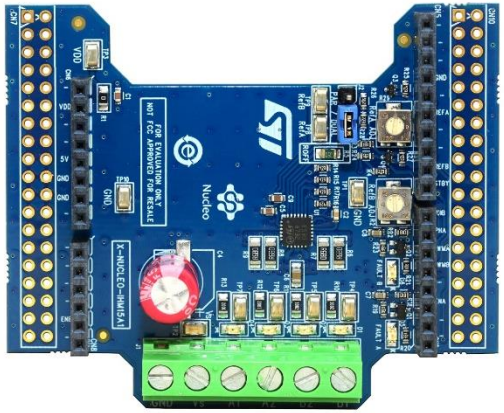
Quick Start Guide

Dual brush DC motor driver expansion board based on STSPIN840 for STM32 Nucleo (X-NUCLEO-IHM15A1)



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Version 1.0 (May 28, 2018)

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X-NUCLEO-IHM15A1: Dual brush DC motor driver expansion board
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Dual brush DC motor driver expansion board

X-NUCLEO-IHM15A1 hardware description

- The X-NUCLEO-IHM15A1 dual brush DC motor driver expansion board is based on the STSPIN840 for STM32 Nucleo.
- It provides an affordable and easy-to-use solution for the implementation of compact motor driving applications such as thermal printers, robotics and toys. Thanks to the parallel operation, it can be easily converted to a single brush DC driver with double current capability. The current limiters and complete set of protection features make it suitable for rugged applications.
- The X-NUCLEO-IHM15A1 is compatible with the Arduino UNO R3 connector and most STM32 Nucleo boards.

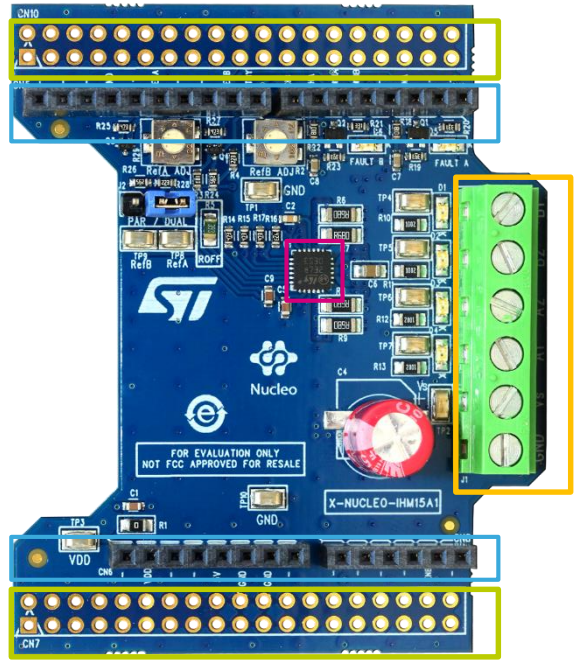
Key features

- Voltage range from 7 to 45 V
- Output current up to 1.5 Arms for each motor
- Two independent current limiters with adjustable OFF time
- Full protection set including: overcurrent, short-circuit, under voltage lock out and thermal shutdown
- Parallel operation
- Compatible with Arduino UNO R3 connector
- Compatible with STM32 Nucleo boards

Key products on board

STSPIN840: compact brushed DC motor driver able to drive two bi-directional brushed DC motors simultaneously.

Hardware overview



STSPIN840
Arduino UNO R3 connector
Supply and motor connector
ST morpho connector *

Latest info available at www.st.com
X-NUCLEO-IHM15A1

(*) Not mounted

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Dual brush DC motor driver expansion board

Software overview

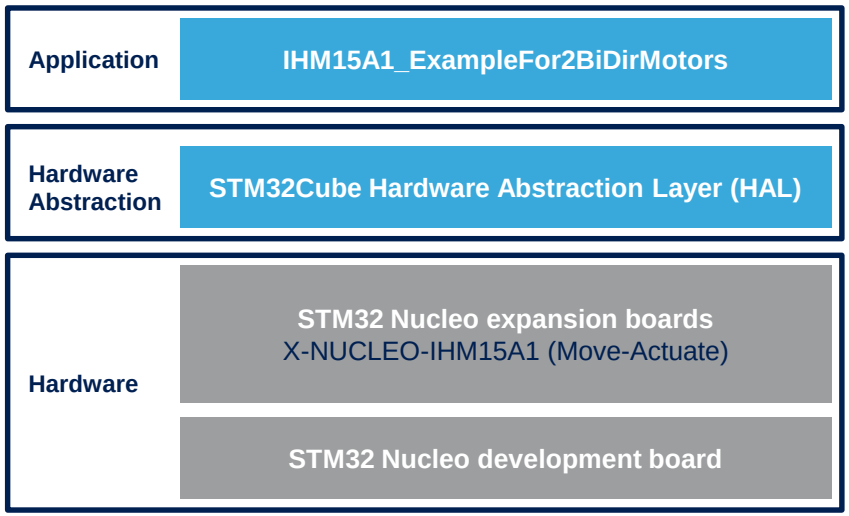
X-CUBE-SPN15 software description

- The X-CUBE-SPN15 is an expansion software package for STM32Cube. The software runs on the STM32 Nucleo providing management of STSPIN840 to control dual brush DC motors. The expansion is built on STM32Cube software technology to ease portability across different STM32 microcontrollers.
- It is compatible with the NUCLEO-F401RE, NUCLEO-F334R8 or NUCLEO-F030R8 development boards connected to an X-NUCLEO-IHM15A1 expansion board.
- The software comes with a sample implementation driving two bidirectional dual brush DC motors.

Key features

- Driver layer for the full management of the STSPIN840 dual brush DC motor driver
- Sample implementation to control up to two bidirectional brush DC motors, available on NUCLEO-F401RE, NUCLEO-F334R8 or NUCLEO-F030R8 when connected to an X-NUCLEO-IHM15A1 expansion board
- Easy portability across different MCU families, thanks to STM32Cube
- Free, user-friendly license terms

Overall system architecture



Latest software available at
X-CUBE-SPN15

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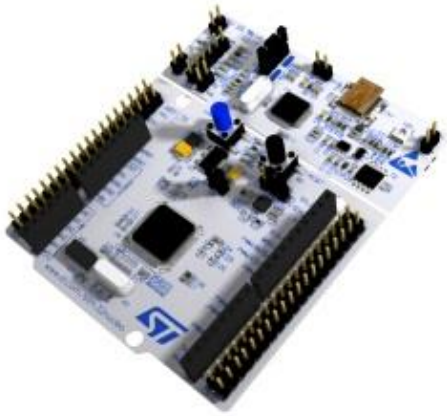
HW prerequisites

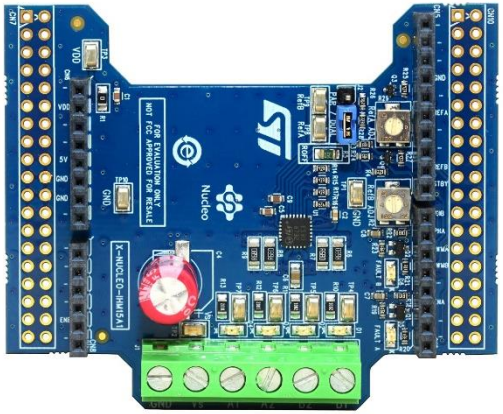
- 1x Dual brush DC motor driver expansion board
  (X-NUCLEO-IHM15A1)
- 1x STM32 Nucleo development board
  (NUCLEO-F401RE or **NUCLEO-F334R8** or **NUCLEO-F030R8)**
- 1 to two brush DC motors
- 1x USB type A to mini-B cable
- an external DC power supply with two electric cables (*)



NUCLEO-F401RE
NUCLEO-F334R8
NUCLEO-F030R8

Mini USB Cable

Dual brush DC motor



X-NUCLEO-IHM15A1

(*) Power stage supply voltage from 7 V to 45 V

Software prerequisites

- **STSW-LINK009**: ST-LINK/V2-1 USB driver
- **STSW-LINK007**: ST-LINK/V2-1 firmware upgrade
- A Windows PC with one of the supported development toolchains:
  - KEIL: MDK-ARM
  - IAR: EWARM
  - GCC-based IDE: System Workbench for STM32
- **X-CUBE-SPN15**: software expansion for STM32Cube

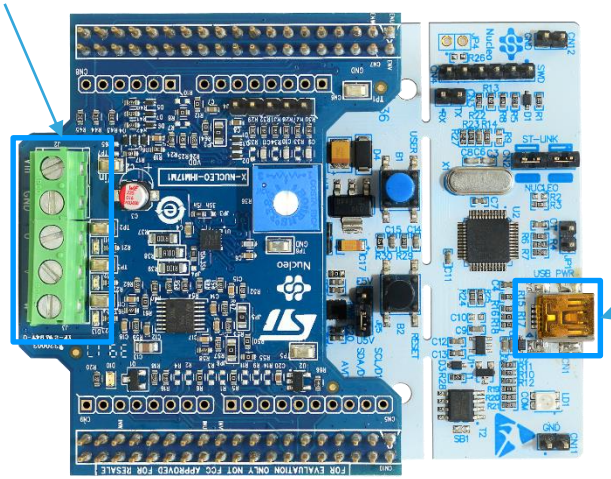
Dual brush DC motor driver expansion board
Start coding in just a few minutes with X-CUBE-SPN15

Driving two bush DC motors with X-NUCLEO-IHM15A1 and X-CUBE-SPN15

1. On the X-NUCLEO-IHM15A1
   - Tune R2 and R29 potentiometers.

2. On the X-NUCLEO-F401RE
   - JP1 off
   - JP5 (PWR) on UV5 side
   - JP6 (IDD) on

3. Stack the X-NUCLEO-IHM15A1 on the STM32 Nucleo board using the Arduino UNO connector and connect the brush DC motors to the J1 connector.
   One motor on A1-A2 outputs and the other one on B1-B2 outputs.



4. Connect the STM32 Nucleo board to the PC through the USB cable.

Start coding in just a few minutes with X-CUBE-SPN15

5. Open your preferred toolchain (MDK-ARM from Keil, EWARM from IAR, or SW4STM32 from www.openstm32.org)

6. open the software project from **Projects\Multi\Applications\MotionControl \YourToolChainName\YourSTM32NucleoBoard**

7. Build the project and download .bin file into the STM32 memory.

8. Connect the power supply (VIN\GND) and power-up the board

9. Run the example and push the blue button to start and the black button to stop the motor

Documents & related resources

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

X-NUCLEO-IHM15A1:

- Gerber files, BOM, and schematics
- **DB3576:** Dual brush DC motor driver expansion board based on STSPIN840 for STM32 Nucleo – **Data brief**
- **UM2393:** Getting started with the X-NUCLEO-IHM15A1 dual brush DC motor driver expansion based on STSPIN840 for STM32 Nucleo– **User manual**

X-CUBE-SPN15:

- **DB3580:** Dual brush DC motor driver software expansion for STM32Cube – **Data brief**
- **UM2394:** Getting started with the X-CUBE-SPN15 dual brush DC motor driver software expansion for STM32Cube– **User manual**
- Software setup file

Consult www.st.com for the complete list

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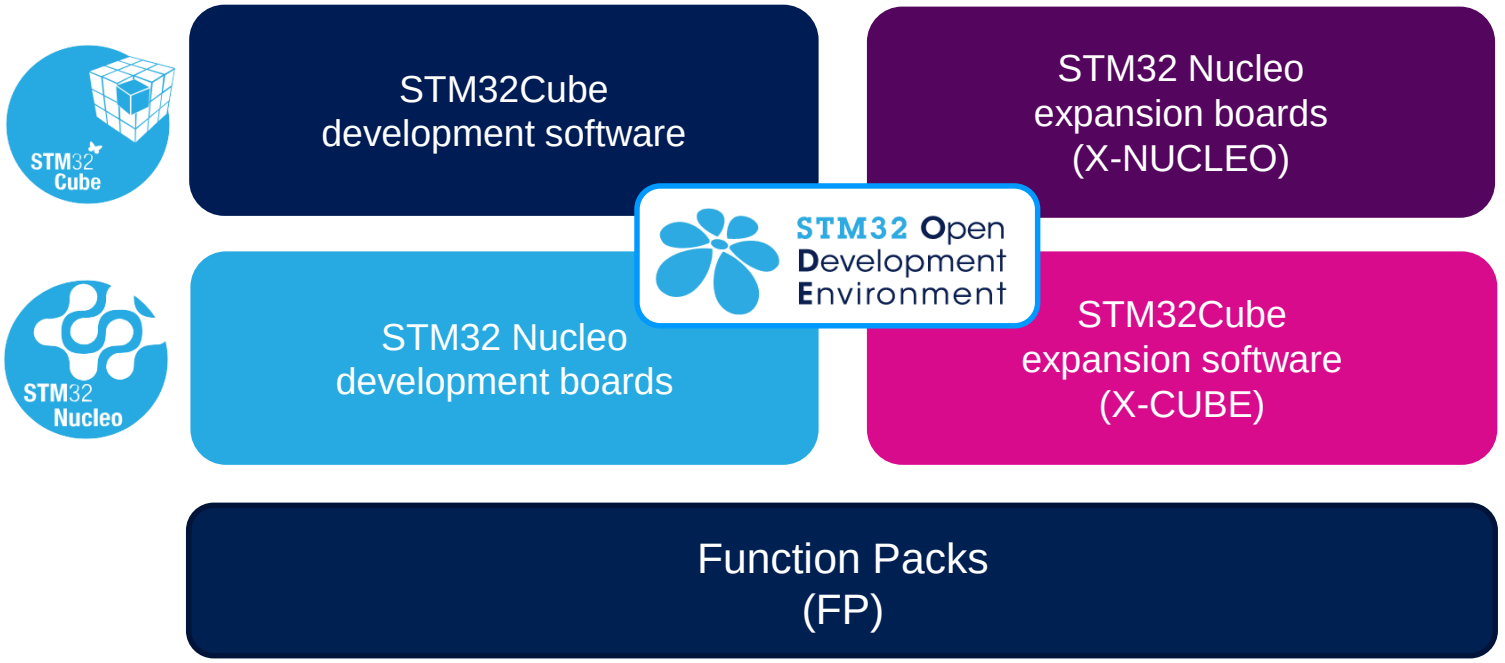
STM32 Open Development Environment: Overview

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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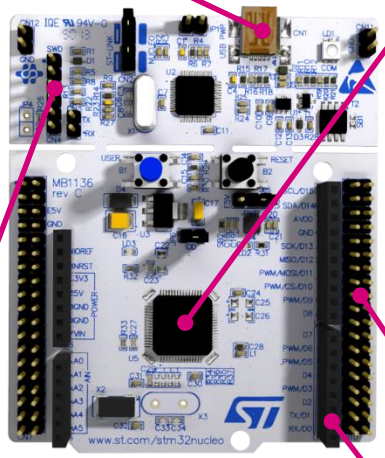
Development Boards (NUCLEO)

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

Power supply through USB or external source

Integrated debugging and programming ST-LINK probe



STM32 Nucleo

STM32 microcontroller

STM32 F0 STM32 F1 STM32 F2 STM32 F3 STM32 F4 STM32 F7

STM32 L0 STM32 L1

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

ST morpho extension header

Arduino™ UNO R3 extension headers

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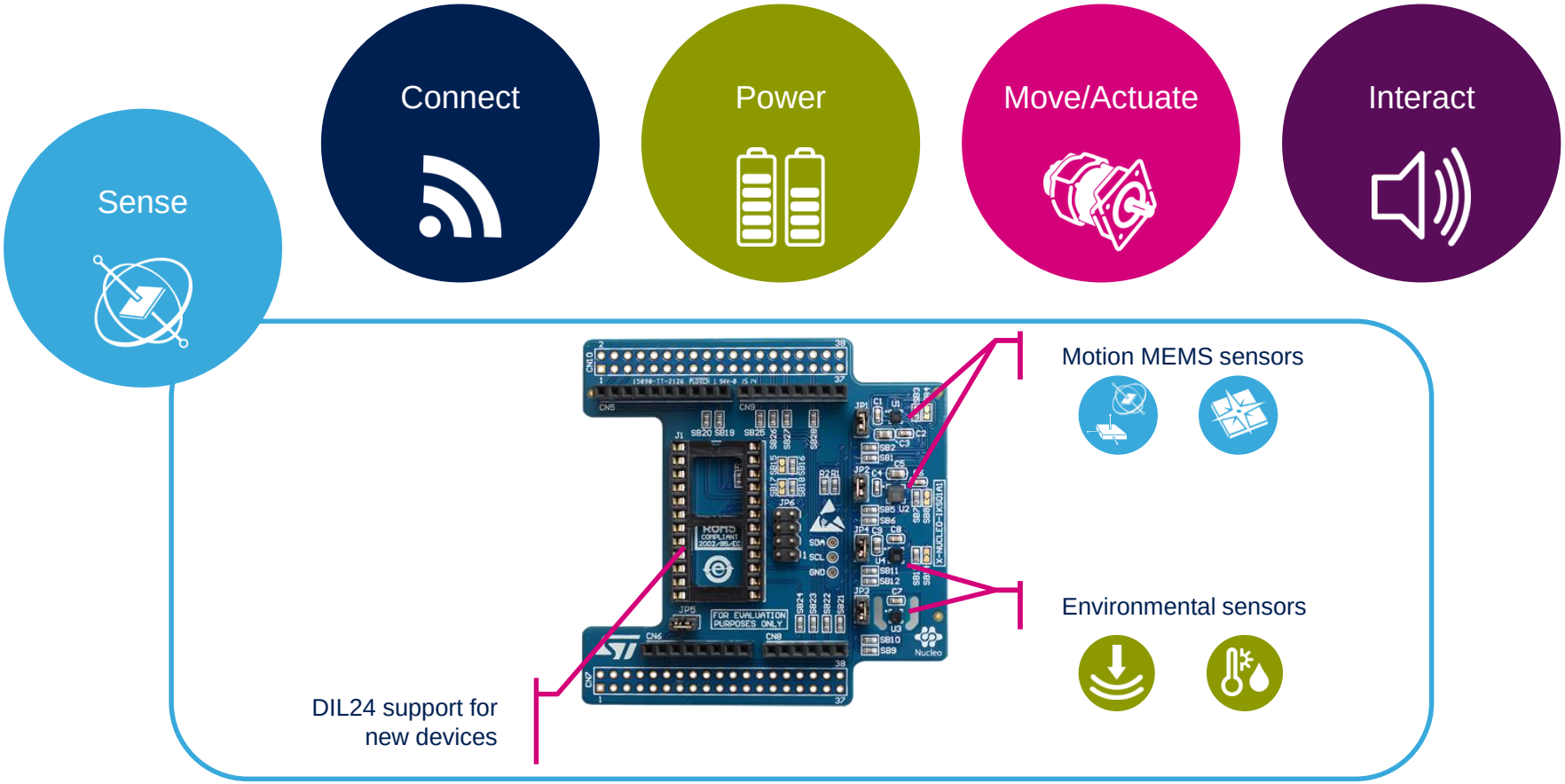
Expansion Boards (X-NUCLEO)

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



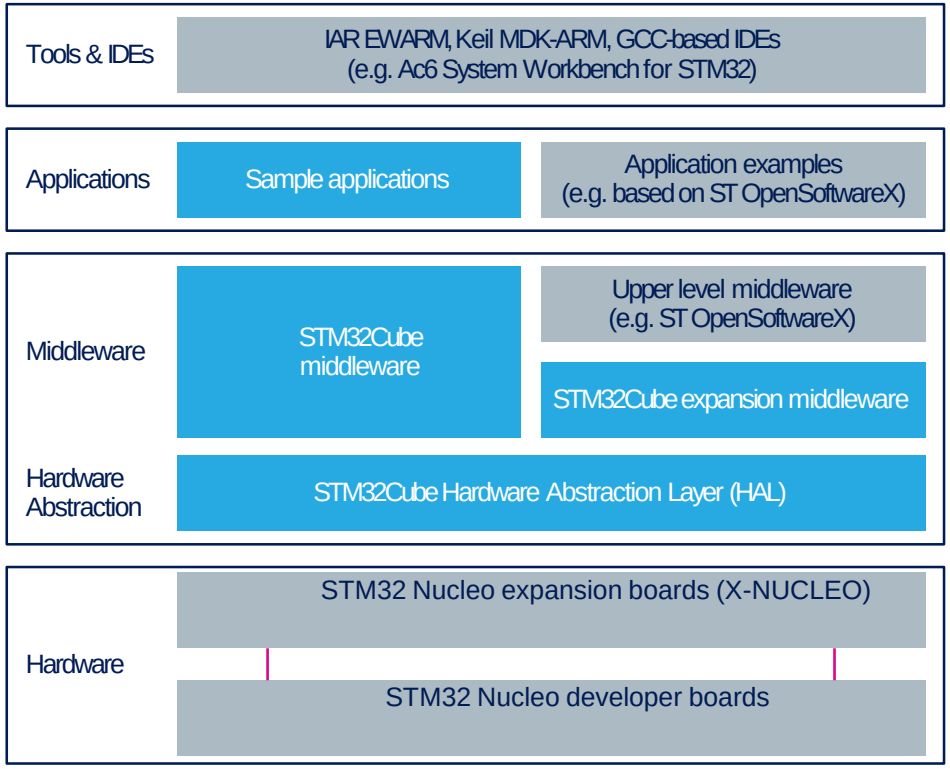
Example of STM32 expansion board (X-NUCLEO-IKS01A1)

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

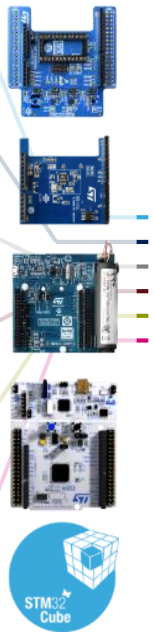
Energy management & battery

Power — POWER

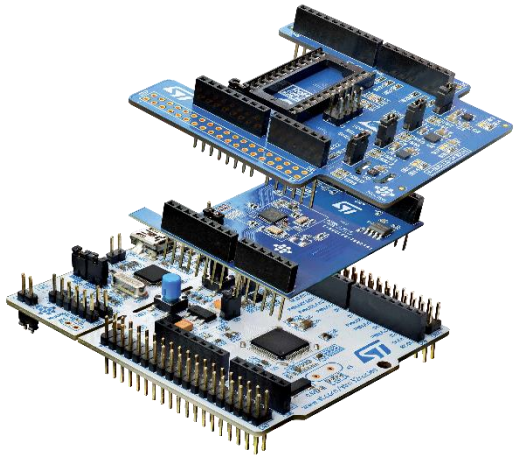
General-purpose microcontrollers
Secure microcontrollers

Process — PROCESS

Software



STM32 Open Development Environment



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