



Quick start guide for X-CUBE-SPN1

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

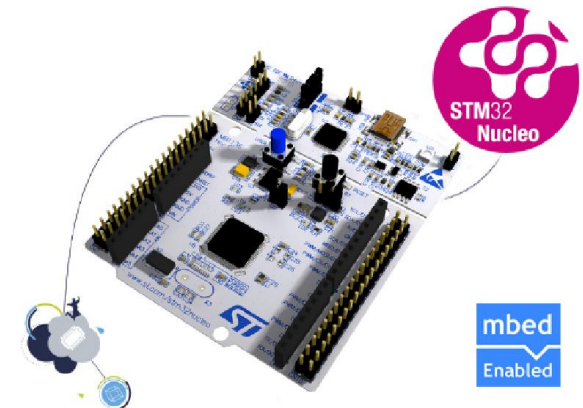


Configuration for 1 motor driving

System requirements to drive 1 motor (1/2)

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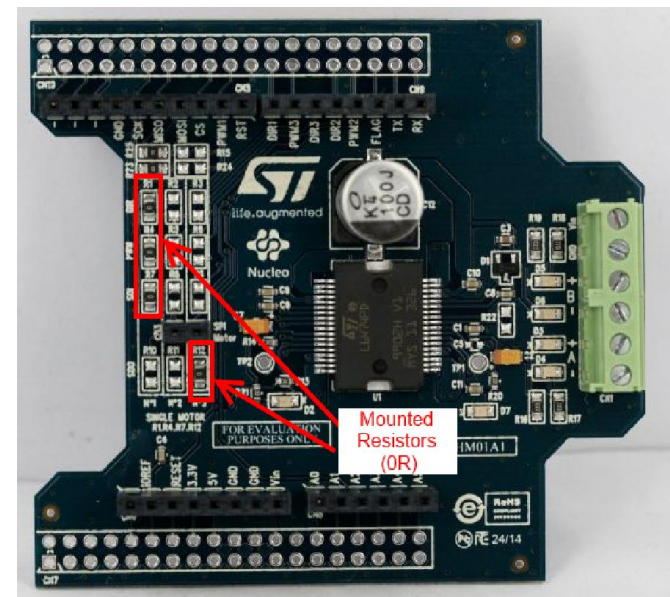
- To drive one motor, you need :
 - A Nucleo STM32F401 or a Nucleo STM32F030 or a Nucleo STM32L053
 - One X-NUCLEO-IHM01A expansion board
 - A stepper motor
 - An external DC power supply with two electric cables
 - An USB cable type A to mini-B
 - A windows PC with one of the supported development toolchains:
 - 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)

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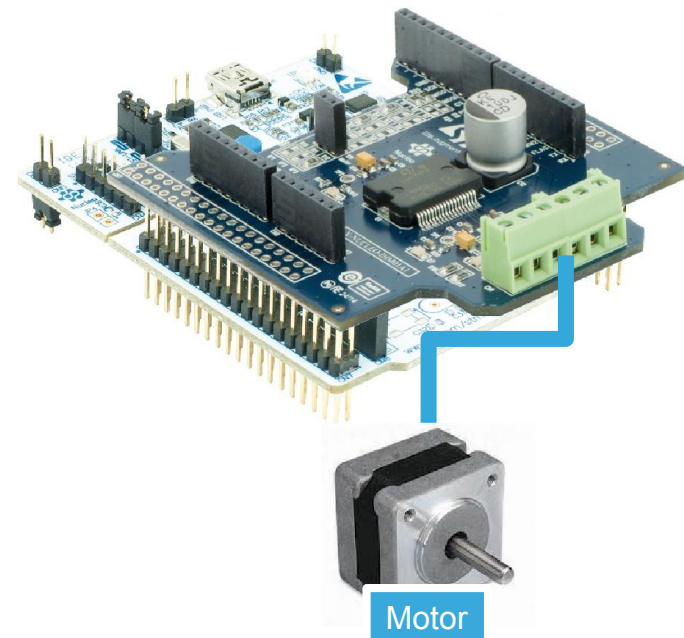
- The STM32 Nucleo has to be configured with the following jumpers position:
 - JP1 off
 - JP5 (PWR) on UV5 side
 - JP6 (IDD) on
- The X-NUCLEO-IHM01A expansion board must have:
 - Mounted resistors (0R) on R1, R4, R7 and R12
 - Unmounted resistors on R2, R3, R5, R6, R8, R9, R10 and R11



System setup to drive 1 motor

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- 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

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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_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).

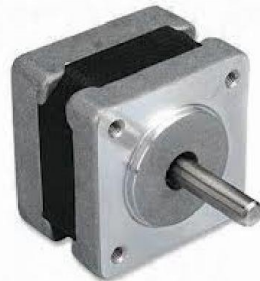
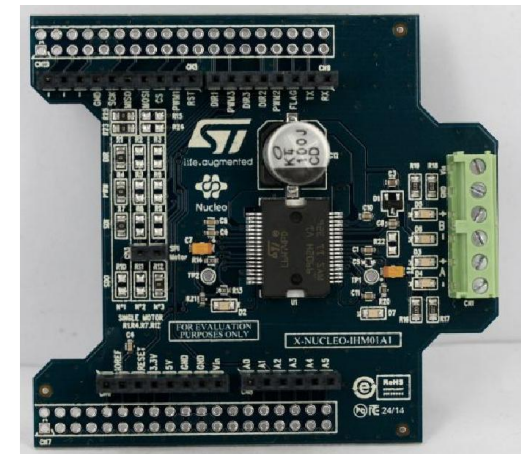
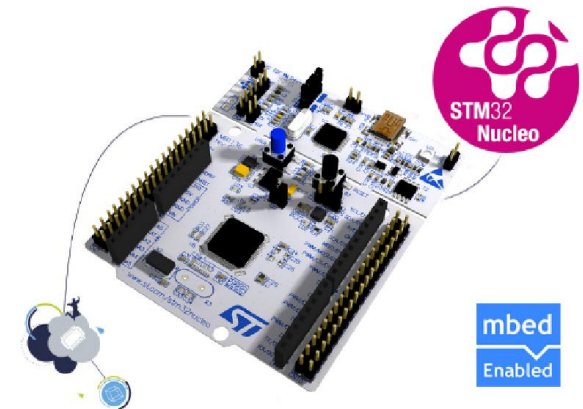


Configuration for 2 motors driving

System requirements to drive 2 motors (1/2)

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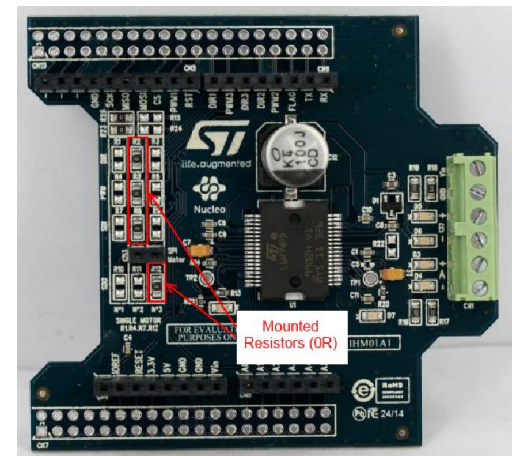
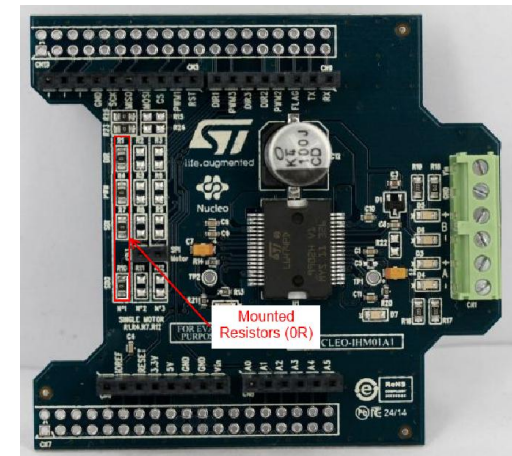
- To drive two motors, you need :
 - A Nucleo STM32F401 or a Nucleo STM32F030 or a Nucleo STM32L053
 - Two X-NUCLEO-IHM01A expansion boards
 - Two stepper motors
 - An external DC power supply with four electric cables
 - An USB cable type A to mini-B
 - A windows PC with one of the supported development 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)

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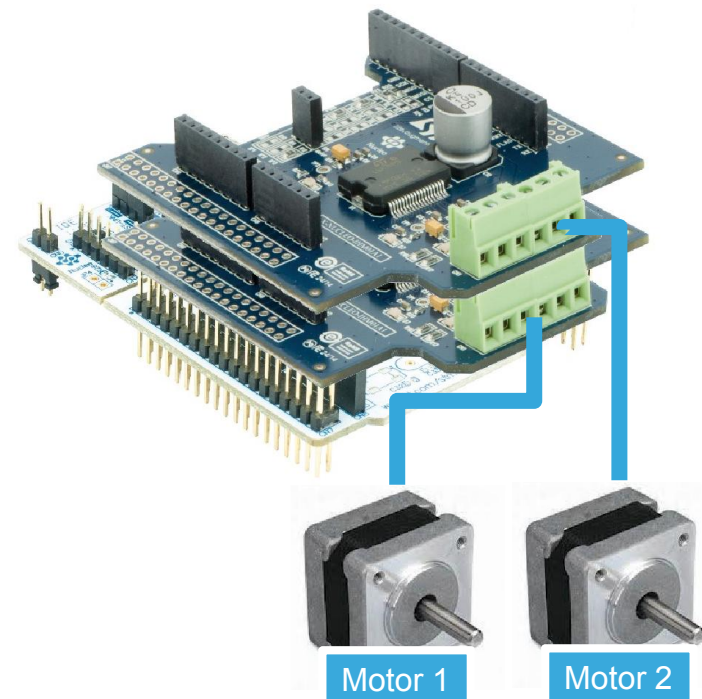
- The STM32 Nucleo has to be configured with the following jumpers position:
 - JP1 off, JP5 (PWR) on UV5 side, JP6 (IDD) on
- The X-NUCLEO-IHM01A expansion board for first motor must have:
 - Mounted resistors (0R) on R1, R4, R7 and 10
 - Unmounted resistors on R2, R3, R5, R6,R8, R9, R11 and R12
- The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

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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
- 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

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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_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)

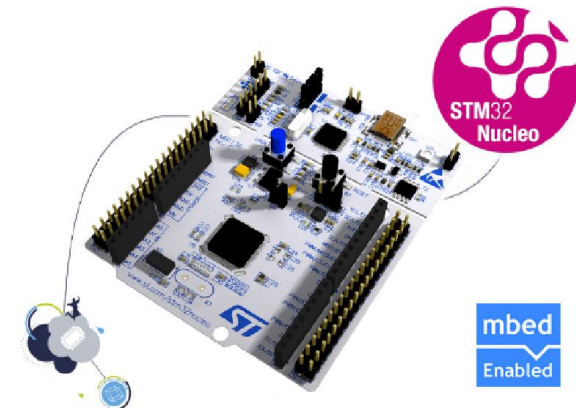


Configuration for 3 motors driving

System requirements to drive 3 motors (1/3)

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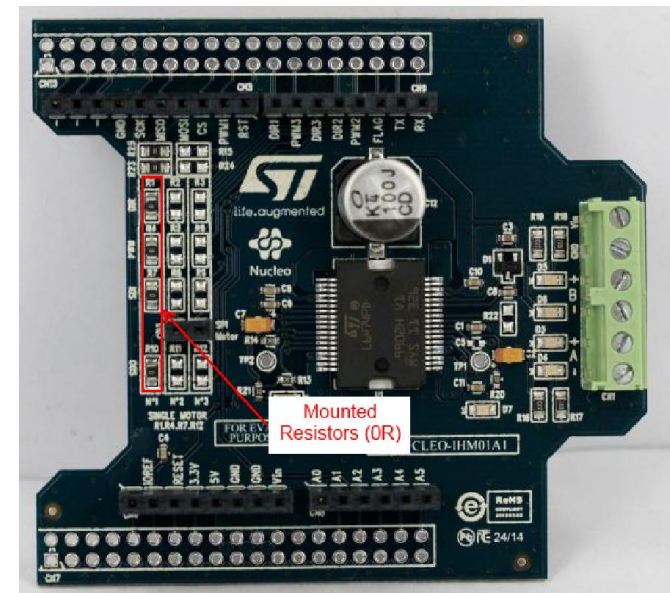
- To drive three motors, you need :
 - A Nucleo STM32F401 or a Nucleo STM32F030 or a Nucleo STM32L053
 - Three X-NUCLEO-IHM01A expansion boards
 - Three stepper motors
 - An external DC power supply with six electric cables
 - An USB cable type A to mini-B
 - A windows PC with one of the supported development 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)

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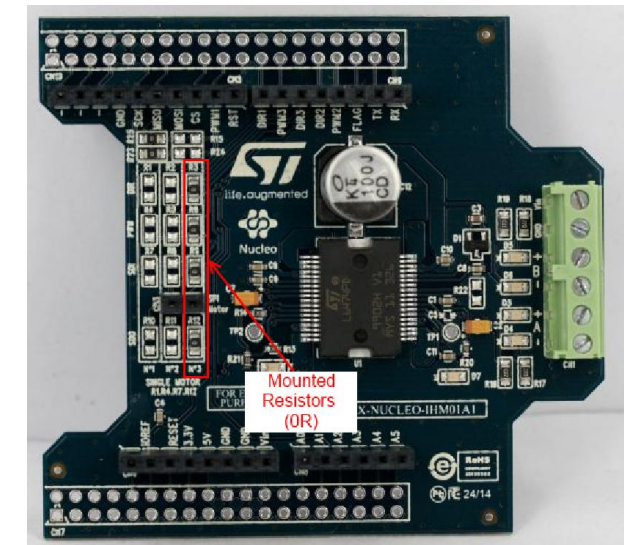
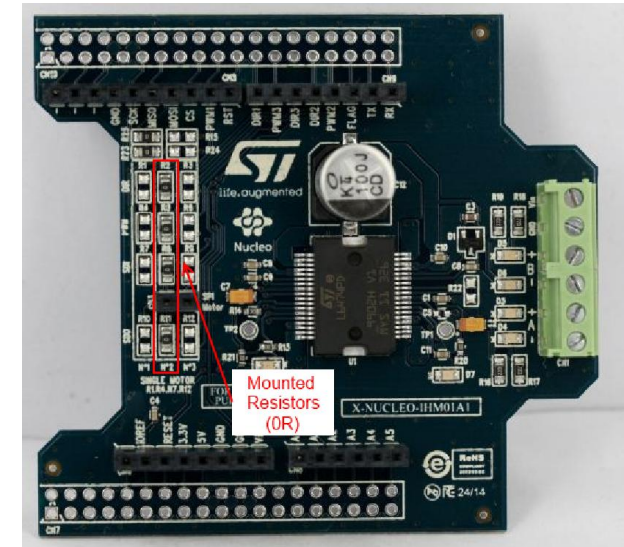
- The STM32 Nucleo has to be configured with the following jumpers position:
 - JP1 off
 - JP5 (PWR) on UV5 side
 - JP6 (IDD) on
- The X-NUCLEO-IHM01A expansion board for first motor must have:
 - Mounted resistors (0R) on R1, R4, R7 and 10
 - Unmounted resistors on R2, R3, R5, R6, R8, R9, R11 and R12



System requirements to drive 3 motors (3/3)

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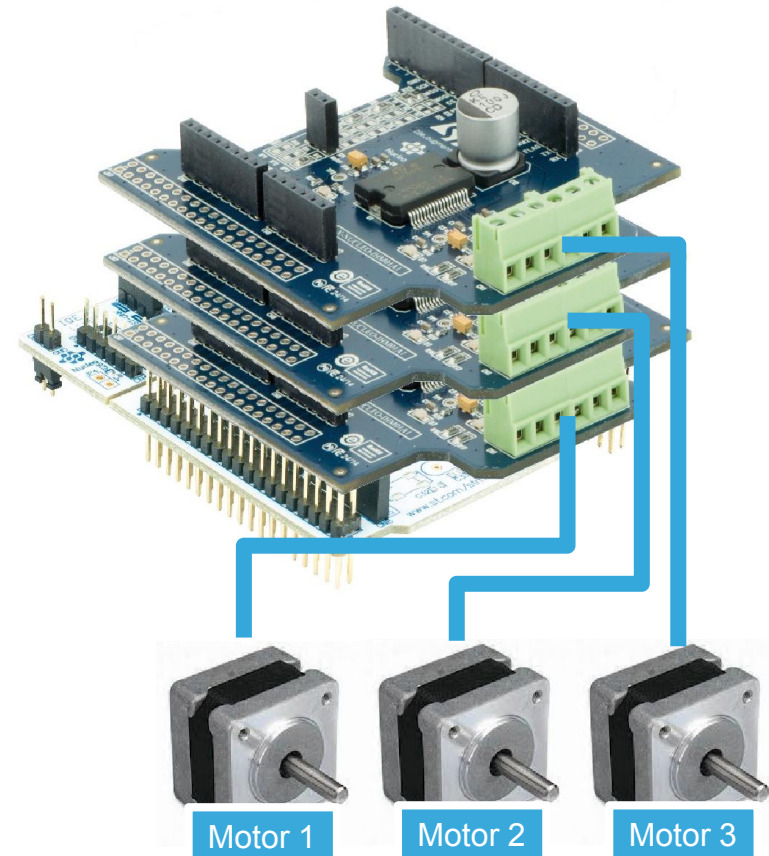
- The X-NUCLEO-IHM01A expansion board for second motor must have:
 - Mounted resistors (0R) on R2, R5, R8 and R11
 - Unmounted resistors on R1, R3, R4, R6, R7, R9, R10 and R12
- The X-NUCLEO-IHM01A expansion board for third motor must have:
 - Mounted resistors (0R) on R3, R6, R9 and R12
 - Unmounted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