



DesignNews

C++ Primer for Embedded Systems

Day 1:

Tooling Up for Embedded C++ : STM32CubeIDE

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Webinar Logistics

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- If you have technical problems, click “Help” or submit a question asking for assistance.
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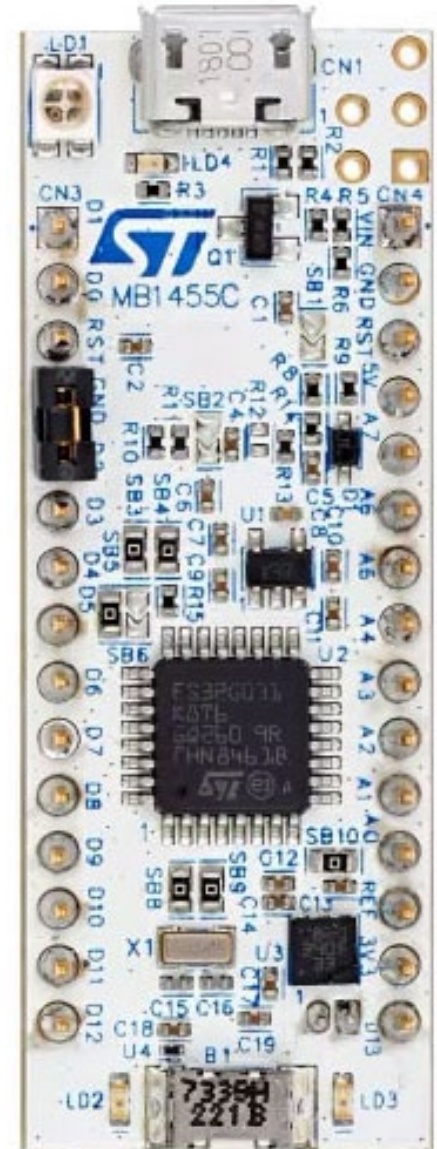
Fred Eady

Visit 'Lecturer Profile' in your console for more details.

AGENDA

- **Install STM32CubeIDE**
- **Create an STM32CubeIDE C++ Project**

STM32
CubeIDE



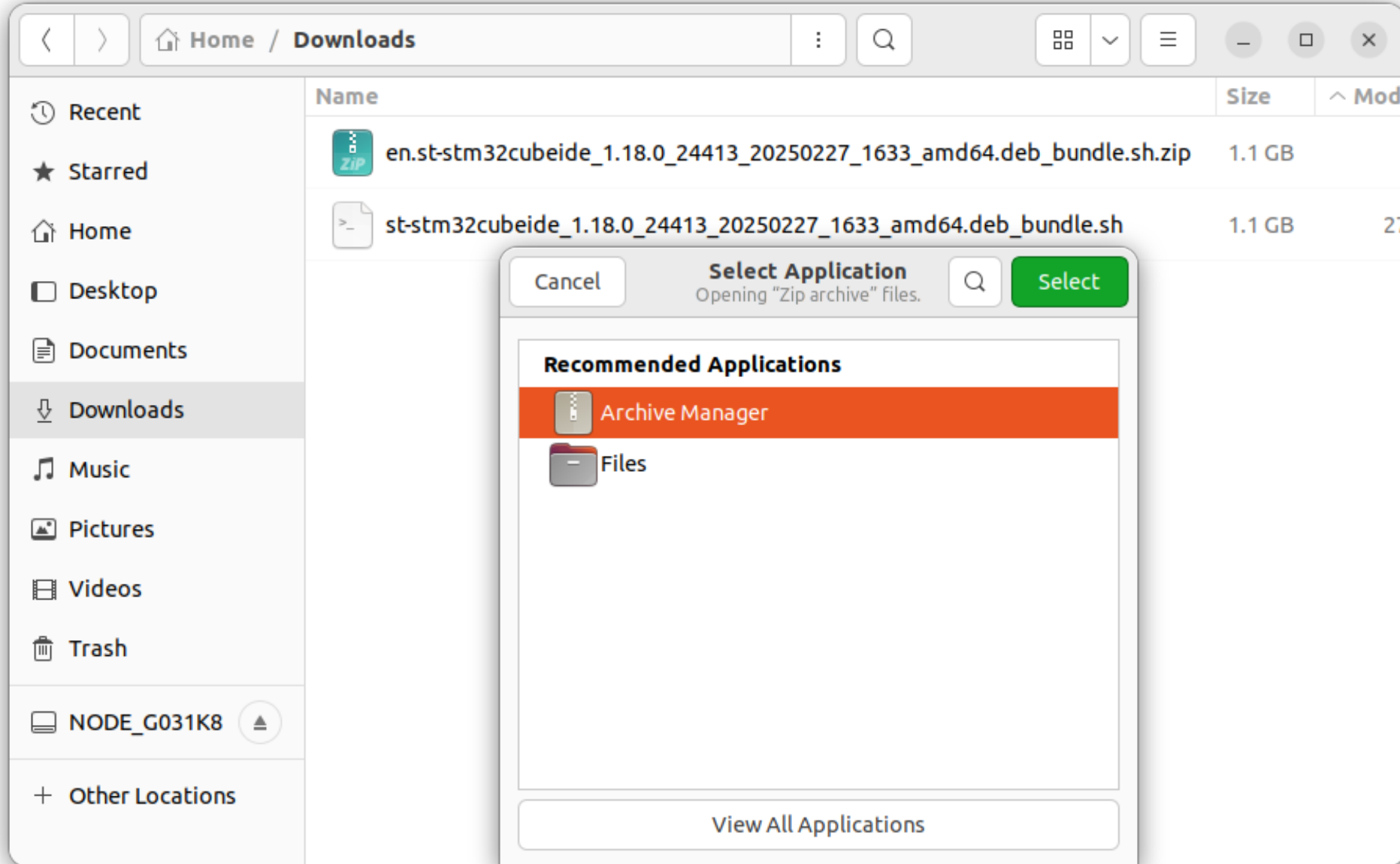
Download and Install STM32CubeIDE

Get Software

	Part Number	General Description	Supplier	Download	All versions
+	STM32CubeIDE-DEB	STM32CubeIDE Debian Linux Installer	ST	Get latest	Select version
+	STM32CubeIDE-Lnx	STM32CubeIDE Generic Linux Installer	ST	Get latest	1.18.0 1.17.0 1.16.1 1.16.0 1.15.1 1.15.0
+	STM32CubeIDE-Mac	STM32CubeIDE macOS Installer	ST	Get latest	Select version
+	STM32CubeIDE-RPM	STM32CubeIDE RPM Linux Installer	ST	Get latest	Select version
+	STM32CubeIDE-Win	STM32CubeIDE Windows Installer	ST	Get latest	Select version

STMicroelectronics recommends always keeping your software up to date

Download and Install STM32CubeIDE



Download and Install STM32CubeIDE

```
fred@shop-ubuntu-1770: ~/Downloads
File Edit View Search Terminal Help

fred@shop-ubuntu-1770:~$ cd Downloads/
fred@shop-ubuntu-1770:~/Downloads$ ls -l
total 2215280
-rw-rw-r-- 1 fred fred 1134215911 Apr 13 16:53 en.st-stm32cubeide_1.18.0_24413_20250227_1633_amd64.deb_bundle.sh.zip
-rw-rw-r-- 1 fred fred 1134215653 Feb 27 20:51 st-stm32cubeide_1.18.0_24413_20250227_1633_amd64.deb_bundle.sh
fred@shop-ubuntu-1770:~/Downloads$ chmod +x st-stm32cubeide_1.18.0_24413_20250227_1633_amd64.deb_bundle.sh
fred@shop-ubuntu-1770:~/Downloads$ ls -l
total 2215280
-rw-rw-r-- 1 fred fred 1134215911 Apr 13 16:53 en.st-stm32cubeide_1.18.0_24413_20250227_1633_amd64.deb_bundle.sh.zip
-rwxrwxr-x 1 fred fred 1134215653 Feb 27 20:51 st-stm32cubeide_1.18.0_24413_20250227_1633_amd64.deb_bundle.sh
fred@shop-ubuntu-1770:~/Downloads$ sudo ./st-stm32cubeide_1.18.0_24413_20250227_1633_amd64.deb_bundle.sh
Creating directory makeself_dir_XiCZzS
Verifying archive integrity...█
```

Download and Install STM32CubeIDE

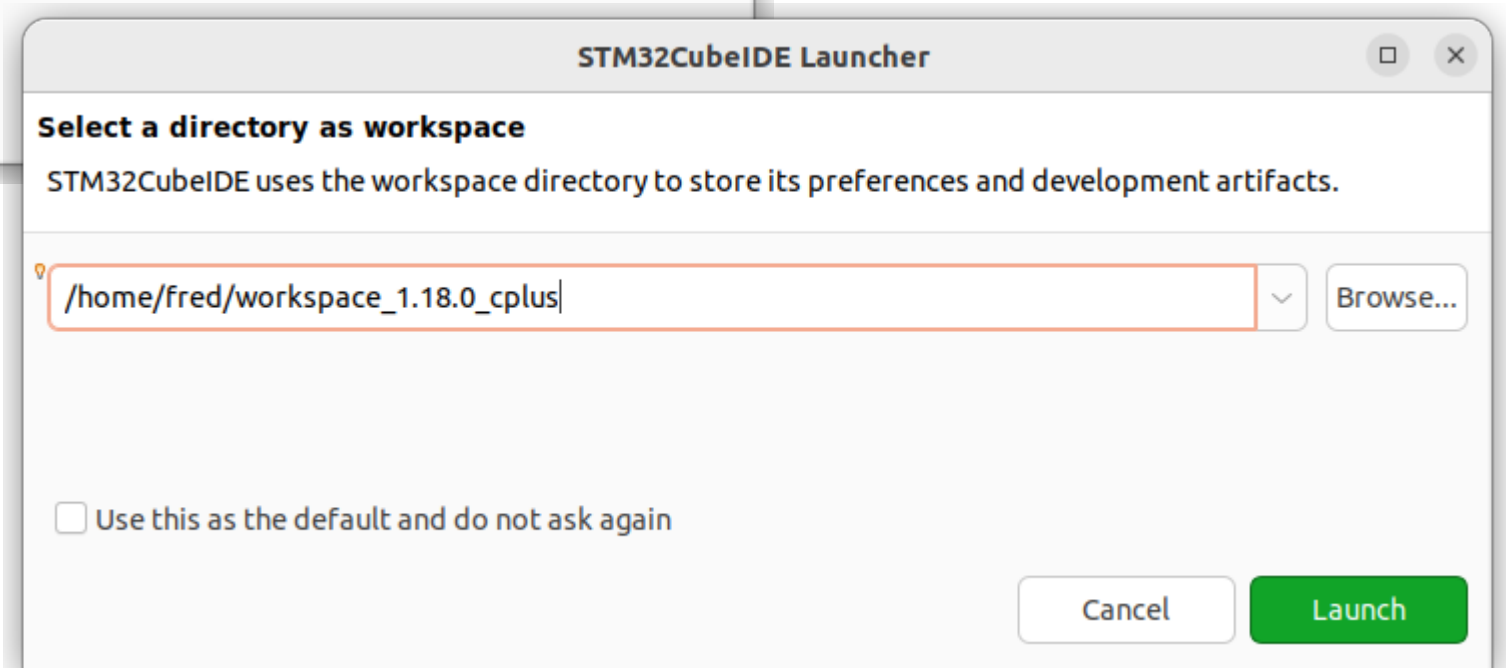
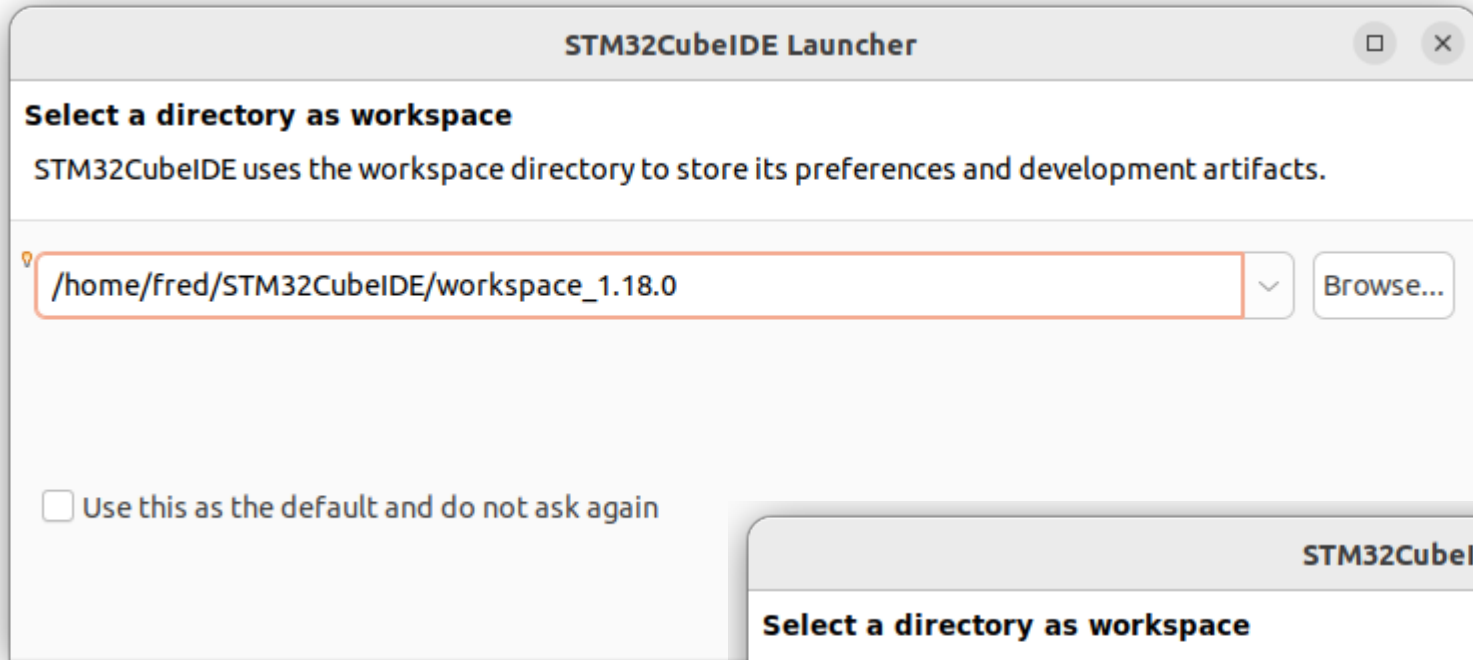
```
fred@shop-ubuntu-1770: ~/Downloads
File Edit View Search Terminal Help
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I ACCEPT (y) / I DO NOT ACCEPT (N) [N/y] y
License accepted.
OS Version: 22.04
Do you want to install Segger J-Link udev rules? [Y/n] n
```

Designate a Workspace



Select the Target MCU

STM32 Project IDE

Target Selection
 Select STM32 target or STM32Cube example

MCU/MPU Selector | Board Selector | Example Selector | Cross Selector

Board Filters

Commercial Part Number: NUCLEO-G031K8

PRODUCT INFO

- Type
- Supplier
- MCU / MPU Series
- Marketing Status
- Price

MEMORY

- Ext. Flash = 0 (MBit)
- Ext. EEPROM = 0 (kBytes)
- Ext. RAM = 0 (MBit)

FEATURES

- Embedded Sensor
- User Button
- Camera
- CAN
- Connector

Features

Large Picture | Docs & Resources | Datasheet | Buy

STM32G0 Series

NUCLEO-G031K8 **STM32 Nucleo-32 development board with STM32G031K8 MCU, supports Arduino nano connectivity**

ACTIVE
 Product is in mass production

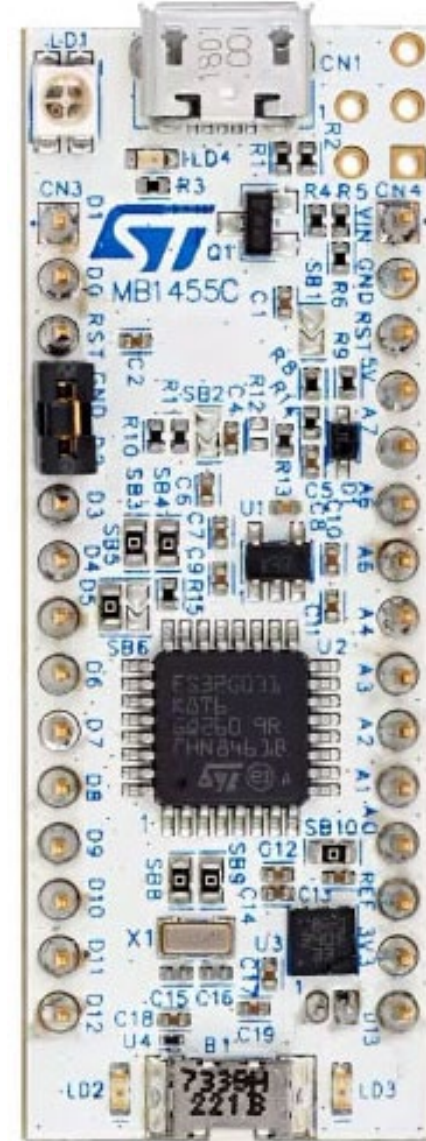
Part Number : NUCLEO-G031K8
 Commercial Part Number : NUCLEO-G031K8
 Unit Price (US\$) : 10.32
 Mounted Device : [STM32G031K8T6](#)

The STM32 Nucleo-32 board provides an affordable and flexible way for users to try out new concepts and build prototypes by choosing from the various combinations of performance and power consumption features, provided by the STM32 microcontroller. The Arduino™ Nano V3 connectivity support allows the easy expansion of the functionality of the STM32 Nucleo open development platform with a wide choice of specialized shields. The STM32 Nucleo-32 board does not require any separate probe as it integrates the ST-LINK debugger/programmer. The STM32 Nucleo-32 board comes with the STM32 comprehensive free software libraries and examples available with the STM32Cube MCU Package.

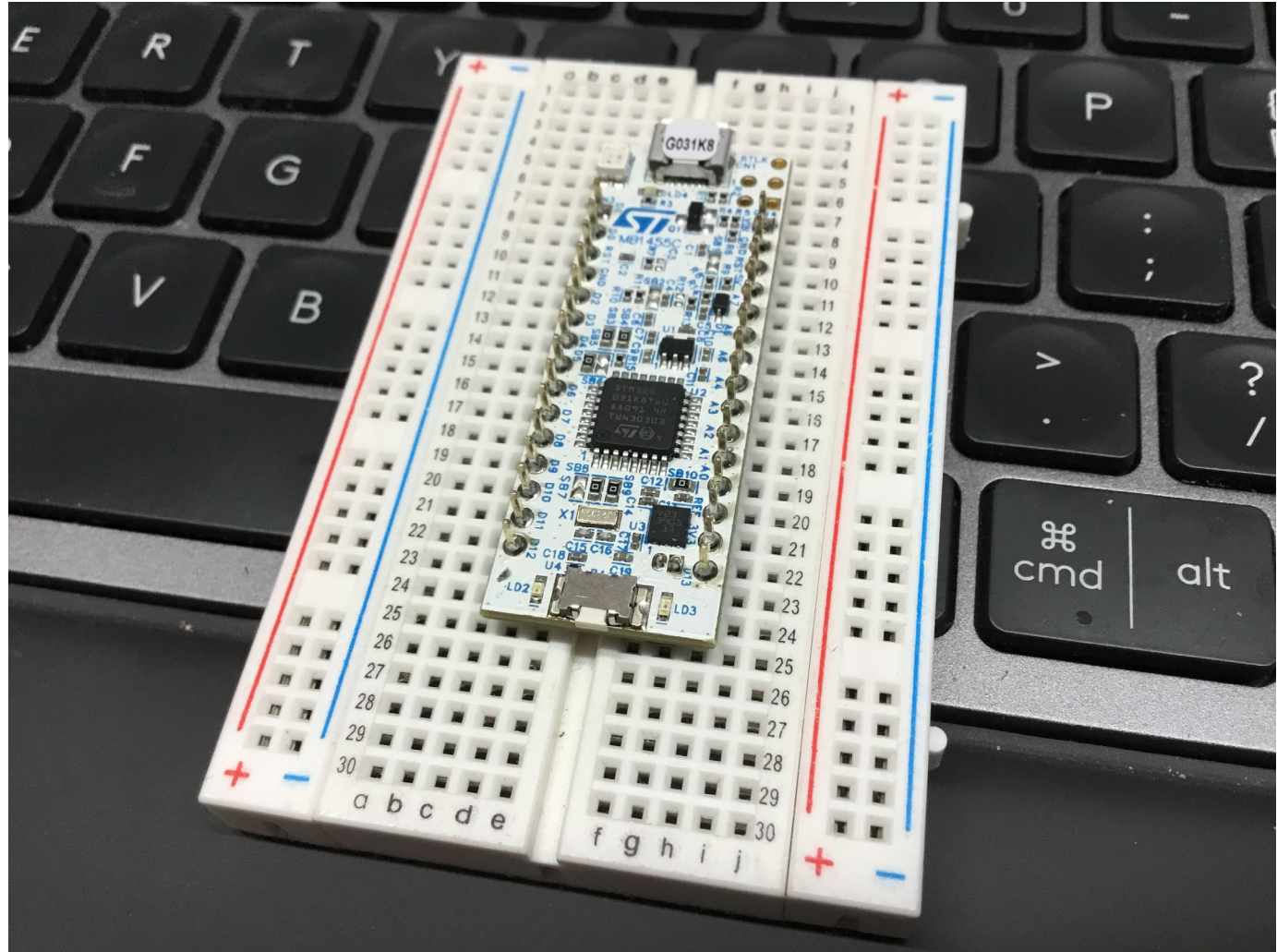
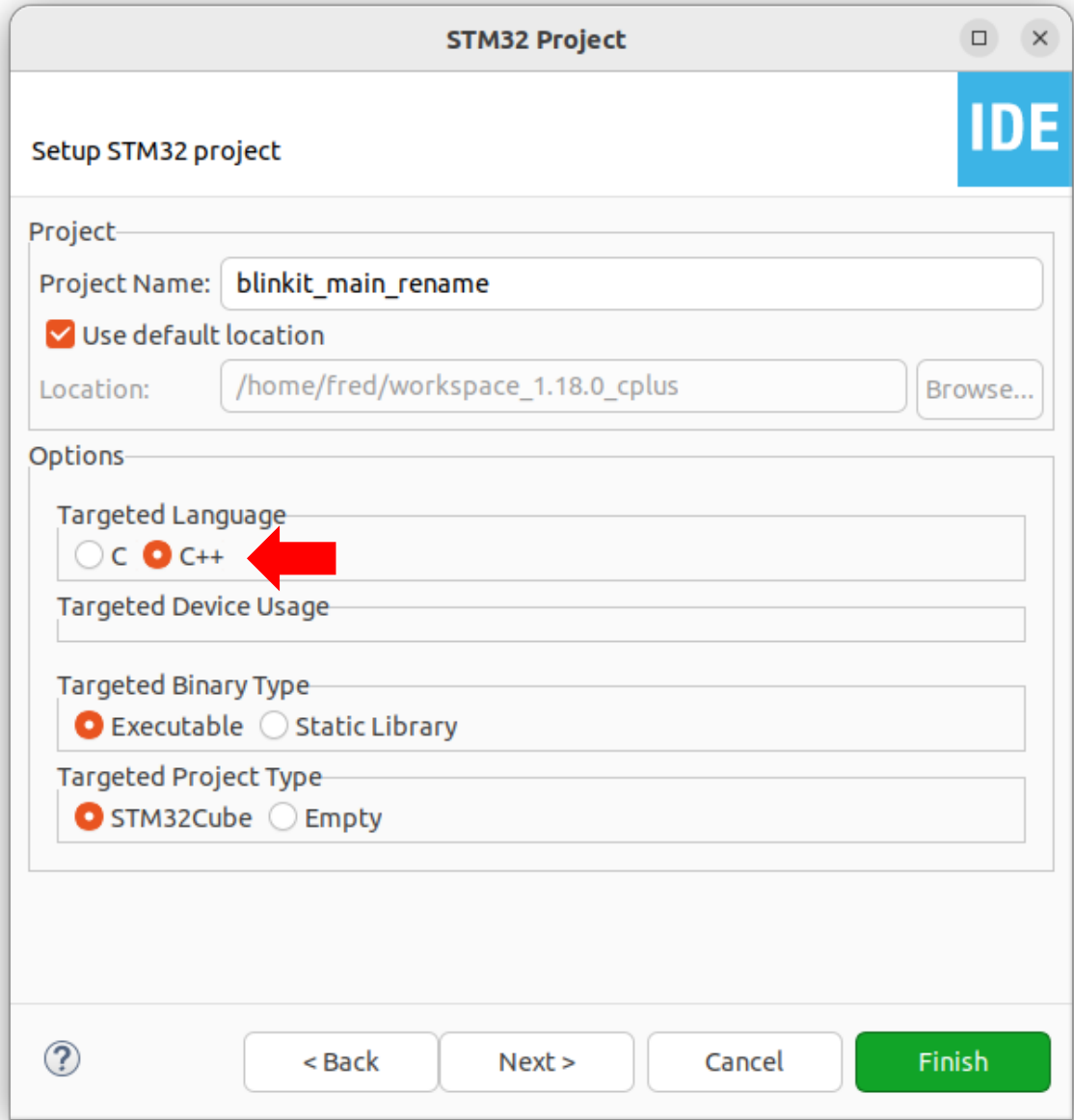
Boards List: 1 item Export

Overview	Commercial Part No	Type	Marketing Status	Unit Price (US\$)	Mounted Device
	NUCLEO-G031K8	Nucleo-32	Active	10.32	STM32G031K8T6

< Back Next > Cancel Finish



Setup the STM32 C++ Project



Get the STM32G0 Software Pack

User Authentication Manager

Please login to download a software package.
Go to Help -> STM32Cube updates -> Connection to myST

User Authentication Dialog

Already registered?

Enter your e-mail address and password to login your myST user.

E-mail address: fred@edtp.com

Password:

Remember me on this computer.

Login

New user?

myST brings you a set of personalized features:

- Participate to ST Events
- Stay informed with ST eNewsletters
- Get help with ST Online Support
- Discuss on the ST Community
- Benefit from our Online Design Tools
- Download Software
- Order free samples
- Manage your weekly product updates
- Buy ST Products & Tools

Create Account

Help

- Information Center
- Video tutorials
- Help Contents
- Search
- Show Context Help
- Show Active Keybindings... Shift+Ctrl+L
- Tips and Tricks...
- Cheat Sheets...
- Eclipse User Storage
- Check for Updates
- Install New Software...
- Eclipse Marketplace...
- STM32Cube updates**
- Configuration Tool
- ST-LINK Upgrade
- About STM32CubeIDE

STM32Cube updates

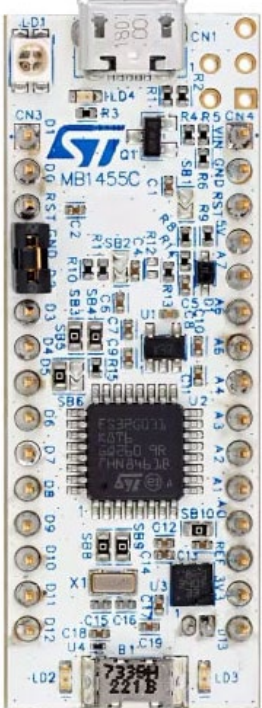
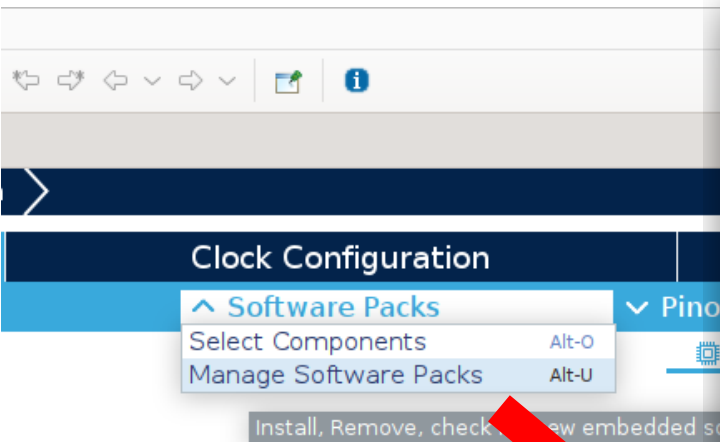
- IDE** Connection to myST
- MX** Check for Target Selector Device Database Updates
- MX** Check for Embedded Software Packages Updates

Clock Configuration

Software Packs

Pinout

Download and Install the STM32G0 Software Pack



Embedded Software Packages Manager

STM32Cube MCU Packages and embedded software packs releases

Releases Information was last refreshed less than one hour ago.

Infineon	RealThread	SEGGER	WES	emotas	portGmbH	quantropi	wolfSSL
STM32Cube MCU Packages	STMicroelectronics	Avnet-lotConnect	Cesanta	EmbeddedOffice	ITTIA_DB		

	Description	Installed Version	Available
▶	STM32F7		
▼	STM32G0		
<input checked="" type="checkbox"/>	STM32Cube MCU Package for STM32G0 Series (Size : 368.0 MB)		1.6.2
<input type="checkbox"/>	STM32Cube MCU Package for STM32G0 Series (Size : 204.68 MB)		

Details

STM32CubeG0 Firmware Package V1.6.0 / 10-June-2022

Main Changes

- General updates to fix known defects and enhancements imp
- Upgrade USB Device Lib to use **V2.11.0**
- Upgrade USB Host Lib to use **V3.4.1**

From Local ... From Url ... Refresh Install Remove Close

Downloading selected software packages

Download File stm32cube_fw_g0_v162.zip

39.6 MBytes / 165.0 MBytes (11s left)

Download and Unzip selected Files

OK Cancel

Rename the main.c Function

```

1  /* USER CODE BEGIN Header */
2  /**
3   *
4   * @file      : main.c
5   * @brief    : Main program body
6   *
7   * @attention
8   *
9   * Copyright (c) 2025 STMicroelectronics.
10  * All rights reserved.
11  *
12  * This software is licensed under terms that can be found in the LICENSE file
13  * in the root directory of this software component.
14  * If no LICENSE file comes with this software, it is provided AS-IS.
15  *
16  *
17  */
18  /* USER CODE END Header */
19  /* Includes -----*/
20  #include "main.h"
21  #include "usart.h"
22  #include "gpio.h"
23
24  /* Private includes -----*/
25  /* USER CODE BEGIN Includes */
26
27  /* USER CODE END Includes */
28
29  /* Private typedef -----*/
30  /* USER CODE BEGIN PTD */
31
32  /* USER CODE END PTD */
33
34  /* Private define -----*/
35  /* USER CODE BEGIN PD */
36
37  /* USER CODE END PD */
38
39  /* Private variables -----*/
40  /* USER CODE BEGIN PV */
41
42  /* USER CODE END PV */
43
44  /* Private function prototypes -----*/
45  /* USER CODE BEGIN PFP */
46
47  /* USER CODE END PFP */
48
49  /* Private functions -----*/
50  /* USER CODE BEGIN PF1 */
51
52  /* USER CODE END PF1 */
53
54  int main(void)
55  {
56  /* USER CODE BEGIN 1 */
57
58  /* USER CODE END 1 */
59
60  /* Infinite loop */
61  for(;;)
62  {
63  /* USER CODE BEGIN Loop */
64
65  /* USER CODE END Loop */
66
67  }
68  }
69
70  /**
71  * @}
72  */
73
74  /**
75  * @}
76  */
77
78  /**
79  * @}
80  */
81
82  /**
83  * @}
84  */
85
86  /**
87  * @}
88  */
89
90  /**
91  * @}
92  */
93
94  /**
95  * @}
96  */
97
98  /**
99  * @}
100 */

```

Problems Tasks Console

```

CDT Build Console [blinkit_main_rename]
text data bss
8788 12 1716 1
Finished building: default.
Finished building: blinkit
17:09:47 Build Finished. 0 errors, 0 warnings. (took 325ms)

```

File Edit Source Refactor Navigate Search Project Run V

Project Explorer

- blinkit_main_rename
 - Binaries
 - Includes
 - Core
 - Inc
 - Src
 - gpio.c
 - main.c**
 - stm32g0xx_hal_msp.c
 - stm32g0xx_it.c
 - syscalls.c
 - systemem.c
 - system_stm32g0xx.c
 - usart.c
 - Startup
 - Drivers
 - Debug
 - blinkit_main_rename.ioc
 - STM32G031K8TX_FLASH.ld

Context Menu:

- New
- Open
- Show In Shift+Alt+W
- Open With
- Copy Ctrl+C
- Paste Ctrl+V
- Delete
- Source
- Move...
- Rename... F2**
- Import... Rename Resource
- Export...

Rename Resource Dialog:

New name: main.cpp

Update references

[Open preferences...](#)

Preview > Cancel OK

Create the C++ Directory and Files

The screenshot shows the STM32CubeIDE Project Explorer with the 'Src' folder expanded. A context menu is open over the 'Src' folder, and the 'New' option is selected. The 'New' submenu is also open, showing options like 'File', 'Folder', 'Class', 'Header File', and 'Source File'. Red arrows indicate the navigation path from the 'Src' folder to the 'New' menu, then to the 'New' submenu, and finally to the 'Source File' option. A red bracket highlights the 'blinkit_cplus.cpp' and 'blinkit_cplus.h' files in the 'Src' folder.

Configure the Path to the C++ Include Files

The screenshot shows the 'Properties for blinkit_main_rename' dialog box in STM32CubeIDE. The 'Settings' tab is active, and the 'MCU/MPU G++ Compiler' section is expanded. The 'Include paths (-)' field is highlighted with a red arrow, and the path '..\blinkit_code' is entered. The 'Include files (-include)' field is empty. The 'Configuration' is set to 'Debug [Active]'. The 'Apply and Close' button is highlighted in green.

type filter text

Settings

Configuration: Debug [Active] Manage Configurations...

Tool Settings Build Steps Build Artifact Binary Parsers Error Parsers

MCU/MPU Toolchain

- MCU/MPU Settings
- MCU/MPU Post build outputs
- MCU/MPU GCC Assembler
 - General
 - Debugging
 - Preprocessor
 - Include paths
 - Miscellaneous
- MCU/MPU GCC Compiler
 - General
 - Debugging
 - Preprocessor
 - Include paths
 - Optimization
 - Warnings
 - Miscellaneous
- MCU/MPU G++ Compiler
 - General
 - Debugging
 - Preprocessor
 - Include paths
 - Optimization
 - Warnings
 - Miscellaneous
- MCU/MPU G++ Linker
 - General
 - Libraries
 - Miscellaneous

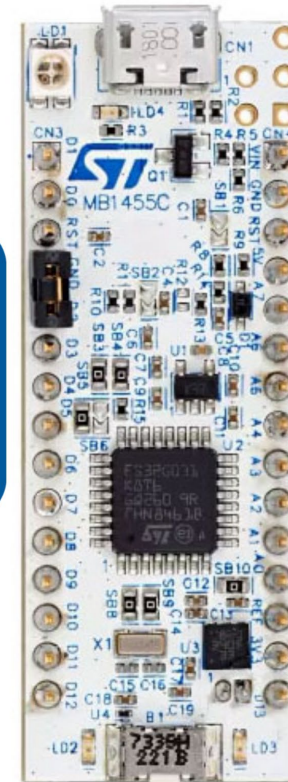
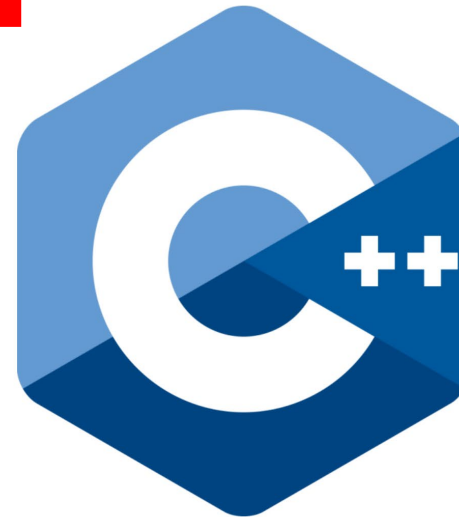
Include paths (-)

- ..\Core\Inc
- ..\blinkit_code
- ..\Drivers\STM32G0xx_HAL_Driver\Inc
- ..\Drivers\STM32G0xx_HAL_Driver\Inc\Legacy
- ..\Drivers\CMSIS\Device\ST\STM32G0xx\Include
- ..\Drivers\CMSIS\Include

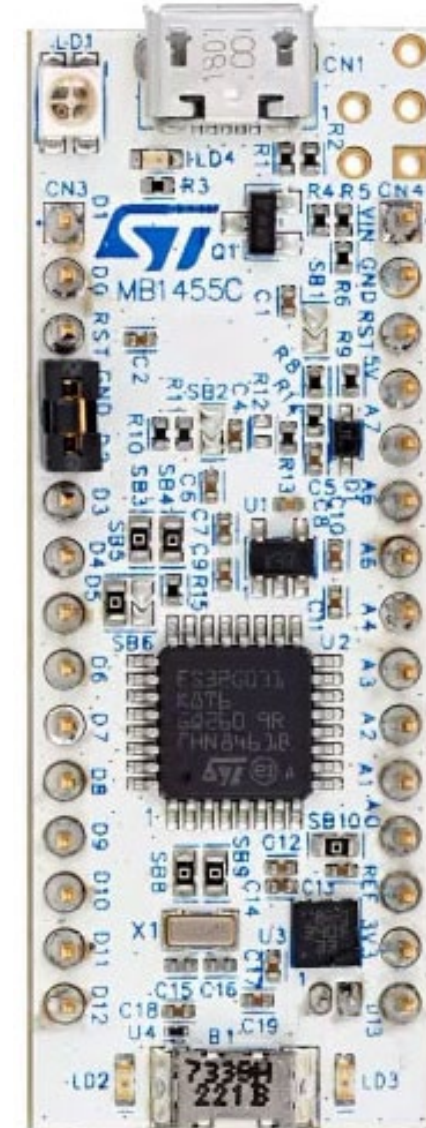
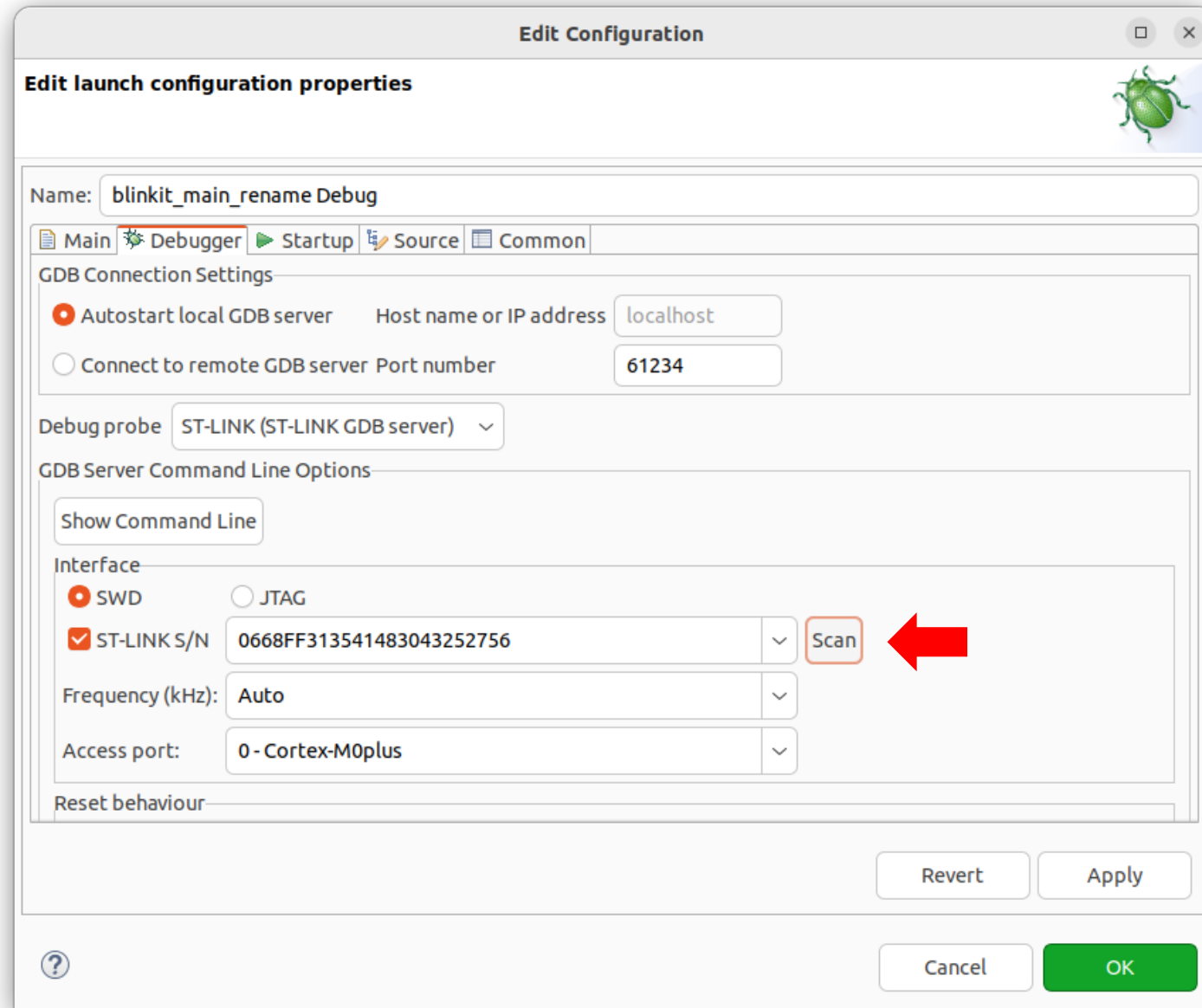
Include files (-include)

Restore Defaults Apply

Cancel Apply and Close



Discover and Assign the ST-LINK Debugger Hardware



Create the C++ Application Code

The screenshot displays the STM32CubeIDE interface with two code editors open: `blinkit_cplus.cpp` and `blinkit_cplus.h`. The Project Explorer on the left shows the project structure, with `main.cpp` selected under the `Core` folder.

```
workspace_1.18.0_cplus - blinkit_main_rename/blinkit_code/blinkit_cplus.cpp - STM32CubeIDE
File Edit Source Refactor Navigate Search Project Run Window Help
Project Explorer
  blinkit_main_rename
    Binaries
    Includes
    Core
      Inc
      Src
        gpio.c
        main.cpp
        stm32g0xx_hal_msp.c
        stm32g0xx_it.c
        syscalls.c
        systemem.c
        system_stm32g0xx.c
        usart.c
      Startup
    Drivers
    blinkit_code
      blinkit_cplus.cpp
      blinkit_cplus.h
    Debug
      blinkit_main_rename.ioc
      blinkit_main_rename.Debug.launch
      STM32G031K8TX_FLASH.ld
  blinkit_cplus.cpp
  blinkit_cplus.h
Outline
Build Targets

blinkit_cplus.cpp
1  /*
2  * blinkit_cplus.cpp
3  *
4  * Created on: Apr 14, 2025
5  * Author: fred
6  */
7
8 #include "main.h"
9 #include "blinkit_cplus.h"
10 #include "stm32g0xx_hal.h"
11 #include "stm32g0xx_hal_gpio.h"
12
13 Blinkit_class::Blinkit_class() {}
14 Blinkit_class::~Blinkit_class() {}
15
16 void Blinkit_class::blinkit(int delay)
17 {
18     HAL_GPIO_TogglePin(LD3_GPIO_Port,LD3_Pin);
19     HAL_Delay(delay);
20 }
21

blinkit_cplus.h
1  /*
2  * blinkit_cplus.h
3  *
4  * Created on: Apr 14, 2025
5  * Author: fred
6  */
7
8 #ifndef BLINKIT_CPLUS_H_
9 #define BLINKIT_CPLUS_H_
10
11 class Blinkit_class {
12 public:
13     Blinkit_class();
14     ~Blinkit_class();
15
16     void blinkit(int delay);
17 };
18
19
20
21 #endif /* BLINKIT_CPLUS_H_ */
22

Download verified successfully
Shutting down...
Exit.
```

Create the C++ Application Code

The screenshot displays the STM32CubeIDE workspace for a project named "workspace_1.18.0_cplusplus - STM32CubeIDE". The interface includes a menu bar (File, Edit, Source, Refactor, Navigate, Search, Project, Run, Window, Help), a toolbar, a Project Explorer on the left, a main editor window, an Outline view on the right, and a Problems/Console/Properties panel at the bottom.

The Project Explorer shows the project structure:

- binaries
- Includes
- Core
 - Inc
 - Src
 - Startup
- Drivers
- blinkit_code
 - blinkit_cplusplus.cpp
 - blinkit_cplusplus.h
- Debug
 - blinkit_main_rename.ioc
 - blinkit_main_rename.Debug.launch
 - STM32G031K8TX_FLASH.ld

The main editor window shows the code in `main.cpp`. A red circle highlights the include statements in the original code:

```
18 /* USER CODE END Header */
19 /* Includes -----*/
20 #include "main.h"
21 #include "usart.h"
22 #include "gpio.h"
23
```

A red arrow points from this section to a second, smaller window showing the updated code:

```
14 * IT NO LICENSE FILE COMES WIT
15 *
16 *****
17 */
18 /* USER CODE END Header */
19 /* Includes -----*/
20 #include "main.h"
21 #include "usart.h"
22 #include "gpio.h"
23
24 /* Private includes -----
25 /* USER CODE BEGIN Includes */
26 #include "blinkit_cplusplus.h"
27 /* USER CODE END Includes */
28
```

The Outline view on the right shows the project's structure:

- main.h
- usart.h
- gpio.h
- blinkit_cplusplus.h
- SystemClock_Config(void) : void
- main(void) : int
- SystemClock_Config(void) : void
- Error_Handler(void) : void
- assert_failed(uint8_t*, uint32_t) : void

The bottom panel shows "Problems", "Tasks", "Console", and "Properties" tabs, with the message "No consoles to display at this time."

Create the C++ Application Code

The screenshot displays the STM32CubeIDE workspace for a project named 'workspace_1.18.0_cplusplus - STM32CubeIDE'. The interface includes a menu bar (File, Edit, Source, Refactor, Navigate, Search, Project, Run, Window, Help), a toolbar, and a Project Explorer on the left. The Project Explorer shows a tree view with folders like Binaries, Includes, Core, Drivers, and blinkit_code, along with files like blinkit_main_rename.ioc and STM32G031K8TX_FLASH.ld. The main editor window shows the code for 'main.cpp' with the following content:

```
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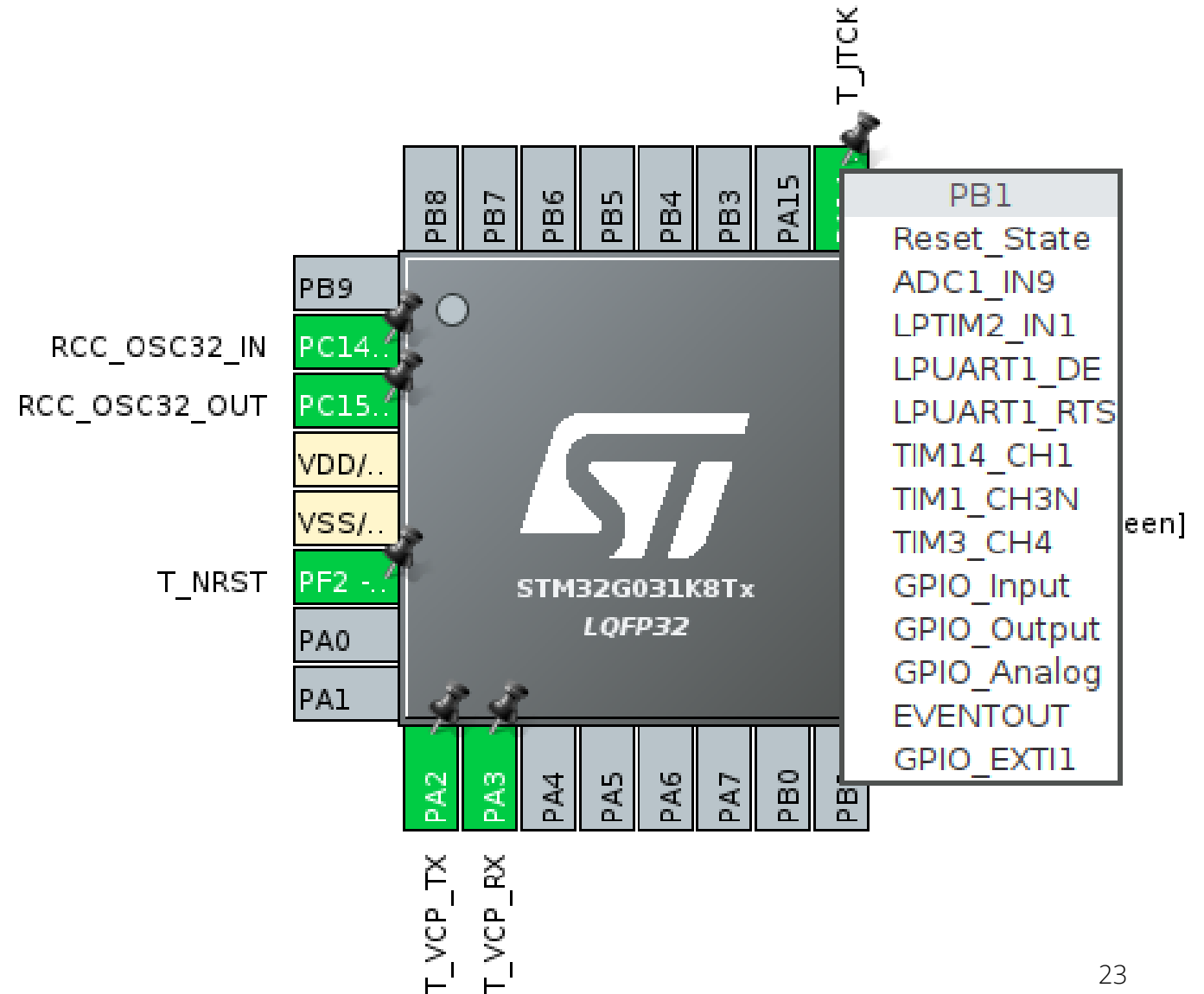
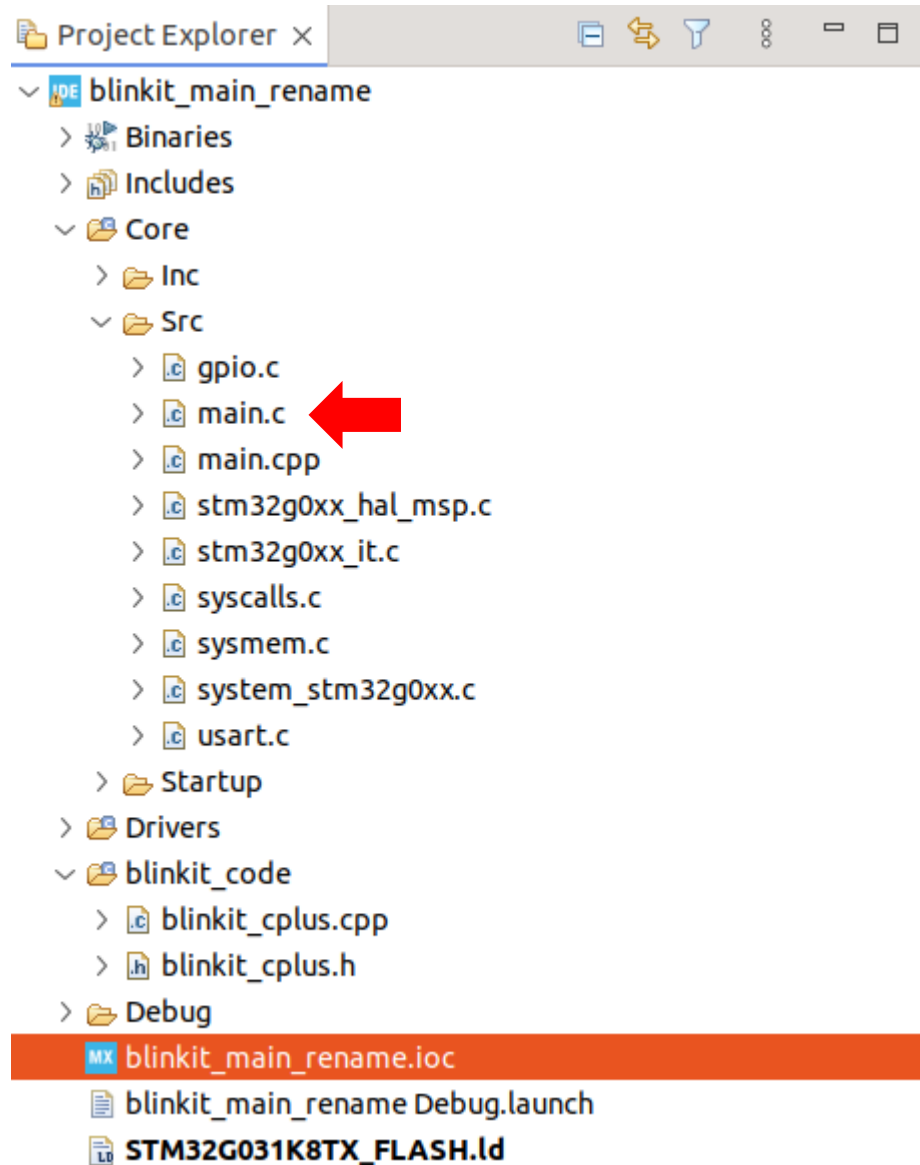
81  /* Configure the system clock */
82  SystemClock_Config();
83
84  /* USER CODE BEGIN SysInit */
85
86  /* USER CODE END SysInit */
87
88  /* Initialize all configured peripherals */
89  MX_GPIO_Init();
90  MX_USART2_UART_Init();
91  /* USER CODE BEGIN 2 */
92  Blinkit_class blinkled;
93  /* USER CODE END 2 */
94
95  /* Infinite loop */
96  /* USER CODE BEGIN WHILE */
97  while (1)
98  {
99      blinkled.blinkit(100);
100
101      /* USER CODE END WHILE */
102
103      /* USER CODE BEGIN 3 */
104  }
105  /* USER CODE END 3 */
106 }
```

The right-hand side of the IDE shows the Outline and Build Targets panels. The Outline panel lists the files and functions in the project: main.h, usart.h, gpio.h, blinkit_cplusplus.h, SystemClock_Config(void): void, main(void): int, SystemClock_Config(void): void, Error_Handler(void): void, and assert_failed(uint8_t*, uint32_t): void. The Build Targets panel is currently empty.

blinkit Using C++



The Downside of Renaming main.c



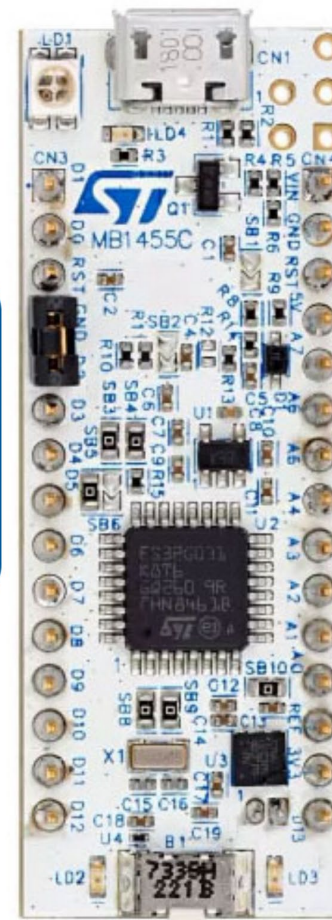
Next Time...

MORE TO COME..

Thank you for attending!!!

Please consider the resources below:

- Today's Download Package
- www.st.com
- digikey.com





Thank You

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