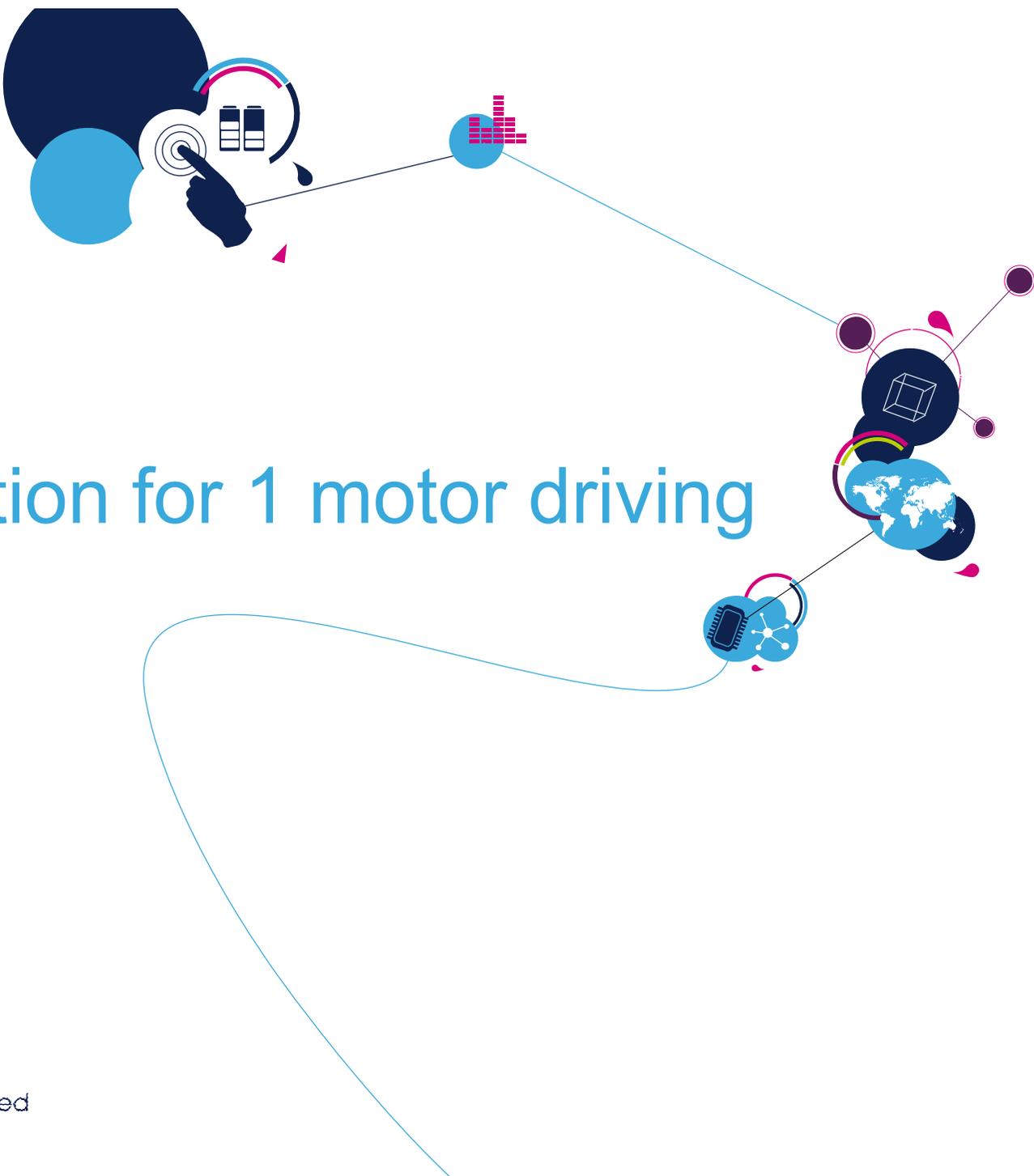


# Quick start guide for X-CUBE-SPN1

Software expansion for STM32Cube using the X-NUCLEO-IHM01A1 L6474  
stepper motor driver expansion board

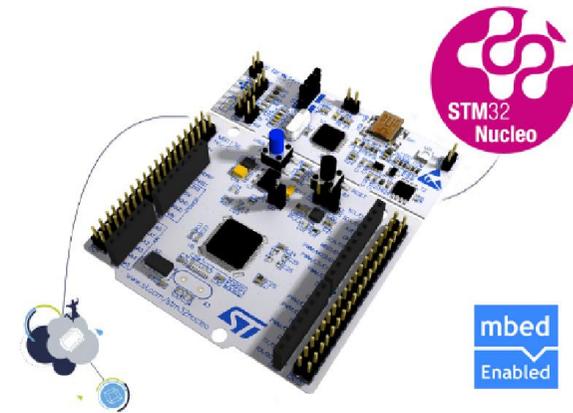


# Configuration for 1 motor driving

# System requirements to drive 1 motor (1/2)

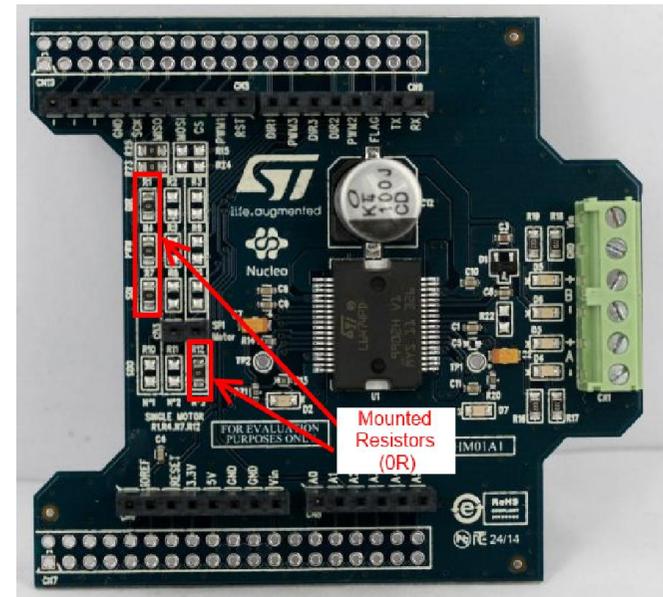
3

- To drive one motor, you need :
  - A Nucleo STM32F401 or a Nucleo STM32F030 or a Nucleo STM32L053
  - One X-NUCLEO-IHM01A expansion board
  - A stepper motor
  - An external DC power supply with two electric cables
  - An USB cable type A to mini-B
  - A windows PC with one of the supported development toolchains:
    - KEIL: MDK-ARM
    - IAR: EWARM
    - GCC-based IDEs (Atollic TrueStudio...)
  - The STM32 Cube firmware for X-NUCLEO-IHM01A1 from: <http://www.st.com/web/en/catalog/tools/PF260865>



# System requirements to drive 1 motor (2/2)

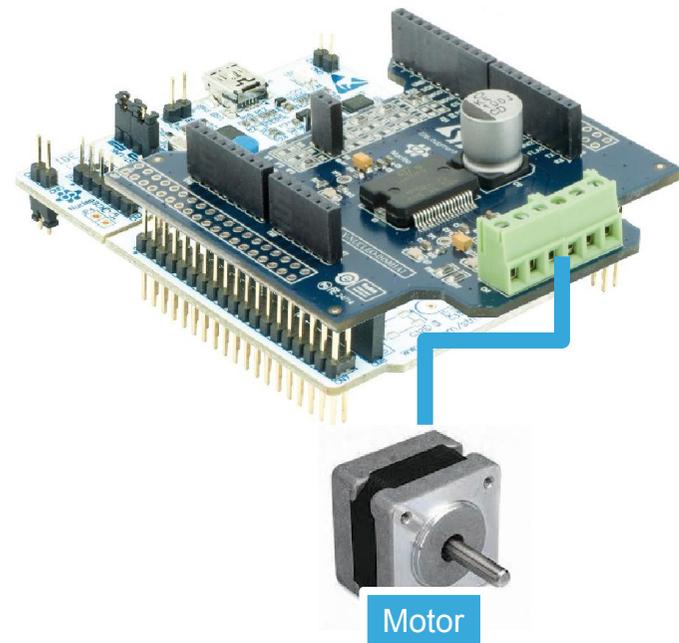
- The STM32 Nucleo has to be configured with the following jumpers position:
  - JP1 off
  - JP5 (PWR) on UV5 side
  - JP6 (IDD) on
- The X-NUCLEO-IHM01A expansion board must have:
  - Mounted resistors (0R) on R1, R4, R7 and R12
  - Unmounted resistors on R2, R3, R5, R6, R8, R9, R10 and R11



# System setup to drive 1 motor

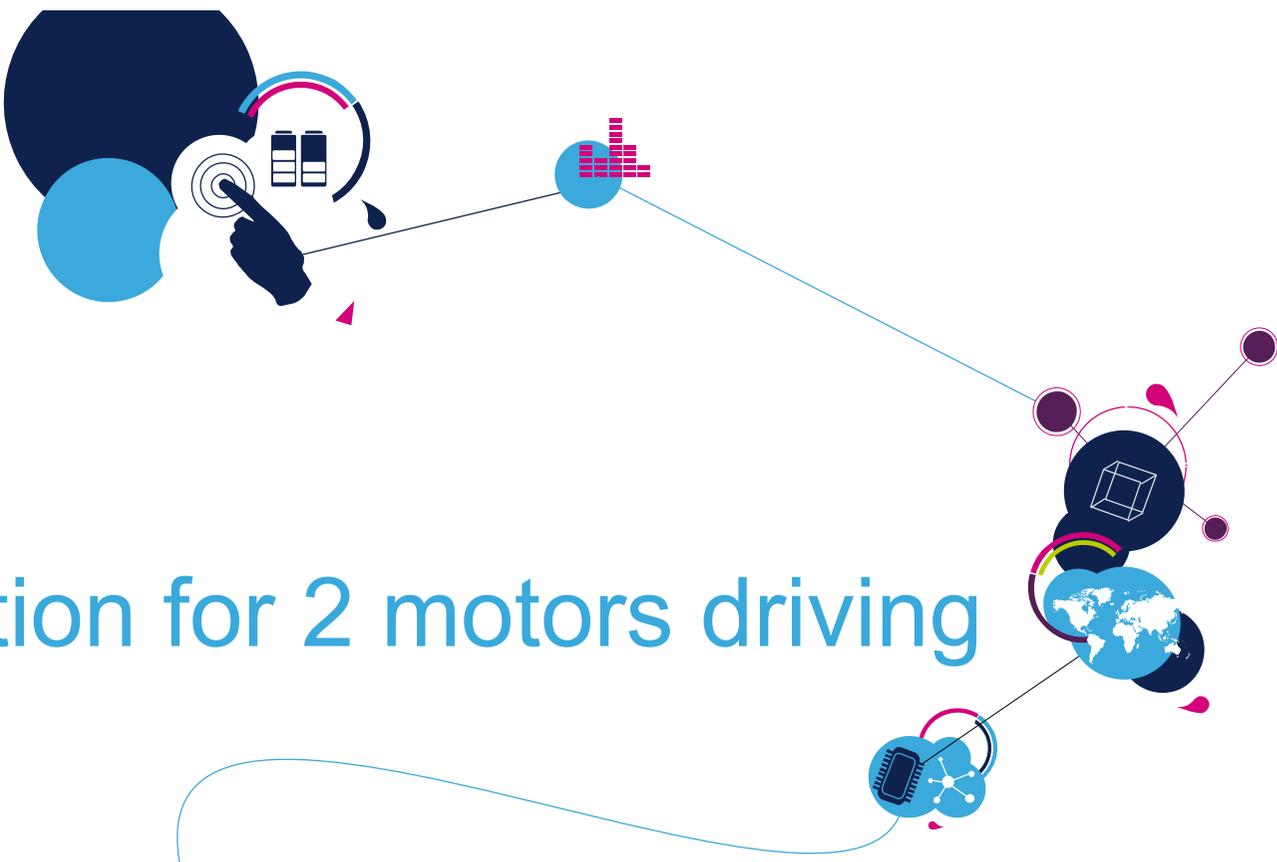
5

- Plug the X-NUCLEO-IHM01A expansion board on top of the STM32 Nucleo by using the Arduino UNO connectors
- Connect the STM32 Nucleo board to a PC with the USB cable through USB connector CN1 to power the board
- Power on the X-NUCLEO-IHM01A expansion board by connecting its connectors Vin and Gnd to the DC power supply. The DC supply must be set to deliver the required voltage by the stepper motor.
- Connect the stepper motor to the X-NUCLEO-IHM01A bridge connectors A+/- and B+/-



# Run the demo software to drive 1 motor

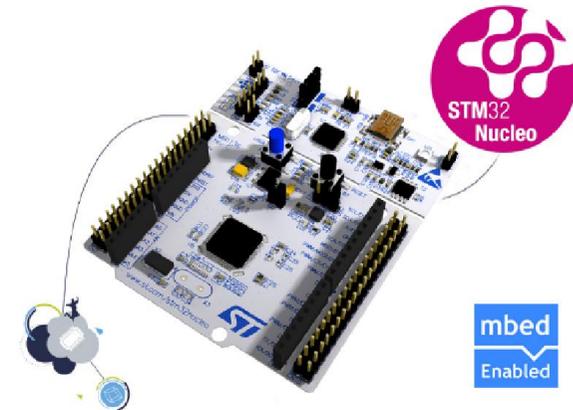
- Once the system setup is ready:
  - Open your preferred toolchain (MDK-ARM from Keil, EWARM from IAR, or Atollic TrueStudio)
  - Depending of the used STM32 Nucleo board, open the software project from:
    - \stm32\_cube\Projects\Multi\Examples\MotionControl\IHM01A1\_ExampleFor1Motor\*YourToolChainName*\STM32F401RE-Nucleo **for Nucleo STM32F401**
    - \stm32\_cube\Projects\Multi\Examples\MotionControl\IHM01A1\_ExampleFor1Motor\*YourToolChainName*\STM32F030R8-Nucleo **for Nucleo STM32F030**
    - \stm32\_cube\Projects\Multi\Examples\MotionControl\IHM01A1\_ExampleFor1Motor\*YourToolChainName*\STM32L053R8-Nucleo **for Nucleo STM32L053**
  - In order to adapt the default parameters which are used by the L6474 depending of your stepper motor characteristics, open the file:  
stm32\_cube\Drivers\BSP\Components\l6474\l6474\_target\_config.h. and modify the parameters which are postfixed by “\_DEVICE\_0”.
  - Rebuild all files and load your image into target memory
  - Run the example. The motor automatically starts (see main.c to have the detailed demo sequence).



# Configuration for 2 motors driving

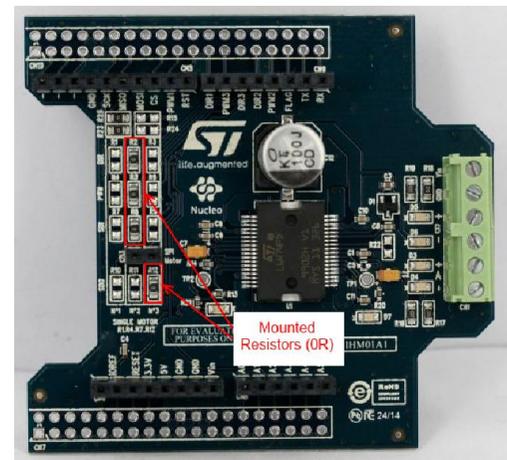
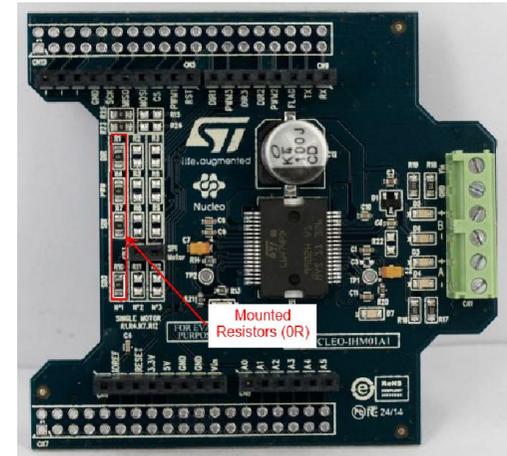
# System requirements to drive 2 motors (1/2)

- To drive two motors, you need :
  - A Nucleo STM32F401 or a Nucleo STM32F030 or a Nucleo STM32L053
  - Two X-NUCLEO-IHM01A expansion boards
  - Two stepper motors
  - An external DC power supply with four electric cables
  - An USB cable type A to mini-B
  - A windows PC with one of the supported development toolchains:
    - KEIL: MDK-ARM
    - IAR: EWARM
    - GCC-based IDEs (Atollic TrueStudio...)
  - The STM32 Cube firmware for X-NUCLEO-IHM01A1 from: <http://www.st.com/web/en/catalog/tools/PF260865>



# System requirements to drive 2 motors (2/2)

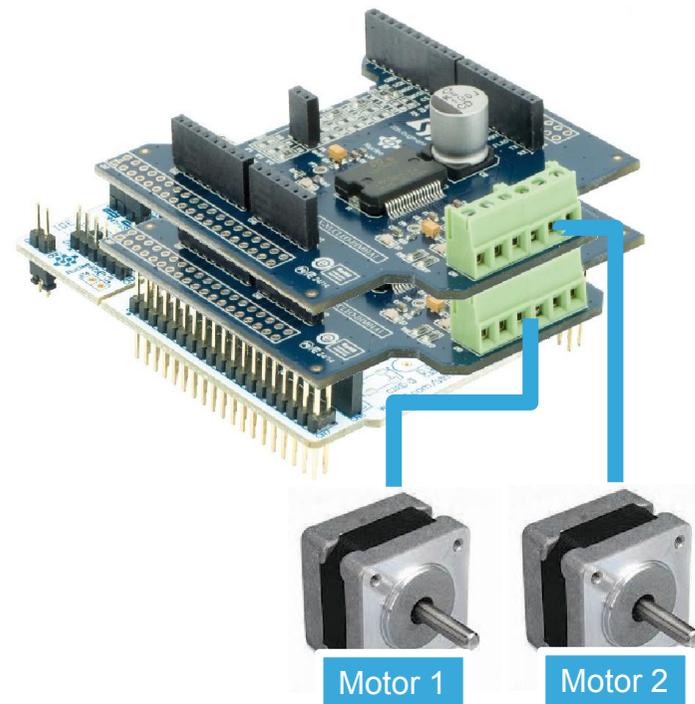
- The STM32 Nucleo has to be configured with the following jumpers position:
  - JP1 off, JP5 (PWR) on UV5 side, JP6 (IDD) on
- The X-NUCLEO-IHM01A expansion board for first motor must have:
  - Mounted resistors (0R) on R1, R4, R7 and 10
  - Unmounted resistors on R2, R3, R5, R6,R8, R9, R11 and R12
- The X-NUCLEO-IHM01A expansion board for second motor must have:
  - Mounted resistors (0R) on R2, R5, R8 and R12
  - Unmounted resistors on R1, R3, R4, R6, R7, R9, R10 and R11



# System setup to drive 2 motors

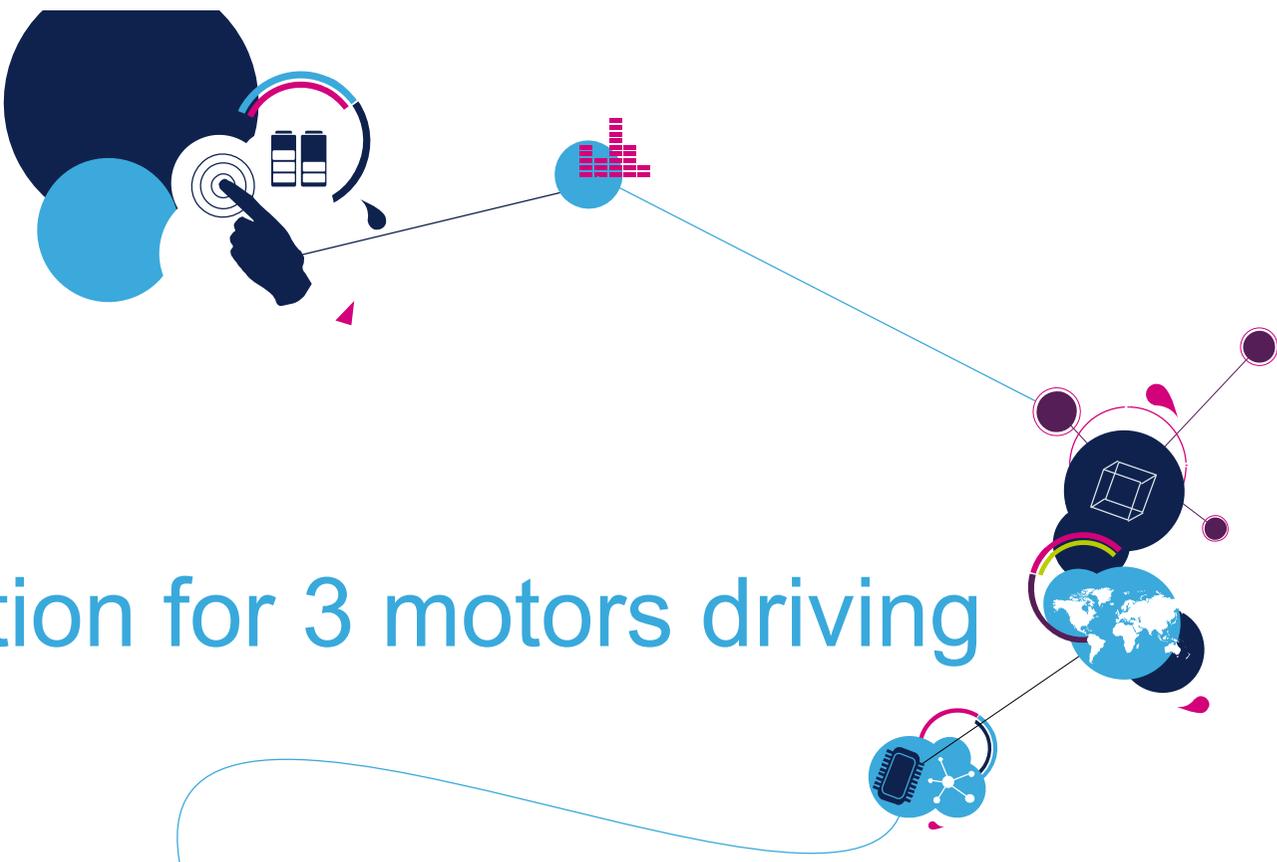
10

- Plug the X-NUCLEO-IHM01A for first motor on top of the STM32 Nucleo by using the Arduino UNO connectors
- Plug the X-NUCLEO-IHM01A for second motor on top of the one for first motor
- Connect the STM32 Nucleo board to a PC with the USB cable through USB connector CN1 to power the board
- Power on the X-NUCLEO-IHM01A expansion boards by connecting their connectors Vin and Gnd to the DC power supply. The DC supply must be set to deliver the required voltage by the stepper motors.
- Connect each stepper motor to the bridge connectors A+/- and B+/- of their dedicated X-NUCLEO-IHM01A board



# Run the demo software to drive 2 motors

- Once the system setup is ready:
  - Open your preferred toolchain (MDK-ARM from Keil, EWARM from IAR, or Atollic TrueStudio)
  - Depending of the used STM32 Nucleo board, open the software project from:
    - `stm32_cube\Projects\Multi\Examples\MotionControl\IHM01A1_ExampleFor2Motors\YourToolChainName\STM32F401RE-Nucleo` for **Nucleo STM32F401**
    - `\stm32_cube\Projects\Multi\Examples\MotionControl\IHM01A1_ExampleFor2Motors\YourToolChainName\STM32F030R8-Nucleo` for **Nucleo STM32F030**
    - `\stm32_cube\Projects\Multi\Examples\MotionControl\IHM01A1_ExampleFor2Motors\YourToolChainName\STM32L053R8-Nucleo` for **Nucleo STM32L053**
  - In order to adapt the default parameters which are used by the L6474s depending of your stepper motor characteristics, open the file:  
`stm32_cube\Drivers\BSP\Components\l6474\l6474_target_config.h` and modify the parameters which are postfixed by “\_DEVICE\_0” for first motor, and postfixed by “\_DEVICE\_1” for second motor
  - Rebuild all files and load your image into target memory
  - Run the example. The motors automatically start (see main.c to have the detailed demo sequence)

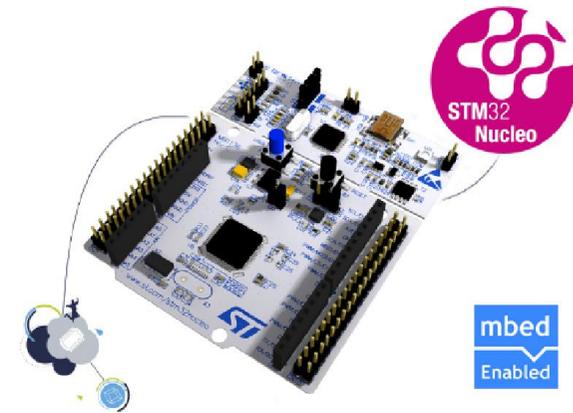


# Configuration for 3 motors driving

# System requirements to drive 3 motors (1/3)

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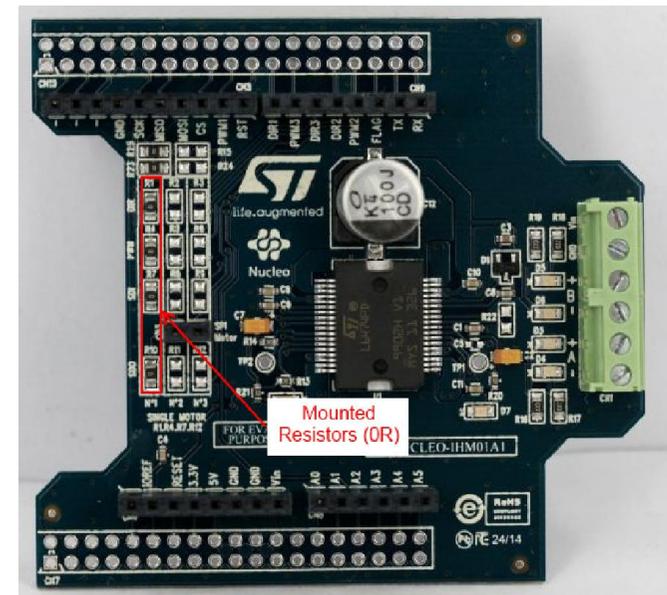
- To drive three motors, you need :
  - A Nucleo STM32F401 or a Nucleo STM32F030 or a Nucleo STM32L053
  - Three X-NUCLEO-IHM01A expansion boards
  - Three stepper motors
  - An external DC power supply with six electric cables
  - An USB cable type A to mini-B
  - A windows PC with one of the supported development toolchains:
    - KEIL: MDK-ARM
    - IAR: EWARM
    - GCC-based IDEs (Atollic TrueStudio...)
  - The STM32 Cube firmware for X-NUCLEO-IHM01A1 from: <http://www.st.com/web/en/catalog/tools/PF260865>



# System requirements to drive 3 motors (2/3)

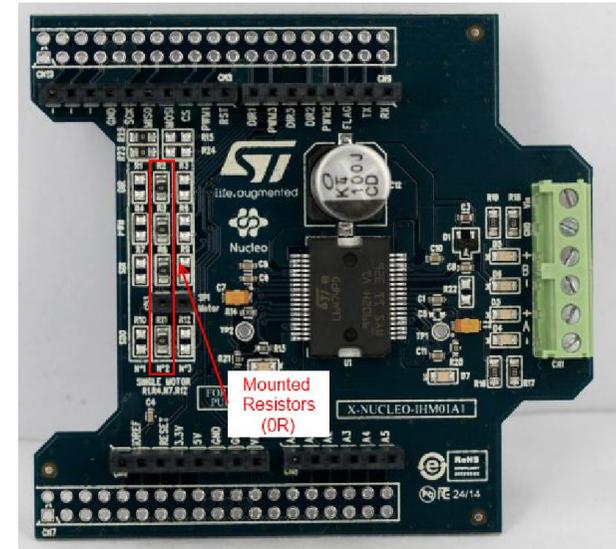
14

- The STM32 Nucleo has to be configured with the following jumpers position:
  - JP1 off
  - JP5 (PWR) on UV5 side
  - JP6 (IDD) on
- The X-NUCLEO-IHM01A expansion board for first motor must have:
  - Mounted resistors (0R) on R1, R4, R7 and 10
  - Unmounted resistors on R2, R3, R5, R6,R8, R9, R11 and R12

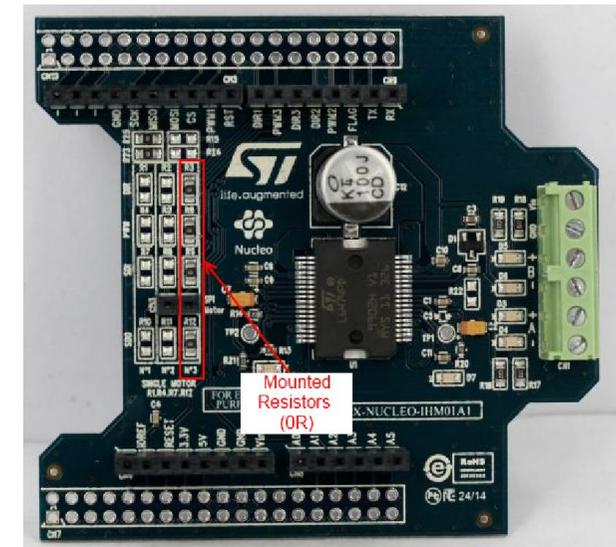


# System requirements to drive 3 motors (3/3)

- The X-NUCLEO-IHM01A expansion board for second motor must have:
  - Mounted resistors (0R) on R2, R5, R8 and R11
  - Unmounted resistors on R1, R3, R4, R6, R7, R9, R10 and R12



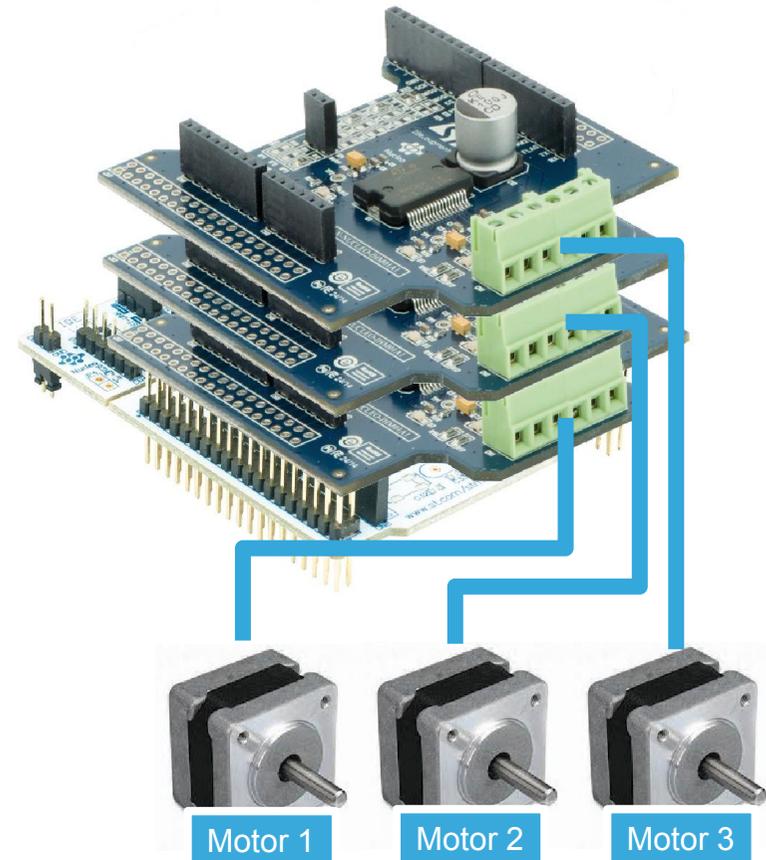
- The X-NUCLEO-IHM01A expansion board for third motor must have:
  - Mounted resistors (0R) on R3, R6, R9 and R12
  - Unmounted resistors on R1, R2, R4, R5, R7, R8, R10 and R11



# System setup to drive 3 motors

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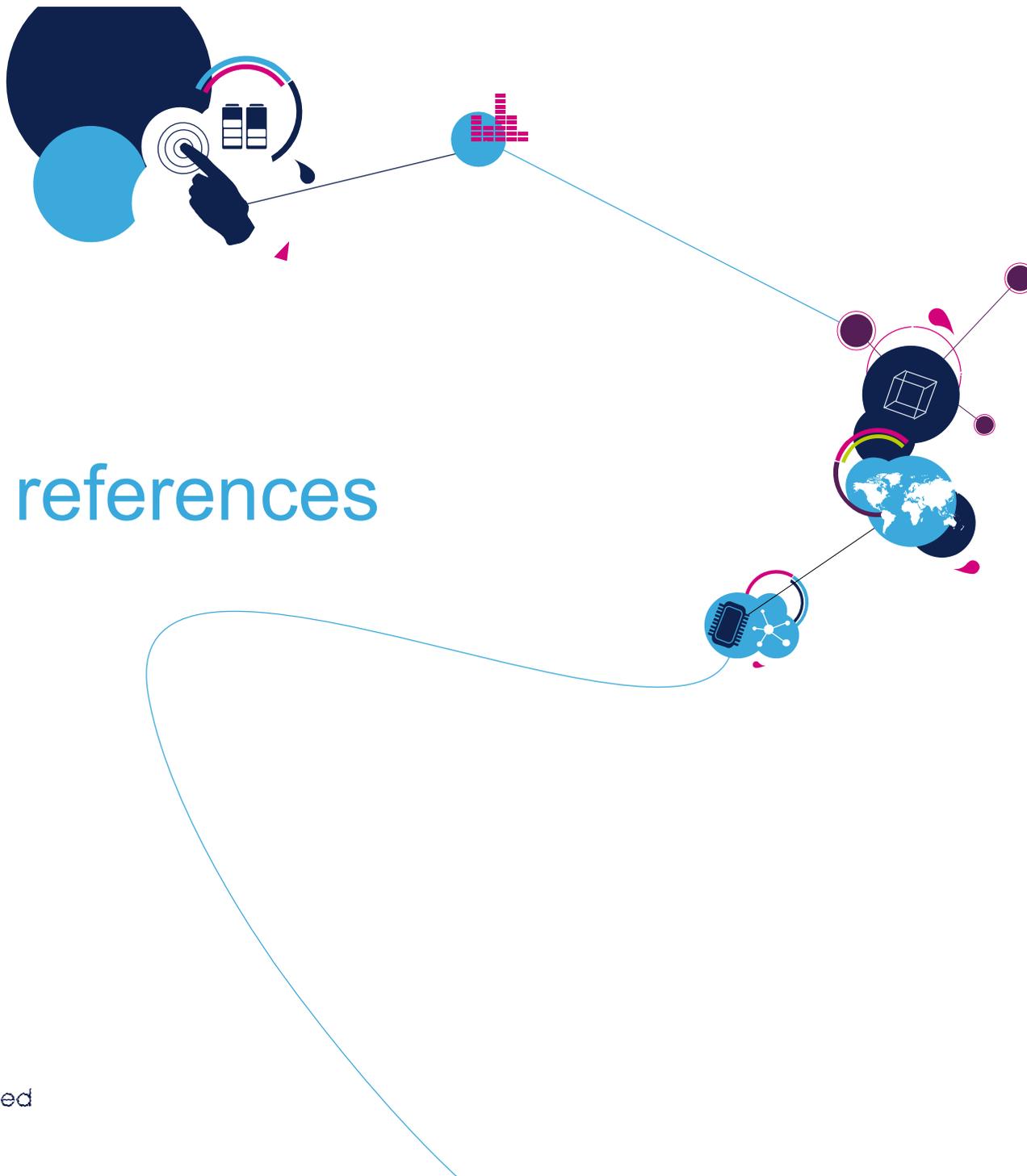
- Plug the X-NUCLEO-IHM01A for first motor on top of the STM32 Nucleo by using the Arduino UNO connectors
- Plug the X-NUCLEO-IHM01A for second motor on top of the one for first motor
- Plug the X-NUCLEO-IHM01A for third motor on top of the second one
- Connect the STM32 Nucleo board to a PC with the USB cable through USB connector CN1 to power the board
- Power on the X-NUCLEO-IHM01A expansion boards by connecting their connectors Vin and Gnd to the DC power supply. The DC supply must be set to deliver the required voltage by the stepper motors.
- Connect each stepper motor to the bridge connectors A+/- and B+/- of their dedicated X-NUCLEO-IHM01A board



# Run the demo software to drive 3 motors

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- Once the system setup is ready:
  - Open your preferred toolchain (MDK-ARM from Keil, EWARM from IAR, or Atollic TrueStudio)
  - Depending of the used STM32 Nucleo board, open the software project from:
    - `stm32_cube\Projects\Multi\Examples\MotionControl\IHM01A1_ExampleFor3Motors\YourToolChainName\STM32F401RE-Nucleo` for Nucleo **STM32F401**
    - `\stm32_cube\Projects\Multi\Examples\MotionControl\IHM01A1_ExampleFor3Motors\YourToolChainName\STM32F030R8-Nucleo` for Nucleo **STM32F030**
    - `\stm32_cube\Projects\Multi\Examples\MotionControl\IHM01A1_ExampleFor3Motors\YourToolChainName\STM32L053R8-Nucleo` for Nucleo **STM32L053**
  - In order to adapt the default parameters which are used by the L6474s depending of your stepper motor characteristics, open the file:  
`stm32_cube\Drivers\BSP\Components\l6474\l6474_target_config.h` and modify the parameters which are postfixed by “\_DEVICE\_0” for first motor, postfixed by “\_DEVICE\_1” for second motor and by “\_DEVICE\_2” for third motor
  - Rebuild all files and load your image into target memory
  - Run the example. The motors automatically start (see main.c to have the detailed demo sequence).



# Additional references

- To have more information about:
  - The hardware configuration of the X-NUCLEO-IHM01A1, refer to the User Manual « UM1794 »: [http://www.st.com/st-web-ui/static/active/en/resource/technical/document/user\\_manual/DM00122662.pdf](http://www.st.com/st-web-ui/static/active/en/resource/technical/document/user_manual/DM00122662.pdf)
  - The L6474 and particularly the values of the default parameters in file “l6474\_target\_config.h”, refer to the datasheet « DS8773 »: <http://www.st.com/st-web-ui/static/active/en/resource/technical/document/datasheet/DM00043117.pdf>
  - The X-CUBE-SPN1 software please refer to the Application note : “X-CUBE-SPN1 Application Note.pdf”. It describes the API and gives examples for all functionalities.