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

- X-NUCLEO-6180XA1: Proximity, gesture and ambient light sensor expansion board
  Hardware and Software overview

- Setup & Demo Examples
  Documents & Related Resources

- STM32 Open Development Environment: Overview
X-NUCLEO-6180XA1 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 3x VL6180X external satellite boards (order code: VL6180X-SATEL – 2 satellites)

Latest info available at www.st.com X-NUCLEO-6180XA1
• 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

X-CUBE-6180XA1 Software Description

- 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 or NUCLEO-L476RG).

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).
- Example code of gesture recognition

Latest info available at www.st.com X-CUBE-6180XA1
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HW prerequisites

• 1x STM32 Nucleo proximity, gesture and ambient light expansion board (X-NUCLEO-6180XA1).

• 1x STM32 Nucleo development board (NUCLEO-F401RE or NUCLEO-L053R8 or NUCLEO-L476RG)

• 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
• **STSW-LINK009**: ST-LINKV2-1 USB driver

• **STSW-LINK007**: ST-LINKV2-1 firmware upgrade

• **X-CUBE-6180XA1**: P-NUCLEO-6180X1 and P-NUCLEO-6180X2 software expansion for STM32Cube

• **STSW-IMG004**: P-NUCLEO-6180X1 and P-NUCLEO-6180X2 graphical interface on Windows Vista, 7 and 8
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

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

5. Open project example
   RangingAndAls or RangingWithSatellites
   Or GestureDetect1

6. Modify, build application

X-CUBE-6180XA1 package

- Generic Nucleo & package docs
- VL6180X API driver
- Gesture recognition library
- VL6180X examples projects
Proximity, gesture and ambient light sensor expansion board

Evaluate using X-CUBE-6180XA1 and a NUCLEO board

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

2. Drag and drop to

3. Or
Documents & Related Resources

X-NUCLEO-6180XA1:

- 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:

- 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 – user manual
  - Software setup file

STSW-IMG004:

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

Consult www.st.com for the complete list
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3. STM32 Open Development Environment: Overview
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 development boards
- STM32 Nucleo expansion boards (X-NUCLEO)
- STM32Cube expansion software (X-CUBE)
- Function Packs (FP)
STM32 Nucleo 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.

- Power supply through USB or external source
- Integrated debugging and programming ST-LINK probe
- STM32 microcontroller
- Complete product range from ultra-low power to high-performance
- ST morpho extension header
- Arduino™ UNO R3 extension headers

www.st.com/stm32nucleo
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)
**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.

**Tools & IDEs**
- IAR EWARM, Keil MDK-ARM, GCC-based IDEs (e.g. Ac6 System Workbench for STM32)

**Applications**
- Sample applications (e.g. based on ST OpenSoftwareX)

**Middleware**
- STM32Cube middleware
- STM32Cube expansion middleware

**Hardware Abstraction**
- STM32Cube Hardware Abstraction Layer (HAL)

**Hardware**
- STM32 Nucleo expansion boards (X-NUCLEO)
- STM32 Nucleo developer boards

**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/stm32cube)
[www.st.com/x-cube](www.st.com/x-cube)
STM32 Open Development Environment
Building block approach

The building blocks
- Sense
  - Accelerometer, gyroscope
  - Inertial modules, magnetometer
  - Pressure, temperature, humidity
  - Proximity, microphone
- Connect
  - Bluetooth LE, Sub-GHz radio
  - NFC, Wi-Fi, GNSS
- Translate
  - Audio amplifier
  - Touch controller
  - Operation Amplifier
- Move / Actuate
  - Stepper motor driver
  - DC & BLDC motor driver
  - Industrial input / output
- Power
  - Energy management & battery
- Process
  - General-purpose microcontrollers
  - Secure microcontrollers
- Software

Your need
- COLLECT
- TRANSMIT
- ACCESS
- CREATE

Our answer

www.st.com/stm32ode