



STMicroelectronics SensorTile Tutorial: Introduction to STMicroelectronics Development Environment and DataLog Project Example for Apple Mac Platforms



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1. Introduction

The SensorTile is a new Internet of Things (IoT) system provided by STMicroelectronics integrating state-of-the-art processor, wireless interfaces, and sensor systems. The SensorTile can form the foundation for wearable consumer devices, wearable medical devices, residential IoT systems and vehicle IoT systems.

The SensorTile system provides an exceptionally powerful and well-supported platform for introduction to IoT technology. The SensorTile is remarkably compact as shown in Figure 1.

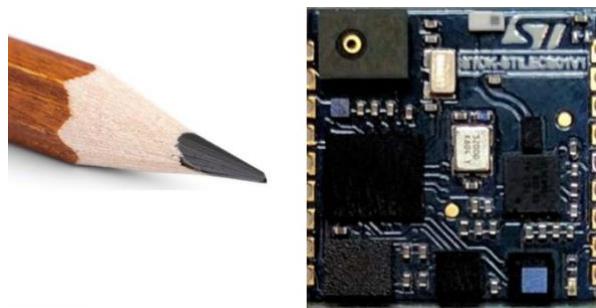


Figure 1. The STMicroelectronics SensorTile Platform with a pencil reference indicating its compact geometry.

The SensorTile includes these components:

- 1) The SensorTile Processor System is an STM32L4 microprocessor based on the ARM Cortex M4 system. This provides introduction to the ARM processor architecture that is deployed on nearly every smartphone on earth.
- 2) The SensorTile Sensors includes:
 - a) The LSM6DSM combining microaccelerometer and microgyroscope.
 - b) The LSM303AGR combining microaccelerometer and magnetometer for compass heading
 - c) The LPS22HB barometric pressure sensor for determination of altitude and atmospheric pressure.
 - d) The MP34DT04 microphone
- 3) The SensorTile also includes a Bluetooth Low Energy (Bluetooth Smart) wireless interface the BlueNRG-MS system.
- 4) The SensorTile also includes non-volatile flash storage that stores the executable code that enables IoT system operation.
- 5) The SensorTile also includes a cradle accessory with additional features including:
 - a) SD Card Flash Storage System
 - b) STC3115 Battery Monitor providing detailed energy monitoring for the SensorTile
 - c) HTS221 Humidity and Temperature environmental sensors



2. Introduction to This Tutorial

This Tutorial introduces the development environment for the SensorTile system.

Development environments are essential to development of software for IoT systems and other products. These provide support to developers for both creation of systems, testing, debugging, and installation of software systems on platforms.

This development environment is referred to as an Integrated Development Environment (IDE). This includes all of the software tools required to create a software distribution for the SensorTile, compile this software system into the processor instruction set using a Build capability, execute this system using a Debug capability, and also create an “image” file that can be installed in the SensorTile non-volatile storage.

This tutorial is intended for users that have Apple Mac platforms, and will guide users through the tasks listed below. Please note that there is a companion Tutorial for users that have personal computers with the Windows operating system.

The Tutorial steps include:

1. Installing an Integrated Development Environment (IDE) on Mac.
2. Obtaining reference design example project software. This will specifically include a sensor Data Logging system.
3. Usage of the IDE to Import, Build, Run, Debug and Flash the SensorTile board to run the example Data Logging project.

For more information regarding the SensorTile board, please open the following link on a web-browser on your Mac.

www.st.com/sensortile

2.1. List of Required Equipment and Materials

- 1) 1x STMicroelectronics SensorTile kit.
- 2) 1x STMicroelectronics Nucleo Board.
- 3) 1x Windows with two USB type-A inputs OR you must have a powered USB hub.
- 4) 1x USB 2.0 A-Male to Micro-B Cable (micro USB cable). **This must be a new data cable.**
- 5) 1x USB 2.0 A-Male to Mini-B Cable (mini USB cable). **This must be a new data cable.**
- 6) Network access to the Internet.

Please ensure that the USB cables are data cables purchased for this kit. Many USB cables provide only charging and do not include essential data lines.

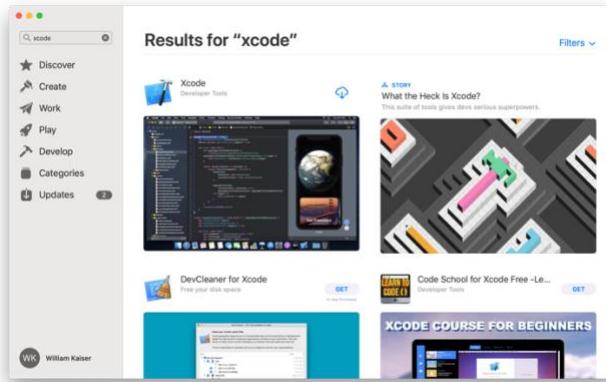


3. Integrated Development Environment Installation

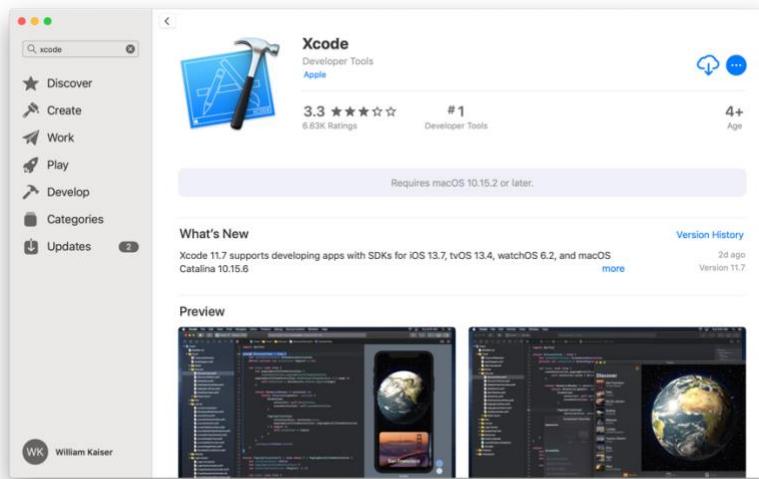
This portion of the document will guide users through the System WorkBench Integrated Development Environment (IDE) installation process.

3.1. Prerequisite Steps

1. First, check your operating system version at Apple > About This Mac
2. Update your Mac's operating system (OS) to OS X 10.10 Yosemite or a newer version.
3. Navigate to the Apple App Store



4. Click on Xcode





5. Select your Xcode Version

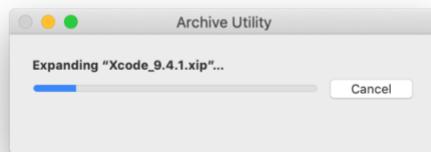
1. If your Mac OSX version is Catalina then select a version 11.7 here

[Download](#)

6. If your Mac OSx version is Mojave or prior to Catalina then select version 9.4.1 here

[Download](#)

7. Download the .zip file and then double click on the file – this screen will appear



8. Wait for completion

9. This app file will appear in Finder after completion

Name	Size	Kind
Xcode.app	--	Application

10. Double click on Xcode.app and proceed with installation

11. This screen will appear, select **Agree**

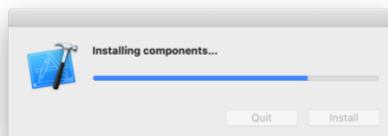




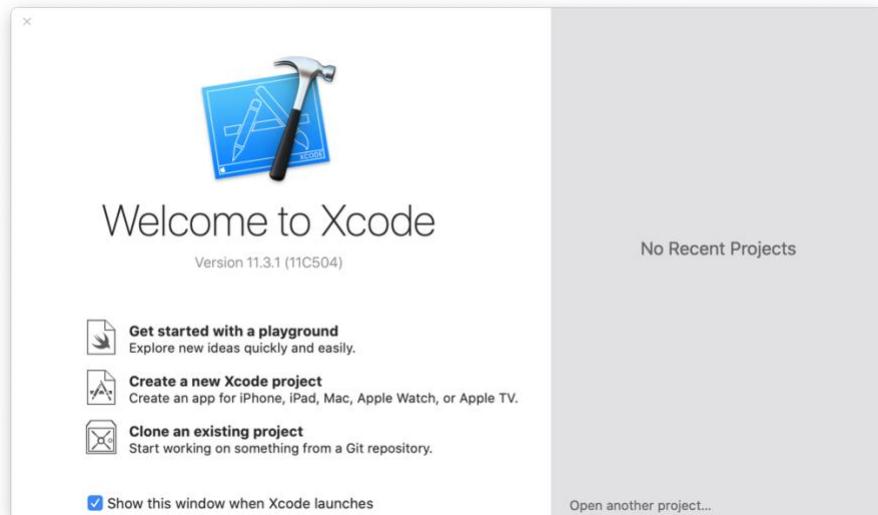
12. This screen will appear, select **OK**



13. This screen will appear



14. Finally, this screen will appear



15. Then, **Quit** the Xcode application

16. Now, open the Mac OSx Terminal Application (you may enter Terminal in the SpotLight Search



17. This screen will appear

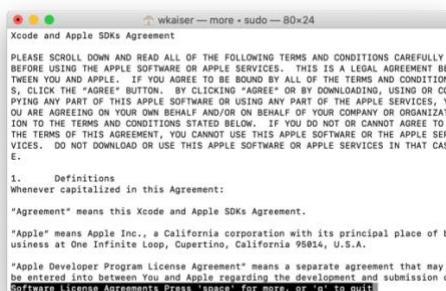
18. Enter this command

```
sudo xcodebuild -license
```

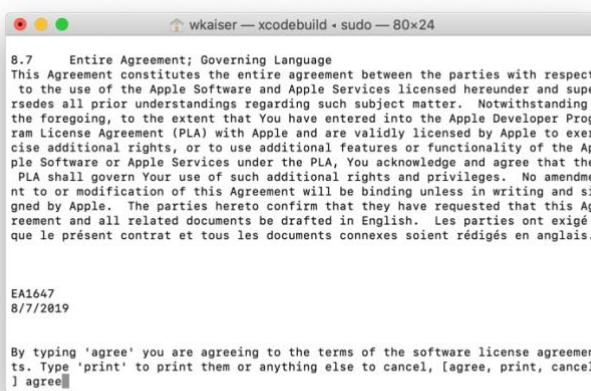


19. When prompted to enter your password, enter the password for the administrator account on the Mac.

20. Press the [Space] key to scroll through the license.



21. When the license is completed , type agree followed by the [Enter] key.





22. Now, the STM32CubeIDE app will be installed.

23. Navigate to this Web site:

<https://www.st.com/en/development-tools/stm32cubeide.html>

The screenshot shows the official STMicroelectronics website at [st.com/en/development-tools/stm32cubeide.html](https://www.st.com/en/development-tools/stm32cubeide.html). The page is titled "STM32CubeIDE ACTIVE Integrated Development Environment for STM32". It features a "Get Software" button and a "Download databrief" button. The "Overview" tab is selected. The URL in the browser bar is [st.com/en/development-tools/stm32cubeide.html](https://www.st.com/en/development-tools/stm32cubeide.html).

24. Select Get Software

25. Select

STM32CubeIDE-Mac STM32CubeIDE macOS Installer

Get Software

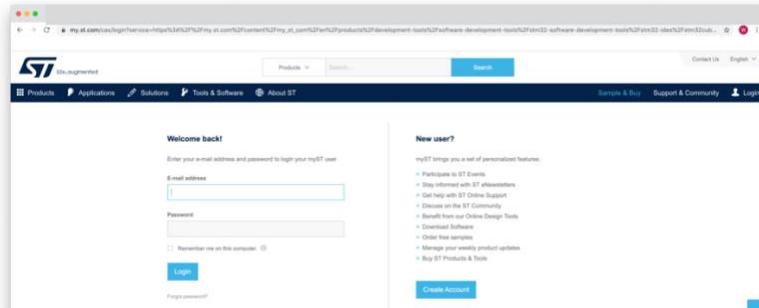
Part Number	General Description	Software Version	Download	Previous versions
+ STM32CubeIDE-DEB	STM32CubeIDE Debian Linux Installer	1.4.0	Get Software	Select version
+ STM32CubeIDE-Lnx	STM32CubeIDE Generic Linux Installer	1.4.0	Get Software	Select version
+ STM32CubeIDE-Mac	STM32CubeIDE macOS Installer	1.4.0	Get Software	Select version
+ STM32CubeIDE-RPM	STM32CubeIDE RPM Linux Installer	1.4.0	Get Software	Select version
+ STM32CubeIDE-Win	STM32CubeIDE Windows Installer	1.4.0	Get Software	Select version



26. This Web page will appear. Enter registration information.

27. Please use a **gmail** email account if possible.

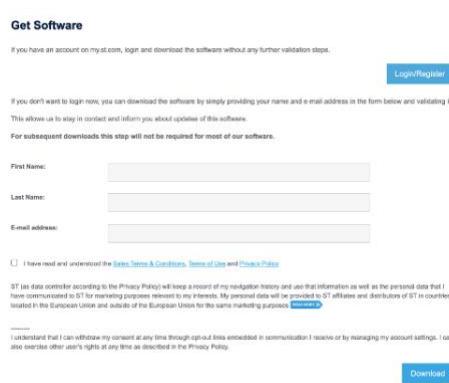
28. Please note that the confirmation email from STMicroelectronics may be directed to the Spam folder. Please check for this.



29. Open the email from STMicroelectronics and follow the link provided. This license agreement will appear. Click **Accept**

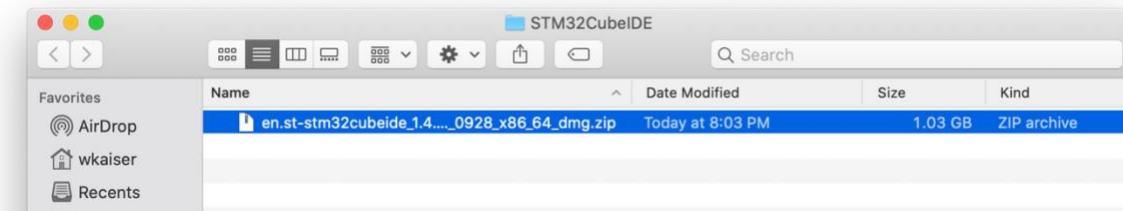


30. A request for a login may appear. Proceed to log in.

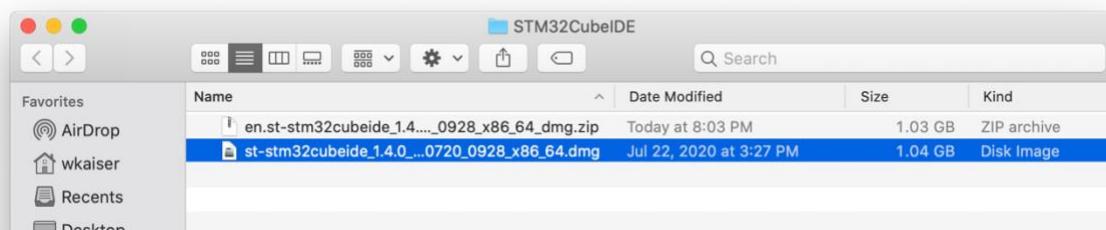




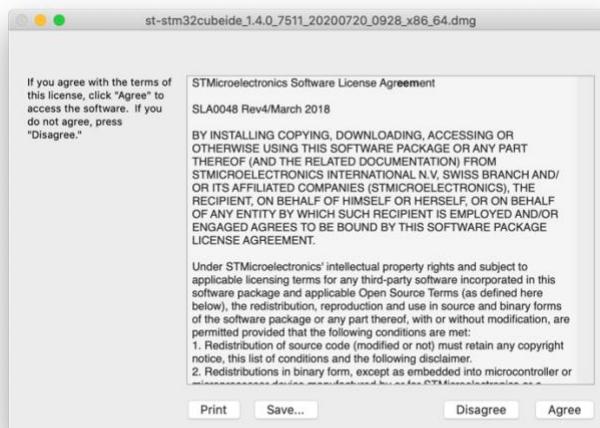
31. Download will start



32. Double click on the downloaded file to unzip



33. Double click on the **.dmg** file – installation will start. Select **Agree**



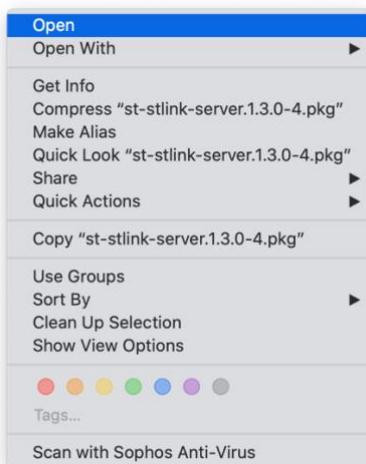


34. This screen will appear.

35. Right click on the .pkg file at upper left.



36. This screen will appear. Click on Open

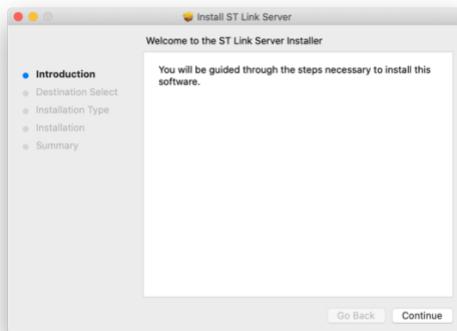




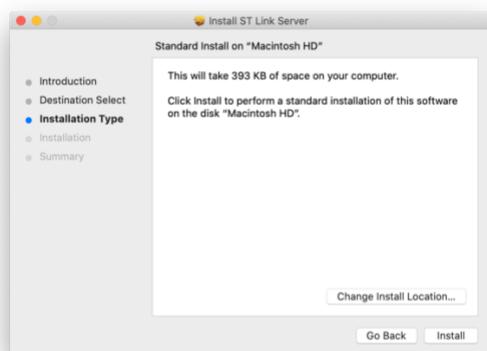
37. This screen will appear. Click on **Open**



38. This screen will appear. Click on **Continue**



39. This screen will appear. Click on **Install**

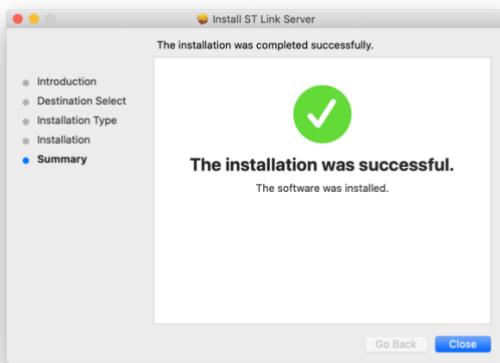




40. This screen will appear. Enter system administrator password and click on **Install**



41. This screen will appear.

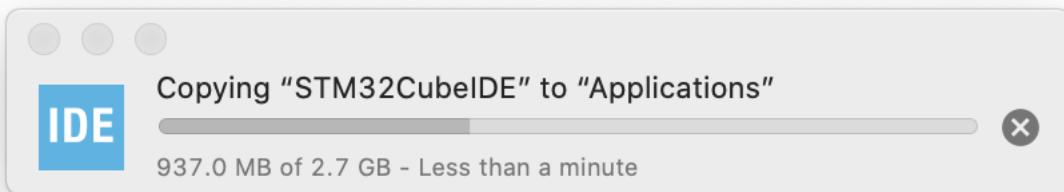


42. Return to the previous screen and drag **IDE** into Applications



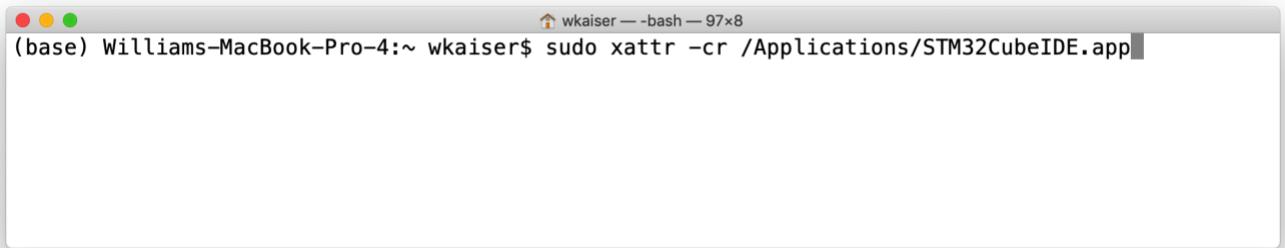


43. Wait for completion



44. Open the Mac OSx Terminal. Enter this command

```
sudo xattr -cr /Applications/STM32CubeIDE.app
```



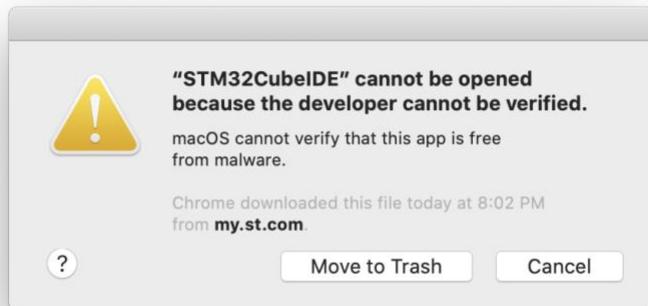
45. Then, enter the system administrator password at the prompt



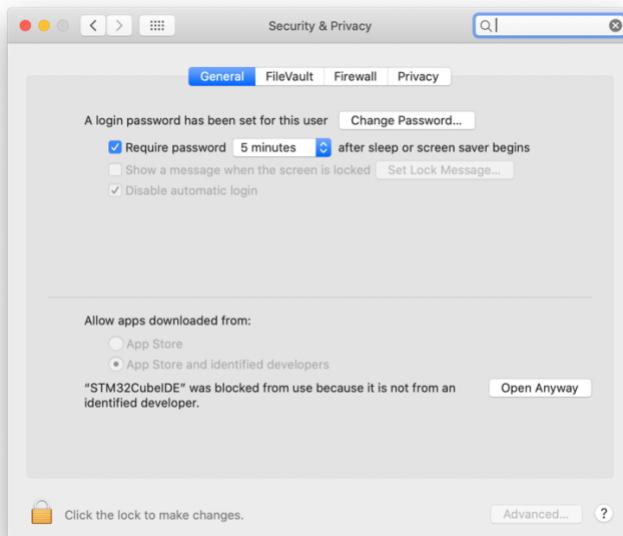
46. Find the STM32CubeIDE App. Enter STM32CubeIDE in the Apple Spotlight Search

47. Right click on the STM32CubeIDE App. This screen will appear

48. Select CANCEL



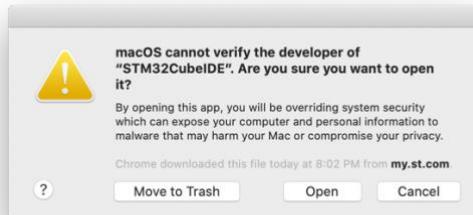
49. Then navigate to System Preferences > Security & Privacy > General



50. Find the message regarding STM32CubeIDE and select Open Anyway

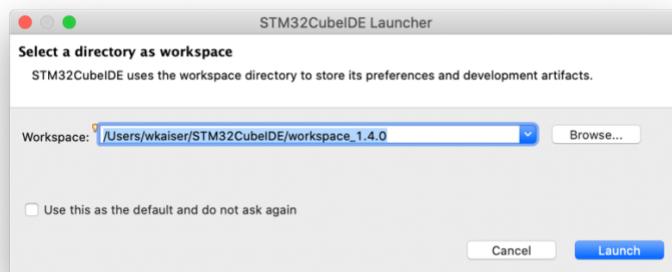


51. Again, **right click** on the STM32CubeIDE App. This screen will appear. Select **Open**

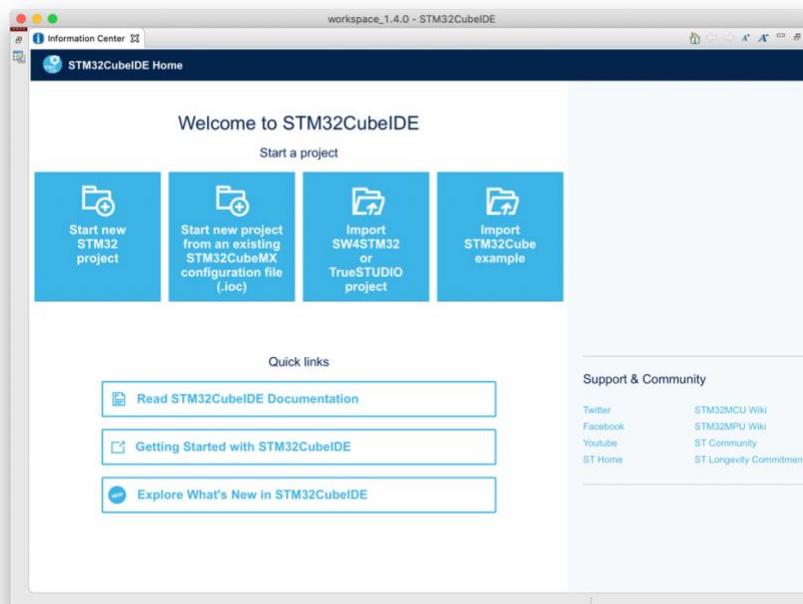


52. STM32CubeIDE will start. Select the Default Workspace and select Launch.

53. Please note that the Default Workspace should not include spaces in its pathnames



54. This screen will appear. This can be closed by selecting the X in the upper left corner tab.





4. Assembling the SensorTile Kit

4.1. SensorTile Hardware Platform Kit

This section describes assembly of the SensorTile Kit.

Be very careful in this section, if the wire connections are not configured correctly, the boards could be permanently damaged.

4.2. SensorTile Hardware Video

It is very important to watch this video first before proceeding

<https://drive.google.com/file/d/18Jxhp0tnJQ5v3jmpUbSF6NUin58nMZ9a/view?usp=sharing>

55. Remove the SensorTile and SensorTile cradle board from its packaging. Avoid bending the connector pins

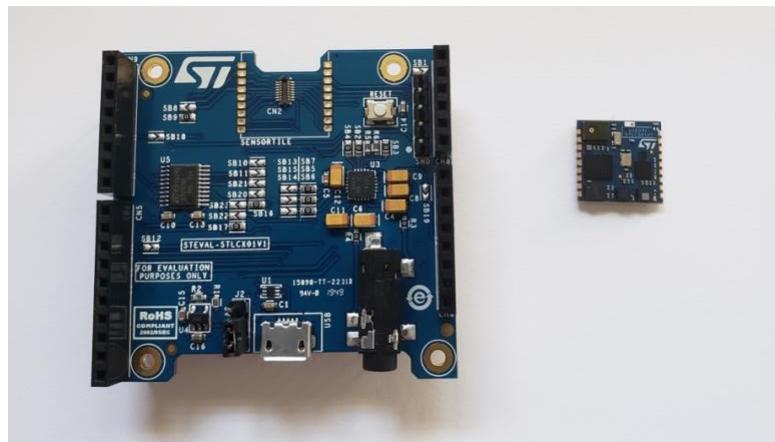


Figure 2. SensorTile Cradle Board (left) and SensorTile (right)

56. Place the SensorTile on the SensorTile Cradle board in the position shown. Press down to seat the SensorTile in its connector.



Figure 3: Ensure the orientation of the SensorTile on the larger Cradle board matches this figure.

57. Add adhesive (Scotch Tape) to the Cradle Board wrapping over the SensorTile to ensure that it remains anchored in position.

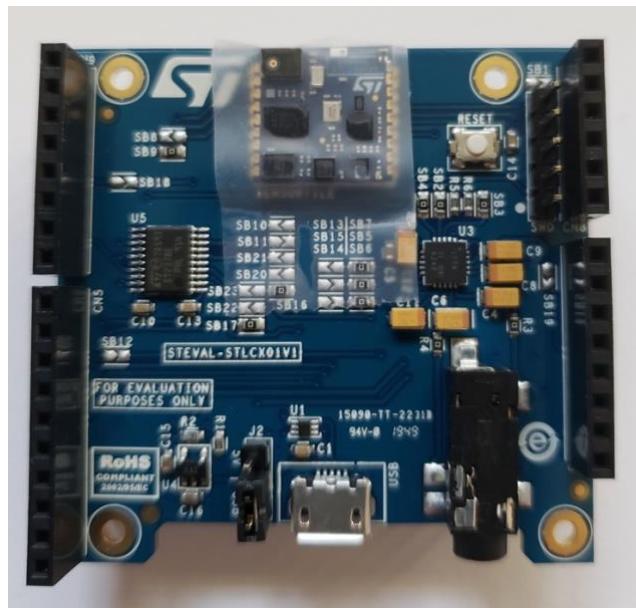


Figure 4. SensorTile on Cradle Board with protective layer of adhesive tape.

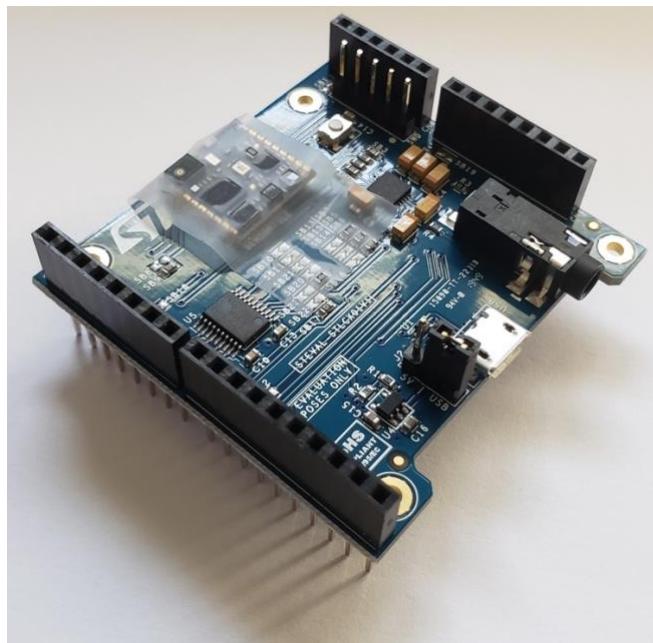


Figure 5. SensorTile on Cradle Board with protective layer of adhesive tape.

58. Remove and examine the Nucleo Board

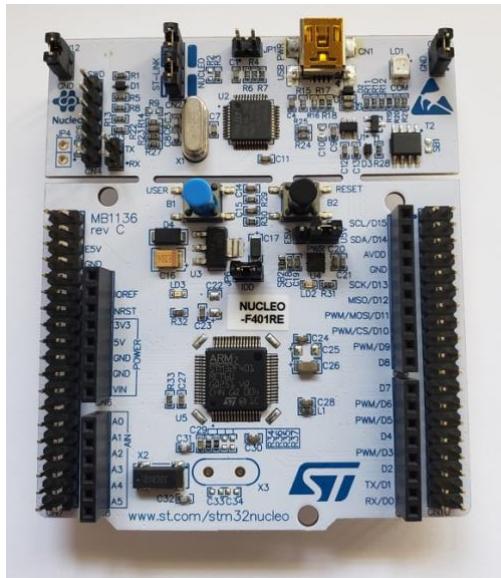


Figure 6. Nucleo F401RE Board.

59. Note the CN2 jumpers on the Nucleo Board

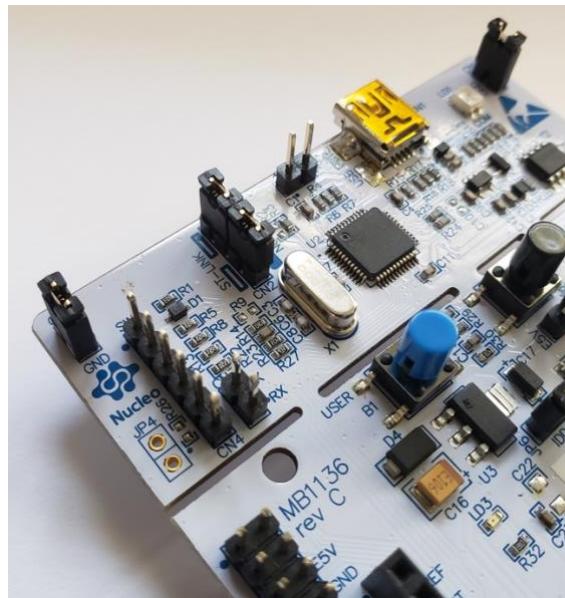


Figure 7. Nucleo F401RE Board – Note CN2 Jumpers at Center of image.

60. Remove the **CN2 jumpers** on the Nucleo Board. (These should always be removed. However, you may save the jumpers).

61. All other jumpers should remain.

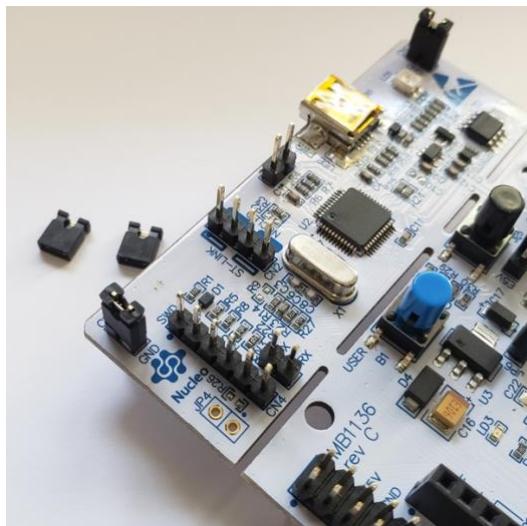


Figure 8. Nucleo F401RE Board – Note CN2 Jumpers Removed at Center of Image



62. Place the Nucleo left of the Cradle board with USB connectors facing downwards.

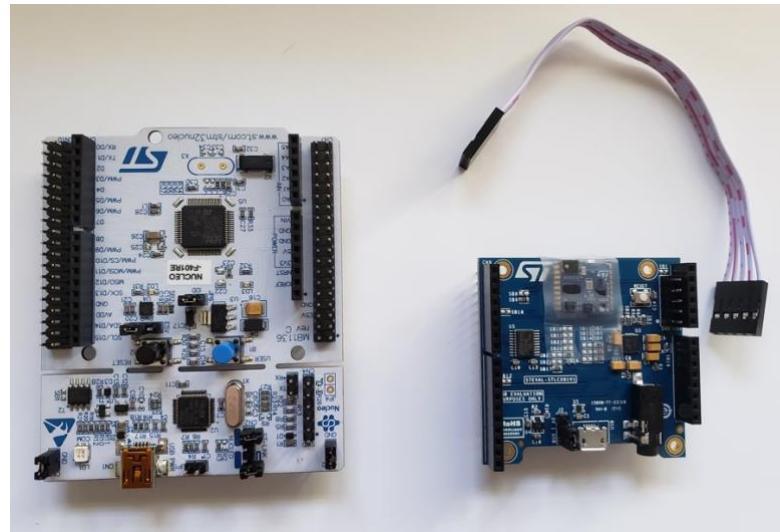


Figure 9. Nucleo Board (left) and SensorTile Cradle Board (right) with SWD Cable Note that USB connectors are oriented downwards in this image.

63. Connect the SWD cable to the Cradle board.

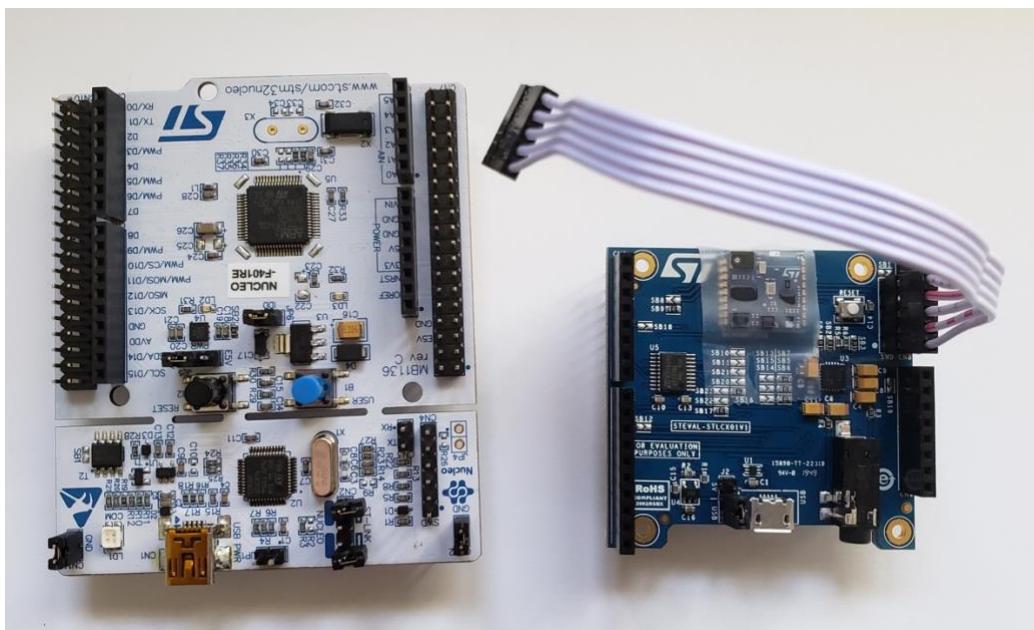


Figure 10. Nucleo Board (left) and SensorTile Cradle Board (right) with SWD Cable connected to five pins on Cradle Board. Note that USB connectors are oriented downwards in this image.



64. Connect the SWD cable to the Nucleo Board without twisting the cable. Place the SWD cable into the LOWER 5 PINS of the 6-PIN connector on the Nucleo Board

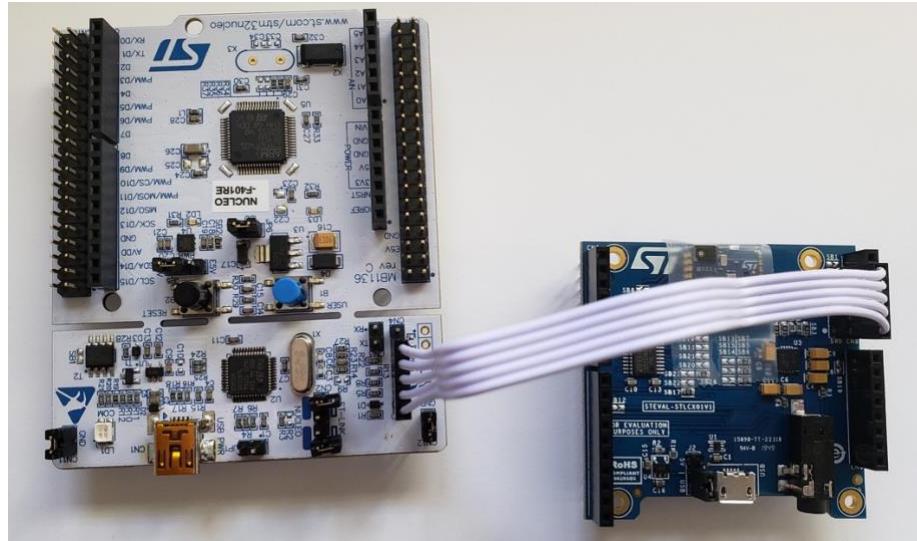


Figure 11. . Nucleo Board (left) and SensorTile Cradle Board (right) with SWD Cable connected to lower 5 pins of the 6-pin connector on the Nucleo Board. Note that USB connectors are oriented downwards in this image.

65. Ensure that the SWD cable connection matches the configuration shown below.

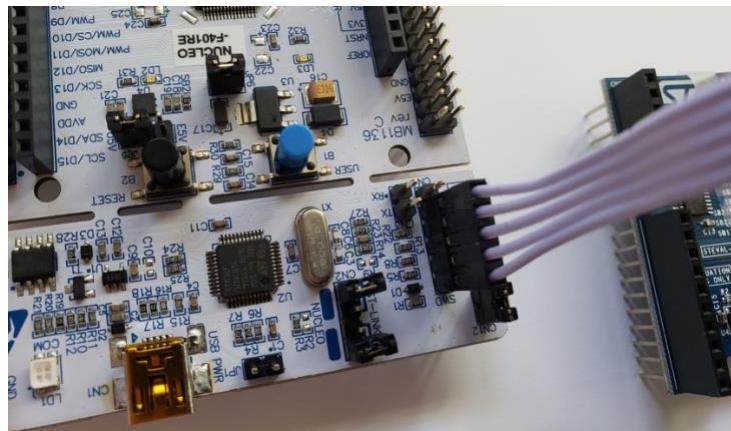


Figure 12. Nucleo Board (left) and SensorTile Cradle Board (right) with SWD Cable connected to lower 5 pins Nucleo Board. Note that USB connectors are oriented downwards in this image.

66. Ensure that the SWD cable connection matches the configuration shown below.

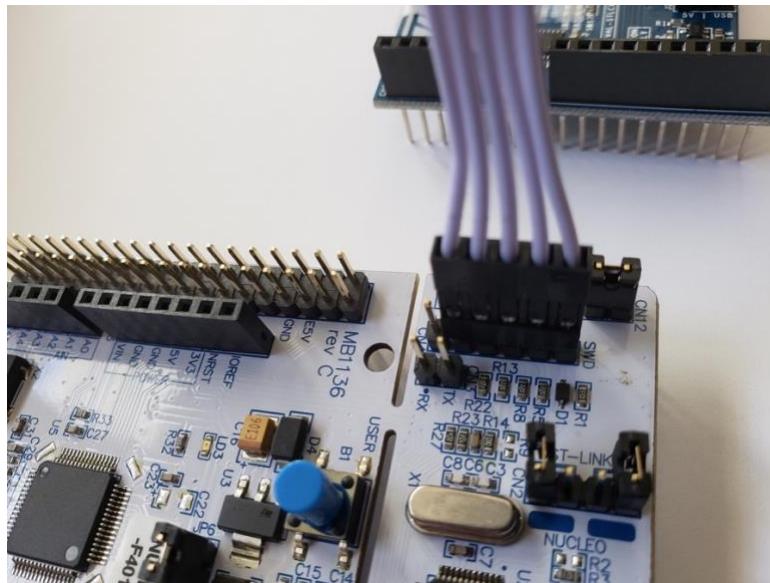


Figure 13. . Nucleo Board (left) and SensorTile Cradle Board (right) with SWD Cable connected to lower 5 pins Nucleo Board. Note that USB connectors are oriented downwards in this image.

67. Now, RETAIN THE CABLE IN PLACE. Rotate the Cradle Board on top of the Nucleo Board so that the pins on the underside of the Cradle Board match the corresponding connector on the Nucleo Board.



Figure 14. SensorTile Cradle Board is placed on top of the Nucleo board without removing the cable and only by “flipping” the SensorTile Cradle Board on top of the Nucleo Board so that its connector pins are aligned with the corresponding connector on the Nucleo Board..

68. Now, ensure that all pins match and no pins are bent. Then press the two boards together.

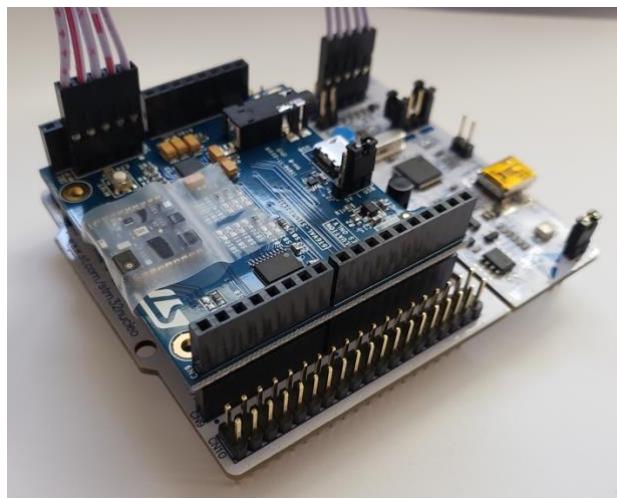


Figure 15. . SensorTile Cradle Board is placed on top of the Nucleo board without removing the cable and only by “flipping” the SensorTile Cradle Board on top of the Nucleo Board so that its connector pins are aligned with the corresponding connector on the Nucleo Board. In this image the boards have been pressed together after ensuring that all pins are aligned.

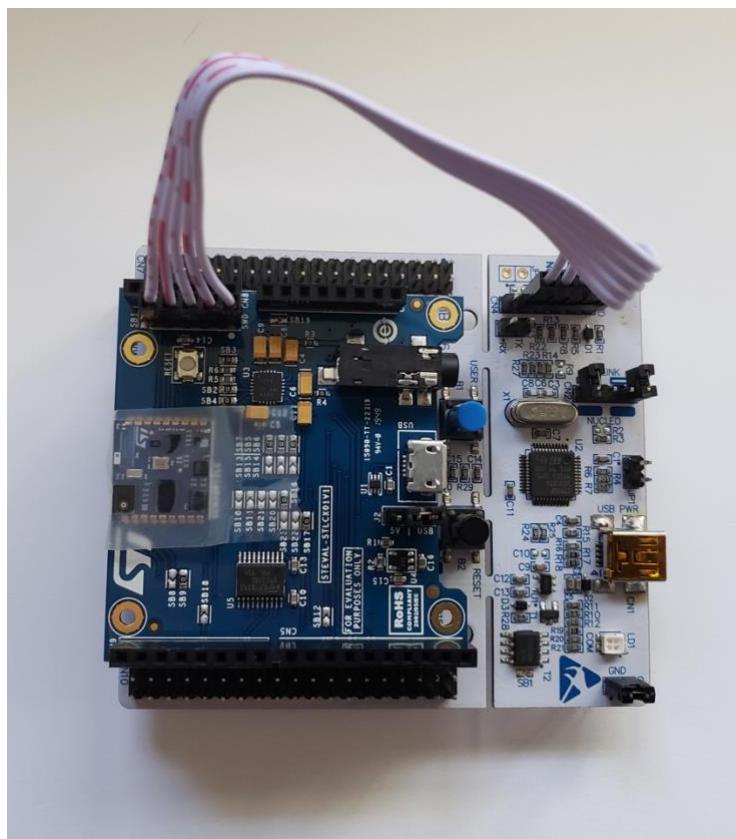


Figure 16. The fully assembled system.



5. Connect the SensorTile System to the Apple Mac Platform

5.1. USB Connectors

69. First, determine the connector type on the Apple Mac platform

1. Apple Mac with **Two USB-A Ports** with one at left side and one at right side



2. Apple Mac with **One USB-A Port**



3. Apple Mac with **Two USB-C Ports**



4. Apple Mac with **One USB-C Port**





70. Cables, Connectors and Connections

1. Apple Mac with Two USB-A Ports with one at left side and one at right side

- A. One USB-A to Micro-USB Cable
- B. One USB-A to Mini-USB Cable
- C. Connect Both USB-A Cables to Mac Ports**

2. Apple Mac with One USB-A Port

- A. One USB-A to Micro-USB Cable
- B. One USB-A to Mini-USB Cable
- C. USB Hub (USB-A to USB-A)
- D. Connect Hub to Mac USB-A Port**

E. Connect Both USB-A Cables to Hub Ports



3. Apple Mac with Two USB-C Ports

- A. One USB-A to Micro-USB Cable
- B. One USB-A to Mini-USB Cable
- C. Two USB-C to USB-A Adapters
- D. Connect Both USB-C to USB-A Adapters to Mac Ports**

E. Connect Both USB-A Cables to USB-A Ports on Adapters





4. Apple Mac with One USB-C Port

- A. One USB-A to Micro-USB Cable
- B. One USB-A to Mini-USB Cable
- C. One USB-C to USB-A Adapters
- D. Connect One USB-C to USB-A Adapters to Mac Ports**



- E. Connect Hub to Adapter USB-A Port**



- F. Connect Both USB-A Cables to Hub Ports**

71. Attach the MiniUSB Cable to the Nucleo and the MicroUSB Cable to the SensorTile Cradle Board.

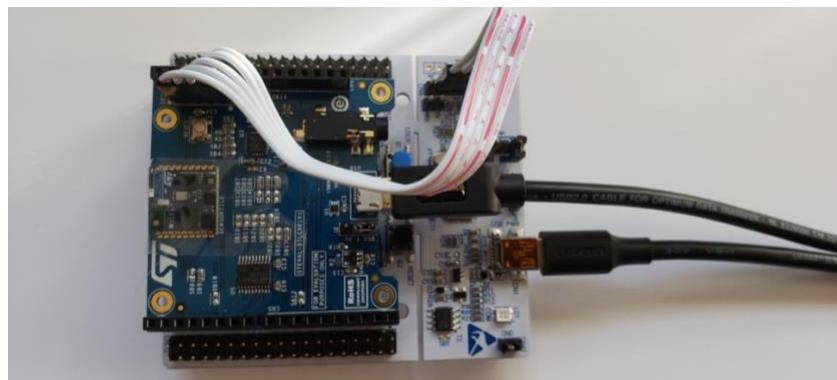


Figure 17. Attach the MiniUSB Cable to the Nucleo and the MicroUSB Cable to the SensorTile Cradle Board.



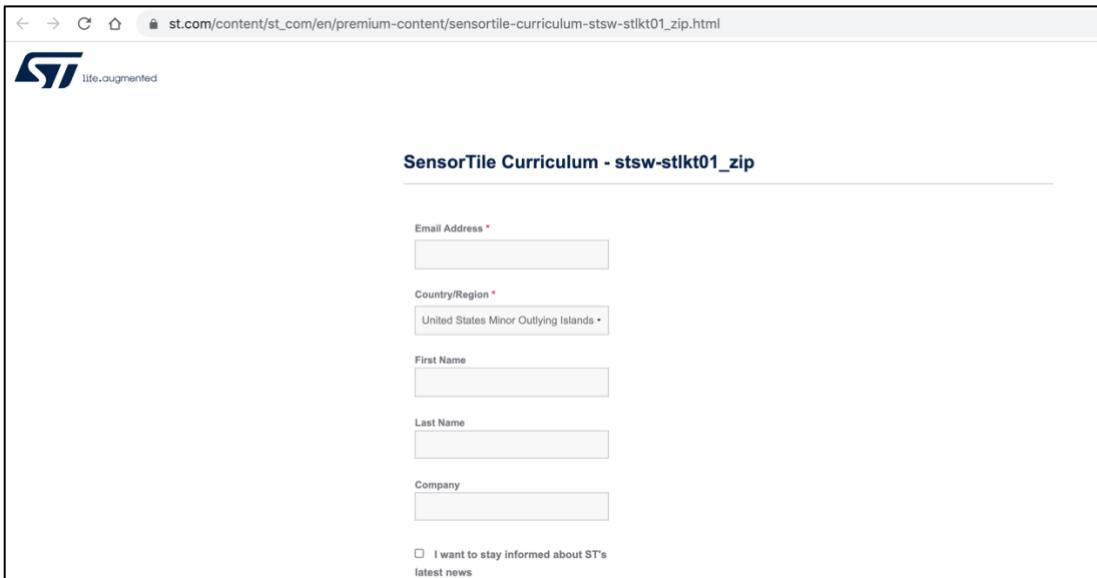
6. Import the DataLog Project

6.1. Download the DataLog Project

1. Open the following link on a web-browser.

http://www.st.com/content/st_com/en/premium-content/sensortile-curriculum-stsw-stlkt01_zip.html

2. This web page will appear



The screenshot shows a web browser window with the URL http://www.st.com/content/st_com/en/premium-content/sensortile-curriculum-stsw-stlkt01_zip.html in the address bar. The page header features the ST logo and the tagline "life.augmented". The main content area is titled "SensorTile Curriculum - stsw-stlkt01_zip". It contains several input fields: "Email Address *", "Country/Region *" (set to "United States Minor Outlying Islands"), "First Name", "Last Name", and "Company". At the bottom, there is a checkbox labeled "I want to stay informed about ST's latest news".

3. Enter your previous registration information



4. Scroll to the bottom of the page and accept the terms and click on Submit

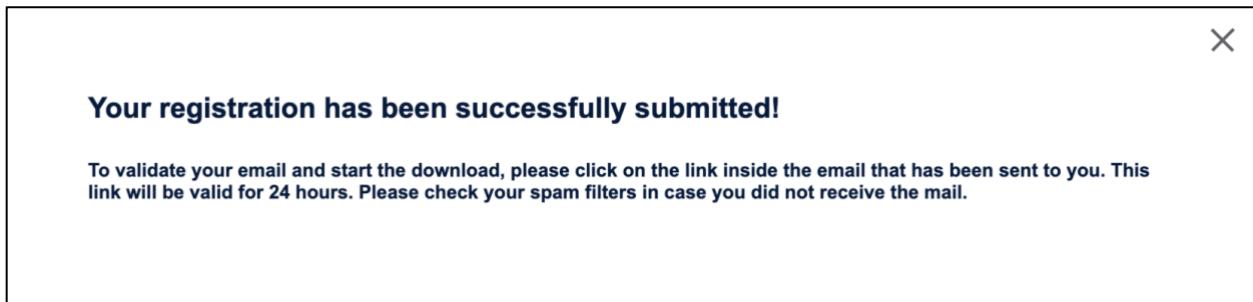
I consent that ST (as data controller according to the Privacy Policy) will keep a record of my navigation history and use that information as well as the personal data that I have communicated to ST for marketing purposes relevant to my interests. My personal data will be provided to ST affiliates and distributors of ST in countries located in the European Union and outside of the European Union for the same marketing purposes [READ MORE >>](#)

I understand that I can withdraw my consent at any time through opt-out links embedded in communication I receive or by managing my account settings. I can also exercise other user's rights at any time as described in the Privacy Policy.

I have read and understood the [Terms of Use](#) and [Privacy Policy *](#)

[Submit](#)

5. This message will appear. You may close the window.



6. Then follow the registration or login steps using your previous registration
7. Wait for the confirmation email.
8. Check your email inbox and spam folders for the email. Click on the link indicated in the email



[View in browser](#)



life.augmented

Start your download

Hi William,

Please click on the button below to validate your email address and start the download of the requested content:

[Download now](#)

This link is browser sensitive and must be opened in the same browser as the one you used to fill out the Premium Content form.

If the above link does not work, simply copy and paste the complete URL into your browser to complete the operation.

Thank you,

STMicroelectronics
www.st.com

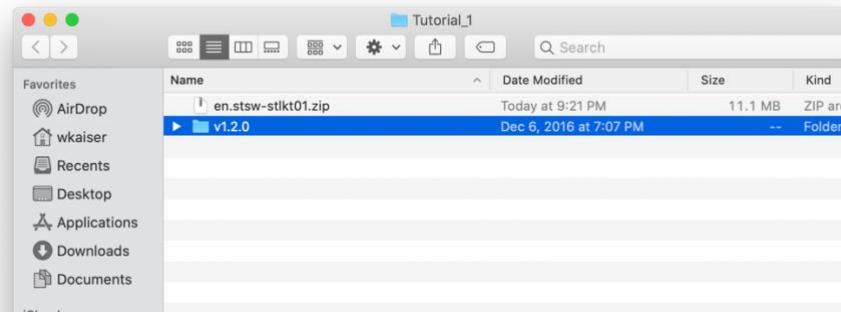
9. Note: this link will not function if your web-browser is in “Incognito” or “Private” mode.
10. Then, click on the link in the confirmation email to Download Now
11. This web page will appear

SensorTile Curriculum - stsw-stlkt01_zip

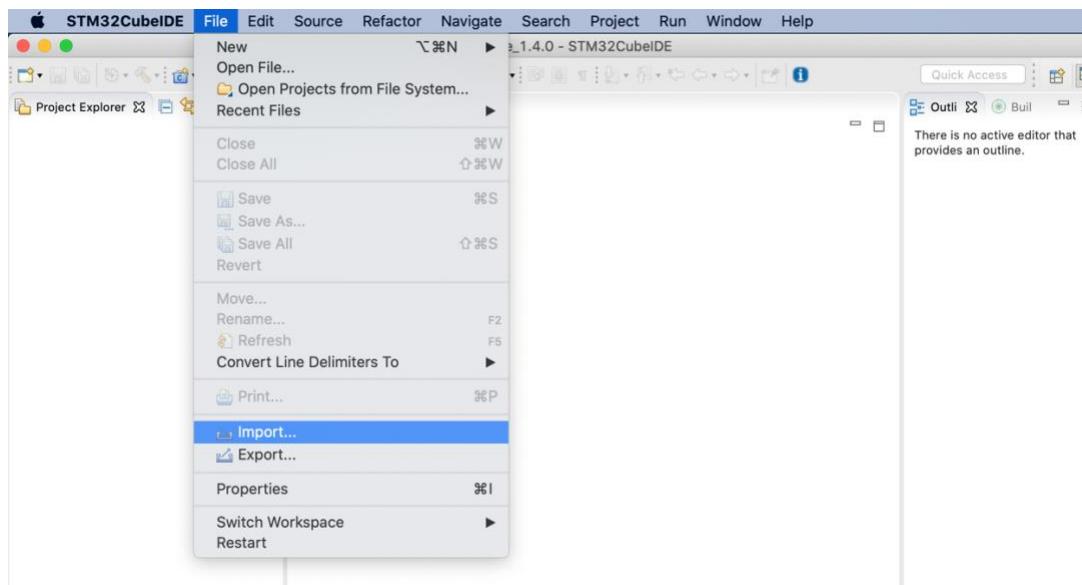
Resources Description

 [stsw-stlkt01_zip](#)

12. Double click on the zip file, stsw-stlkt01_zip
13. Create a directory named **Tutorial_1** (without spaces in directory names) in your file system
14. Then double click on the downloaded archive to unzip.
15. The directory should appear as below in Finder

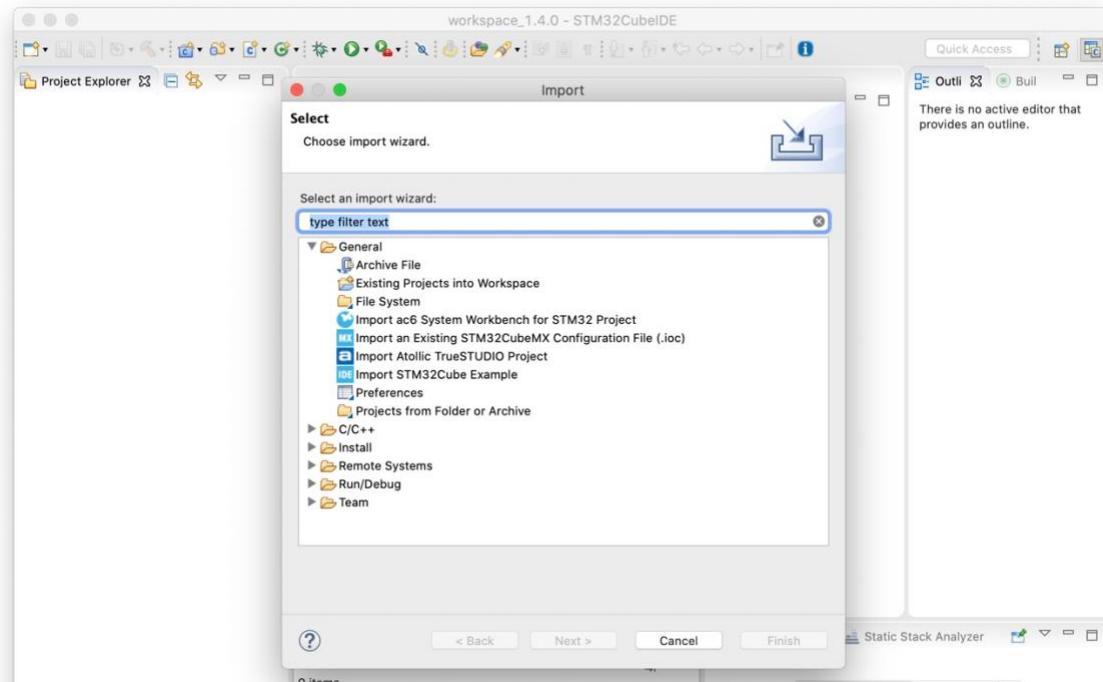


16. Now, start the STM32CubeIDE Application. Select File > Import



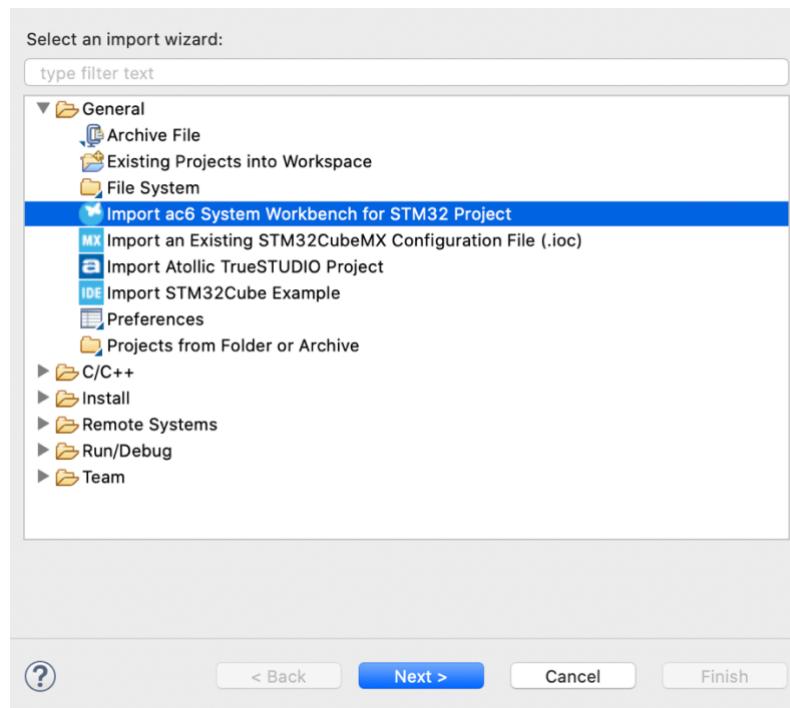


17. Then, Select General



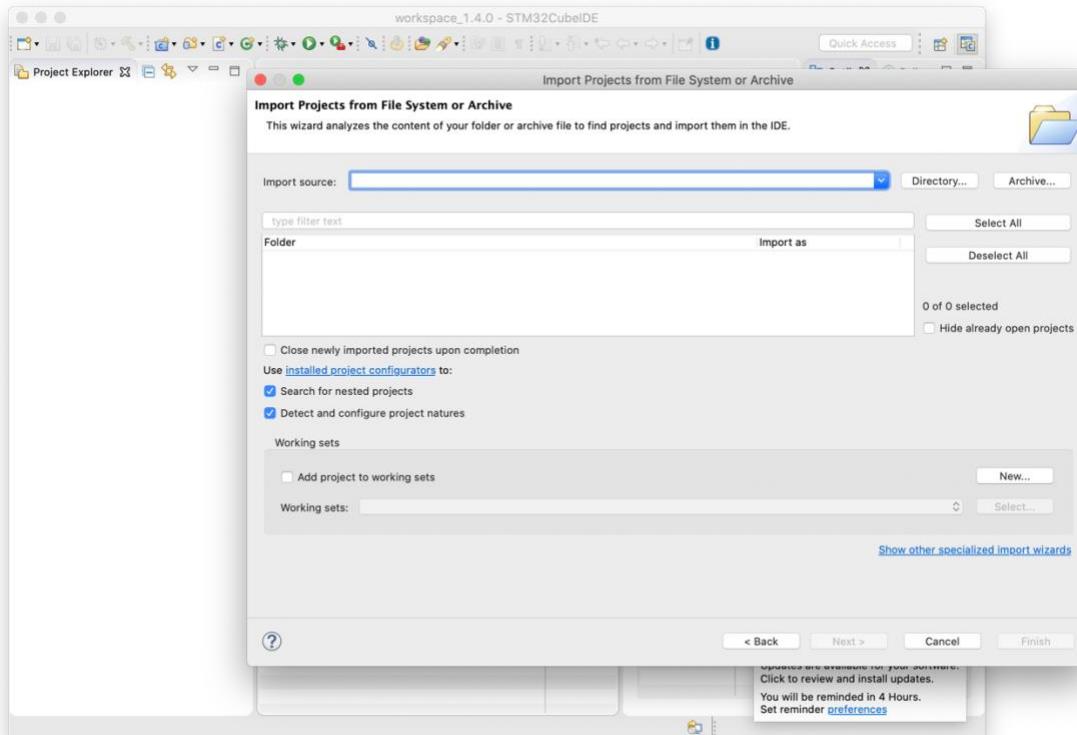
18. Select Import ac6 System Workbench for STM32 Project

NOTE THIS SELECTION IS CRITICAL

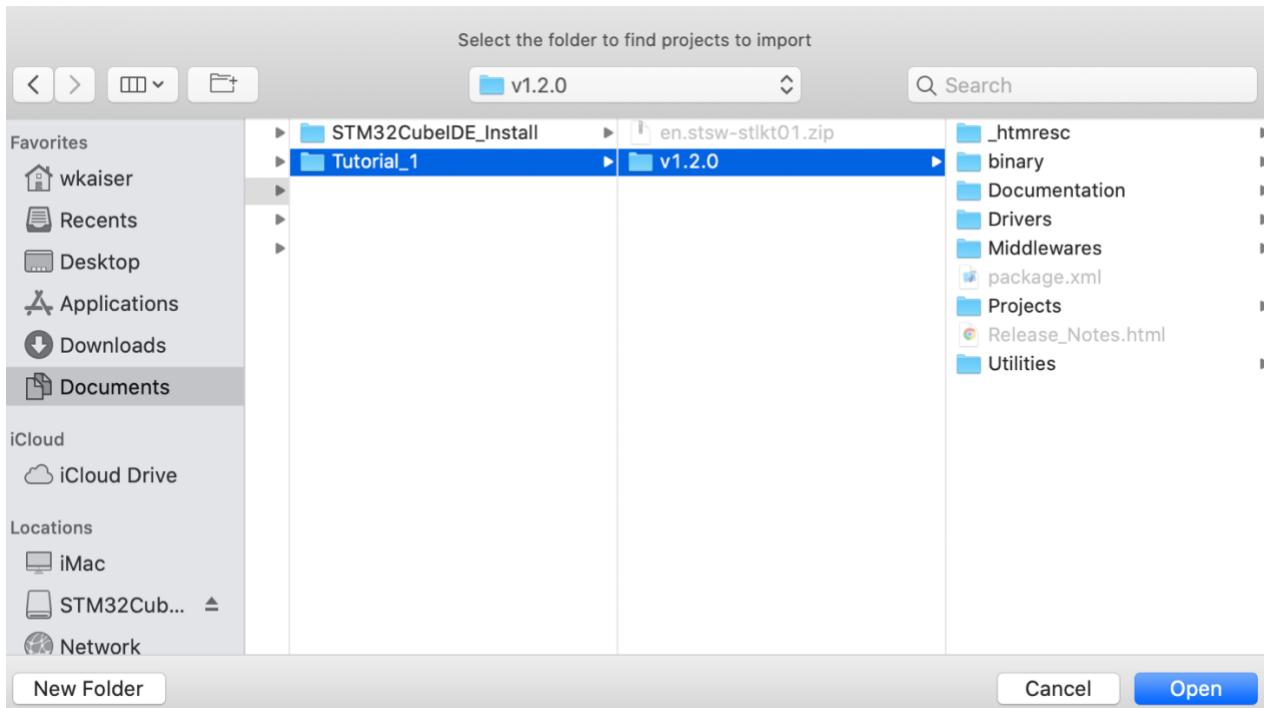




19. This screen will appear

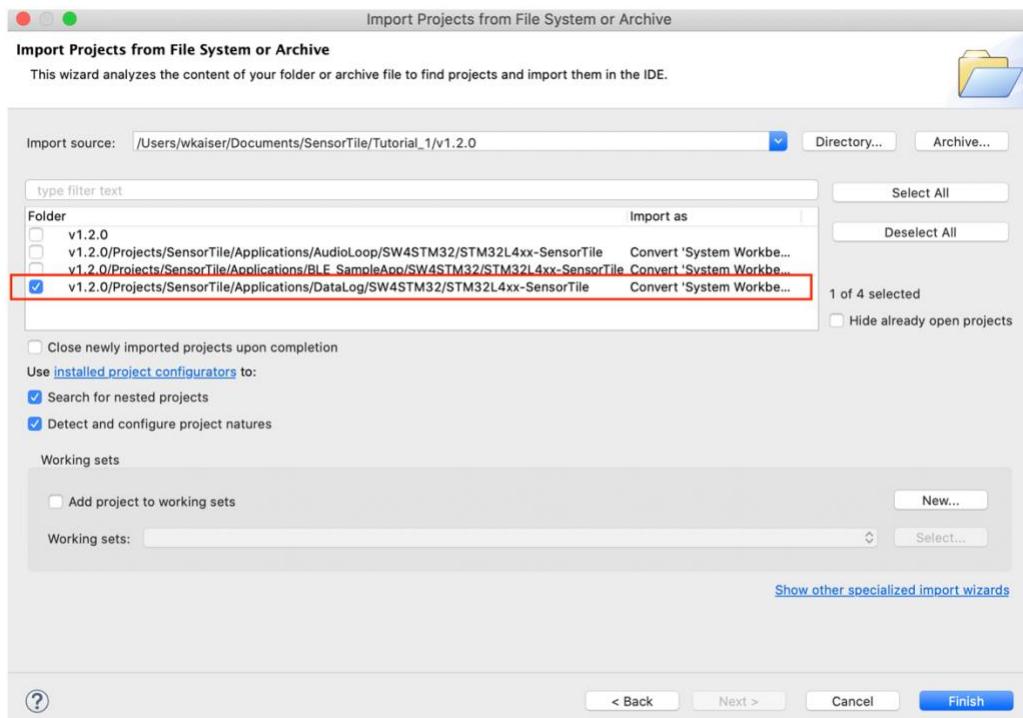


20. Click on Directory and navigate to the directory containing the unzipped Project archive from the previous steps. **This will be the directory named v1.2.0**

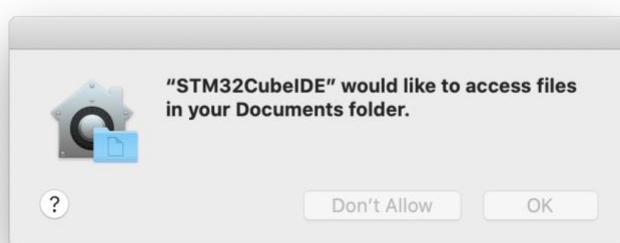




21. This screen will appear. Now, deselect the first check boxes in the list in the Folder window.
22. Select only the Datalog project.
23. All other checkboxes below should remain. Ensure that the selections match the image below.

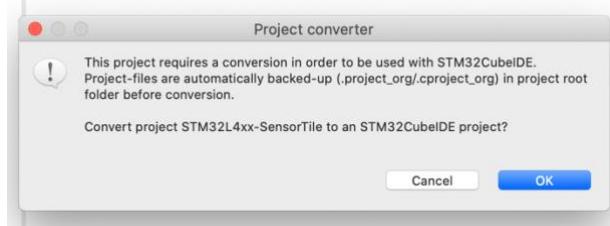


24. Select **Finish**
25. This screen will appear. Select **OK**

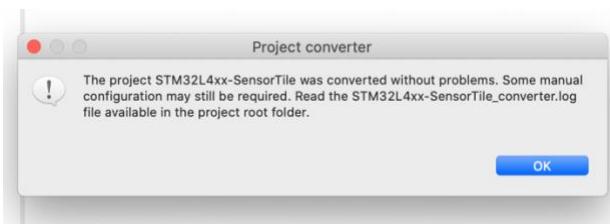




26. This screen will appear. Select OK

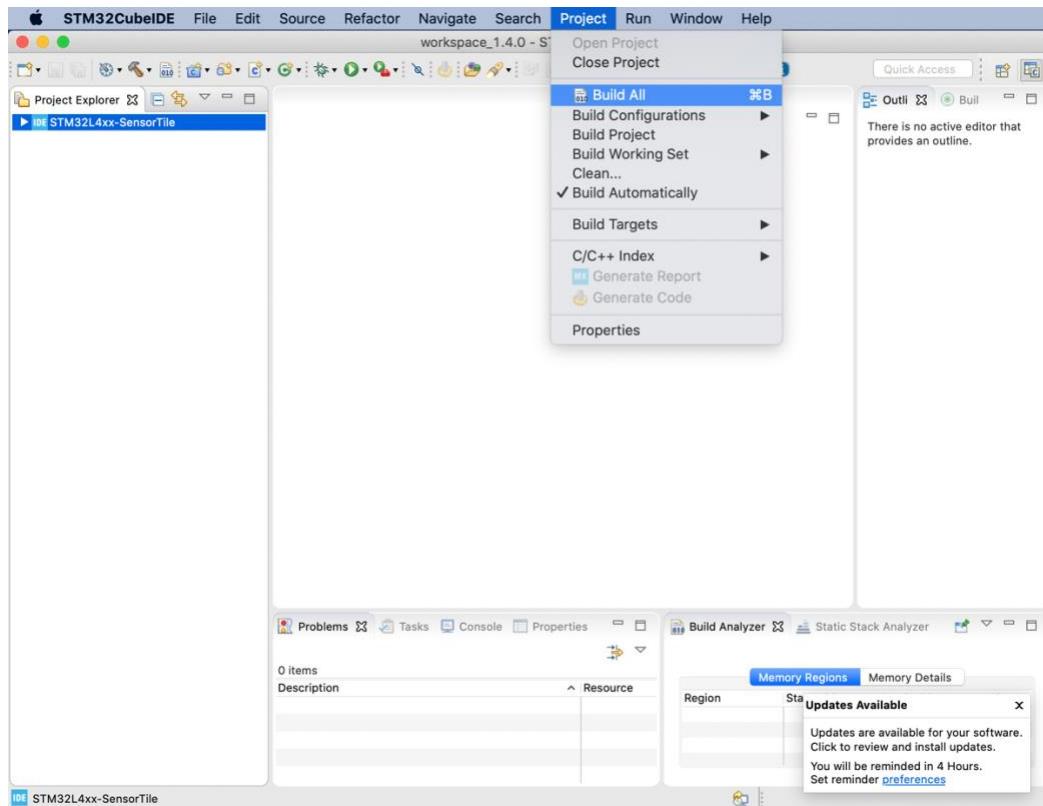


27. This screen will appear. Select OK



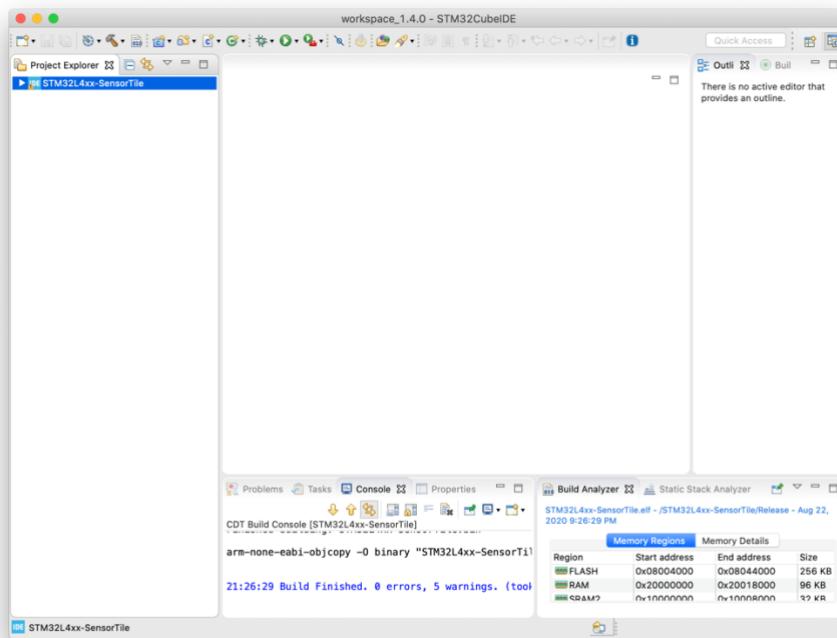
28. Highlight the Project with one mouse click on the top most entry in the Project Explorer.
 This will be the Project indicated as STM32L4xx-SensorTile

29. Select Project > Build All

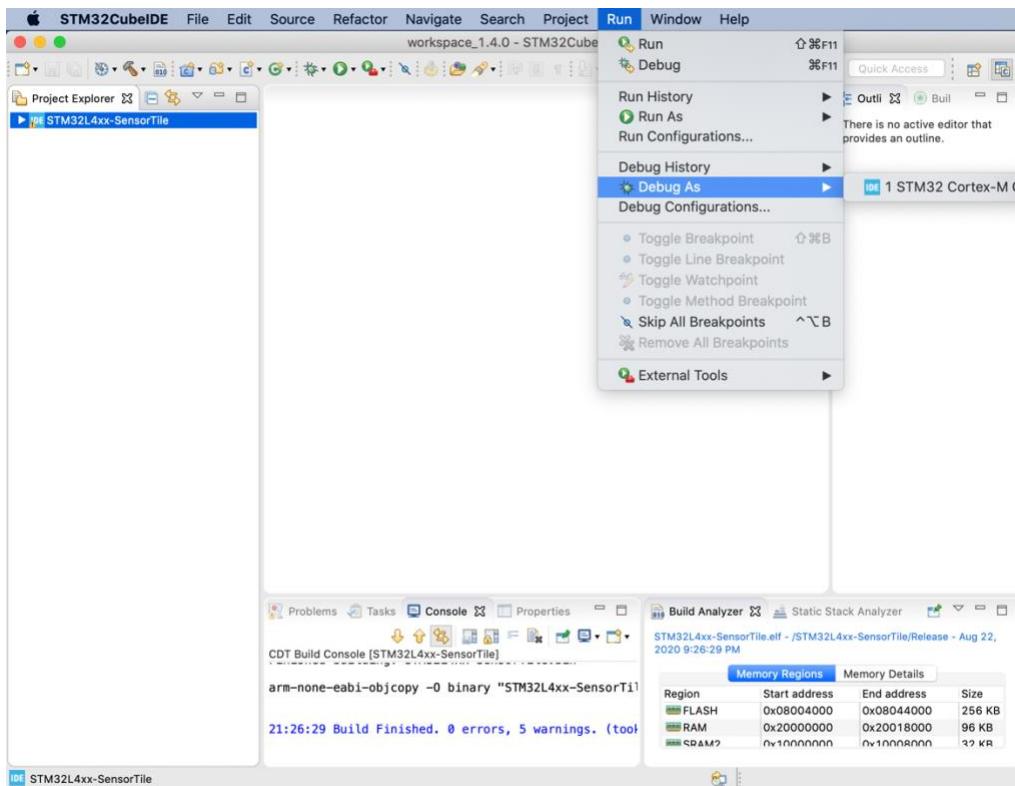




30. This screen will appear after Build completes

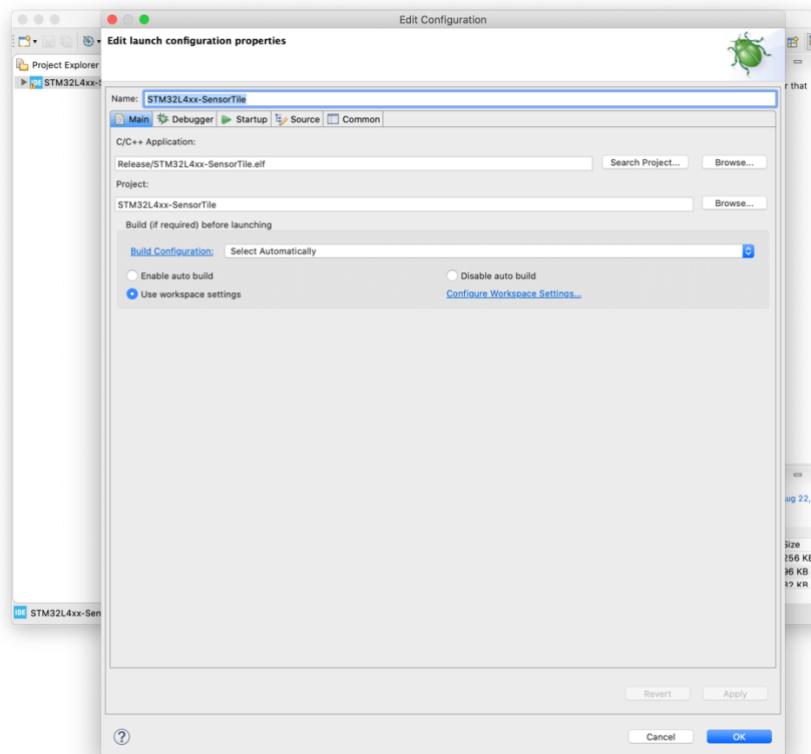


31. Now, select Run > Debug As > STM32 Cortex-M C/C++

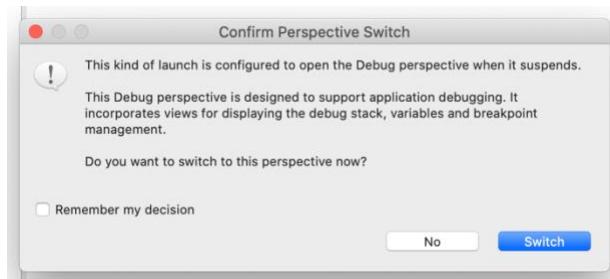




32. This screen will appear. Select OK.

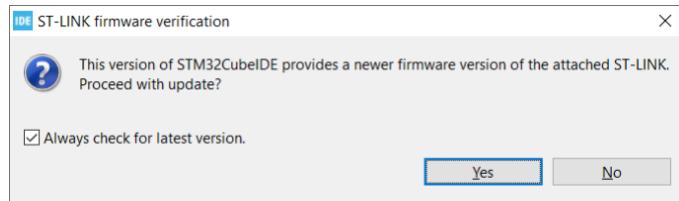


33. This screen will appear. **Select Switch. Do not check the checkbox.** This screen is useful in the future.

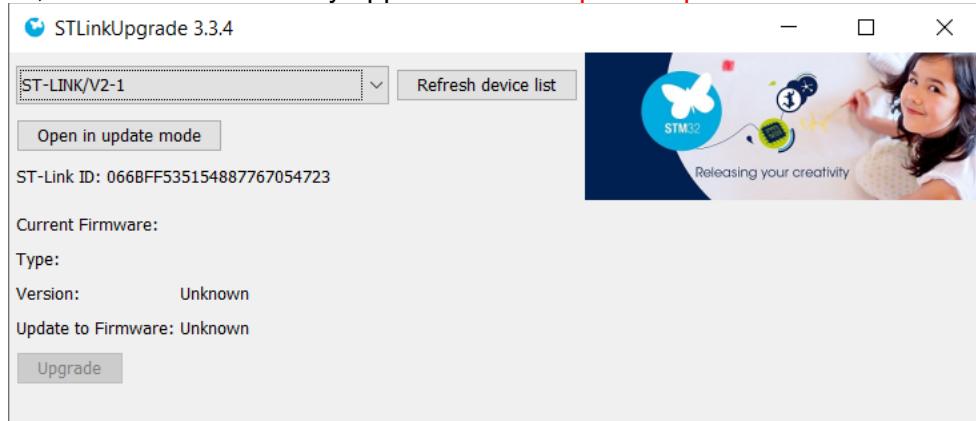




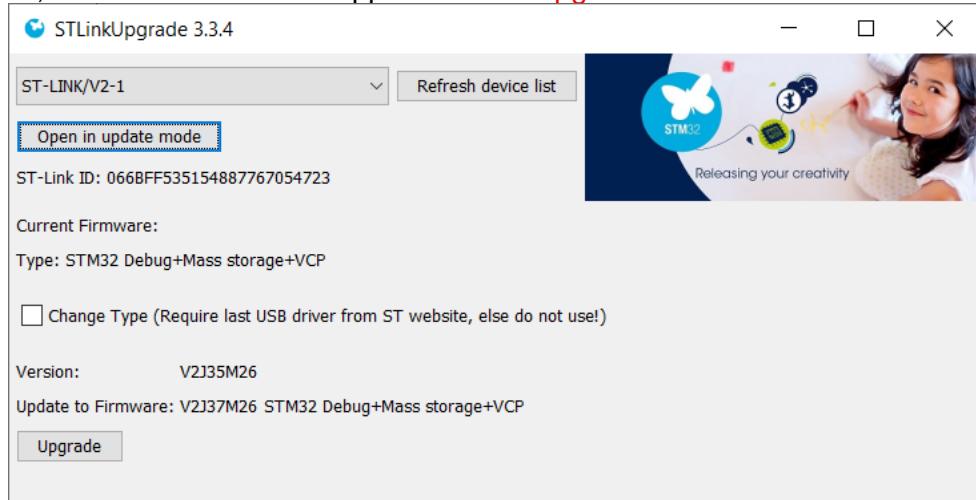
34. During the first operation, this window below will appear. Select **Yes**.



35. Then, this screen below may appear. Select **Open in update mode**



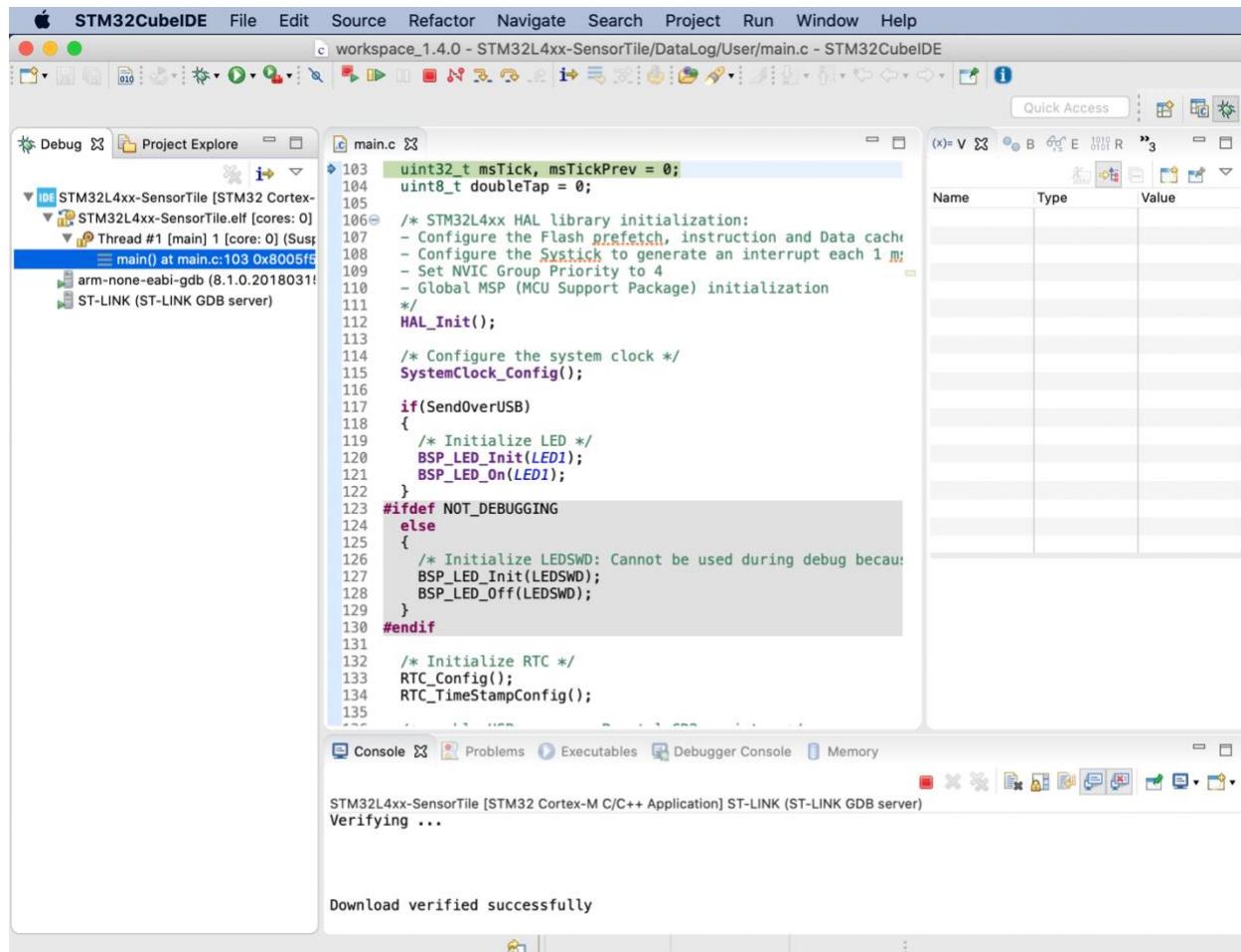
36. Then, this screen below will appear. Select **Upgrade**.



37. After completion of this step, return to the STM32CubeIDE application.



38. Now, the Debug Window will appear. Note that the task is shown as Suspended



The screenshot shows the STM32CubeIDE interface. The top menu bar includes File, Edit, Source, Refactor, Navigate, Search, Project, Run, Window, and Help. The workspace is titled "workspace_1.4.0 - STM32L4xx-SensorTile/DataLog/User/main.c - STM32CubeIDE". The left sidebar has a "Debug" tab selected, showing a tree view of the project structure: STM32L4xx-SensorTile [STM32 Cortex-M] and STM32L4xx-SensorTile. Under STM32L4xx-SensorTile, there is a "Thread #1 [main] 1 [core: 0] (Suspended)" entry. The main editor window displays the "main.c" source code. The code includes initialization for the system clock, LED, and RTC. A tooltip "Verifying ..." is visible near the bottom of the editor. The right side of the interface features a "Quick Access" toolbar and a "Registers" window. The bottom status bar indicates "STM32L4xx-SensorTile [STM32 Cortex-M C/C++ Application] ST-LINK (ST-LINK GDB server) Verifying ...".

```

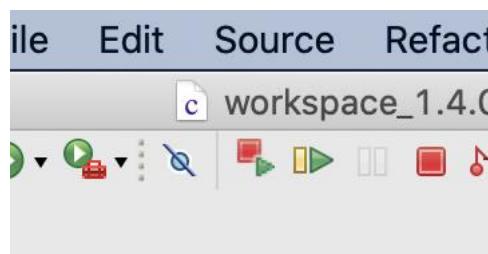
103 uint32_t msTick, msTickPrev = 0;
104 uint8_t doubleTap = 0;
105
106 /* STM32L4xx HAL library initialization:
107 - Configure the Flash prefetch, instruction and Data cache
108 - Configure the Systick to generate an interrupt each 1 ms
109 - Set NVIC Group Priority to 4
110 - Global MSP (MCU Support Package) initialization
111 */
112 HAL_Init();
113
114 /* Configure the system clock */
115 SystemClock_Config();
116
117 if(SendOverUSB)
118 {
119     /* Initialize LED */
120     BSP_LED_Init(LED1);
121     BSP_LED_On(LED1);
122 }
123 #ifdef NOT_DEBUGGING
124 else
125 {
126     /* Initialize LEDSWD: Cannot be used during debug because
127     BSP_LED_Init(LEDSWD);
128     BSP_LED_Off(LEDSWD);
129 }
130#endif
131
132 /* Initialize RTC */
133 RTC_Config();
134 RTC_TimeStampConfig();
135

```

Download verified successfully

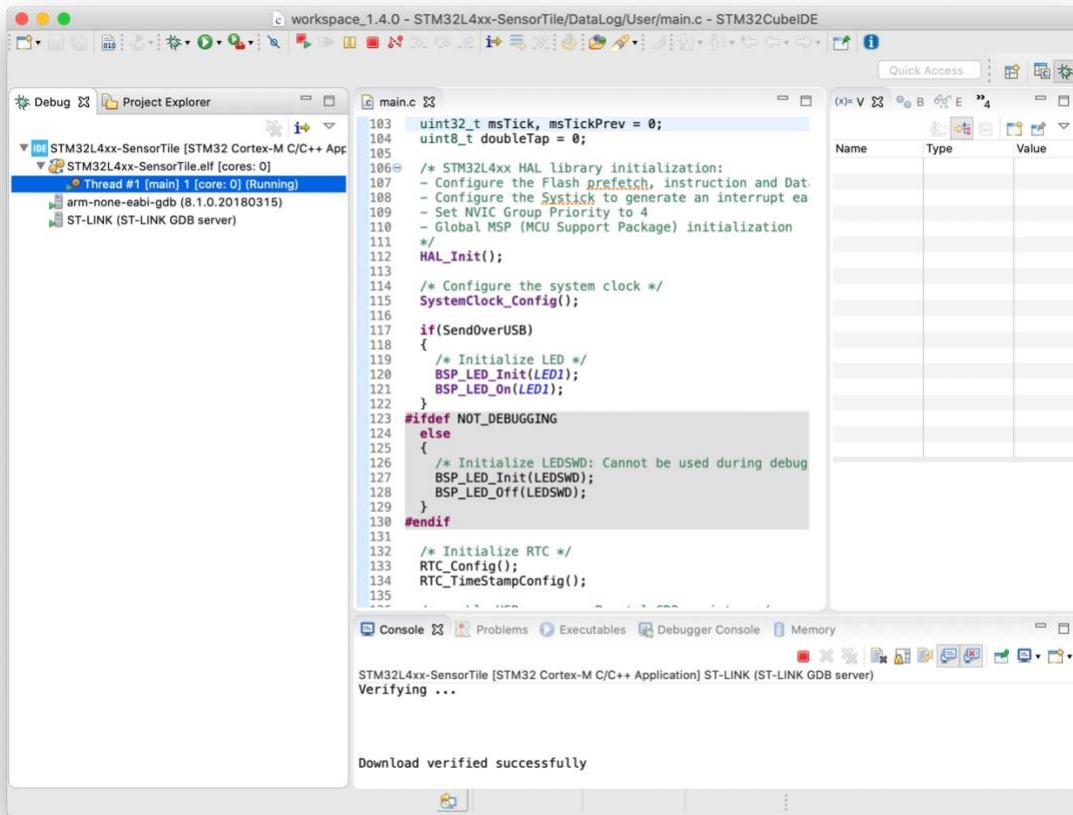
39. Now, find the Resume button underneath the “Source” entry.

40. The resume button in the right facing green arrow.





41. Click on the resume button. The screen will change and indicate that the Project is running.

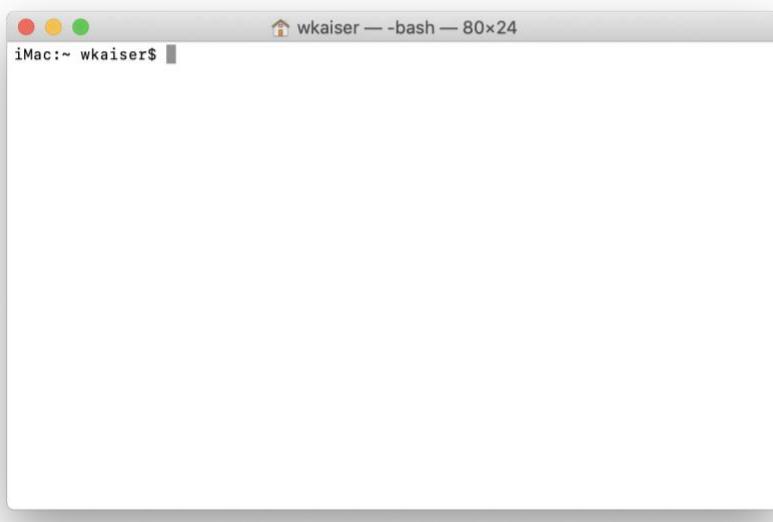


```

103     uint32_t msTick, msTickPrev = 0;
104     uint8_t doubleTap = 0;
105
106     /* STM32L4xx HAL library initialization:
107      - Configure the Flash prefetch, instruction and Data
108      - Configure the Systick to generate an interrupt ea
109      - Set NVIC Group Priority to 4
110      - Global MSP (MCU Support Package) initialization
111  */
112     HAL_Init();
113
114     /* Configure the system clock */
115     SystemClock_Config();
116
117     if(SendOverUSB)
118     {
119         /* Initialize LED */
120         BSP_LED_Init(LED1);
121         BSP_LED_On(LED1);
122     }
123 #ifdef NOT_DEBUGGING
124 else
125 {
126     /* Initialize LEDSWD: Cannot be used during debug
127     BSP_LED_Init(LEDSWD);
128     BSP_LED_Off(LEDSWD);
129 }
130#endif
131
132     /* Initialize RTC */
133     RTC_Config();
134     RTC_TimeStampConfig();
135

```

42. Now, start a Terminal session



iMac:~ wkaiser\$



43. First, determine the Device File interface assigned to the SensorTile

44. Enter this command:

ls /dev/tty.usbmodem*

45. This screen will appear. Mac OSx assigns Device File numbers to each serial port.

46. The SensorTile Device File ends in numeral 1.



```
wkaiser — bash — 80x24
iMac:~ wkaiser$ ls /dev/tty.usbmodem*
/dev/tty.usbmodem14103          /dev/tty.usbmodemFFFFFFFFFF1
iMac:~ wkaiser$
```

47. Now, the screen command can be used to observe data from the SensorTile.

48. There are two methods for entering this. One is by copy and paste of the address

- Using the cursor, you may copy the device file address to the clipboard
- Then, enter screen and paste the address as below



```
wkaiser — bash — 97x11
(base) Williams-MacBook-Pro-4:~ wkaiser$ screen -L /dev/tty.usbmodemFFFFFFFFFF1
```



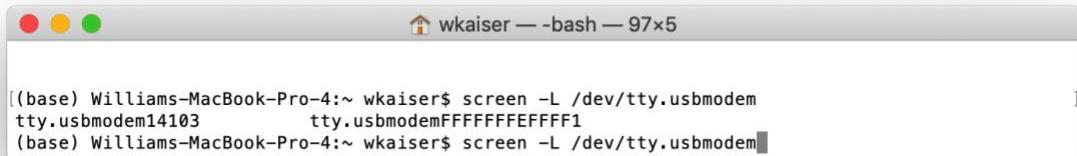
49. The second method is to use the Tab-Autocomplete method

a) First, enter



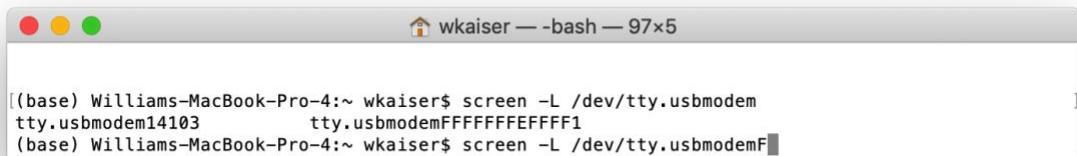
```
(base) Williams-MacBook-Pro-4:~ wkaiser$ screen -L /dev/tty.usbmodem
```

b) Press the tab key – this will show the options for Autocomplete



```
((base) Williams-MacBook-Pro-4:~ wkaiser$ screen -L /dev/tty.usbmodem
tty.usbmodem14103      tty.usbmodemFFFFFFFFFFF1
(base) Williams-MacBook-Pro-4:~ wkaiser$ screen -L /dev/tty.usbmodem]
```

c) Type F



```
((base) Williams-MacBook-Pro-4:~ wkaiser$ screen -L /dev/tty.usbmodem
tty.usbmodem14103      tty.usbmodemFFFFFFFFFFF1
(base) Williams-MacBook-Pro-4:~ wkaiser$ screen -L /dev/tty.usbmodemF]
```

d) Type the tab key, this will Autocomplete the address



```
((base) Williams-MacBook-Pro-4:~ wkaiser$ screen -L /dev/tty.usbmodem
tty.usbmodem14103      tty.usbmodemFFFFFFFFFFF1
(base) Williams-MacBook-Pro-4:~ wkaiser$ screen -L /dev/tty.usbmodemFFFFFFFFFFF1 ]
```



50. Enter Return and data from the screen command will be visible

```
wkaiser — screen /dev/tty.usbmodemFFFFFEFFFF1 • SCREEN — 80x24
ACC_X: -388, ACC_Y: -22, ACC_Z: -933
GYR_X: 2240, GYR_Y: -3570, GYR_Z: 0
MAG_X: 171, MAG_Y: 79, MAG_Z: 283
PRESS: 970.26
TimeStamp: 00:03:08.27
ACC_X: -378, ACC_Y: -24, ACC_Z: -934
GYR_X: 2318, GYR_Y: -3570, GYR_Z: 0
MAG_X: 172, MAG_Y: 79, MAG_Z: 283
PRESS: 970.26
TimeStamp: 00:03:08.37
ACC_X: -379, ACC_Y: -21, ACC_Z: -934
GYR_X: 2240, GYR_Y: -3570, GYR_Z: 70
MAG_X: 166, MAG_Y: 72, MAG_Z: 286
PRESS: 970.27
TimeStamp: 00:03:08.47
ACC_X: -378, ACC_Y: -22, ACC_Z: -933
GYR_X: 2240, GYR_Y: -3580, GYR_Z: 70
MAG_X: 166, MAG_Y: 73, MAG_Z: 285
PRESS: 970.27
TimeStamp: 00:03:08.57
ACC_X: -379, ACC_Y: -22, ACC_Z: -932
GYR_X: 2240, GYR_Y: -3570, GYR_Z: 70
MAG_X: 177, MAG_Y: 75, MAG_Z: 285
PRESS: 970.28
```

51. This session can be terminated with the exit command sequence.

52. Hold down the Ctrl key and then press the “a” key and then the “\” key



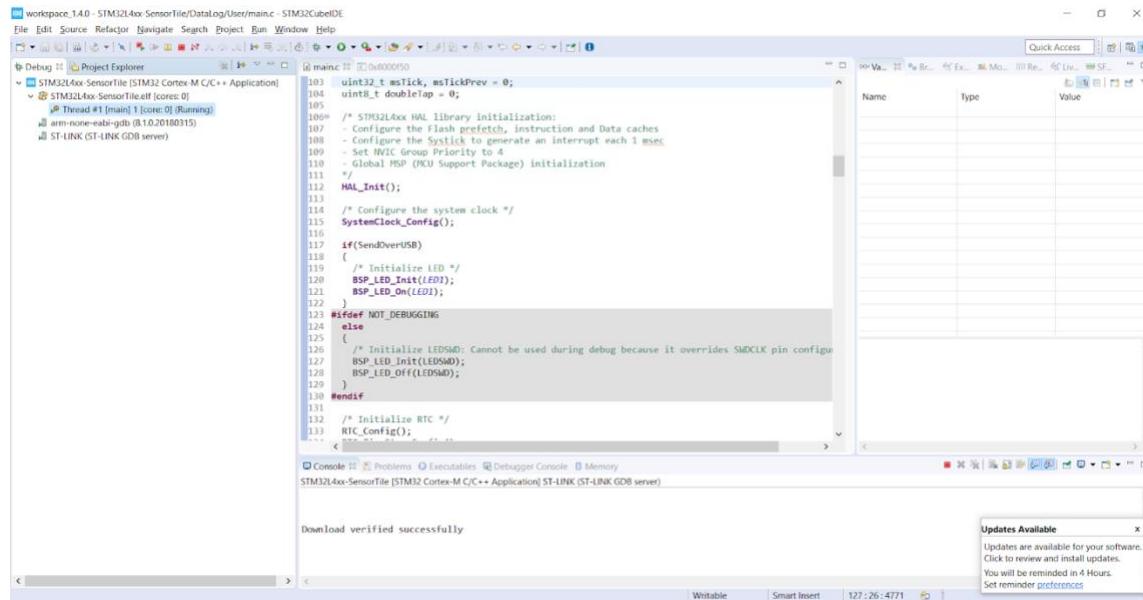
7. Stopping Execution and Restarting a Project

There are many times when it is needed to halt execution on the SensorTile, remove the SensorTile application, and build a new application.

53. To proceed, first close the screen application

54. Then, navigate to the Debug Window on the STM32CubeIDE.

55. This is selected by pressing on the “Bug” symbol at the upper right corner



```

main.c
103     uint32_t msTick, msTickPrev = 0;
104     uint32_t doubleTap = 0;
105
106     /* STM32L4xx HAL library initialization:
107     - Configure the Flash prefetch, instruction and Data caches
108     - Initialize the System Clock to generate an interrupt each 1 msec
109     - Set MPW Group Priority to 4
110     - Global MSP (MCU Support Package) initialization
111 */
112     HAL_Init();
113
114     /* Configure the system clock */
115     SystemClock_Config();
116
117     if(SendOverUSB)
118     {
119         /* Initialize LED */
120         BSP_LED_Init(LED1);
121         BSP_LED_On(LED1);
122     }
123 #ifndef NOT_DEBUGGING
124     else
125     {
126         /* Initialize LEDSD0: Cannot be used during debug because it overrides SMDCLK pin config
127         BSP_LED_Init(LEDSD0);
128         BSP_LED_Off(LEDSD0);
129     }
130 #endif
131
132     /* Initialize RTC */
133     RTC_Config();

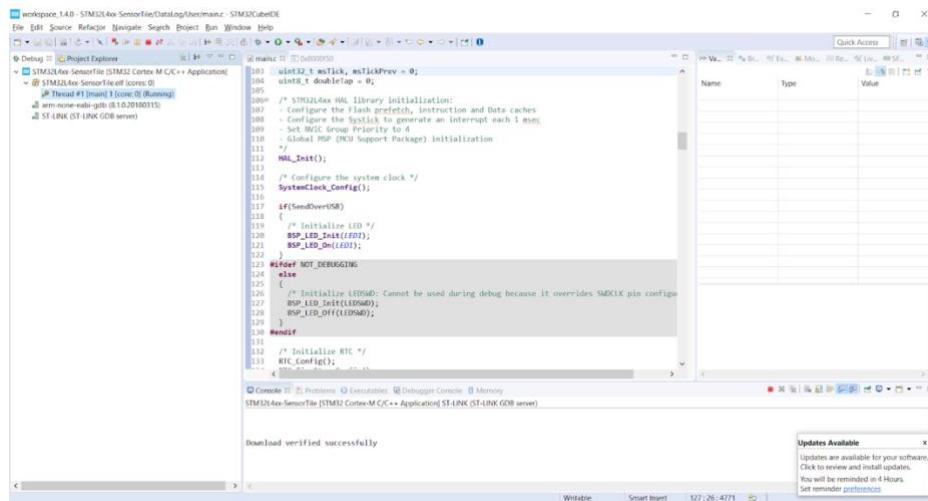
```

56. This is the “Bug” symbol

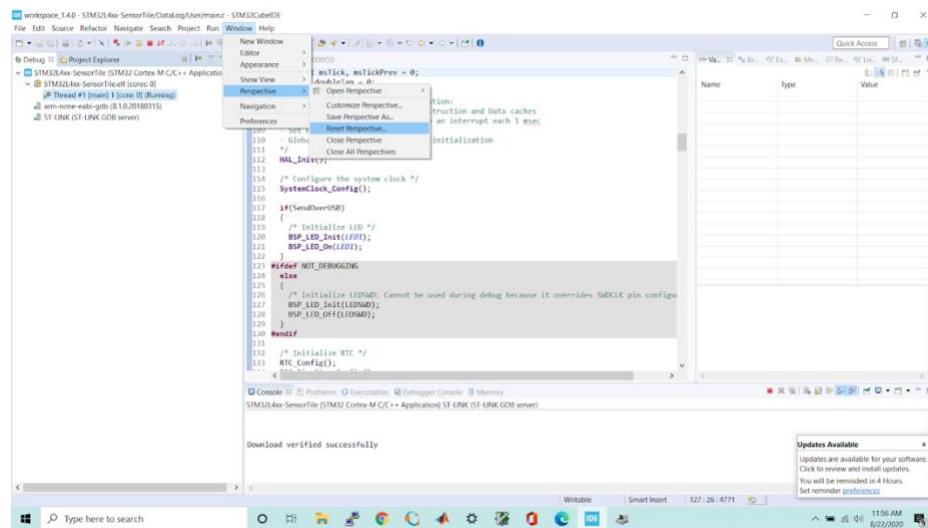




57. The screen should appear this way:



58. If the screen does not appear in this format, select Window > Perspective > Reset Perspective



59. Now, press on the Red Square “Terminate” button as below.



workspace_1.40 - STM32L4xx-SensorTile/DataLog/User/main.c - STM32CubeIDE

```

File Edit Source Refactor Navigate Search Project Run Window Help
Debug Project Explorer Terminal (Ctrl+F2) Quick Access
STM32L4xx-SensorTile [STM32 Cortex M C/C++ Application]
  Thread #1 [main] 1 [core: 0] (Running)
    arm-none-eabi-gdb (8.1.0.20180315)
    ST-LINK (ST-LINK GDB server)

main.c:103:1: warning: unused variable 'usTick, usTickPrev' [-Wunused-variable]
103 wint32_t usTick, usTickPrev = 0;
104 wint32_t doubleTap = 0;
105
106 /* STM32L4xx HAL library initialization:
107   - Configure the Flash prefetch, instruction and Data caches
108   - Configure the Systick to generate an interrupt each 1 ms
109   - Set NVIC Group Priority to 4
110   - Global MSP (MPU Support Package) initialization
111 */
112 HAL_Init();
113
114 /* Configure the system clock */
115 SystemClock_Config();
116
117 #if(SensorOverFlow)
118
119 /* Initialize LED */
120 BSP_LED_Init(LED0);
121 BSP_LED_On(LED0);
122
123 #ifndef NOT_DEBUGGING
124
125 /* Initialize LEDSDMD: Cannot be used during debug because it overrides SDIOCLK pin config
126 BSP_LED_Init(LEDSDMD);
127 BSP_LED_On(LEDSDMD);
128
129 #endif
130
131 /* Initialize RTC */
132 RTC_Config();
133
134 #endif

```

Console Problems Executables Debugger Console Memory

STM32L4xx-SensorTile [STM32 Cortex M C/C++ Application] ST-LINK (ST-LINK GDB server)

Download verified successfully

Updates Available

Updates are available for your software. Click to review and install updates. You will be reminded in 4 Hours. Set reminder preferences

11:56 AM 8/22/2019

0 - STM32L4xx-SensorTile/DataLog/User/main.c - STM:

Refactor Navigate Search Project Run Window

project Explorer Terminal (Ctrl+F2)

SensorTile [STM32 Cortex-M C/C++ Application]

xx-SensorTile.elf [cores: 0]

#1 [main] 1 [core: 0] (Running)

eabi-gdb (8.1.0.20180315)

ST-LINK GDB server

60. The screen will now appear with the application shown as terminated

workspace_1.40 - STM32L4xx-SensorTile/DataLog/User/main.c - STM32CubeIDE

```

File Edit Source Refactor Navigate Search Project Run Window Help
Debug Project Explorer Terminal (Ctrl+F2) Quick Access
terminated - STM32L4xx-SensorTile [STM32 Cortex M C/C++ Application]
  terminated, exit value: 0-arm-none-eabi-gdb (8.1.0.20180315)
  terminated, exit value: 2747418112-ST-LINK (ST-LINK GDB server)

main.c:103:1: warning: unused variable 'usTick, usTickPrev' [-Wunused-variable]
103 wint32_t usTick, usTickPrev = 0;
104 wint32_t doubleTap = 0;
105
106 /* STM32L4xx HAL library initialization:
107   - Configure the Flash prefetch, instruction and Data caches
108   - Configure the Systick to generate an interrupt each 1 ms
109   - Set NVIC Group Priority to 4
110   - Global MSP (MPU Support Package) initialization
111 */
112 HAL_Init();
113
114 /* Configure the system clock */
115 SystemClock_Config();
116
117 #if(SensorOverFlow)
118
119 /* Initialize LED */
120 BSP_LED_Init(LED0);
121 BSP_LED_On(LED0);
122
123 #ifndef NOT_DEBUGGING
124
125 /* Initialize LEDSDMD: Cannot be used during debug because it overrides SDIOCLK pin config
126 BSP_LED_Init(LEDSDMD);
127 BSP_LED_On(LEDSDMD);
128
129 #endif
130
131 /* Initialize RTC */
132 RTC_Config();
133
134 #endif

```

Console Problems Executables Debugger Console Memory

terminated - STM32L4xx-SensorTile [STM32 Cortex M C/C++ Application] ST-LINK (ST-LINK GDB server)

Download verified successfully

Debugger connection lost.
Shutting down...

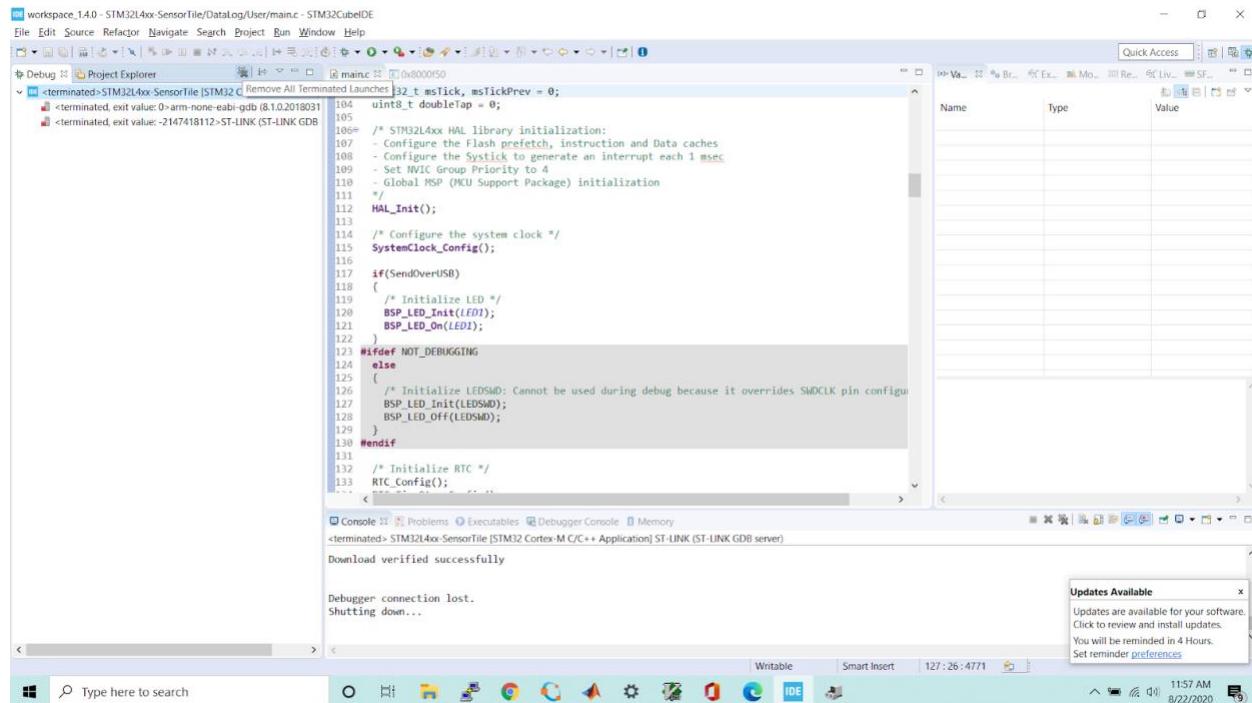
Updates Available

Updates are available for your software. Click to review and install updates. You will be reminded in 4 Hours. Set reminder preferences

11:57 AM 8/23/2019



61. Then, remove this terminated application with the Remove All Terminated Launches button

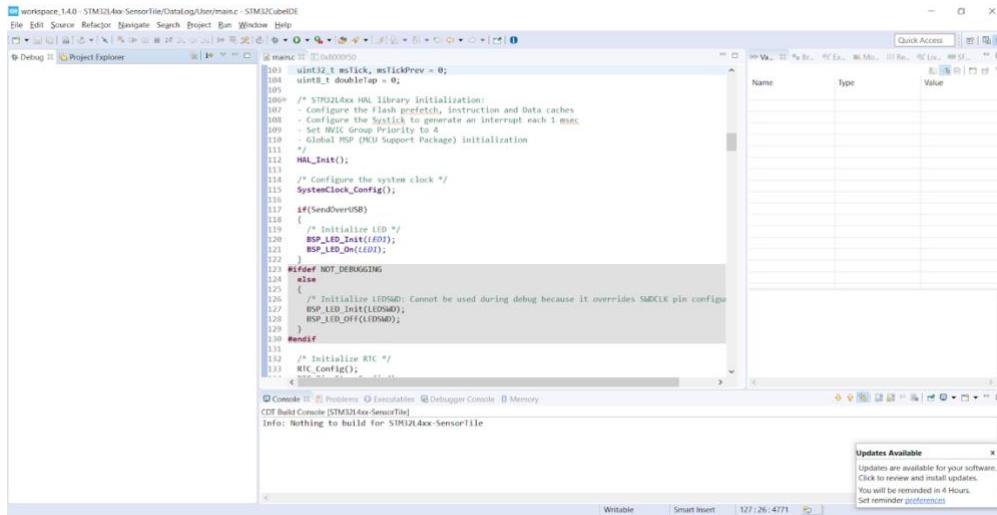


62. The Remove All Terminated Launches button appears at the upper left of the screen.





63. Now, the Debug tab in the screen will show no terminated launches

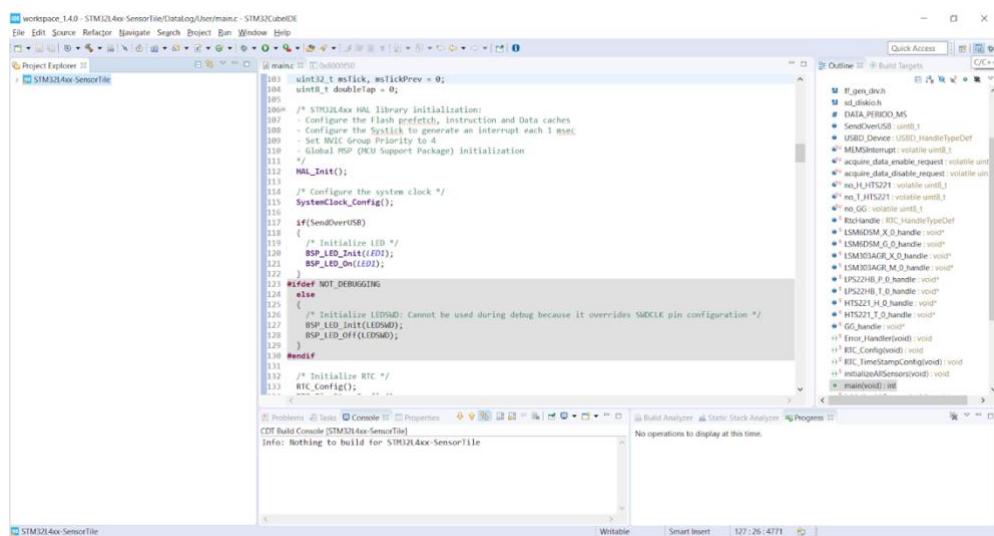


64. Navigate back to the C/C++ window by clicking on the symbol at upper right

65. The C/C++ window window selector symbol at the upper and far right of the screen.

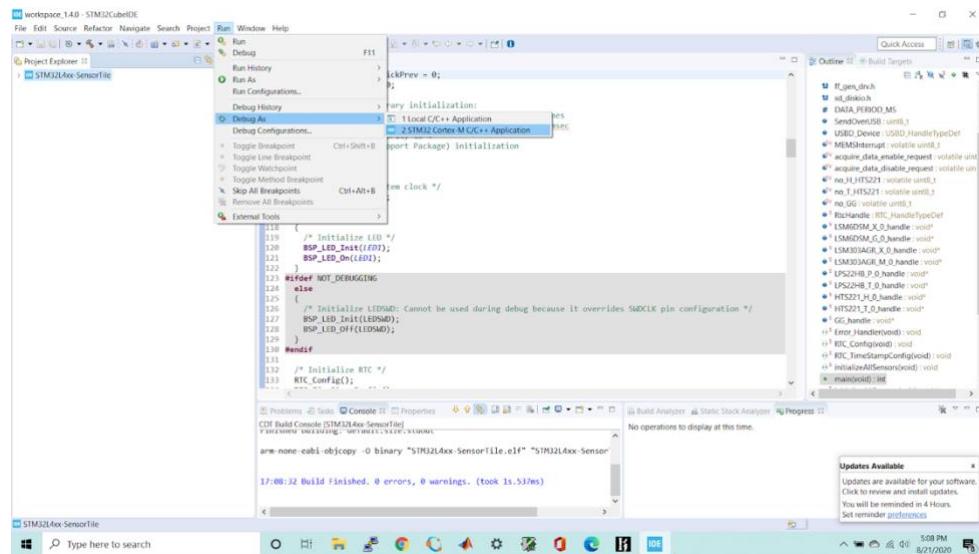


66. The C/C++ window will appear





67. Select Run > Debug As > STM32 Cortex-M C/C++ Application once again and test with the screen application as in previous steps





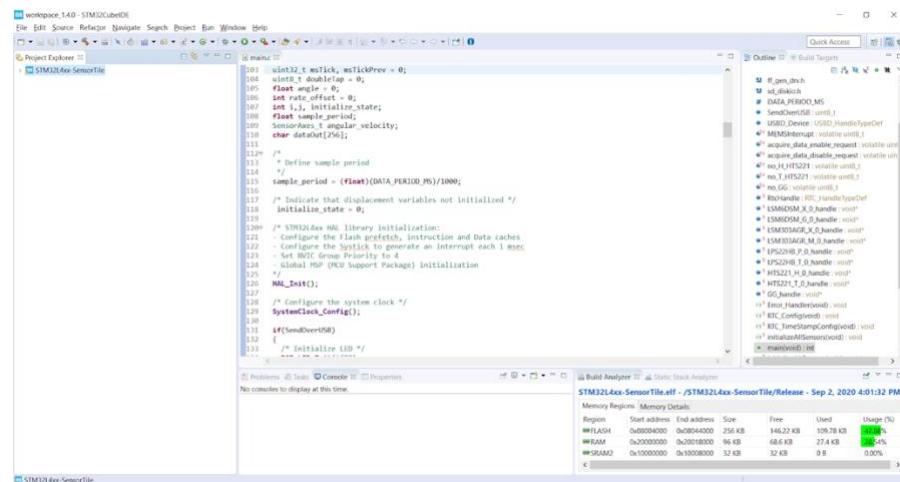
8. Removing a Project from the Workspace

After development and testing of a Project is completed, it will be important to remove the Project from the Workspace **but not delete the Project**.

This will permit the import of a new Project.

68. Navigate to the C/C++ Window

69. If the screen does not appear in this format, select Window > Perspective > Reset Perspective

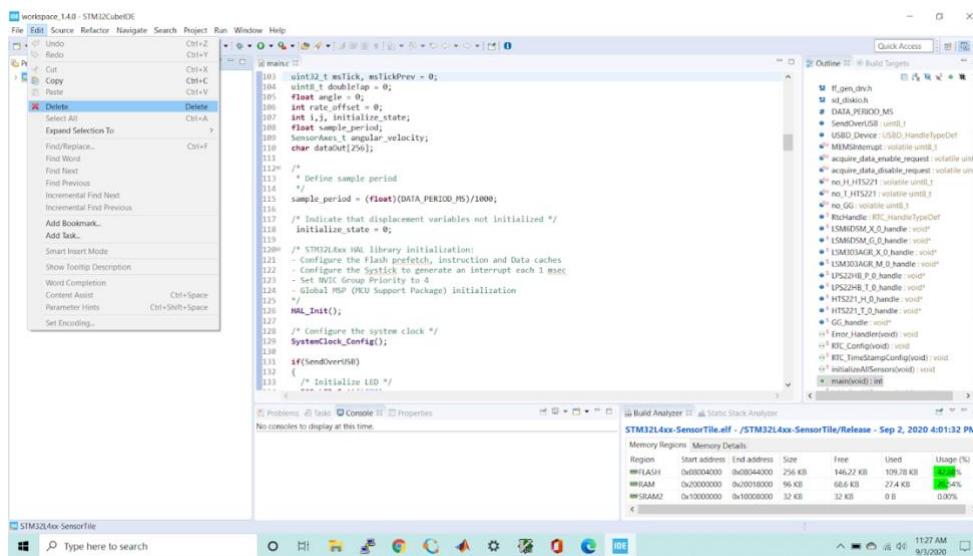


```

101 uint32_t msTick, msTickPrev = 0;
102 float angle = 0;
103 int rate_of_fat = 0;
104 int i, j, l, m, n, state;
105 float sample_period;
106 SensorAvec_t angular_velocity;
107 char dataBuf[256];
108
109 /*
110  * Define sample period
111  */
112 sample_period = (float)(DATA_PERIOD_MS)/1000;
113
114 /* Indicate that displacement variables not initialized */
115 initialize_state = 0;
116
117 /* STM32L4xx HAL library initialization:
118  - Configure the Flash prefetch, instruction and Data caches
119  - Set the Systick to generate an interrupt each 1 msec
120  - Set NVIC Group Priority to 4
121  - Global MSP (MCU Support Package) initialization
122 */
123 HAL_Init();
124
125 /* Configure the system clock */
126 SystemClock_Config();
127
128 if(SendOverUSB)
129 {
130     /* Initialize LED */
131 }

```

70. Highlight the Project in the Project Explorer tab and the select Edit > Delete



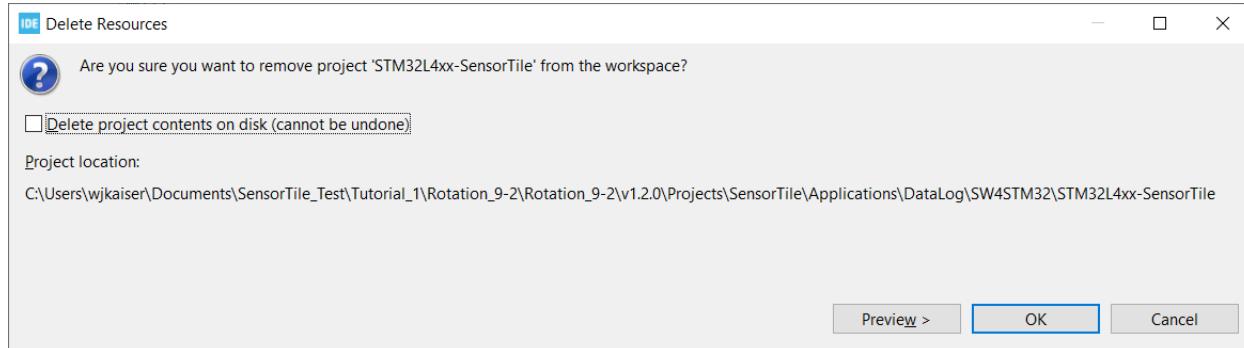
```

101 uint32_t msTick, msTickPrev = 0;
102 uint32_t doubleTap = 0;
103 float angle = 0;
104 int rate_of_fat = 0;
105 int i, j, l, m, n, state;
106 float sample_period;
107 SensorAvec_t angular_velocity;
108 char dataBuf[256];
109
110 /*
111  * Define sample period
112  */
113 sample_period = (float)(DATA_PERIOD_MS)/1000;
114
115 /* Indicate that displacement variables not initialized */
116 initialize_state = 0;
117
118 /* STM32L4xx HAL library initialization:
119  - Configure the Flash prefetch, instruction and Data caches
120  - Set the Systick to generate an interrupt each 1 msec
121  - Set NVIC Group Priority to 4
122  - Global MSP (MCU Support Package) initialization
123 */
124 HAL_Init();
125
126 /* Configure the system clock */
127 SystemClock_Config();
128
129 if(SendOverUSB)
130 {
131     /* Initialize LED */
132 }

```



71. After clicking Delete this window will appear



72. **Do Not Check the Box** – there is no need to delete the Project from the file system. You may wish to retain this so that it can be imported later.

73. Just click **OK**.

74. This screen will appear with no Projects shown.

