

# Quick Start Guide

Bluetooth Low Energy expansion board based on BlueNRG-M2SP module for STM32 Nucleo

(X-NUCLEO-BNRRG2A1)



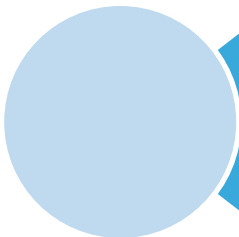
Version 1.0 (Dec 11, 2019)

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X-NUCLEO-BNRG2A1: Bluetooth Low Energy expansion board  
Hardware and Software overview



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Documents & Related Resources



STM32 Open Development Environment: Overview

# Bluetooth Low Energy Expansion Board Hardware Overview

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## Hardware Description

- The X-NUCLEO-BNRG2A1 is a Bluetooth Low Energy (BLE) evaluation and development board system, designed around ST's BLUENRG-M2SP Bluetooth Low Energy module based on BlueNRG-2.
- The BlueNRG-2 processor hosted in the BLUENRG-M2SP module communicates with the STM32 microcontroller, hosted on the Nucleo development board, through an SPI link available on the Arduino UNO R3 connector.

## Key Products on board

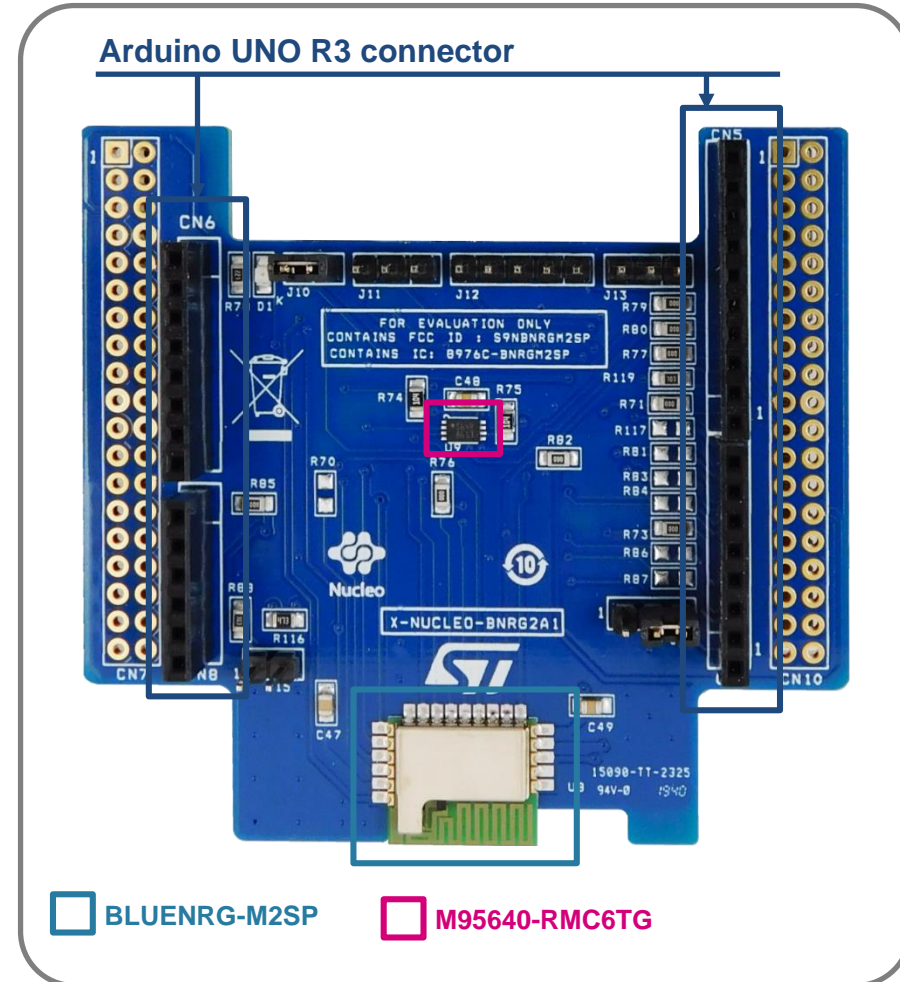
### BLUENRG-M2SP

Bluetooth Low Energy, FCC and IC certified (FCC ID: S9NBNRGM2SP, IC: B976C-BNRGM2SP), module based on Bluetooth® Low Energy wireless network processor BlueNRG-2, BLE v5.0 compliant.

BLUENRG-M2SP integrates a BALF-NRG-02D3 balun and a PCB antenna. It embeds 32 MHz crystal oscillator for the BlueNRG-2.

### M95640-RMC6TG

64-Kbit serial SPI bus EEPROM with high-speed clock interface



# Bluetooth Low Energy Expansion Board

## Software overview

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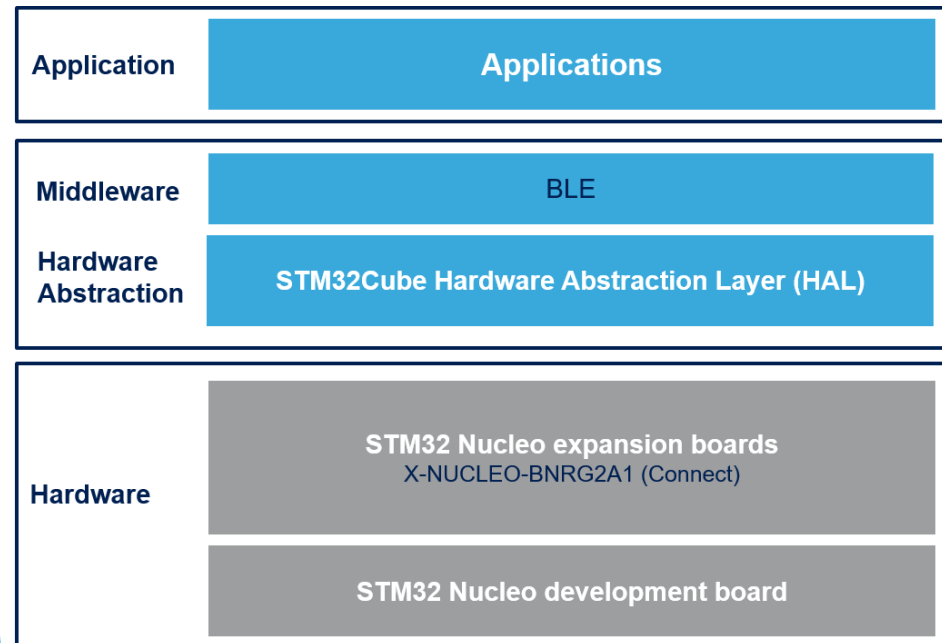
### X-CUBE-BLE2 software description

- The X-CUBE-BLE2 is a software package which provides STM32 drivers running for the BlueNRG-2 Bluetooth Low Energy device. It is an STM32Cube expansion software package that eases portability across different STM32 MCU families
- Implementation examples are available for the STM32 Nucleo Bluetooth Low Energy expansion board (X-NUCLEO-BNRG2A1) plugged on top of an STM32 Nucleo board (NUCLEO-L476RG)

### Key features

- Complete middleware to build applications using the BlueNRG-2 network processor
- Easy portability across different MCU families thanks to the STM32Cube
- Sample applications that the developer can use to start experimenting with the code
- References to free Android and iOS app that can be used along with the sample applications
- Free, user-friendly license terms

### Overall Software Architecture



Latest info available at [www.st.com](http://www.st.com)

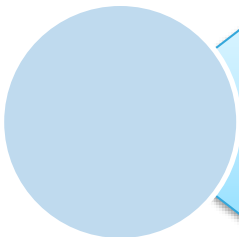
**X-CUBE-BLE2**

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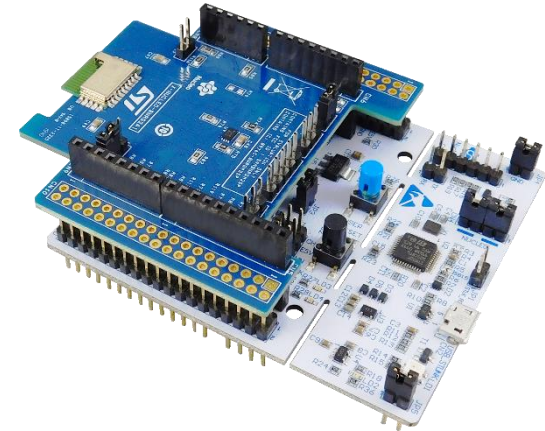
STM32 Open Development Environment: Overview

# Setup & demo examples

## Hardware prerequisites

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- 1 x STM32 Nucleo Bluetooth Low Energy expansion board (**X-NUCLEO-BNRG2A1**)
- 1 x STM32 Nucleo development board (**NUCLEO-L476RG**)
- 1 x BLE-enabled smartphone and associated apps



### Smartphone requirements

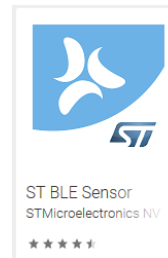


Android OS device



iOS device

### App for Demo



<https://play.google.com/store/apps/details?id=com.st.bluems>

<https://apps.apple.com/it/app/st-bluems/id993670214>

### App for Hands On

Android - BLE scanner



<https://play.google.com/store/apps/details?id=com.macdom.ble.blescanner>

iOS - Light Blue



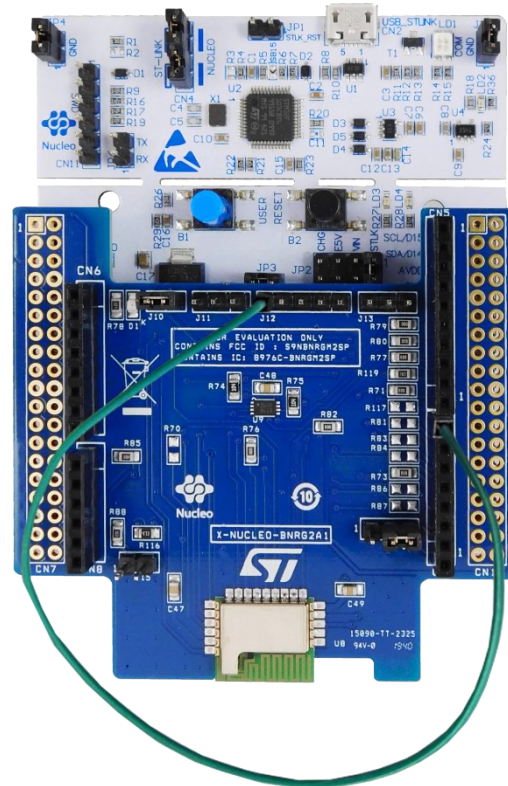
<https://itunes.apple.com/fr/app/lightblue-bluetooth-low-energy/id557428110?mt=8>

# Setup & demo examples

## Hardware limitation

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- **Warning** Even if not strictly required for the correct working of the BlueNRG-2 module, to correctly set the BlueNRG-2 RESET pin on pin D7 of the Arduino connector a 0 Ohm resistor must be soldered on R117. Alternatively, the D7 pin and the pin #5 of the J12 on the X-NUCLEO-BNRG2A1 expansion board must be bridged (as shown in the picture).



# Setup & demo examples

## Software prerequisites

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- **STSW-LINK009:** ST-LINK/V2-1 USB driver
- **STSW-LINK007:** ST-LINK/V2-1 firmware upgrade
- **X-CUBE-BLE2**
  - Copy the .zip file content into the “c:\Program Files (x86)\STMicroelectronics\” folder on your PC
  - The package contains the source code examples (Keil, IAR EWARM, STM32CubeIDE) based on [NUCLEO-L476RG](#)
- **BlueNRG GUI SW package**
  - The BlueNRG GUI SW package contains the Graphical User Interface (GUI) and script launcher PC applications which supports BlueNRG-2, BlueNRG-1, BlueNRG-MS and BlueNRG Bluetooth Low Energy (BLE) devices.



# Bluetooth Low Energy expansion board

## Start coding in just a few minutes with X-CUBE-BLE2

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1 Go to [www.st.com/x-nucleo](http://www.st.com/x-nucleo)



2 Select  
X-NUCLEO-BNRG2A1



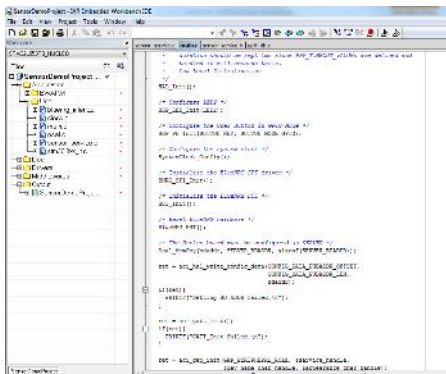
3  
Download and unpack  
X-CUBE-BLE2

### X-CUBE-BLE2 package

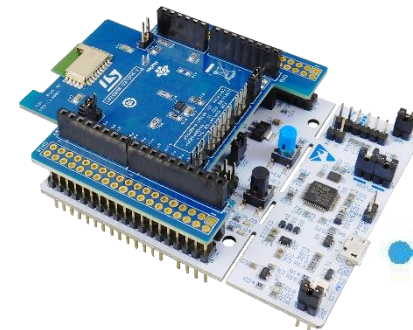
- \_htmresc
  - CubeMX
  - Documentation
  - Drivers
  - Middlewares
  - Projects
  - en.DM00251784.pdf
  - readme.txt
  - Release\_Notes.html
  - STMicroelectronics.X-CUBE-BLE2.pdsc
- Generic Nucleo docs & BLE porting  
BlueNRG SPI driver  
Bluetooth LE HCI stack  
Application examples

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

6  
Modify and build application



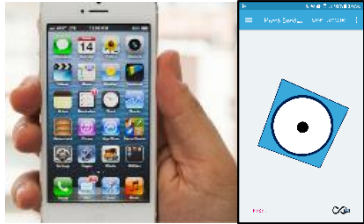
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Open project example  
SensorDemo\_BLESensor-App



# Bluetooth Low Energy expansion board

## Evaluate using X-CUBE-BLE2 (1/2)

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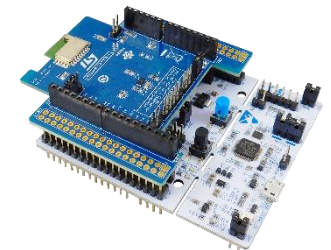
- 1
  - Projects
    - STM32L476RG-Nucleo
      - Applications
        - Beacon
        - SampleApp
        - SensorDemo\_BLESensor-App
        - Binary
        - EWARM
        - Inc
        - MDK-ARM
        - Src
        - STM32CubeIDE

**From X-CUBE-BLE2  
software resource package**

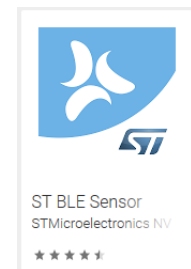
Drag and drop

[SensorDemo\\_BLESensor-App\\_L476RG.bin](#)  
on Nucleo drive

- OSDisk (C:)
- NODE\_L476RG (D:)



- 2 Download and install the ST BLE Sensor application on your smartphone from Google Play or App Store



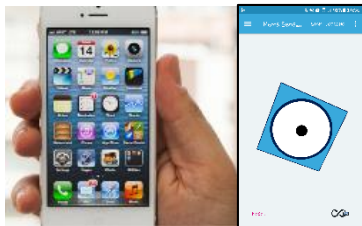
# Bluetooth Low Energy expansion board

## Evaluate using X-CUBE-BLE2 (2/2)

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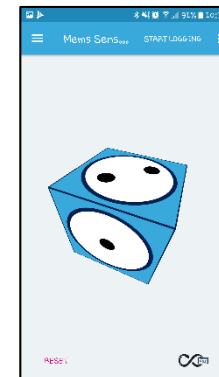
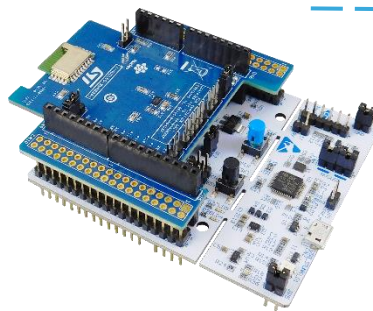
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Connect your smartphone application to the BlueNRG-2 device and control the cube on the smartphone app



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Simulated environmental and motion data are sent periodically from the STM32 Nucleo board to the smartphone app

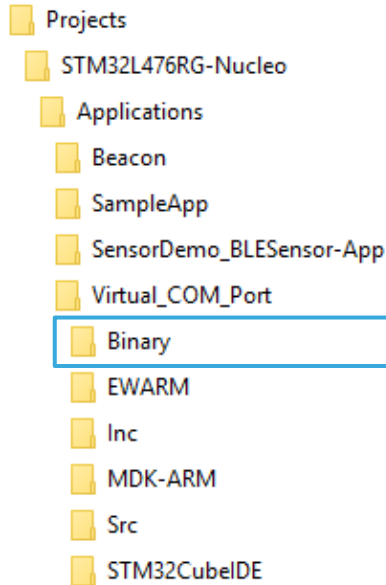


# Bluetooth Low Energy expansion board

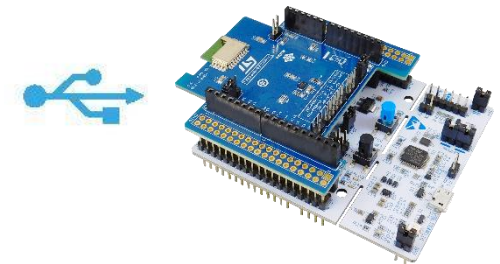
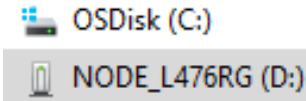
## Evaluate BlueNRG-2 using a GUI

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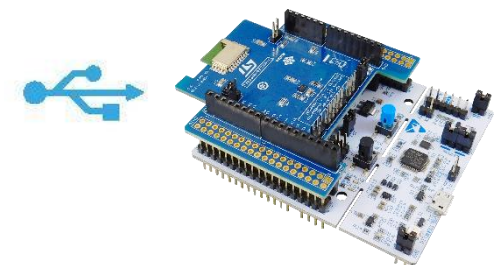
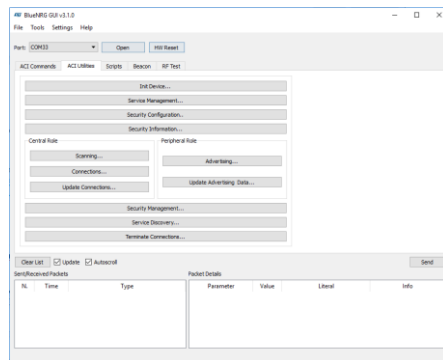
Drag and drop  
Virtual\_COM\_Port\_L476RG.bin  
on Nucleo drive



2

Download the BlueNRG GUI from st.com and install it on your PC

3



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

## X-NUCLEO-BNRG2A1:

- Gerber files, BOM, and schematics
- **DB4086**: Bluetooth Low Energy expansion board based on BLUENRG-M2SP module for STM32 Nucleo – **Data Brief**
- **UM2667**: Getting started with the X-NUCLEO-BNRG2A1 BLE expansion board based on BLUENRG-M2SP module for STM32 Nucleo – **User Manual**

## X-CUBE-BLE2:

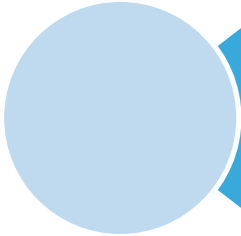
- **DB4087**: Bluetooth Low Energy software expansion for STM32Cube – **Data Brief**
- **UM2666**: Getting started with the X-CUBE-BLE2 Bluetooth Low Energy software expansion for STM32Cube – **User Manual**
- Software setup file

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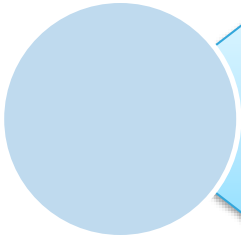
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STM32 Nucleo Bluetooth Low Energy expansion board  
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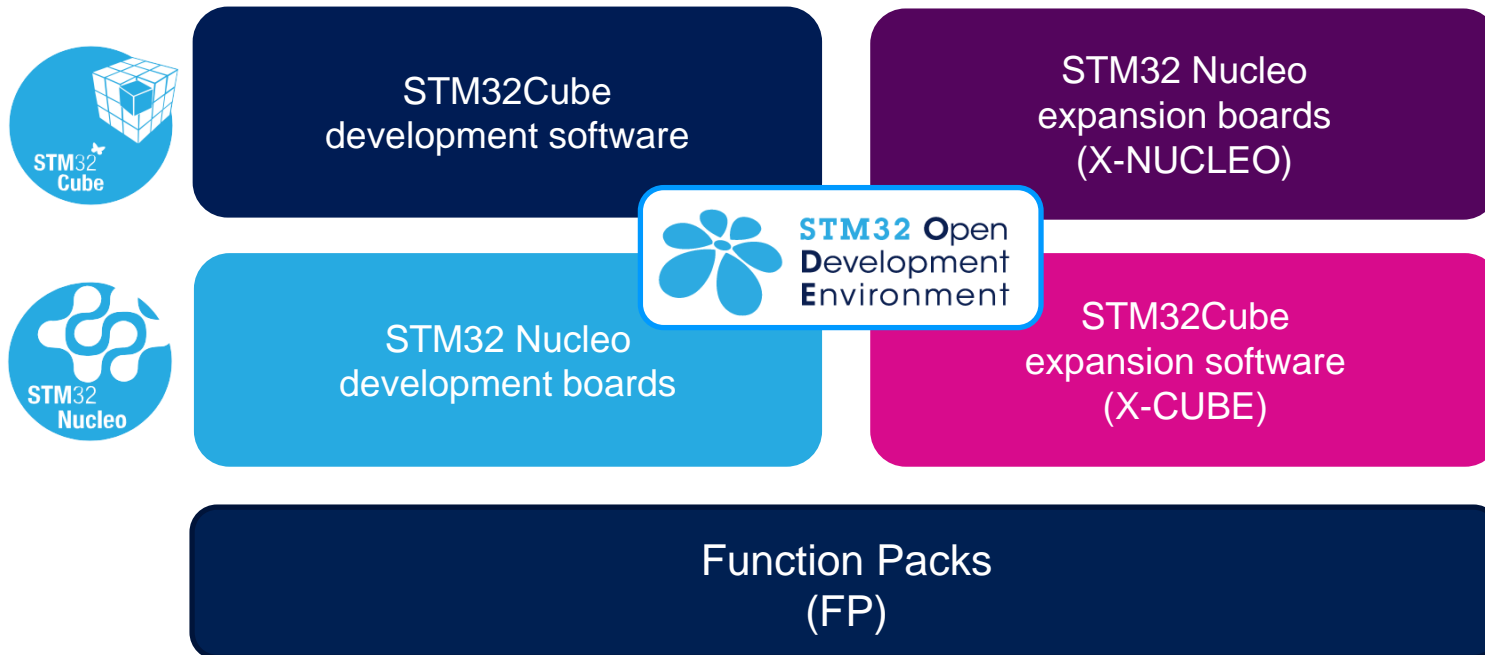
STM32 Open Development Environment: Overview

# STM32 Open Development Environment

## Fast, affordable Prototyping and Development

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- The STM32 Open Development Environment (STM32 ODE) is an open, flexible, easy and affordable way to develop innovative devices and applications based on the STM32 32-bit microcontroller family combined with other state-of-the-art ST components connected via expansion boards. It enables fast prototyping with leading-edge components that can quickly be transformed into final designs



For further information, please visit [www.st.com/stm32ode](http://www.st.com/stm32ode)