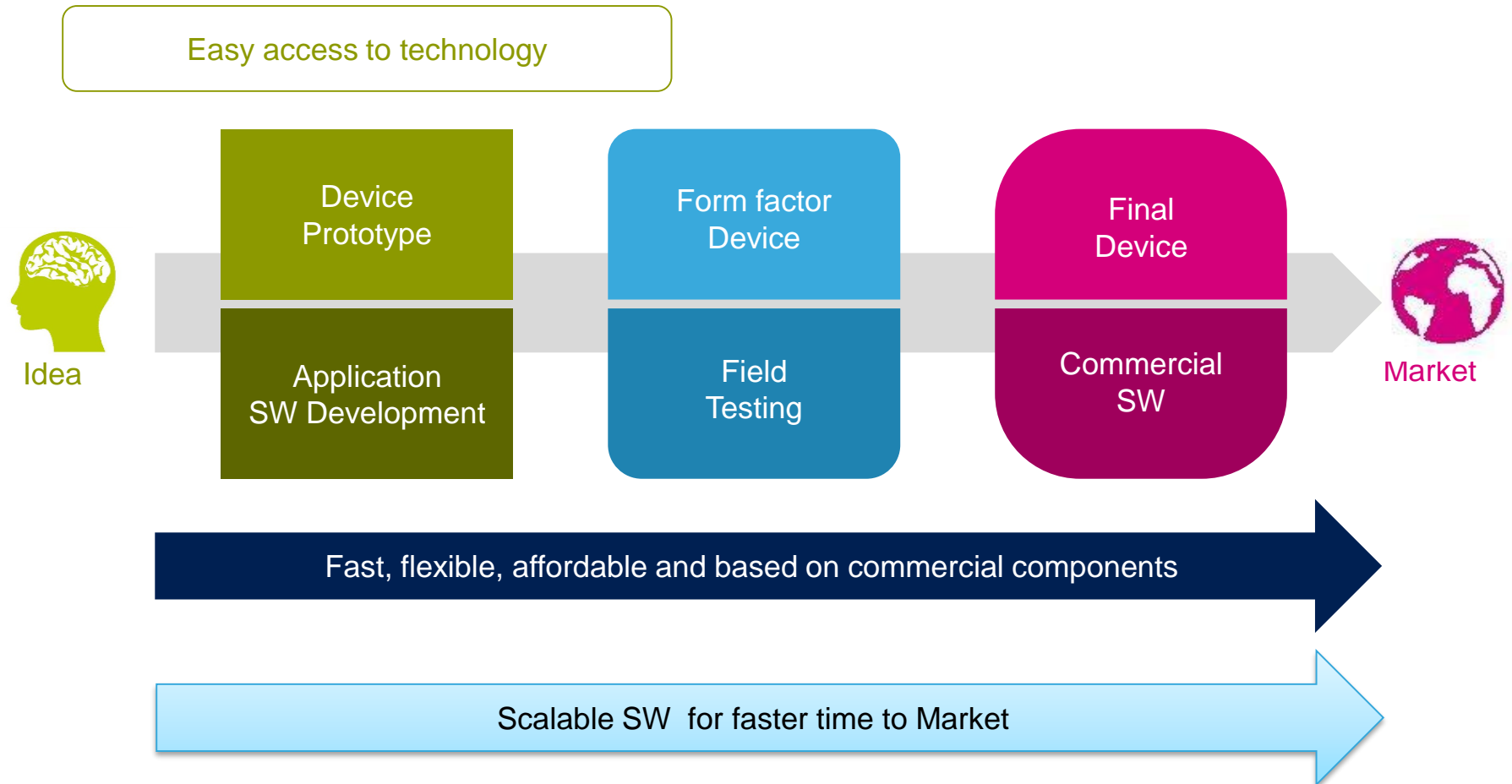
3

Documents & Related Resources

4

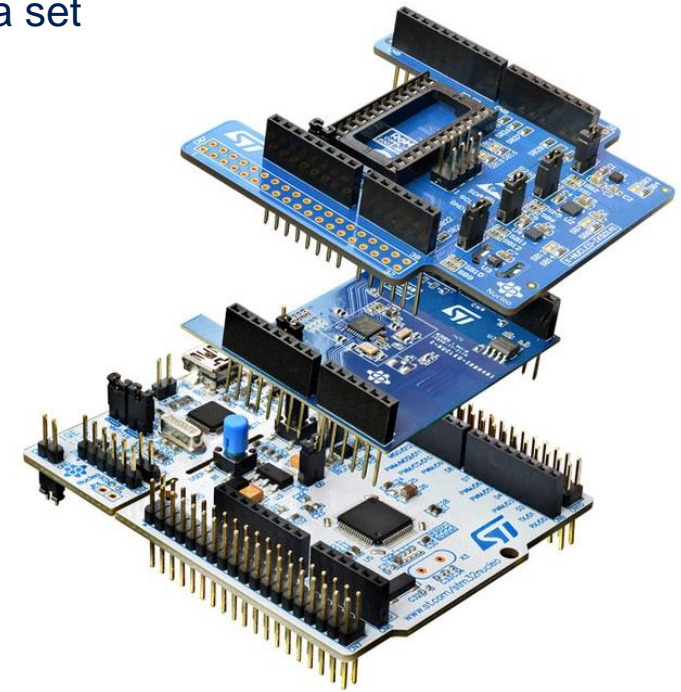
Setup & Demo Examples

STM32 Open Development Environment Lowering the Barriers for “Developers”



STM32 Open Development Environment

The STM32 Open Development Environment consists of a set of **modular developer boards** and a **SW environment** designed around the **STM32 microcontroller** family



STM32 Nucleo development boards

STM32Cube development software

STM32 Nucleo expansion boards

STM32Cube expansion software

Compatibility with multiple Development Environments



STM32 Open Development Environment

Building block approach

The building blocks

Your need

Our answer

Accelerometer, gyroscope
Inertial modules, magnetometer
Pressure, temperature, humidity, UV
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

 **Move / Actuate**


CREATE

Energy management & battery

 **Power**

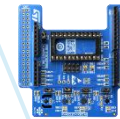
POWER

General purpose microcontrollers
Secure microcontrollers

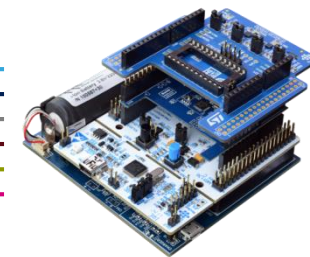
 **Process**

PROCESS

 **Software**



STM32 Open Development Environment

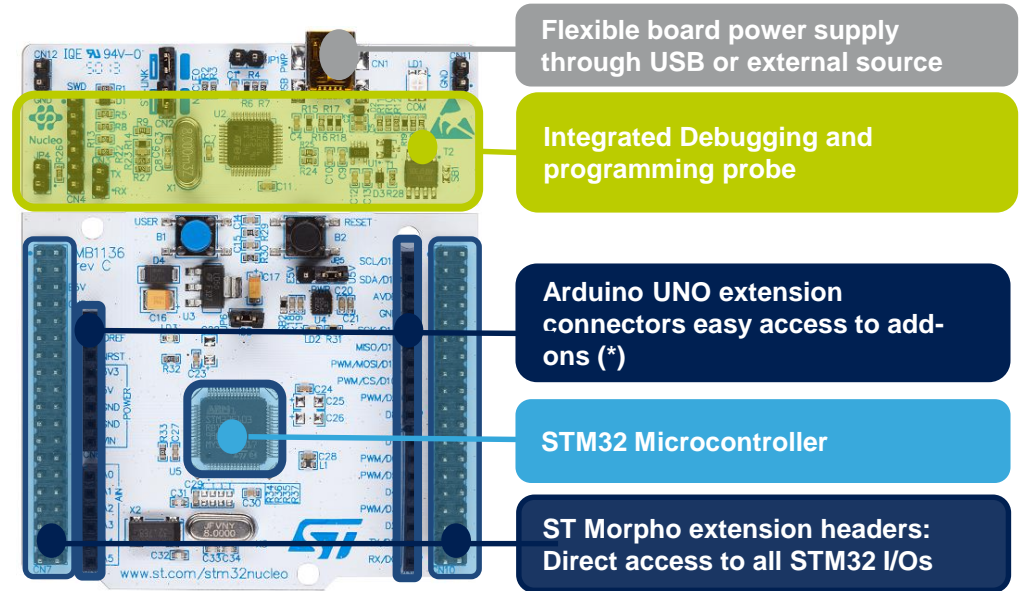


www.st.com/stm32ode

STM32 Nucleo Development Board



- Based on ST's 32-bit ARM Cortex-M based STM32 microprocessors
 - A Boards with 1 MCU and hardware to program/debug
- Two connectors to connect to companion chips boards
- For all STM32 families



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



(*) thanks to the electrical compatibility it can be used as a shield for Arduino UNO R3 or similar

1

Introduction to the STM32 Open Development Environment

2

STM32 Nucleo proximity, gesture and ambient light expansion board

- Hardware overview
- Software overview

3

Documents & Related Resources

4

Setup & Demo Examples

Proximity, gesture and ambient light sensor expansion board

Hardware Overview (1/2)

9

Hardware Description

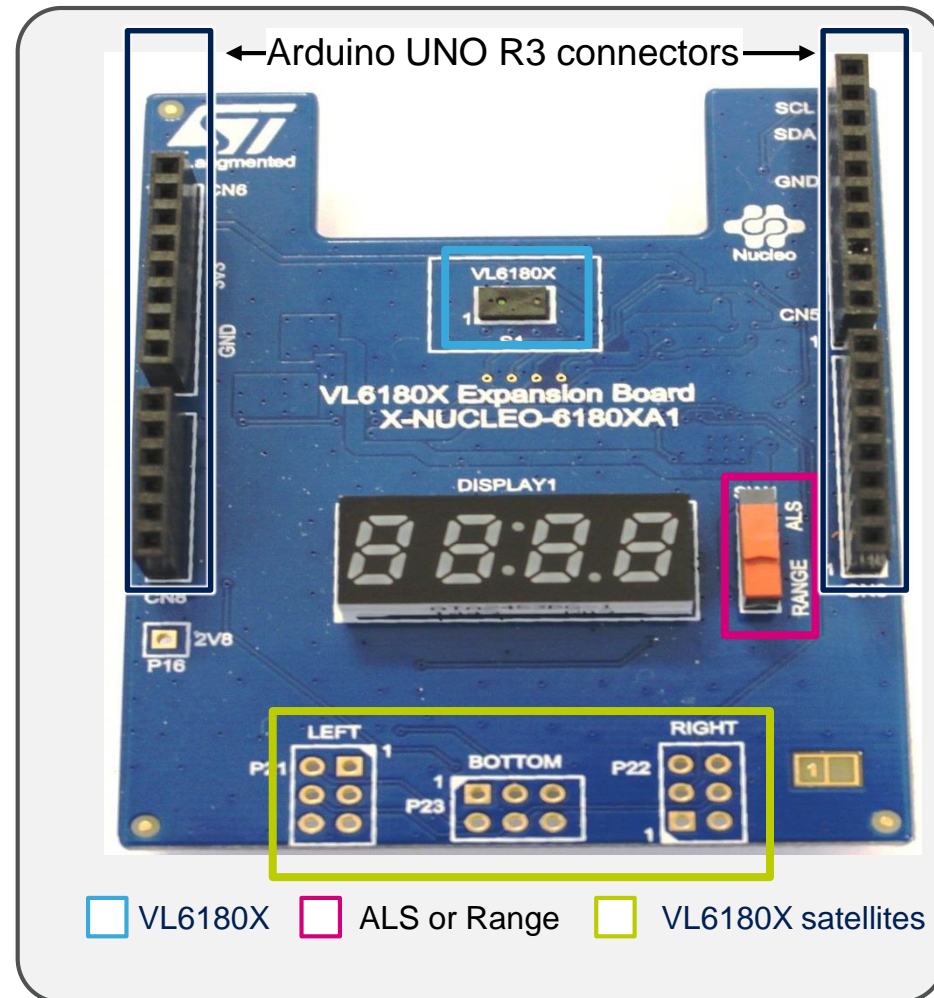
- The X-NUCLEO-6180XA1 is proximity and ambient light sensor evaluation and development board system, designed around VL6180X, a device based on ST's FlightSense™, Time-of-Flight technology.
- The VL6180X communicates with STM32 Nucleo developer board host microcontroller through an I2C link available on the Arduino UNO R3 connector

Key Products on board

VL6180X proximity, gesture and Ambient Light sensor (ALS)

Selection between Ranging and ALS measurement

Possibility to add 3 VL6180X satellite boards (order code: **VL6180X-SATEL** – 2 satellites)



Latest info available at
[X-NUCLEO-6180XA1](#)

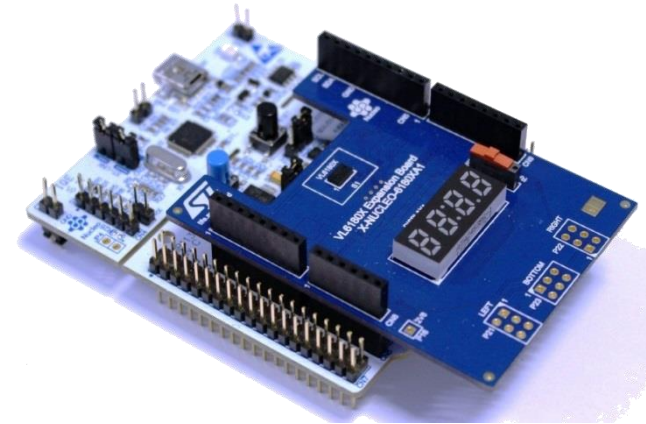
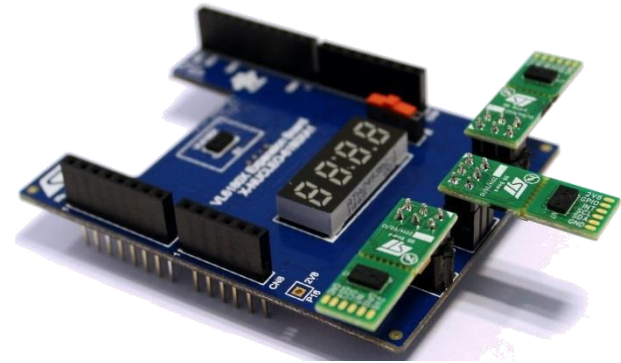
Order Code: **X-NUCLEO-6180XA1**

Proximity, gesture and ambient light sensor expansion board

Hardware Overview (2/2)

10

- X-NUCLEO-6180XA1 with VL6180X-SATEL plug-in
 - In order to easily integrate multiple VL6180X's into customer devices, up to 3 external satellite VL6180X boards can be connected to the expansion board.
- X-NUCLEO-6180XA1 also available as a Nucleo pack (P-NUCLEO)
 - The X-NUCLEO-6180XA1 expansion board can also be ordered on st.com under two variants of Nucleo packs, combining the expansion board and the STM32 Nucleo board:
 - Order code: [P-NUCLEO-6180X1](#)
 - X-NUCLEO-6180XA1 expansion board and NUCLEO-F401RE full features board
 - Order code: [P-NUCLEO-6180X2](#)
 - X-NUCLEO-6180XA1 expansion board and NUCLEO-L053R8 ultra low power board



Proximity, gesture and ambient light sensor expansion board

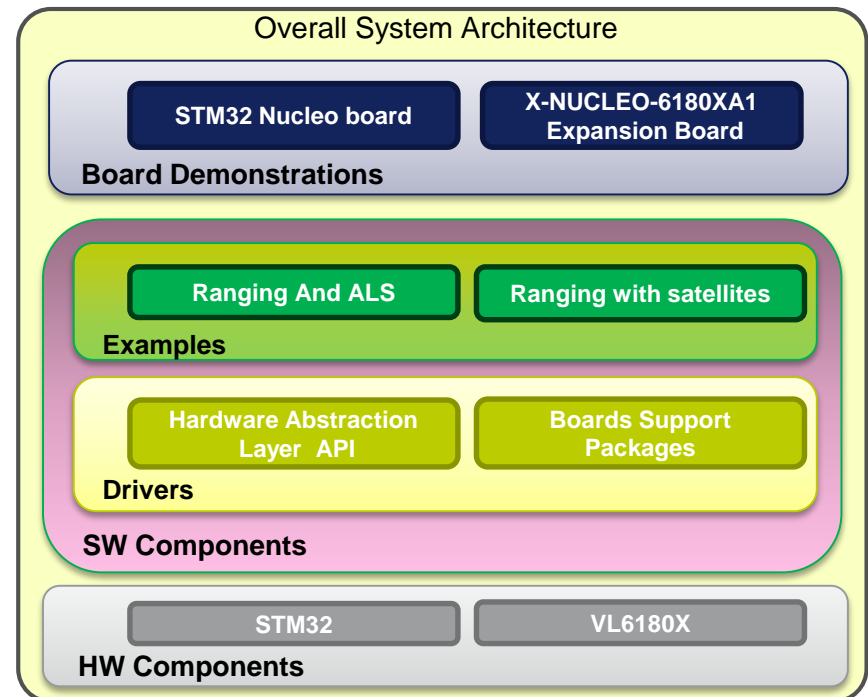
STM32Cube Expansion Software

X-CUBE-6180XA1 Software

- The X-CUBE-6180XA1 software package is an expansion for STM32Cube, associated with the X-NUCLEO-6180XA1 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 Proximity, gesture and ambient light sensor expansion board (X-NUCLEO-6180XA1) plugged on top of an STM32 Nucleo development board (NUCLEO-F401RE or NUCLEO-L053R8).

Key features

- Driver layer (VL6180X API) for complete management of the VL6180X proximity & ambient light sensor (ALS) integrated in the X-NUCLEO-6180XA1 expansion board.
- Easy portability across different MCU families, thanks to STM32Cube.
- Free, user-friendly license terms.
- Example code for ranging and ALS measurement.
- Example code for ranging with multiple VL6180X sensors. Up to 4x VL6180X devices can be controlled using the X-NUCLEO-6180XA1 expansion board equipped with 3x satellites (VL6180X-SATEL).



Latest SW available at
X-CUBE-6180XA1

1

Introduction to the STM32 Open Development Environment

2

STM32 Nucleo proximity, gesture and ambient light expansion board

- Hardware overview
- Software overview

3

Documents & Related Resources

4

Setup & Demo Examples

All documents are available in the Design Resources sheet of the proximity, gesture and ambient light sensor expansion board based on VL6180X for STM32 Nucleo

X-NUCLEO-6180XA1: Product Folder ([Link](#))

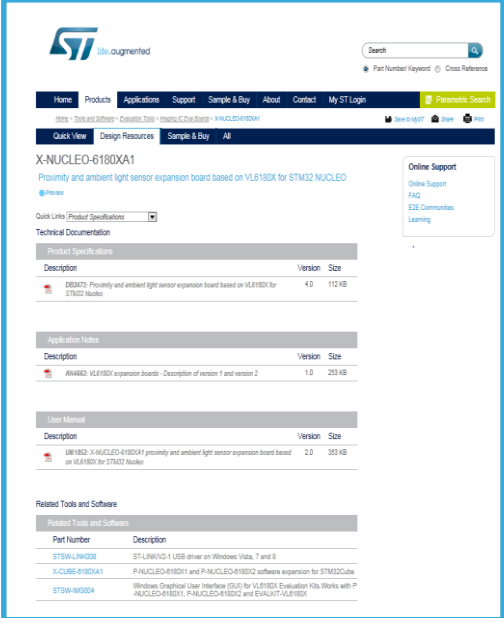
- BOM and schematic included in UM1852
- DB2473: proximity and ambient light sensor expansion board on VL6180X for STM32 Nucleo – data brief
- AN4663: VL6180X expansion boards - Description of version 1 and version 2 – application note
- UM1852: proximity and ambient light sensor expansion board based on VL6180X for STM32 Nucleo – user manual

X-CUBE-6180XA1: Product Folder ([Link](#))

- DB2563: proximity, gesture, ambient light sensor expansion for STM32Cube – data brief
- UM1876: Getting started with VL6180X proximity, gesture, ambient light sensor software expansion for STM32Cube
- Software setup file

STSW-IMG004: Product Folder ([Link](#))

- DB2562: P-NUCLEO-6180X1 and P-NUCLEO-6180X2 packs PC graphical user interface (GUI) – data brief
- Software setup file



The screenshot displays the STMicroelectronics website interface for the X-NUCLEO-6180XA1 product. The page features a navigation bar with links for Home, Products, Applications, Support, Sample & Buy, About, Contact, and My ST Login. A search bar is located in the top right corner. Below the navigation bar, the product name "X-NUCLEO-6180XA1" is prominently displayed, followed by a subtitle: "Proximity and ambient light sensor expansion board based on VL6180X for STM32 NUCLEO". The page is organized into several sections, each with a table of documents:

- Product Specifications:** A table with columns for Description, Version, and Size. It lists document DB2473: Proximity and ambient light sensor expansion board based on VL6180X for STM32 Nucleo, version 4.0, with a size of 112 KB.
- Application Notes:** A table with columns for Description, Version, and Size. It lists document AN4663: VL6180X expansion boards - Description of version 1 and version 2, version 1.0, with a size of 253 KB.
- User Manual:** A table with columns for Description, Version, and Size. It lists document UM1852: X-NUCLEO-6180XA1 proximity and ambient light sensor expansion board based on VL6180X for STM32 Nucleo, version 2.0, with a size of 353 KB.
- Related Tools and Software:** A table with columns for Part Number and Description. It lists several items: STSW-LINK008 (ST-LINKV2-1 USB driver on Windows Vista, 7 and 8), X-CUBE-6180XA1 (P-NUCLEO-6180X1 and P-NUCLEO-6180X2 software expansion for STM32Cube), Windows Graphical User Interface (GUI) for X-NUCLEO-6180XA1 Evaluation Kits Works with P-NUCLEO-6180X1, P-NUCLEO-6180X2 and EVALKIT-VL6180X, and STSW-IMG004.

1

Introduction to the STM32 Open Development Environment

2

STM32 Nucleo proximity, gesture and ambient light expansion board

- Hardware overview
- Software overview

3

Documents & Related Resources

4

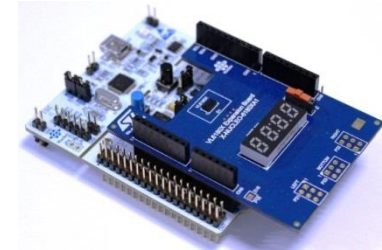
Setup & Demo Examples

Setup & Demo Examples

HW prerequisites

15

- STM32 Nucleo proximity, gesture and ambient light expansion board ([X-NUCLEO-6180XA1](#)).
- STM32 Nucleo development board ([NUCLEO-F401RE](#) or [NUCLEO-L053R8](#))
- If user has no STM32 Nucleo development board, it is possible to order a Nucleo pack.
 - [P-NUCLEO-6180X1](#)
 - X-NUCLEO-6180XA1 expansion board and NUCLEO-F401RE full features board
 - [P-NUCLEO-6180X2](#)
 - X-NUCLEO-6180XA1 expansion board and NUCLEO-L053R8 ultra low power board
- If user has to develop a VL6180X multi-sensor application, [VL6180X-SATEL](#) boards can be ordered



Setup & Demo Examples

SW prerequisites

16

- STSW-LINK009: ST-LINKV2-1 USB driver ([Link](#))
- STSW-LINK007: ST-LINKV2-1 firmware upgrade ([Link](#))
- X-CUBE-6180XA1: P-NUCLEO-6180X1 and P-NUCLEO-6180X2 software expansion for STM32Cube ([Link](#))
- STSW-IMG004: P-NUCLEO-6180X1 and P-NUCLEO-6180X2 graphical interface on Windows Vista, 7 and 8 ([Link](#))

Proximity and ambient light sensor expansion board

Start coding in just a few minutes with X-CUBE-6180XA1

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



2 Select X-NUCLEO-6180XA1

3

Download & unpack X-CUBE-6180XA1

X-CUBE-6180XA1 package

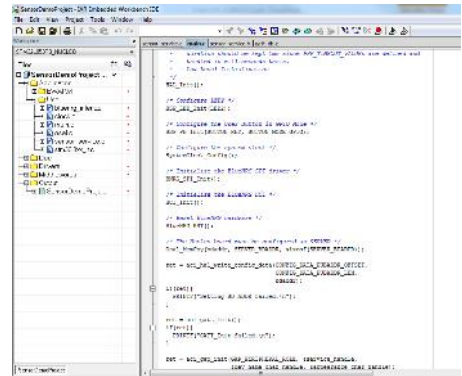
| | |
|-------------------|---------------------------------|
| Documentation | ← Generic Nucleo & package docs |
| Drivers | ← VL6180X API driver |
| Projects | ← VL6180X examples projects |
| Release_Notes.txt | |

4

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

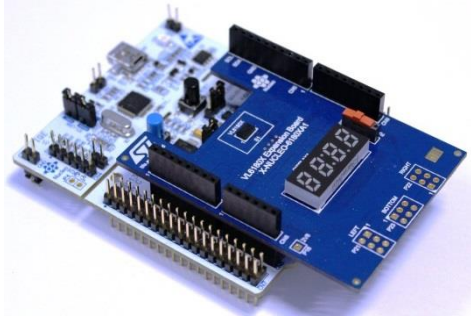
6

Modify, build application



5

Open project example RangingAndAIs or RangingWithSatellites

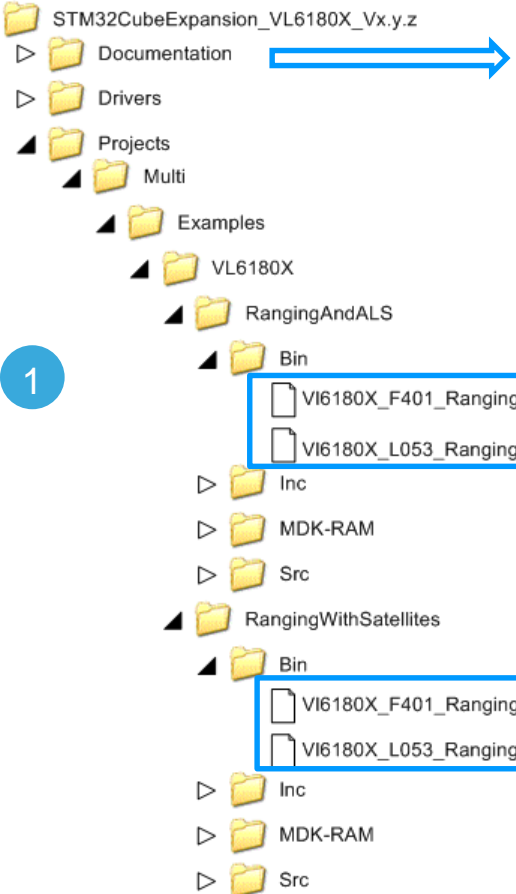


Proximity, gesture and ambient light sensor expansion board

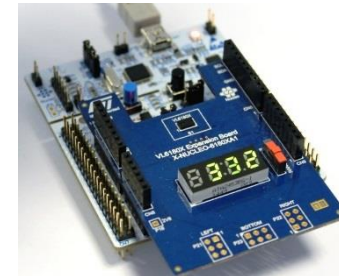
Evaluate using X-CUBE-6180XA1 and P-NUCLEO-6180X1 or P-NUCLEO-6180X2

1

2 Open: P-NUCLEO-6180X1-2 packs software installation-rev1.pdf (UM1876) and follow the instructions

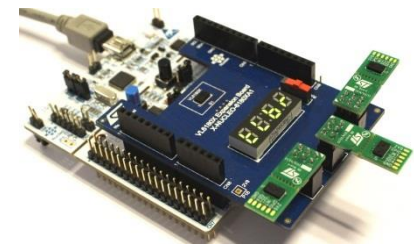


3 Drag and drop to

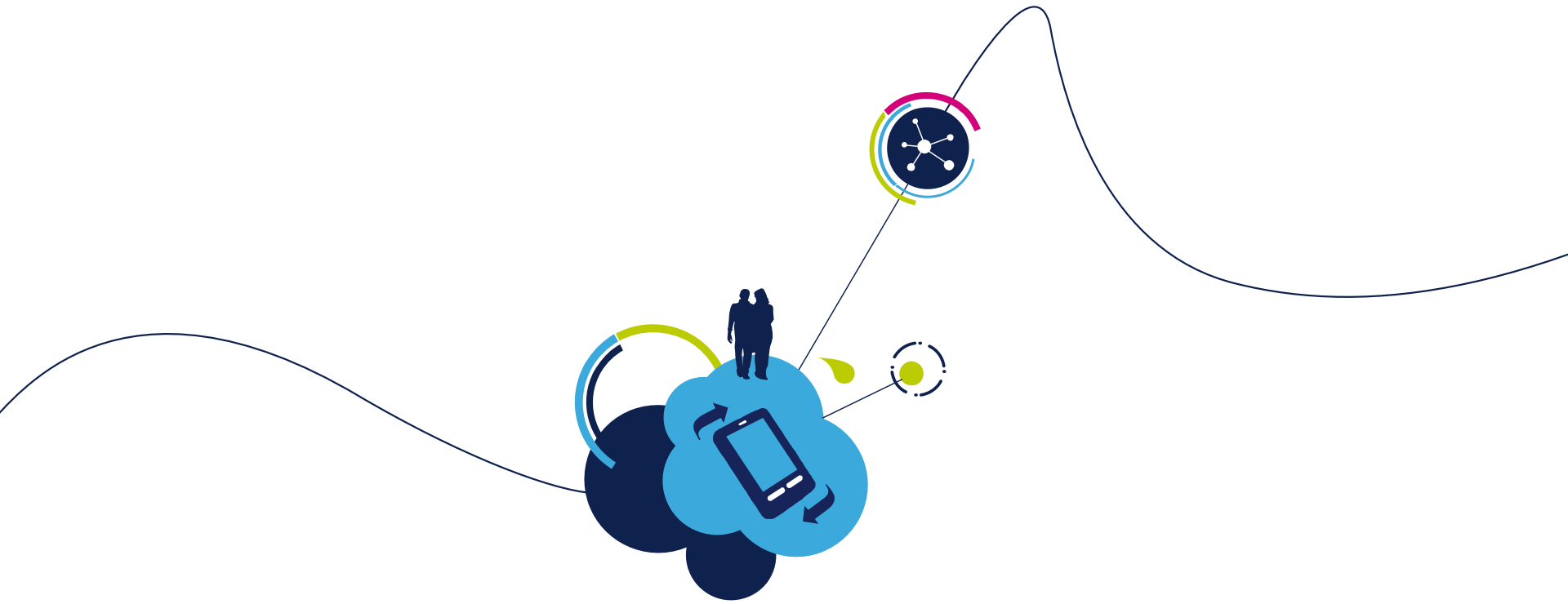


Ranging and ALS demonstration

4 Drag and drop to



Multiple VL6180X sensor demonstration



www.st.com/stm32ode