MCU Programmers User Manual

SWD BLASTER
ARM MCU PROGRAMMER
USER MANUAL

The Earth People Technology SWD Blaster programs and provides in circuit debugging via JTAG or SWD for any ARM MCU. It connects via USB to the Host PC running Windows and is fully plug and play compatible. The SWD Blaster integrates seamlessly into the high-perfroming C/C++ compiler and debgger tool suite IAR Embedded Workbench ID for easy-to-use, fast and reliable debugging. The SWD Blaster streams the program counter, variables, and register data to the host computer to provide a view into program execution in real time.

For debugging Cortex devices, the SWD Blaster also supports the SWO (Serial Wire Output) feature, which can be used for tracing the program execution and tracking variables at predefined points in your code.

Supports all Arm7/Arm9/Arm11 cores, Arm Cortex-A/R/M cores from all Silicon Vendors with Automatic core recognition and JTAG/SWD detection. Supports target voltage range from 1.65V to 5V. Includes 0.1 inch header utilizing the MIPI-20 pinout.

The SWD Blaster provides a fast debugging platform via JTAG and SWD/SWO with download speeds of up to 1.89 MByte/sec. The JTAG and Serial Wire Debug (SWD) clocks up to 8MHz (no limit on the MCU clock speed).

EARTHPEOPLE Technology

MCU Programmers User Manual

1 Description

The SWD Blaster is a stand alone programmer for use with IAR Embedded Workbench and capable of debugging most ARM MCU's. It includes the I-Jet On Board Module from IAR. It also includes a USB-C connector and a 20 pin 0.1 Inch Header that maps to the MIPI-20 pinout. The SWD Blaster has a reset switch for manual reset of the target MCU. There is a level shifter chip which is powered from the target MCU board. This level shifter allows the SWD signals to match the target MCU from 1.65V to 5V.

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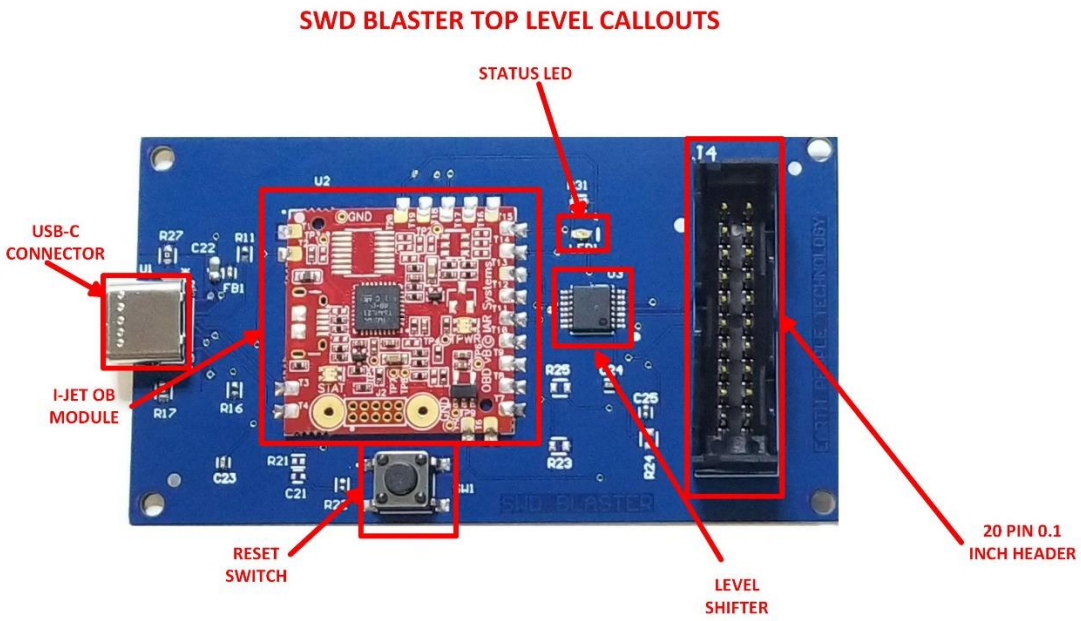
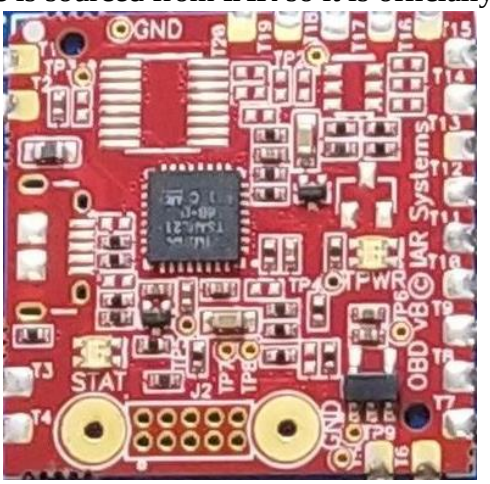


1.1 I-Jet OBM

The I-Jet On Board Module is sourced from IAR so it is officially licensed by the company.



When the SWD Blaster is connected to a USB port on a PC loaded with the latest version of IAR Embedded Workbench, it is immediately recognized as an I-Jet. And it can be used to program the flash of the target MCU or provide in circuit debugging.

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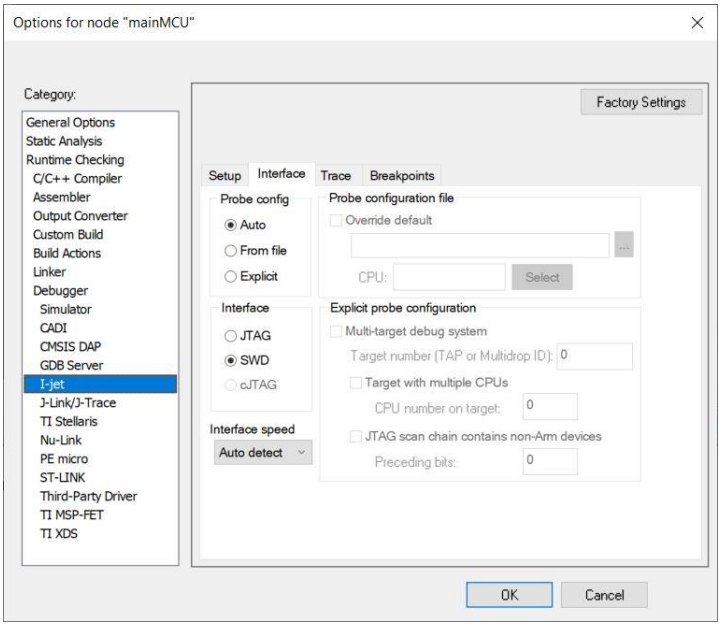

The OBM provides full SWD JTAG in circuit emulation. The emulation speed is limited to 8MHz. However, this speed is more than adequate for most applications. The OBM provides all of the debugging power of the IAR Embedded Workbench. The user can:

- compile user code
- download, debug
- step over functions
- step into functions
- run to cursor
- run full program
- pause
- view all registers
- set breakpoints
- execute to breakpoints
- add variables to watch
- probe variables
- and all other functionality

The OBM is powered by the USB-C connection from the port of the connected PC.

1.2 USB-C Connection

The SWD Blaster communicates with a PC via the USB-C connector. Connect the cable to any USB 2.0 or higher compliant port.

When the IAR Embedded Workbench software is properly installed on the PC, the driver will automatically load.

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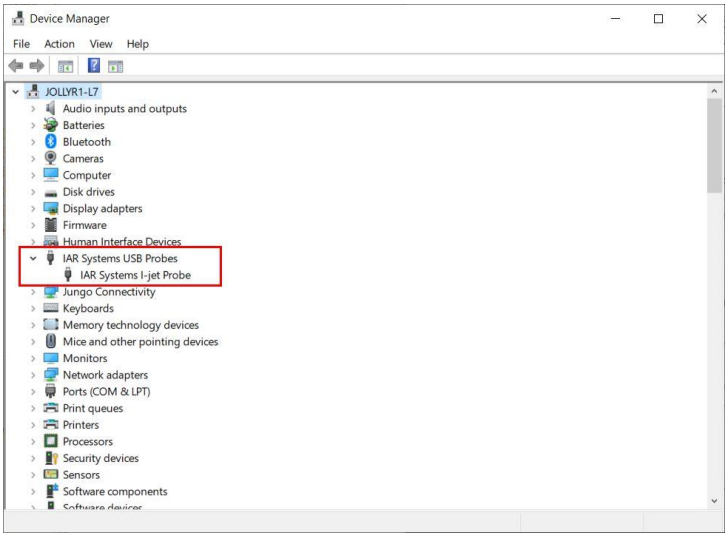
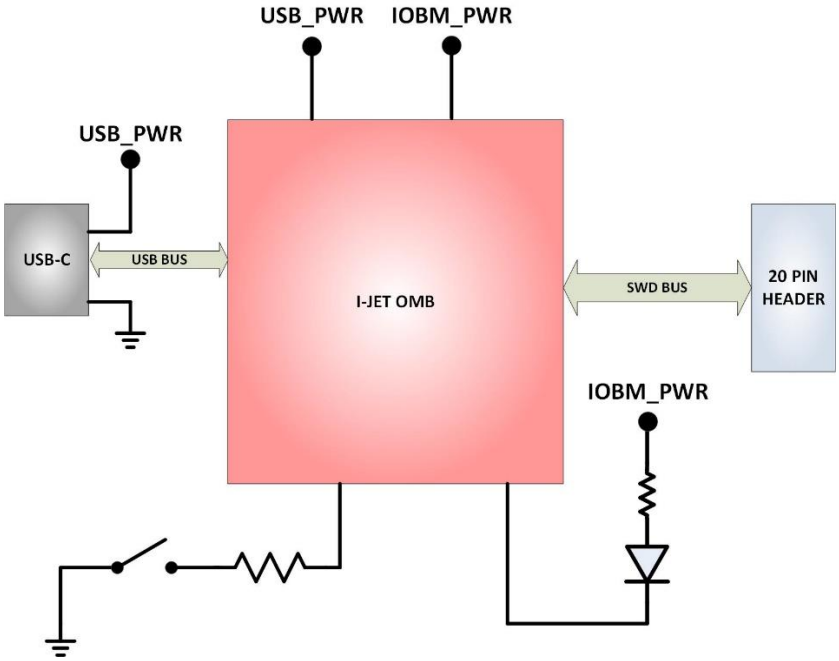


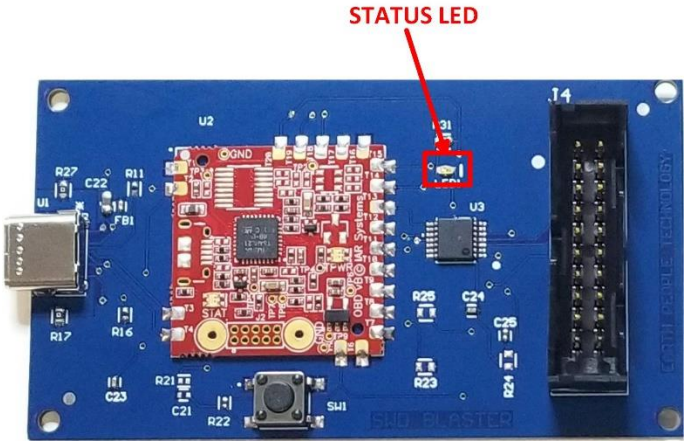
The SWD Blaster is powered by the USB-C connection. The USB Power is used to power up the OB Module. The OB Module provides +3.3V power for external use on the SWD Blaster.



The USB connection provides the bi-directional communication path between Host PC and the SWD Blaster.

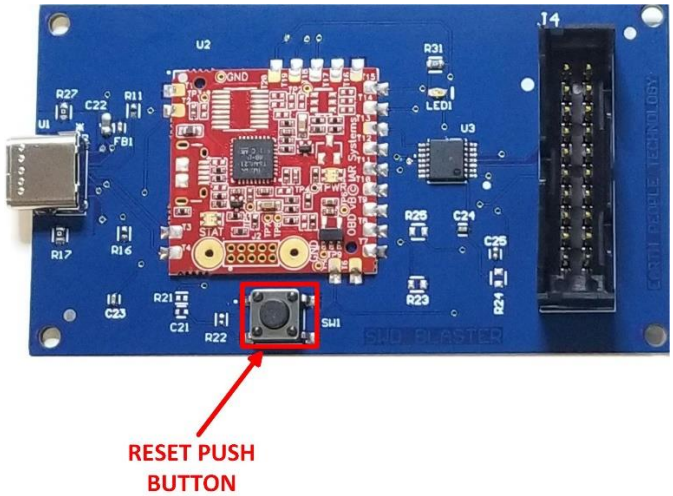
1.3 Status LED

The STATUS LED is used to indicate that the SWD Blaster has been appropriately powered from the Host USB. It will light up green. It is connected to pin 11 of the IOBM and driven with sink from the module.



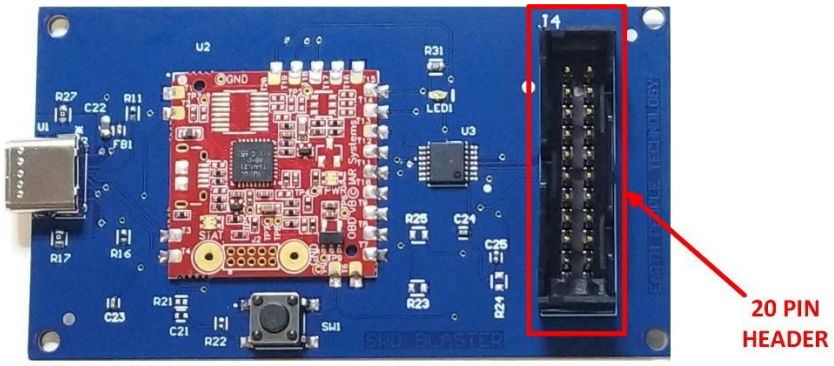
1.4 Reset Switch

The Reset Push Button is used to manually reset the target MCU.



1.5 20 Pin Header

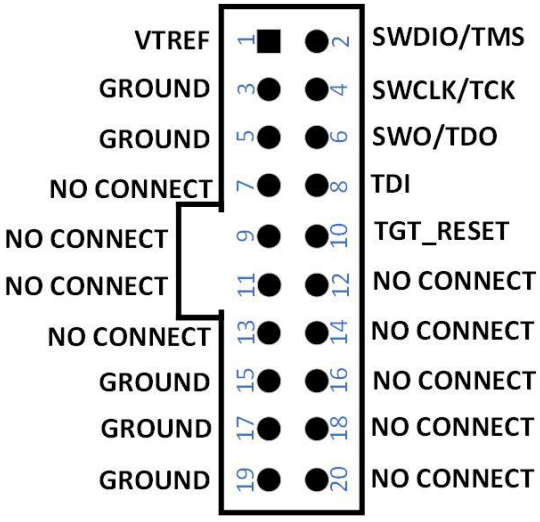
The SWD Blaster includes a 20 Pin 0.1 Inch Dual Row Shrouded Header.



This header is used to connect the

- SWDIO
- SWDCLK
- TARGET POWER
- SWO
- GROUND
- TRESET

Signals to the target MCU. The header pinout follows the MIPI-20 scheme.



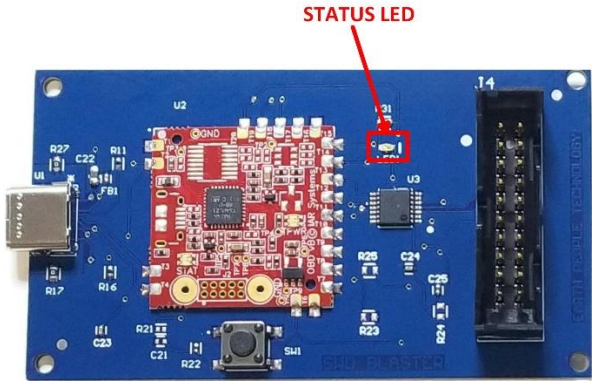
The VTREF signal is power applied from the Target Device. It is used to power the output sample circuit of the IOBM. It must have the capability of supplying:

20mA

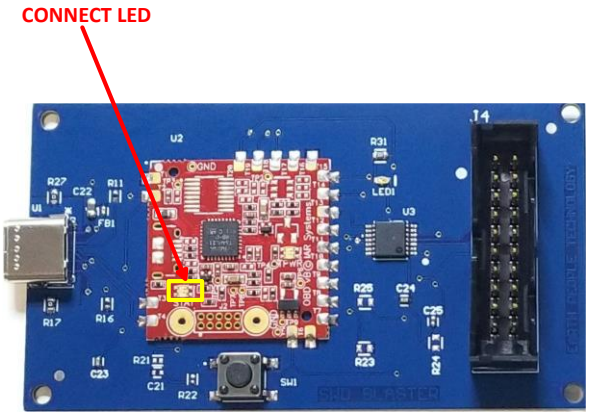
1.6 Using the SWD Blaster

The SWD Blaster must have the IAR Embedded Workbench installed on the PC. The USB driver is included in the software. Once installed, connect the SWD Blaster using a USB-C cable. Connect the USB cable to a port on the Host PC.

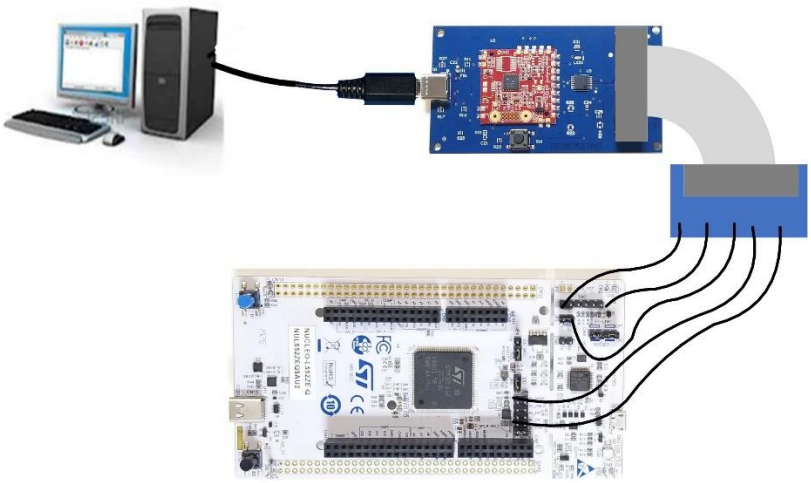
The driver will automatically load. The STATUS LED will light to indicate power has been correctly applied to the SWD Blaster.



The “CONNECT” LED will light up in the Green color.



If the CONNECT LED lights up in Red, it means the IOBM USB Driver did not properly. Use the 20 pin Header and Adapter Board to connect the SWD signals to the Target Board.



Use the Embedded Workbench software to connect to the target board. Write user code, compile, download and start debugging.

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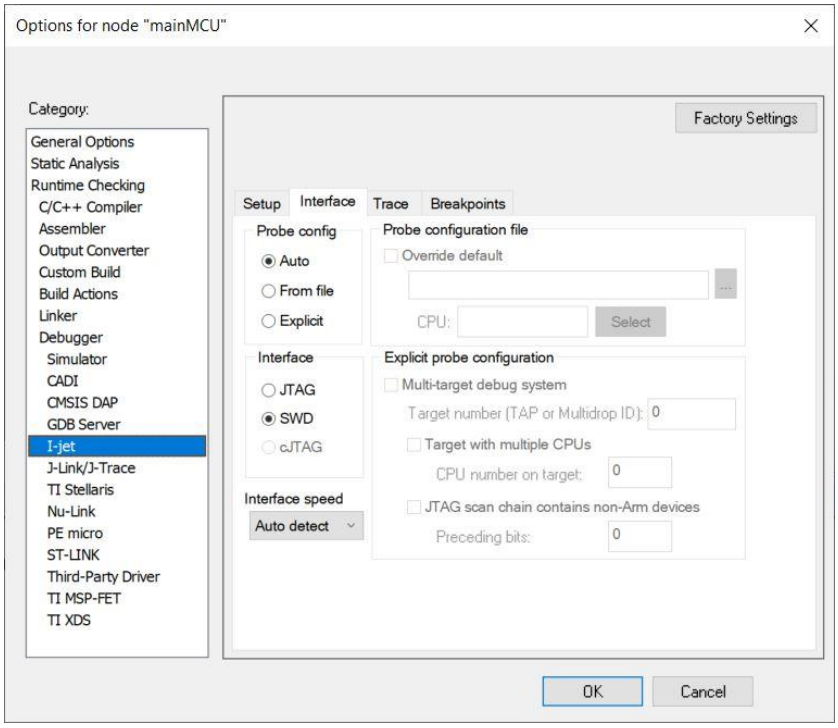

2 Installing Software for use with SWD Blaster

The SWD Blaster uses the I-Jet On Board Module from IAR. IAR makes the software called Embedded Workbench.

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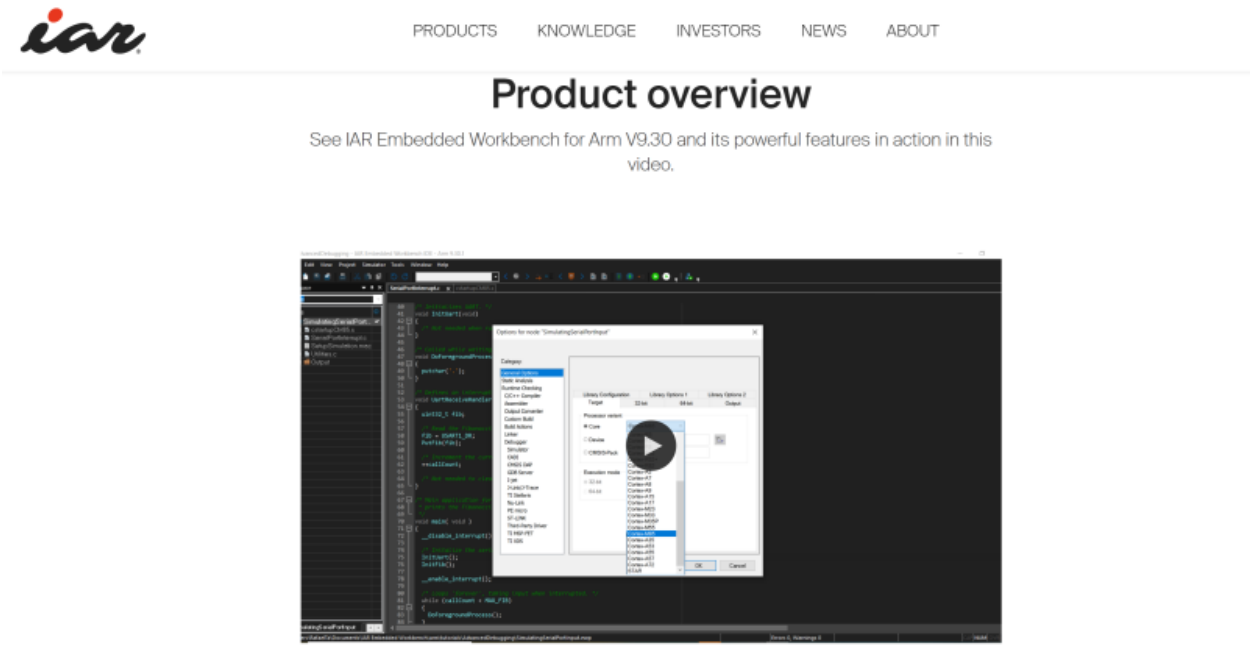

This software along with the SWD Blaster will allow developers to create software to run on any ARM MCU. EPT acquires the I-Jet OBM directly from IAR. So, this is an officially licensed product. The Embedded Workbench software includes all drivers for use with the SWD Blaster.

IAR provides two free versions of Embedded Workbench for download for users.

- Time Limited Embedded Workbench – Full version of software expires after 14 days. No code size limitation.
- Code Limited Embedded Workbench – All software features available (Download and Debugging), compiled code size is limited to 32Kbytes.

Follow the steps below to install the free version of software.

2.1 Download and install IAR Workbench

Go to the IAR Download ARM Software page

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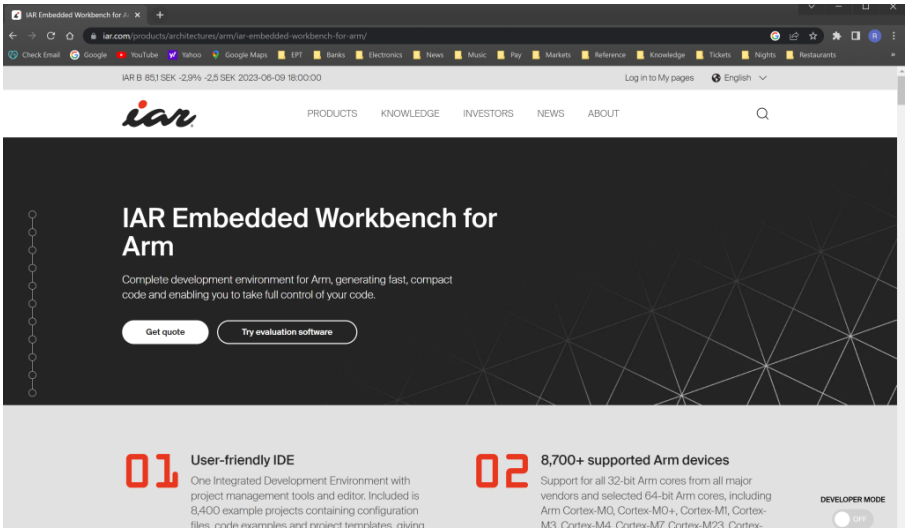
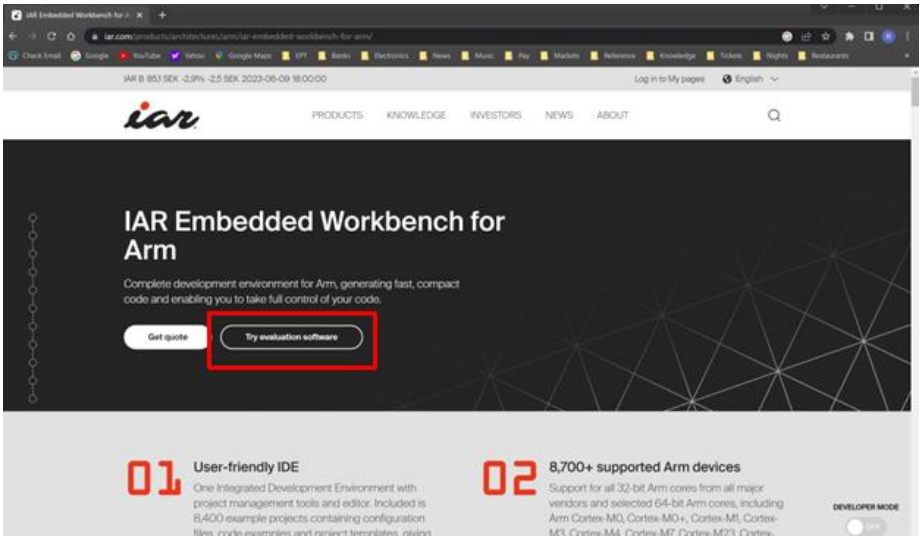


Click on the “Try evaluation software” button



At the “Use this Product” page, click on the “Download” button.

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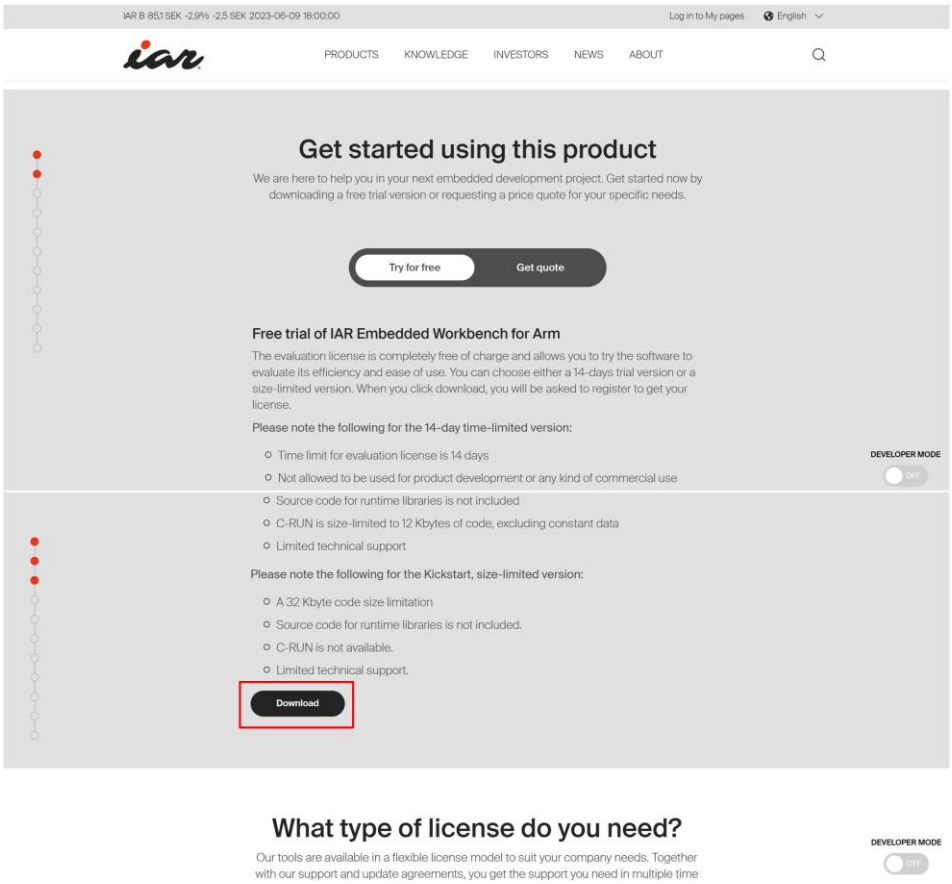

At the “Register for Evaluation" page, fill out the information, then click on the “Submit Registration” button.

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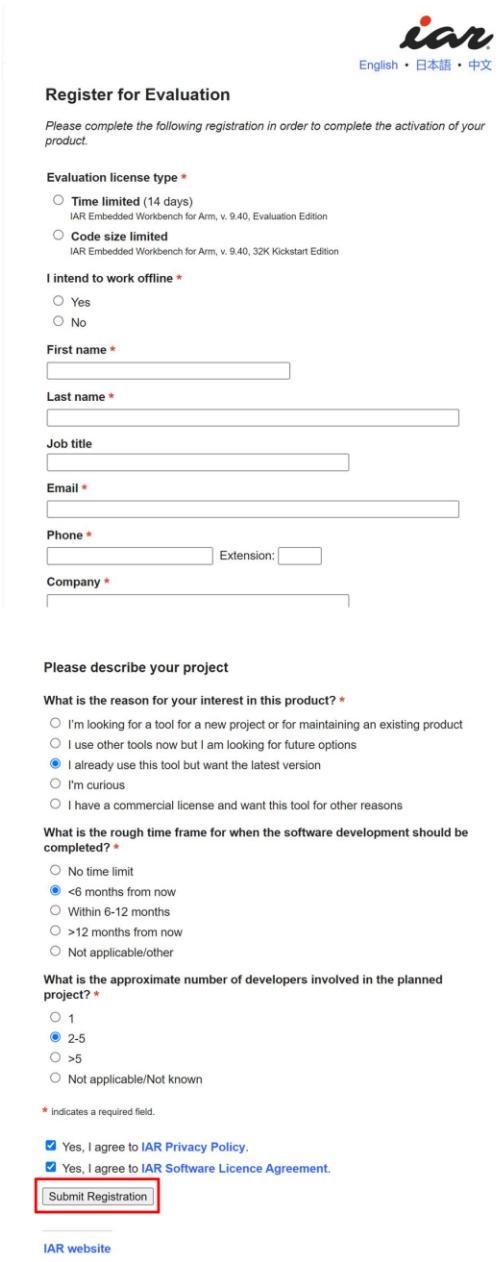

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Register for Evaluation

Please complete the following registration in order to complete the activation of your product.

Evaluation license type *

- ○ **Time limited** (14 days)
  IAR Embedded Workbench for Arm, v. 9.40, Evaluation Edition
- ○ **Code size limited**
  IAR Embedded Workbench for Arm, v. 9.40, 32K Kickstart Edition

I intend to work offline *

- ○ Yes
- ○ No

First name *

Last name *

Job title

Email *

Phone *

Extension:

Company *

Please describe your project

What is the reason for your interest in this product? *

- ○ I'm looking for a tool for a new project or for maintaining an existing product
- ○ I use other tools now but I am looking for future options
- ◉ I already use this tool but want the latest version
- ○ I'm curious
- ○ I have a commercial license and want this tool for other reasons

What is the rough time frame for when the software development should be completed? *

- ○ No time limit
- ◉ <6 months from now
- ○ Within 6-12 months
- ○ >12 months from now
- ○ Not applicable/other

What is the approximate number of developers involved in the planned project? *

- ○ 1
- ◉ 2-5
- ○ >5
- ○ Not applicable/Not known

* indicates a required field.

☑ Yes, I agree to IAR Privacy Policy.
☑ Yes, I agree to IAR Software Licence Agreement.

Submit Registration

IAR website

Go to the email address you specified and search for the email from IAR.

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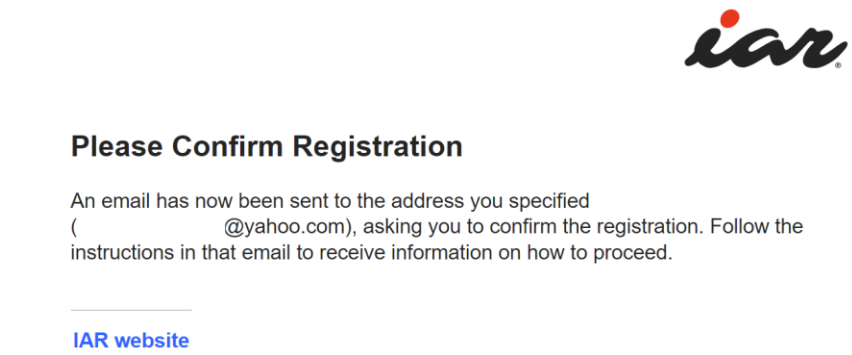
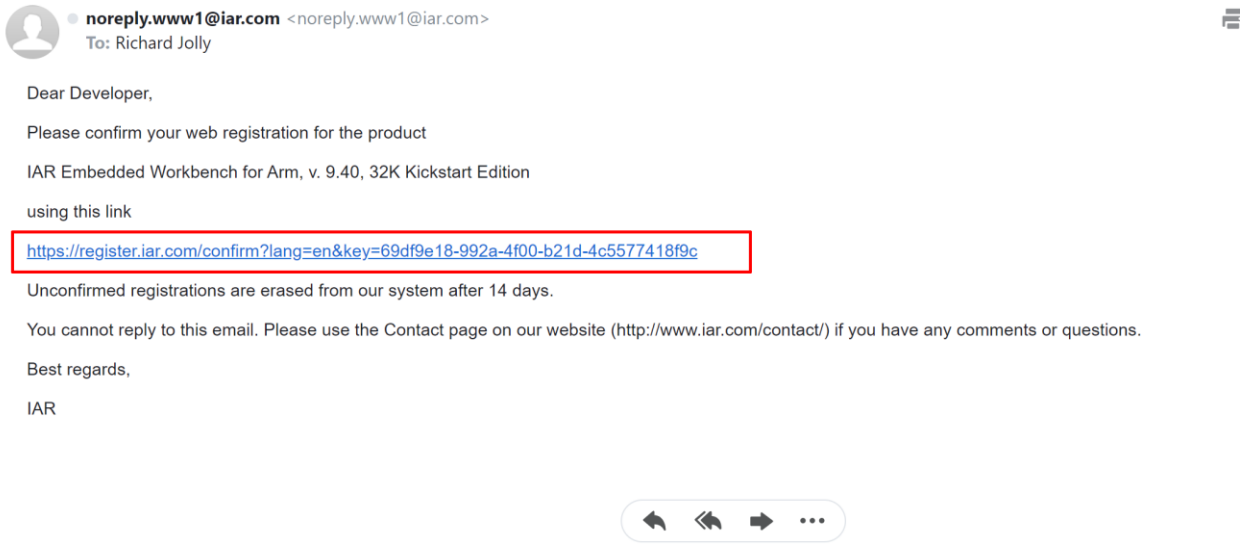


Please Confirm Registration

An email has now been sent to the address you specified
(@yahoo.com), asking you to confirm the registration. Follow the instructions in that email to receive information on how to proceed.

IAR website

Click on the link in the email.



noreply.www1@iar.com <noreply.www1@iar.com>
To: Richard Jolly

Dear Developer,

Please confirm your web registration for the product

IAR Embedded Workbench for Arm, v. 9.40, 32K Kickstart Edition

using this link

https://register.iar.com/confirm?lang=en&key=69df9e18-992a-4f00-b21d-4c5577418f9c

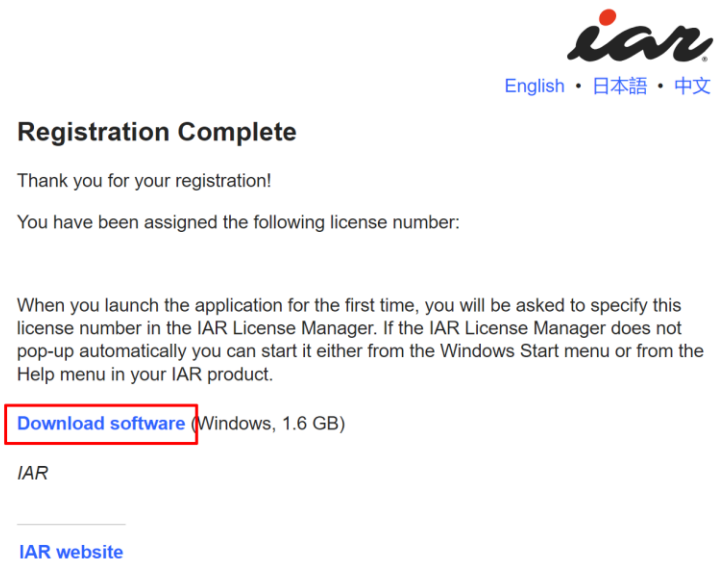
Unconfirmed registrations are erased from our system after 14 days.

You cannot reply to this email. Please use the Contact page on our website (http://www.iar.com/contact/) if you have any comments or questions.

Best regards,

IAR

Click on the “Download software" link



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Registration Complete

Thank you for your registration!

You have been assigned the following license number:

When you launch the application for the first time, you will be asked to specify this license number in the IAR License Manager. If the IAR License Manager does not pop-up automatically you can start it either from the Windows Start menu or from the Help menu in your IAR product.

Download software (Windows, 1.6 GB)

IAR

IAR website

Wait for the download to complete

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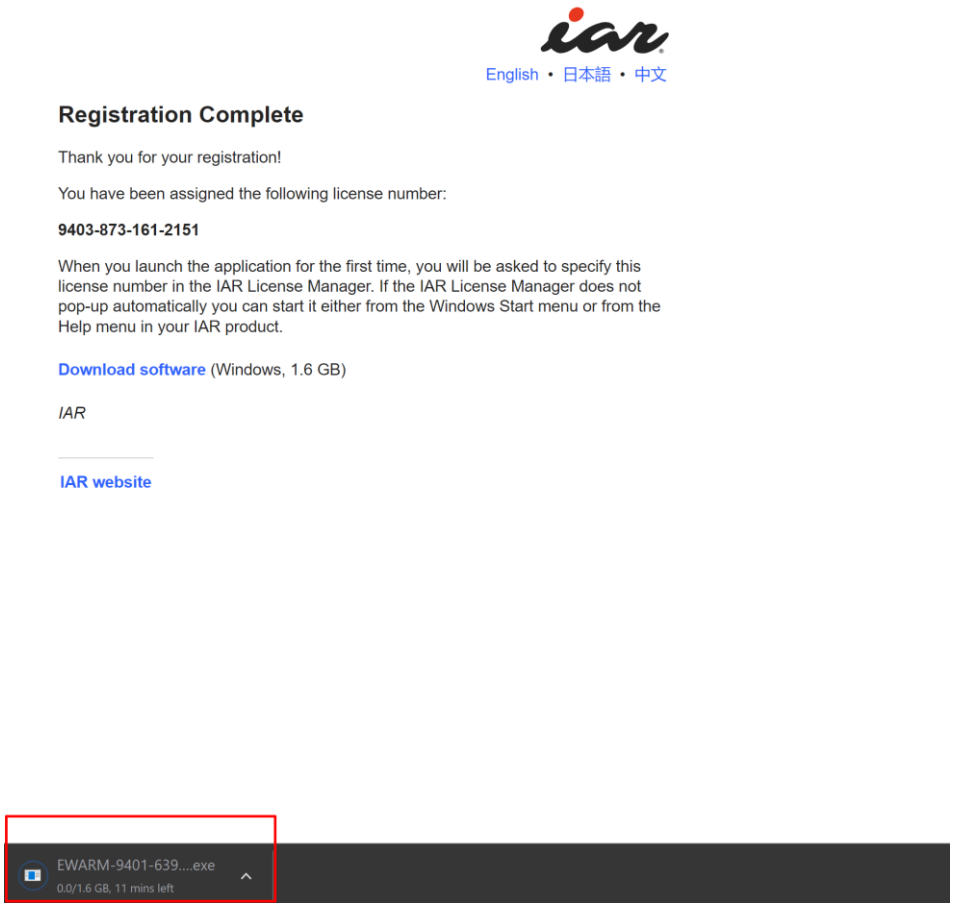

Double click on the link when complete

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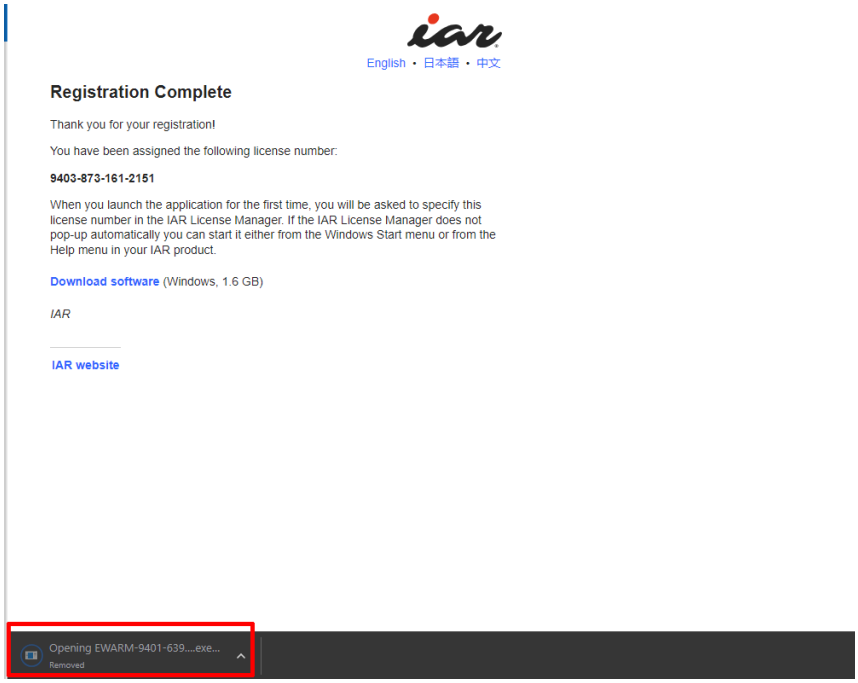
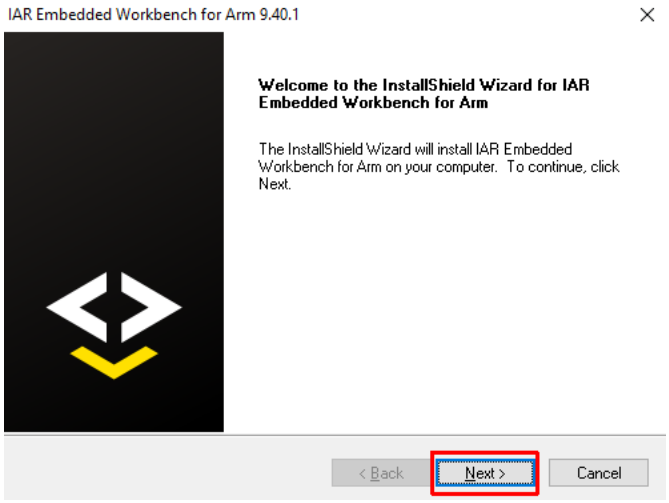


Double click on the



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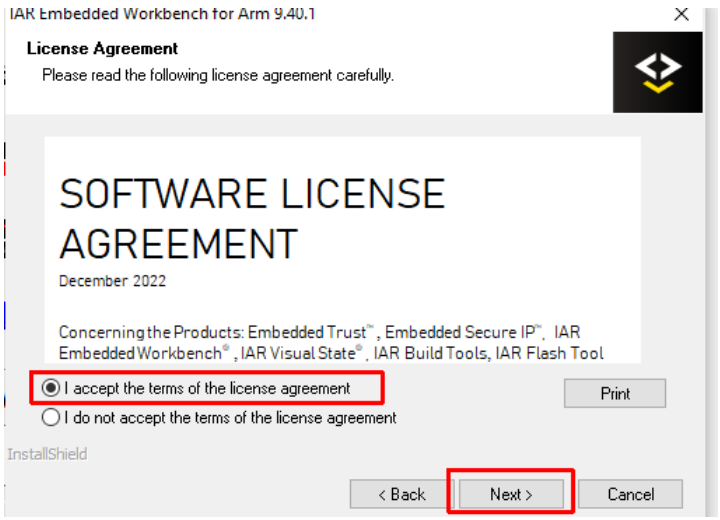
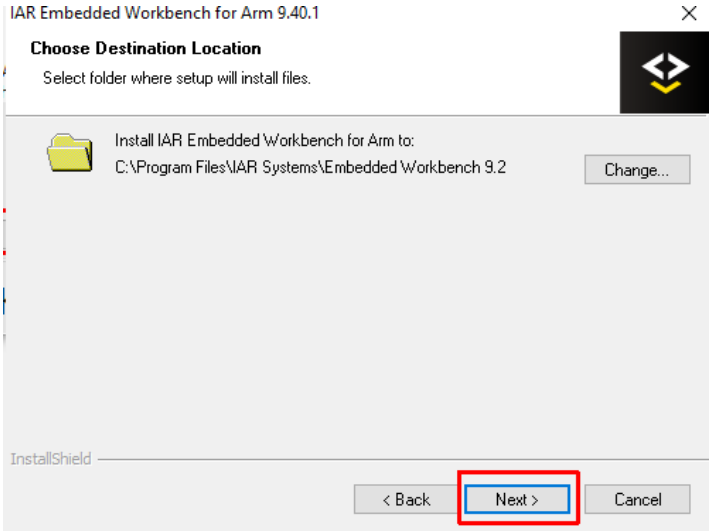


Double click on the



Make sure the “I-Jet” and “ST-LINK” radio boxes are selected. Then click Next.

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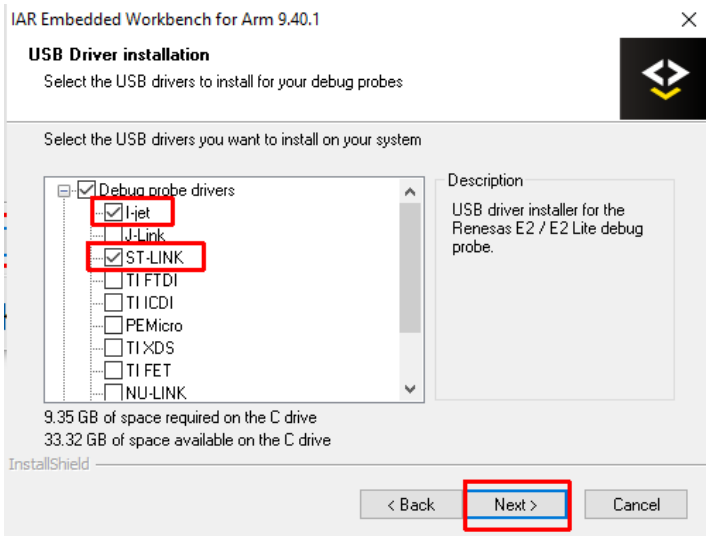
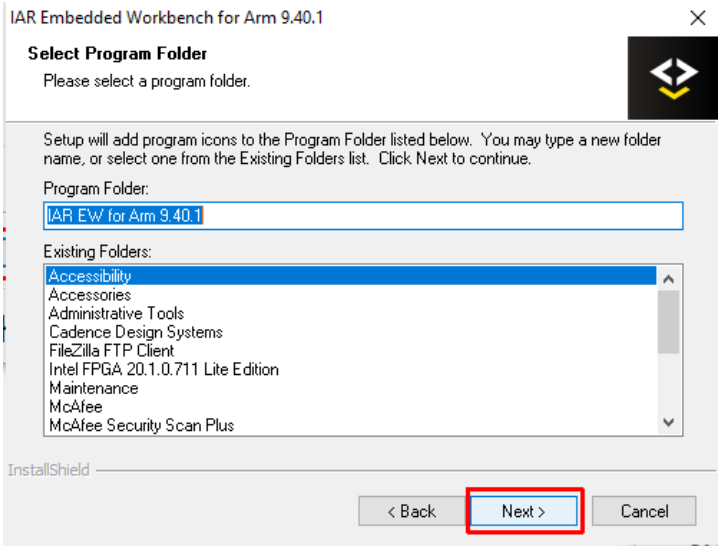


Accept the defaults on the next screens and click next.



Click Install

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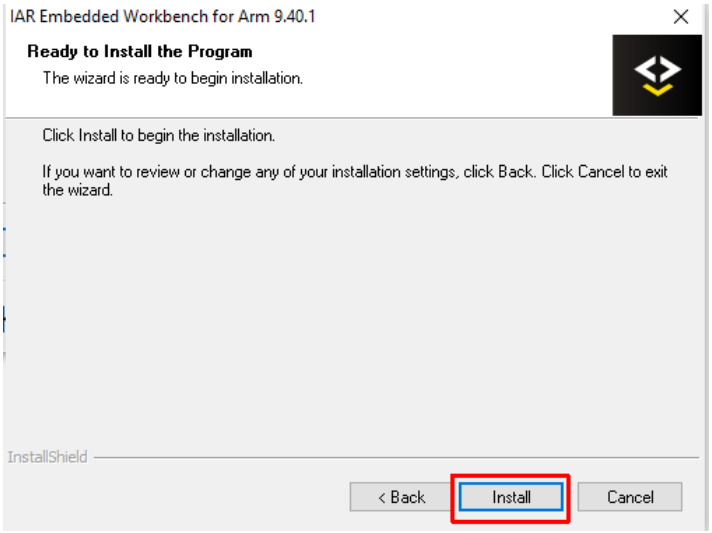
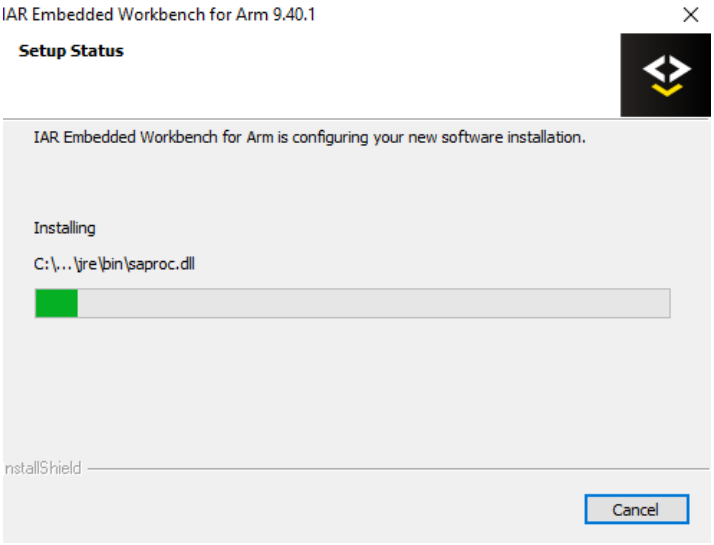
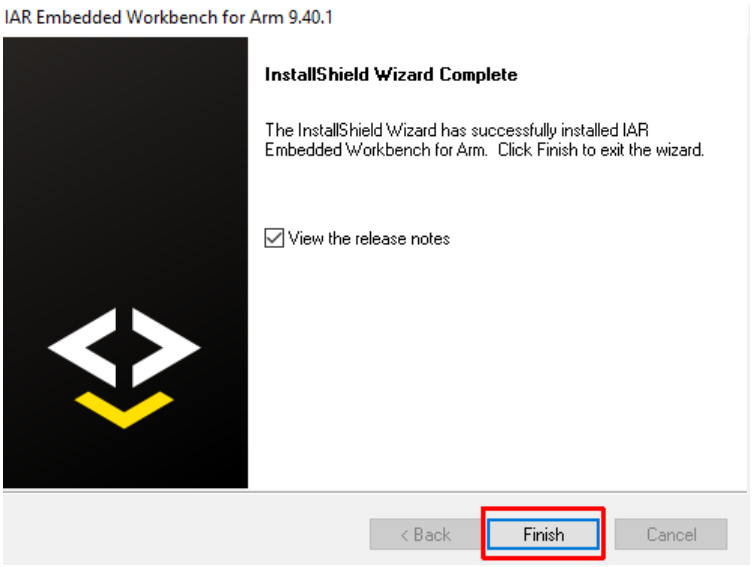


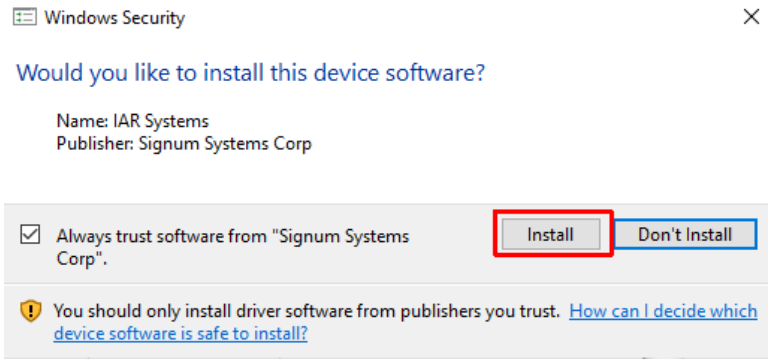
Wait until the EW is installed



When complete, click on the “Finish” button



Next up, the drivers will install for programming cables.



Select the defaults and allow the wizards to complete the driver installation.

Once software and driver installation is complete, you will need to obtain a license. Click on the Windows button and click on the “IAR License Manager For ARM xxx” link.

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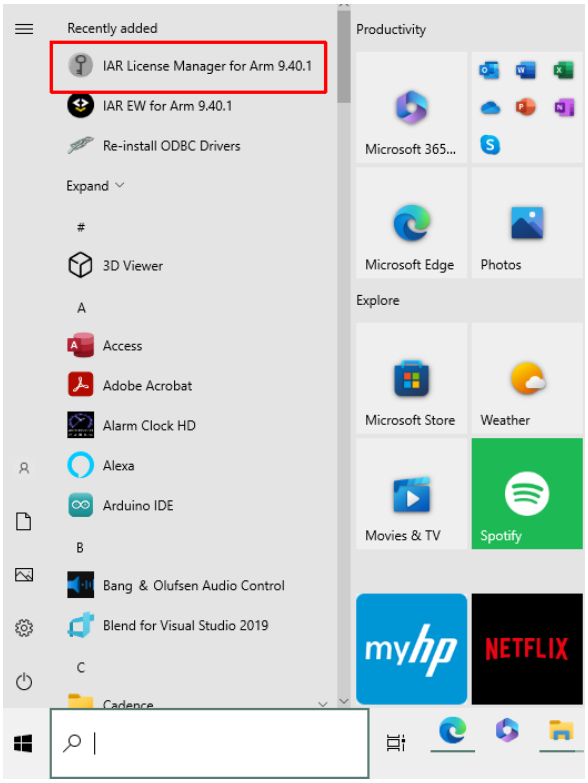
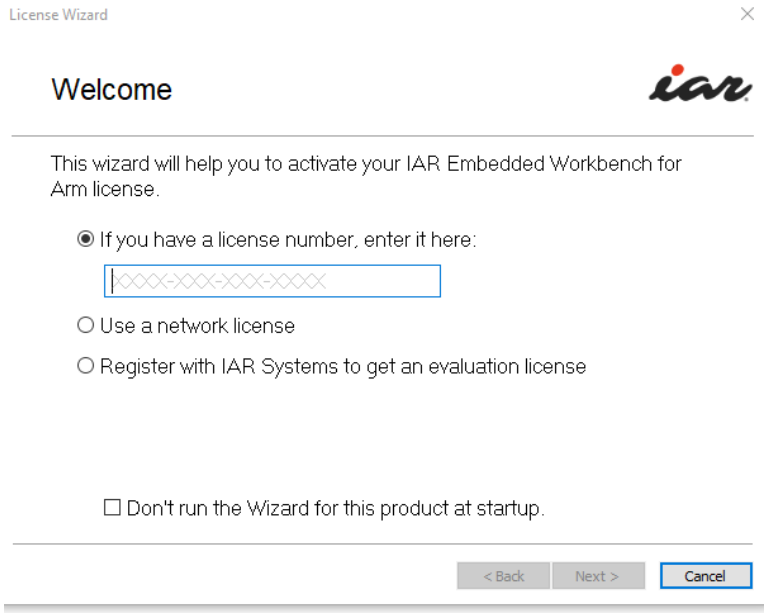
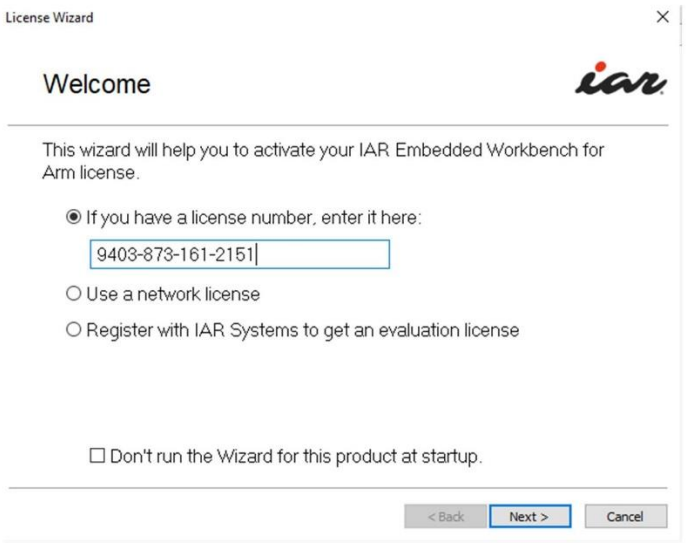


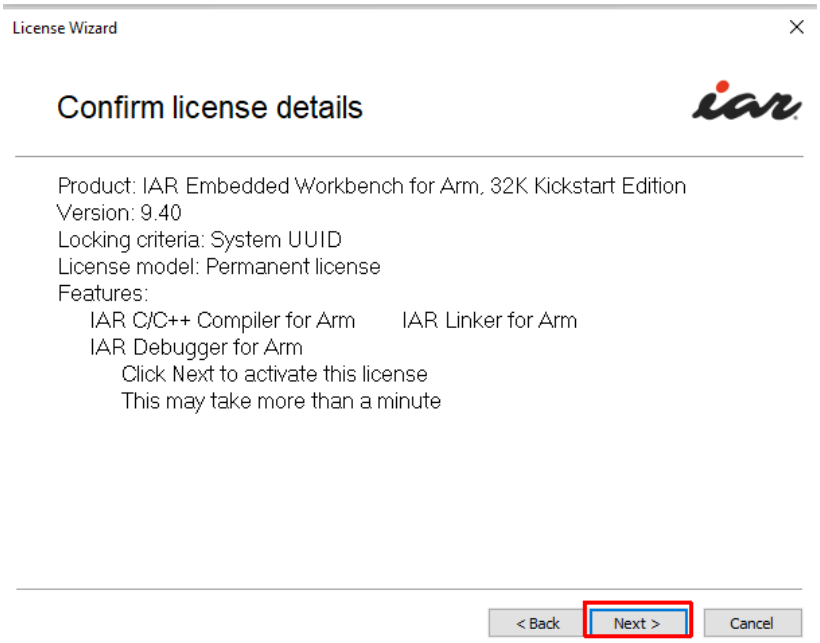
The license manager will search for installed licenses. When it does not find one, you will see this message:



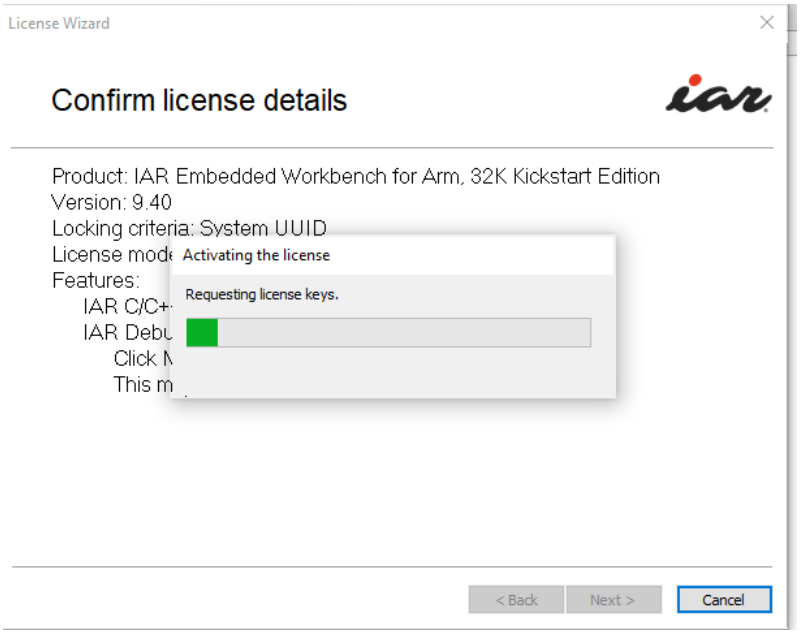
Here, you will refer to the previous website that displays your license number. So, select the “If you have a license umber, enter it here” and click next.



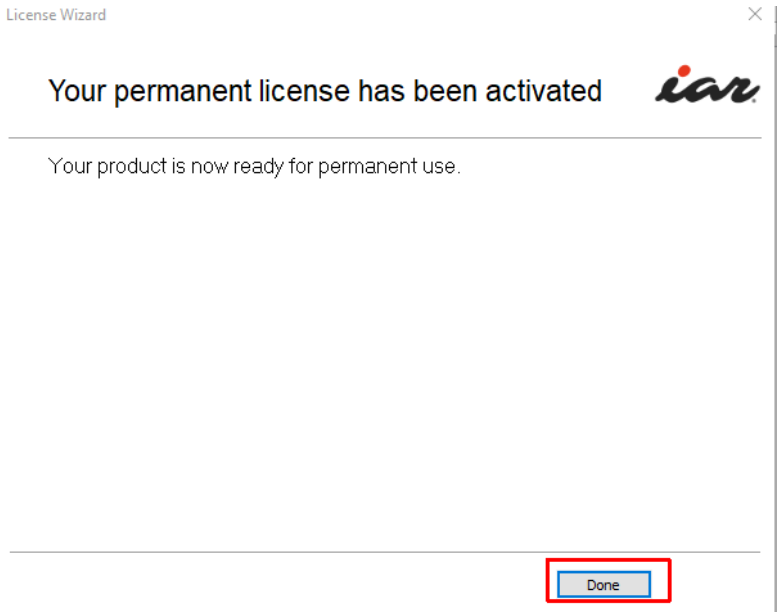
You should receive a confirmation. Click “Next”



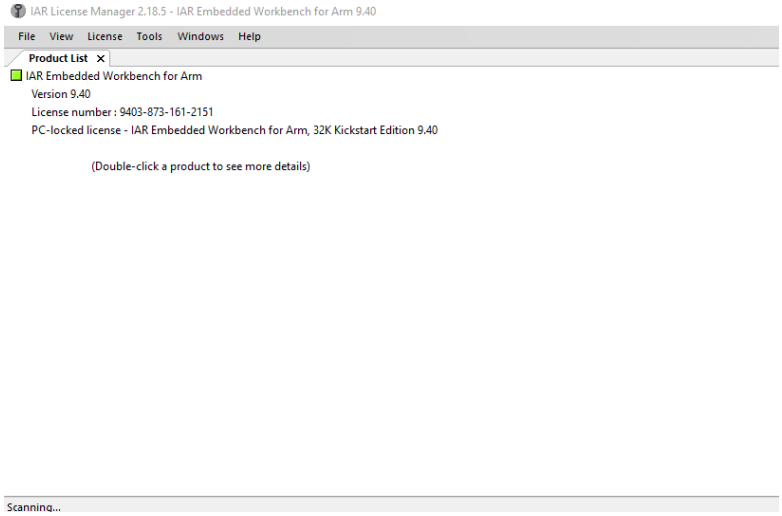
The following message will appear.



Click “Done”



License Manager should now look like this:



The IAR EW software is now installed and the license has been applied. You can run the software by clicking on the icon in the Windows Tray.

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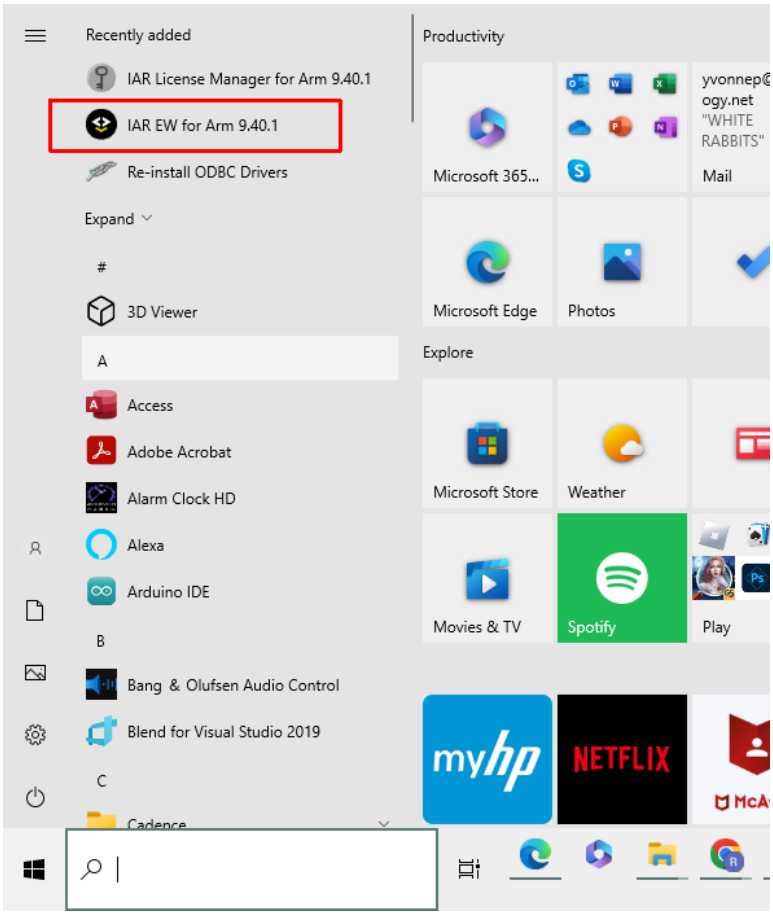
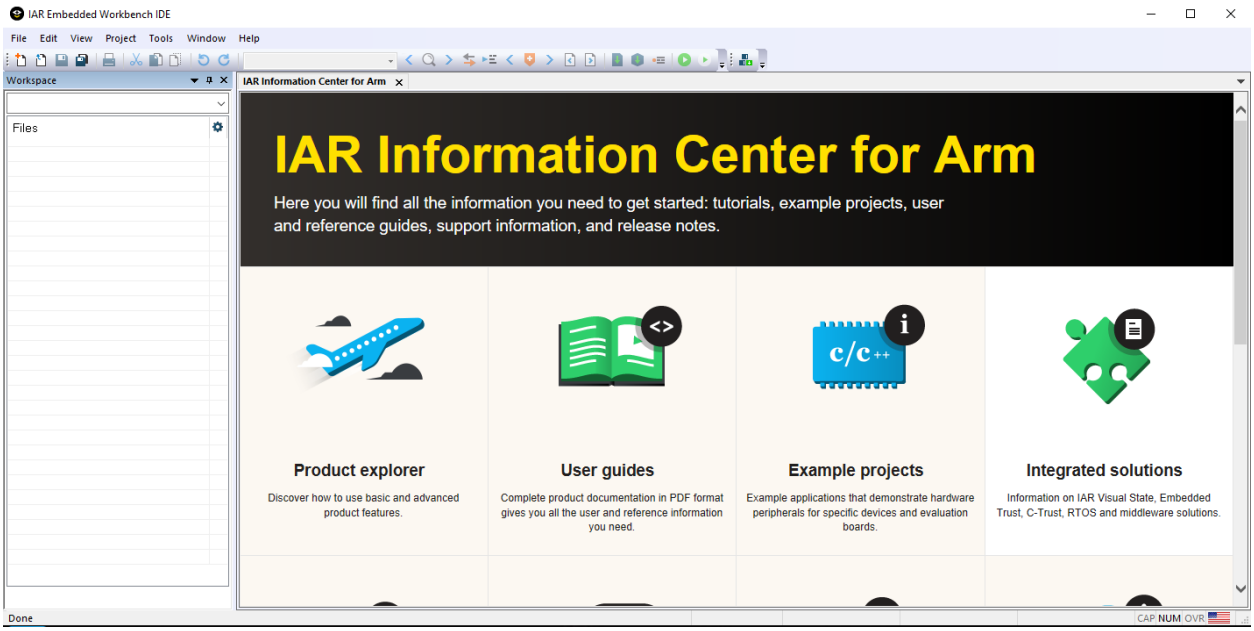


It will open similar to this:



So, the software is ready, but we are not ready to start creating a project for an MCU just yet. Follow the next steps to get the Board Support Package software installed. The BSP software will allow us to prepare all the project files to use in IAR EW.

2.2 ST CubeMX software installation

The SWD Blaster will support a wide range of MCUs with the list not limited to:

ST Micro

NXP

Texas Instruments

Microchip

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Infineon

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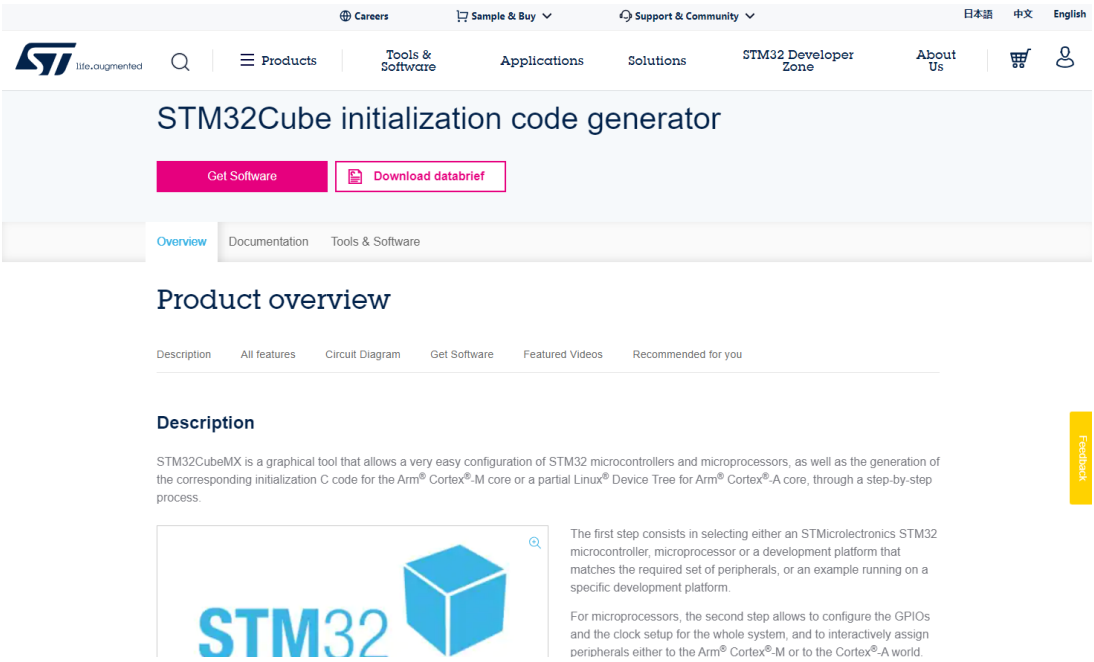
MCU Programmers User Manual

For the example purposes of this User Manual, we will focus on MCU's from ST Micro. We will install and give a tutorial on the use of ST CubeMX Board Support Package software. However, most of the above vendors have similar BSP software.

Go to the ST.com website and find the STM32CubeMX download page.



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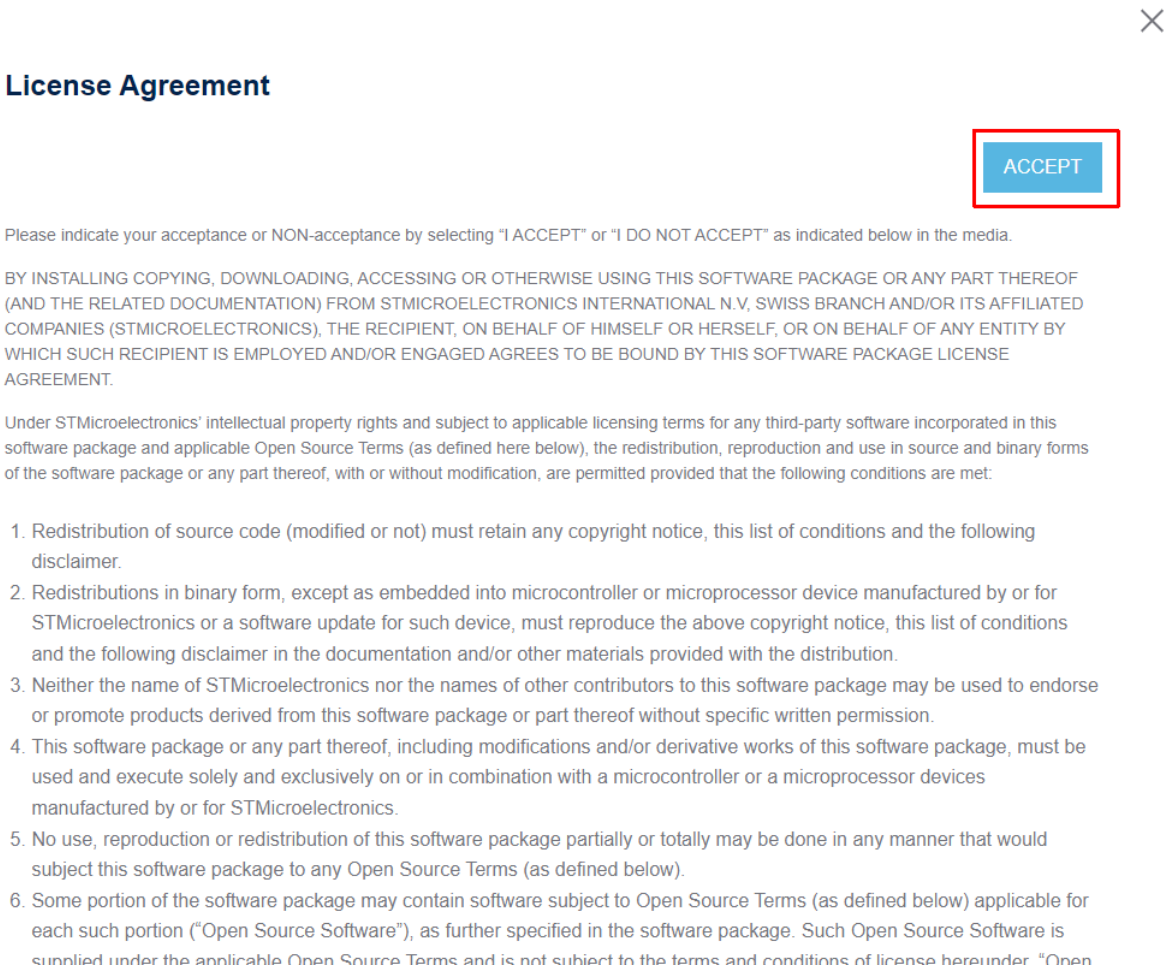

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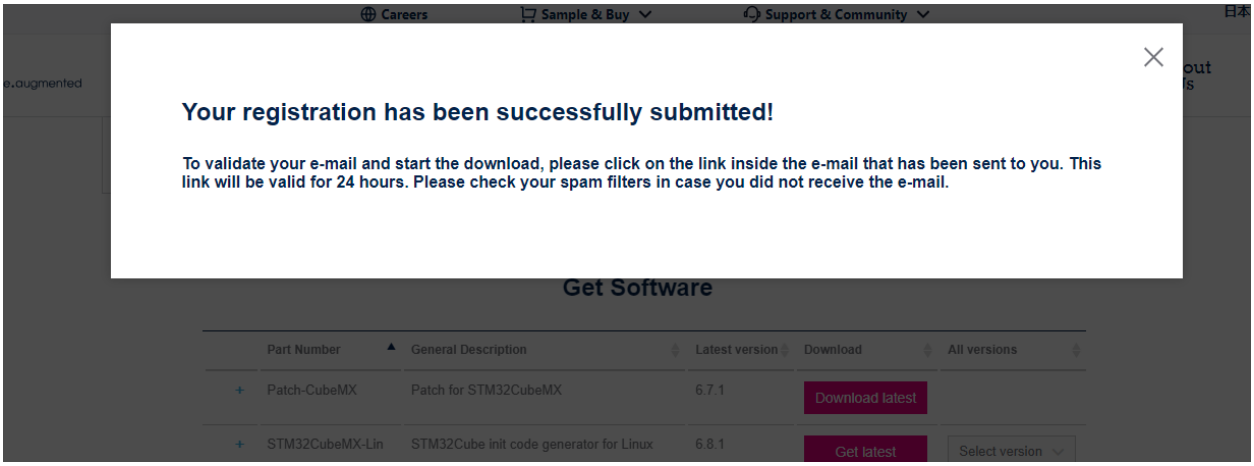
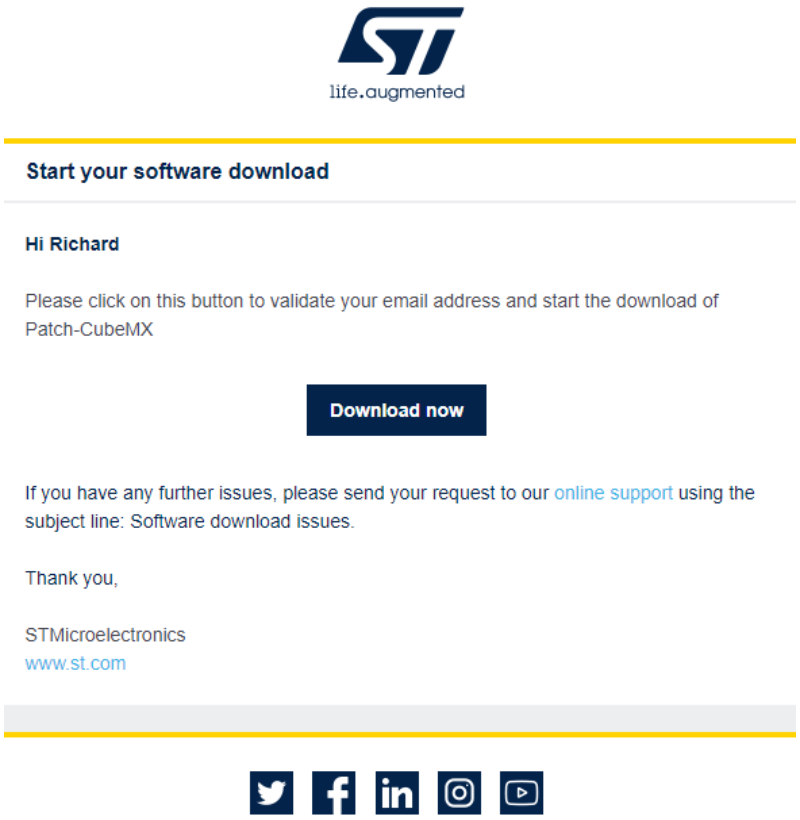
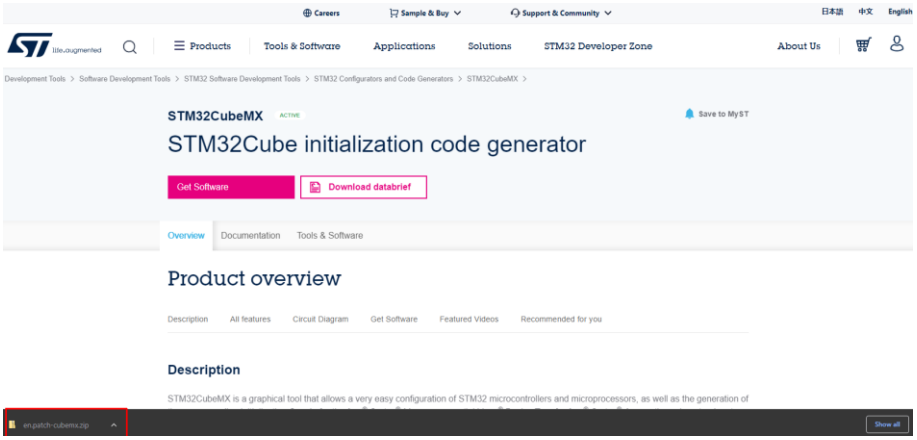


Search for the email from STMicro.

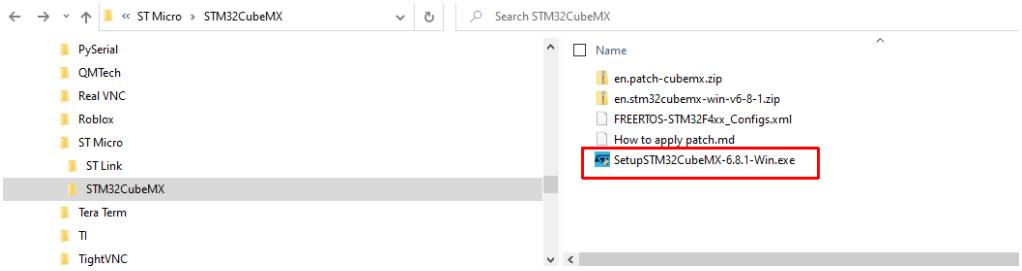


Click on the “Download now” button.

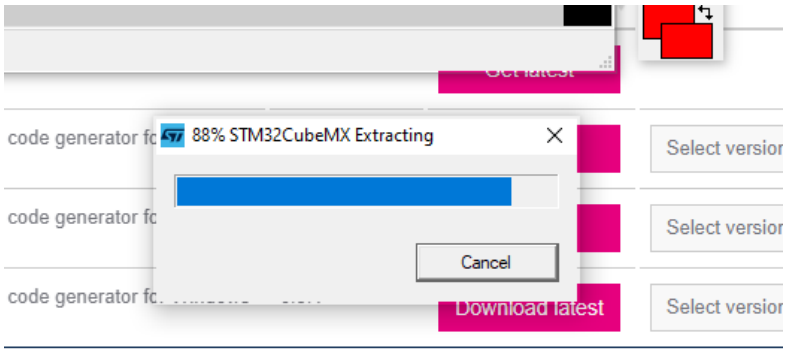
The browser will store the file in the tray.



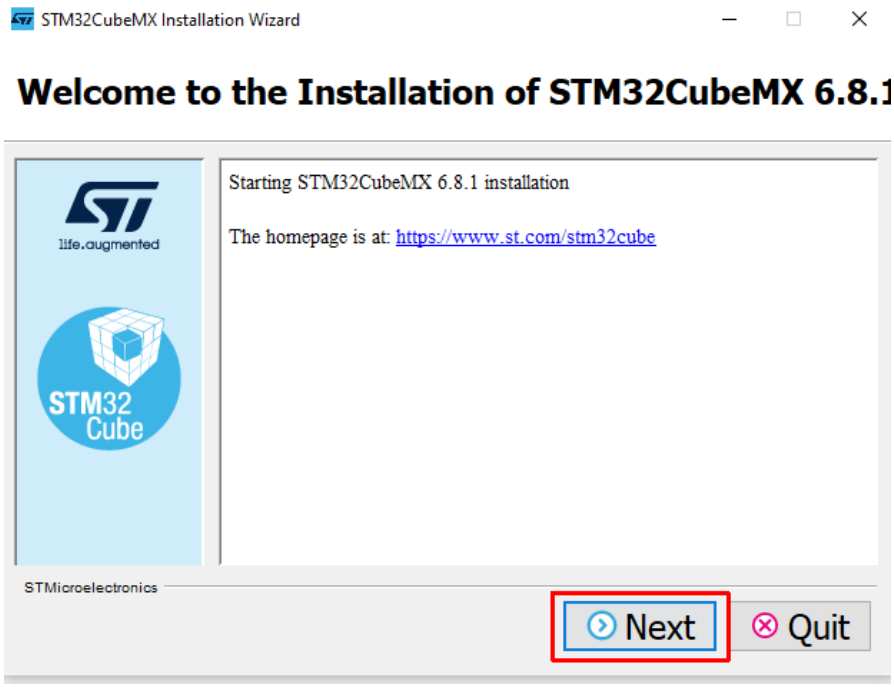
Double click on the link to install.



Select the install from the question, you should see the extraction message:



Click “Next”



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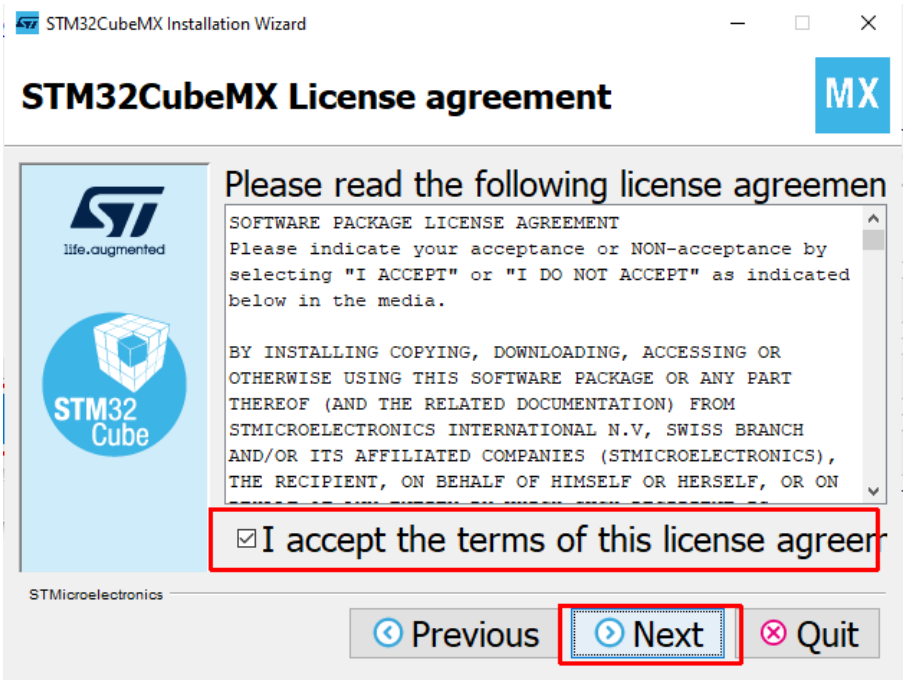
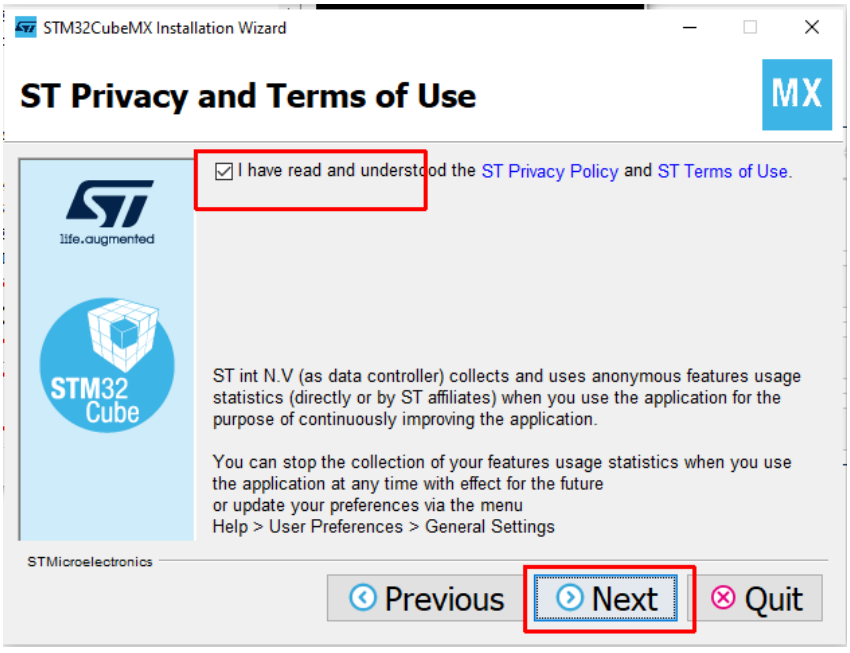
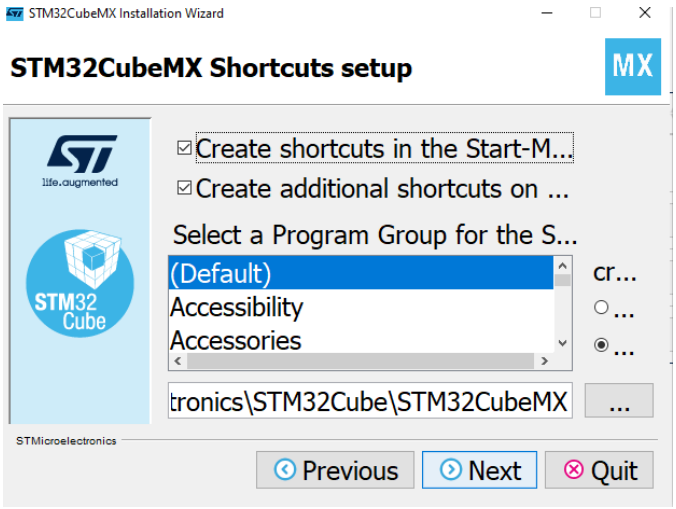


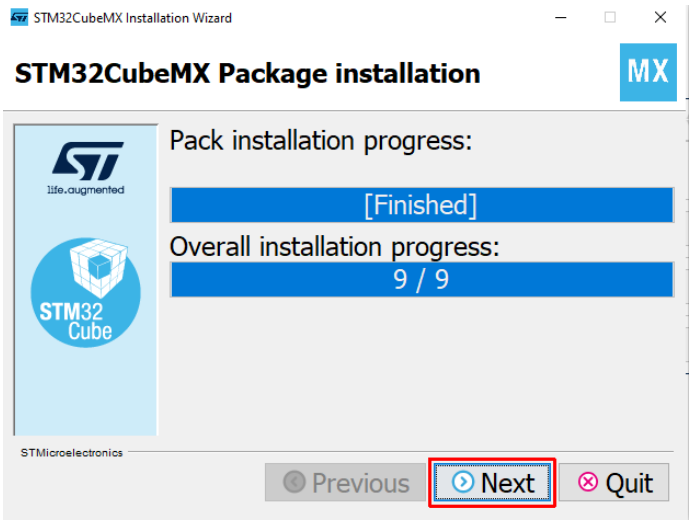
Accept the Privacy Terms and click “Next”.



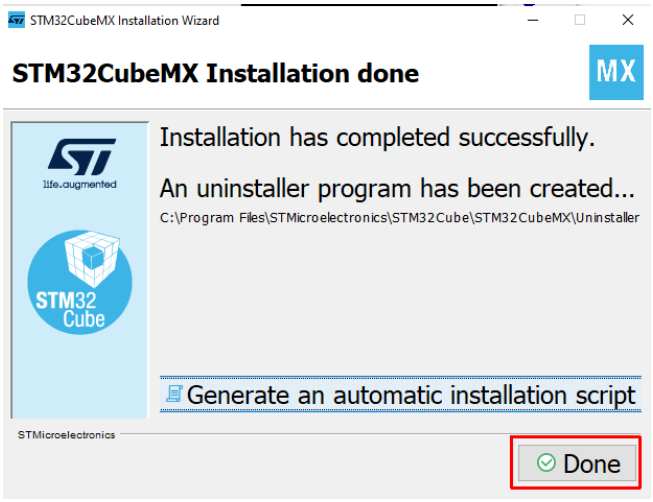
Accept the defaults and install.



Click on “Next”



Click “Done”



Click on the Windows Icon and click on the STM32CubeMX icon.

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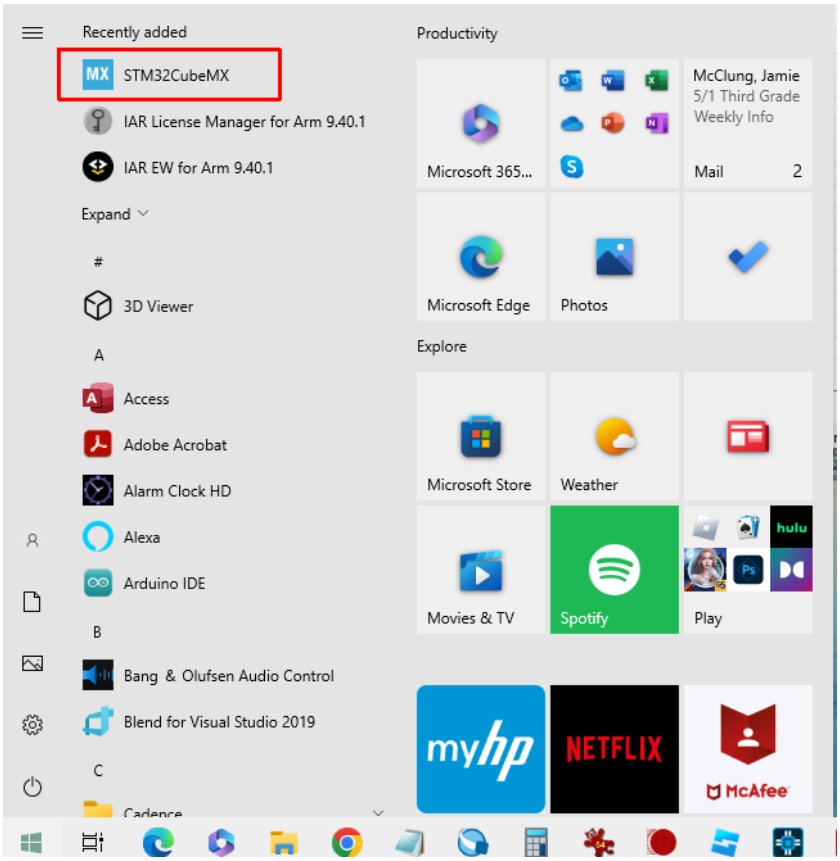
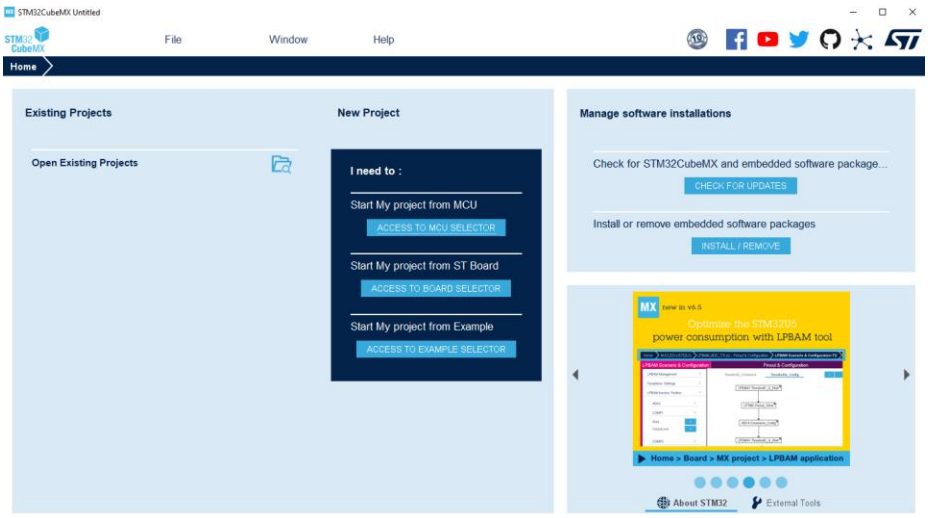


The software will open.

Once the software is opened, we are ready to start an MCU project.



2.3 Creating a Project for IAR Embedded Workbench

For the purposes of this example, we will be using the NUCLEO-L552ZE-Q board from STMicro. The same steps can be used for most STM32 MCU's.

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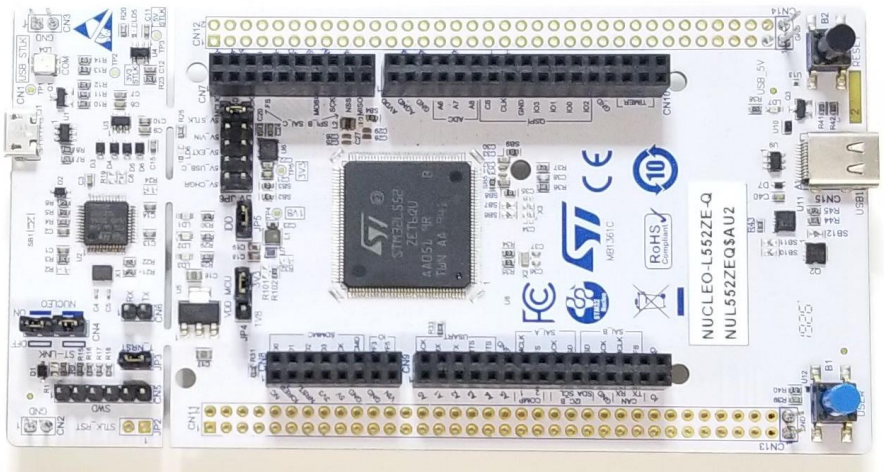
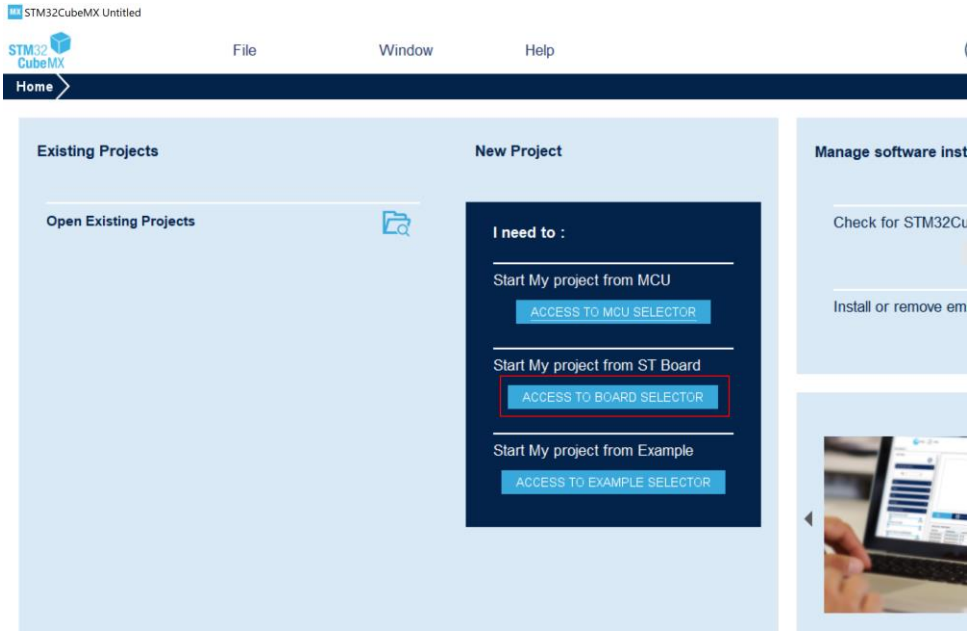


The first step is to select the MCU under CubeMX. CubeMX has a built in selection tool for the specific NUCLEO boards in its catalog. So, we only need to select the board from the drop down box. First click on the “Access To Board Selector” button.



CubeMX will download the required files from an internet connection.

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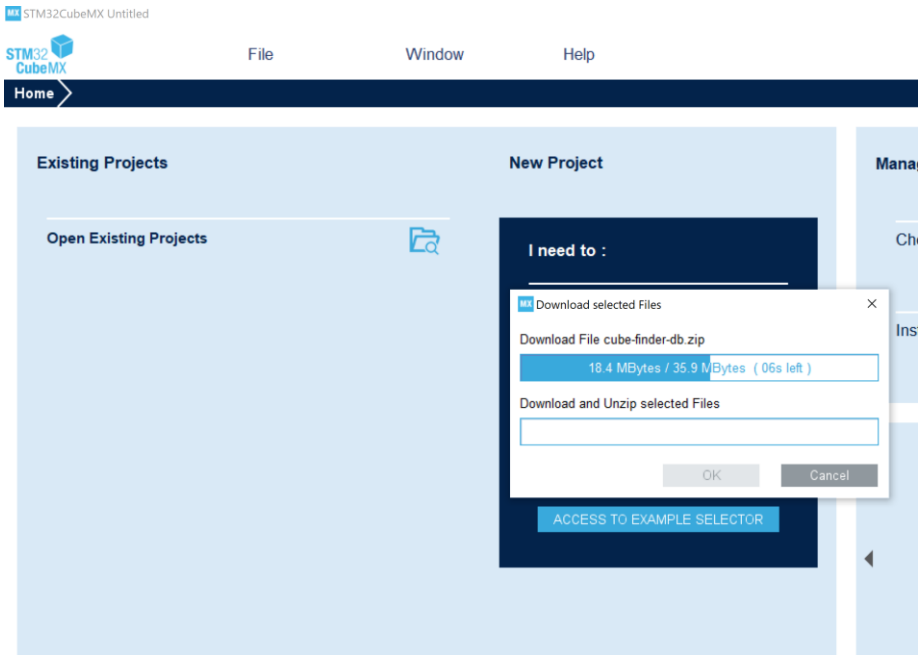

Then you will see the selector menu.

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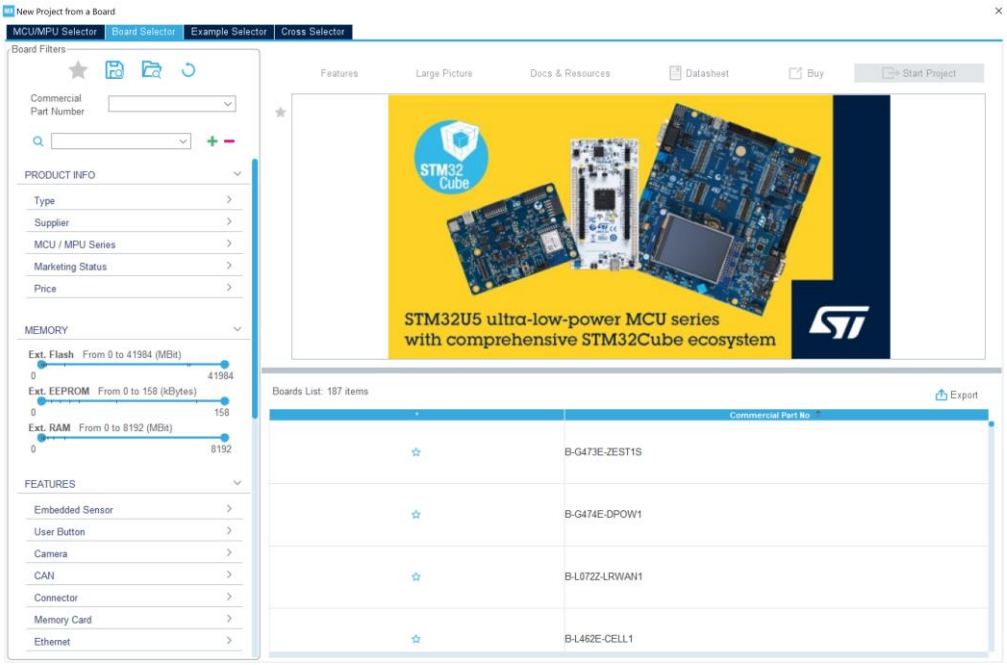

Click on the Drop Down box next to the “Commercial Part Number” and scroll down to the NUCLEO-L552ZE-Q.

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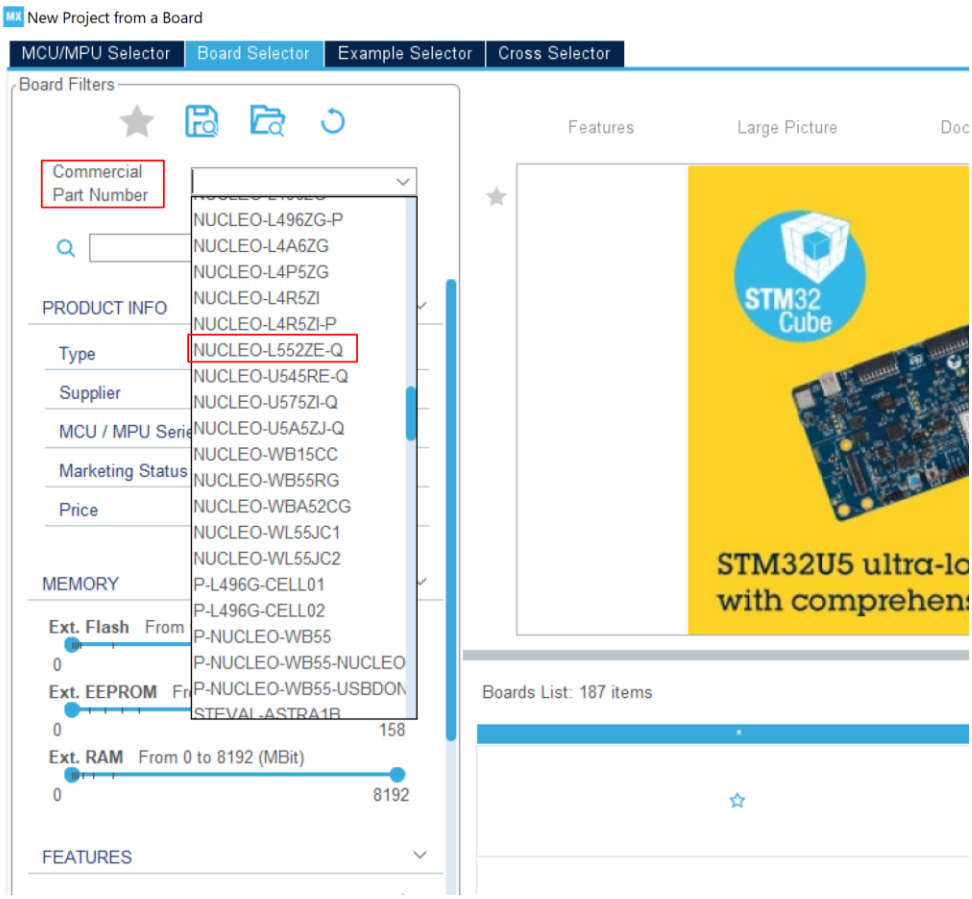

Click on the selection, and the Part Number will show under the Drop Down Box.

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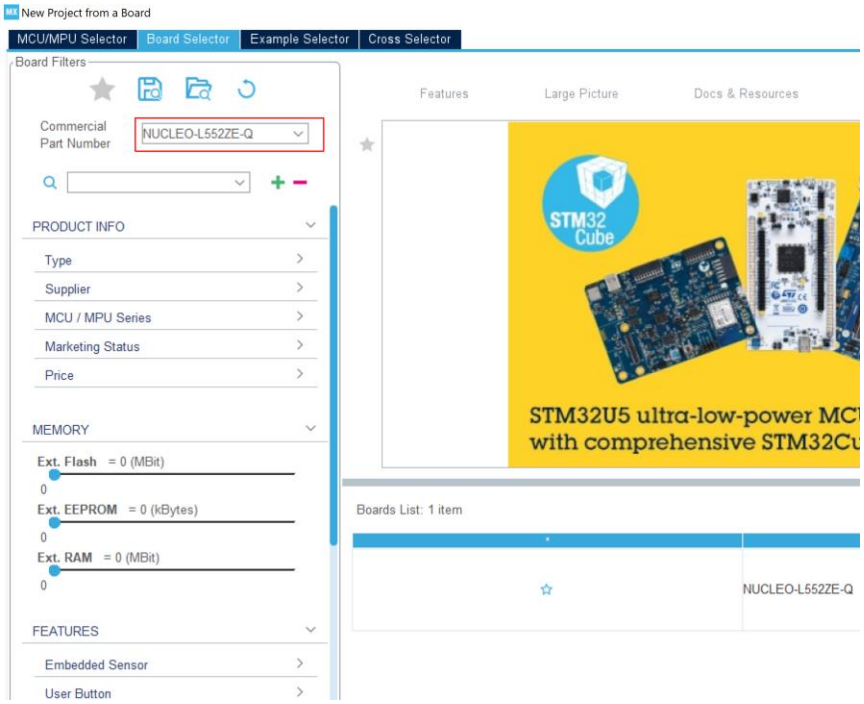
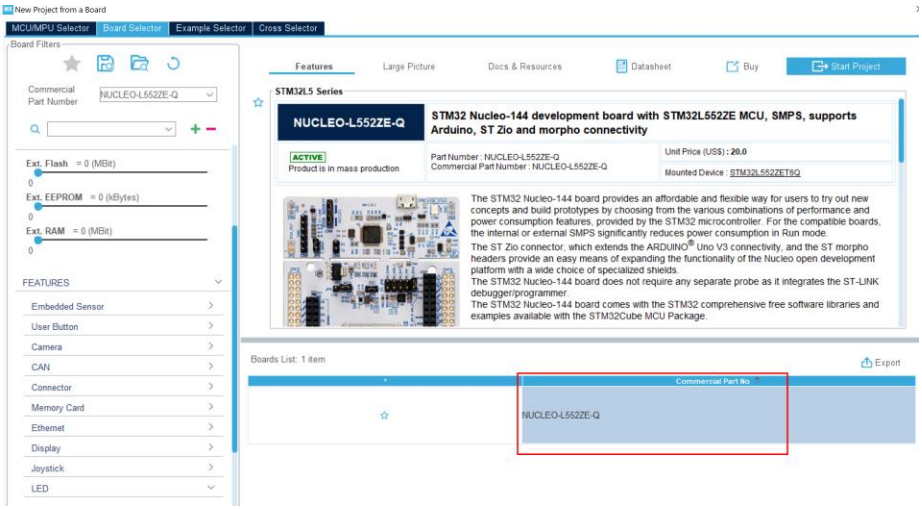


Click on the NUCLEO-L552LZE-Q icon in the lower left corner, and the details of the board will be populated under Features.



Next, click on the “Start Project” in the upper right corner.

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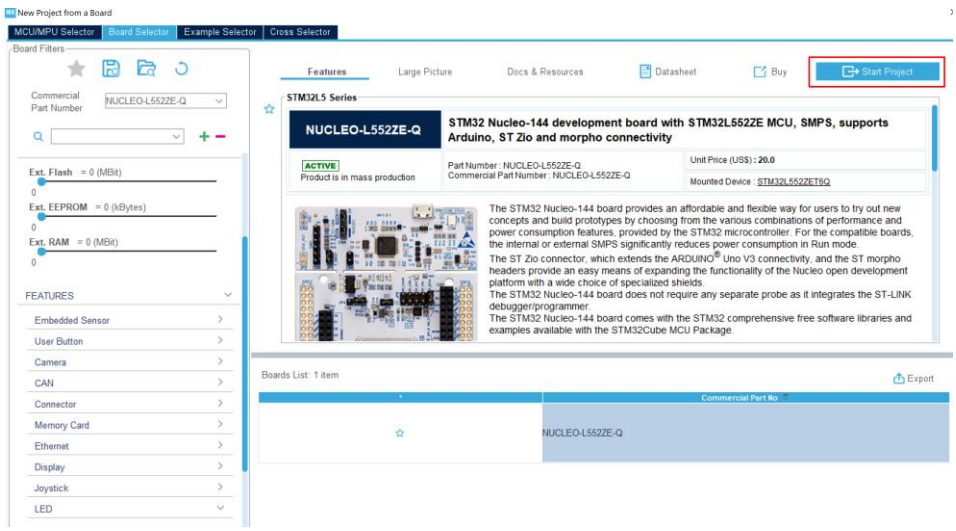
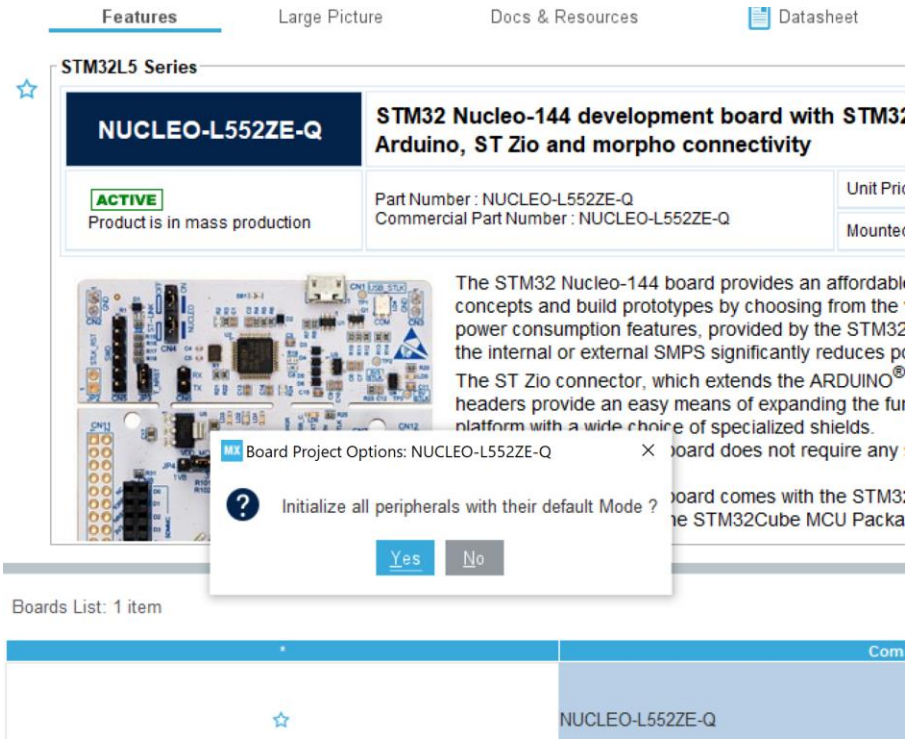
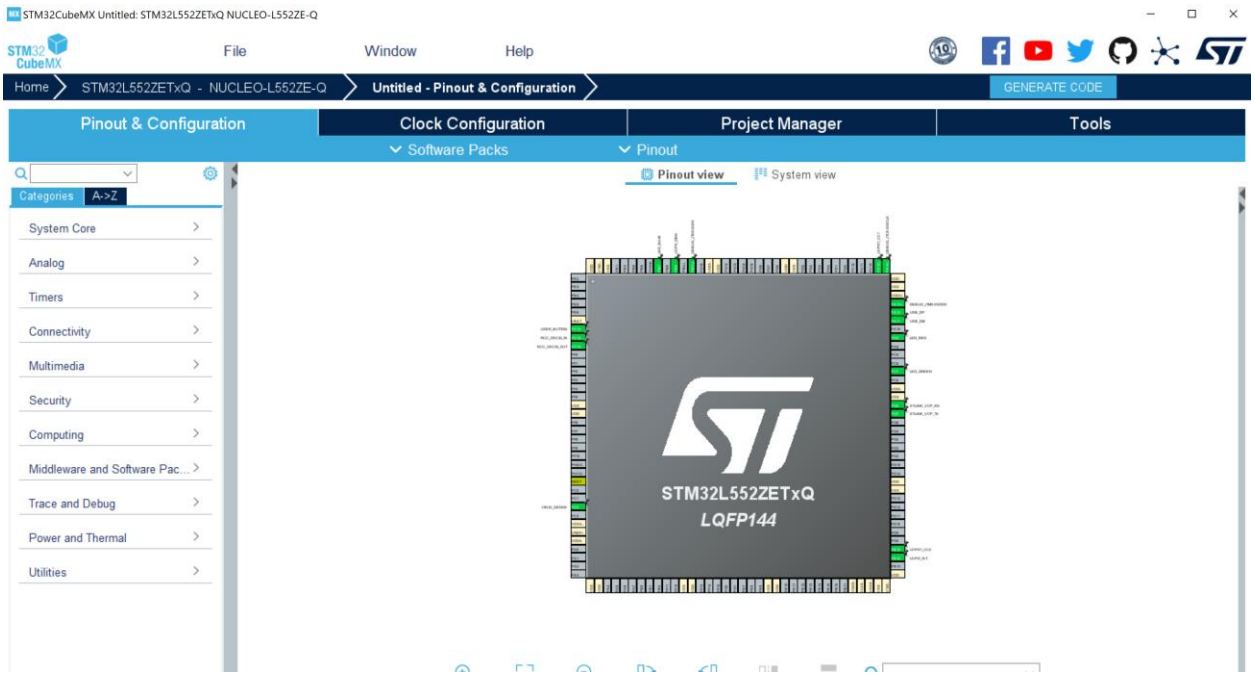


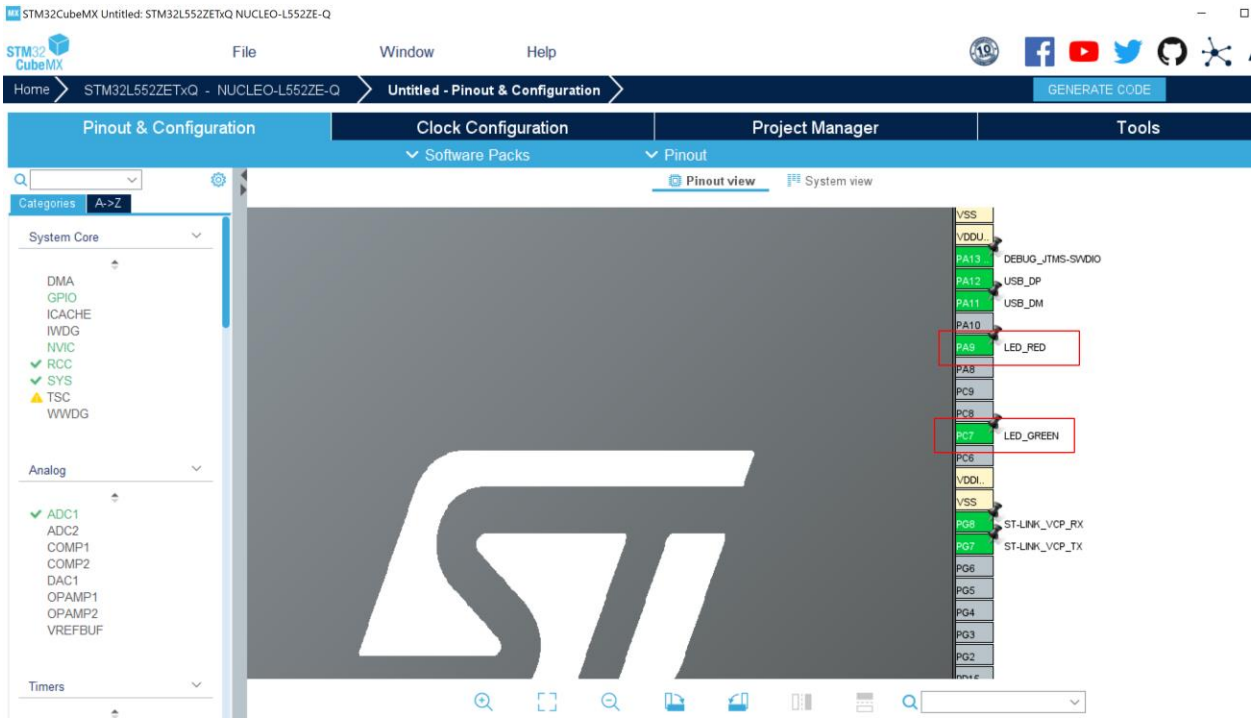
Accept the defaults.



You will see an image of the L552 chip with the GPIO's pre-selected.



You can select the various tabs under “Categories” to see the default settings that STMicro has chosen for the board. We are specifically interested in the LED Green GPIO and the LED Red GPIO.



Click on the “Clock Configuration” tab to see the internal and external clock setups. We are specifically interested in the “SYSCLK” which is running at 110MHz for this project.

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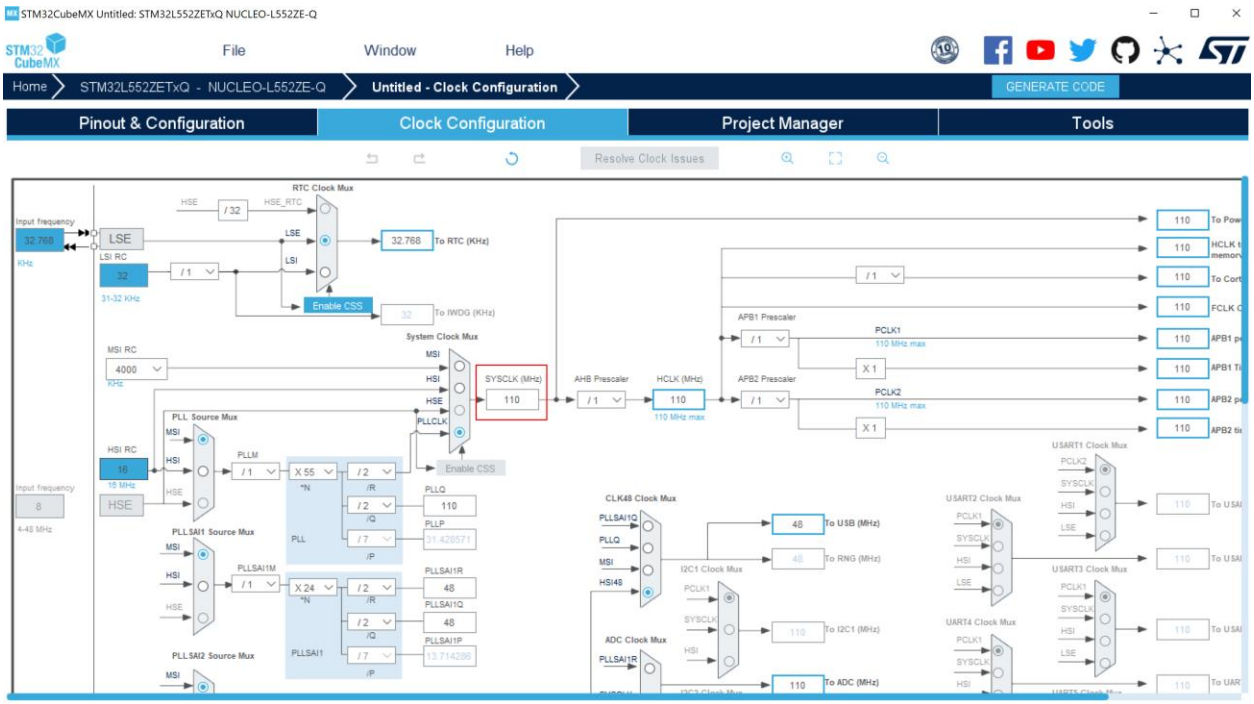

Click on the “Project Manager” tab. Enter a project name and location on your PC.

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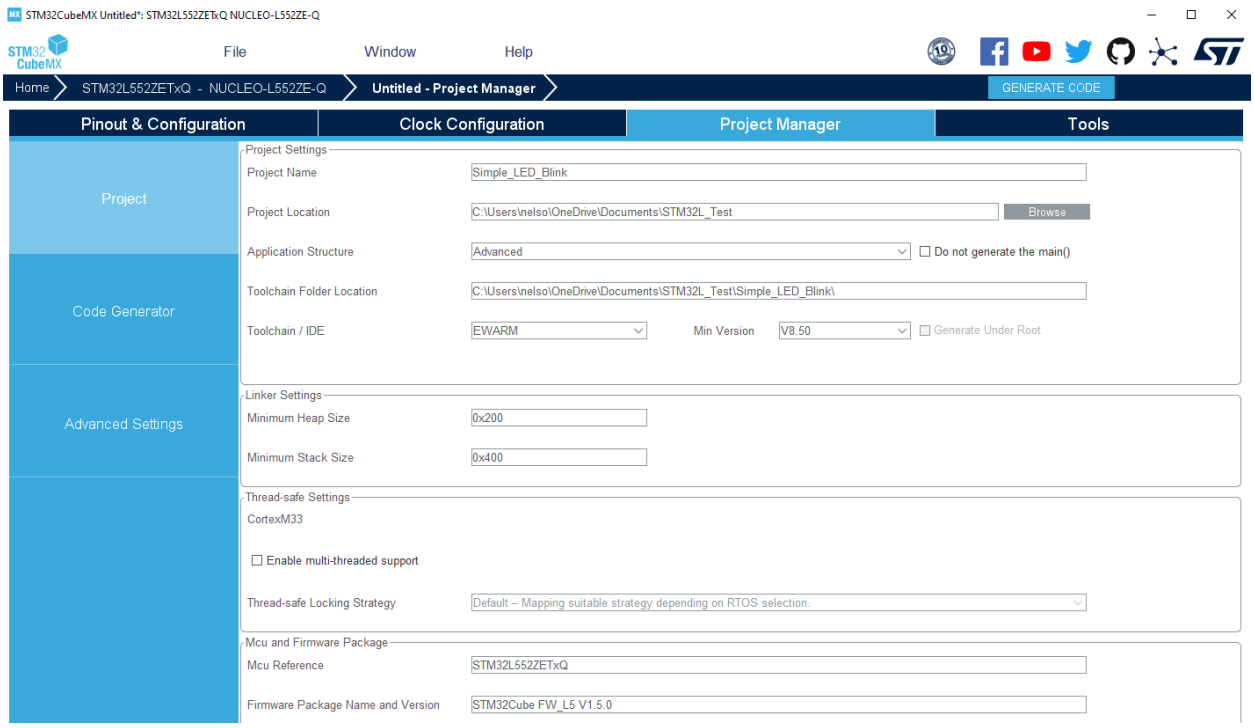

Click on the “Generate Code” button to create an IAR Project.

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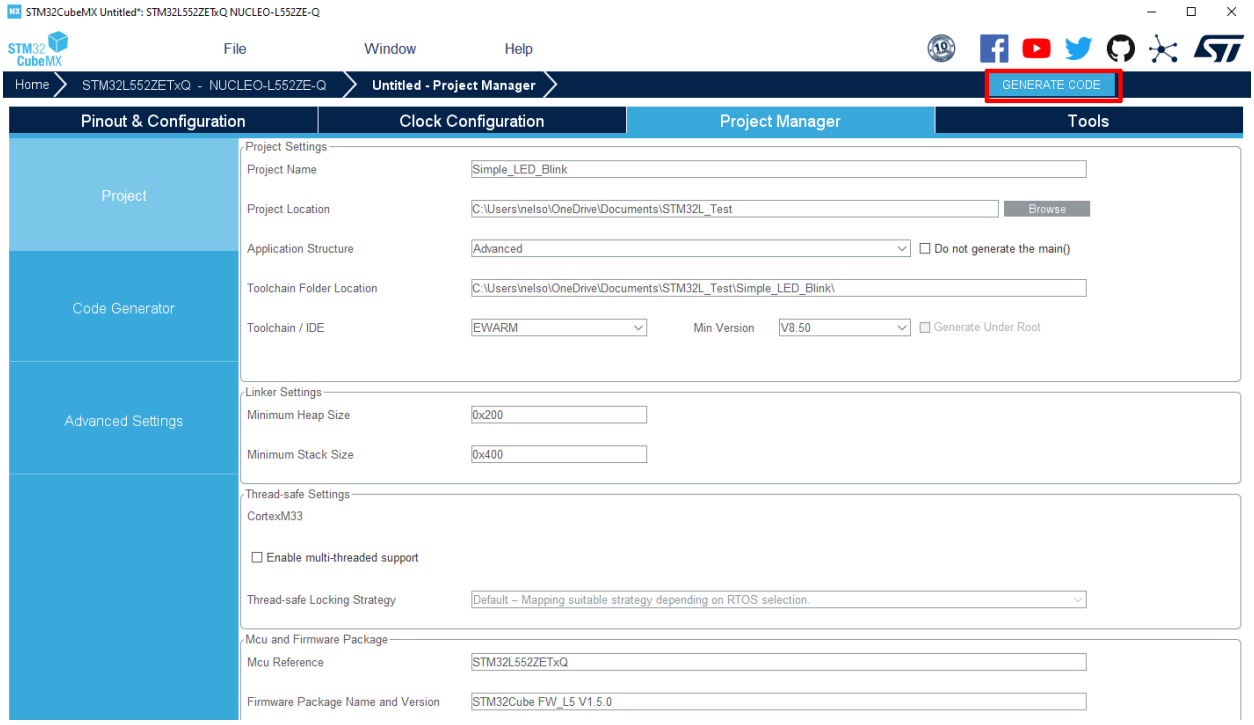
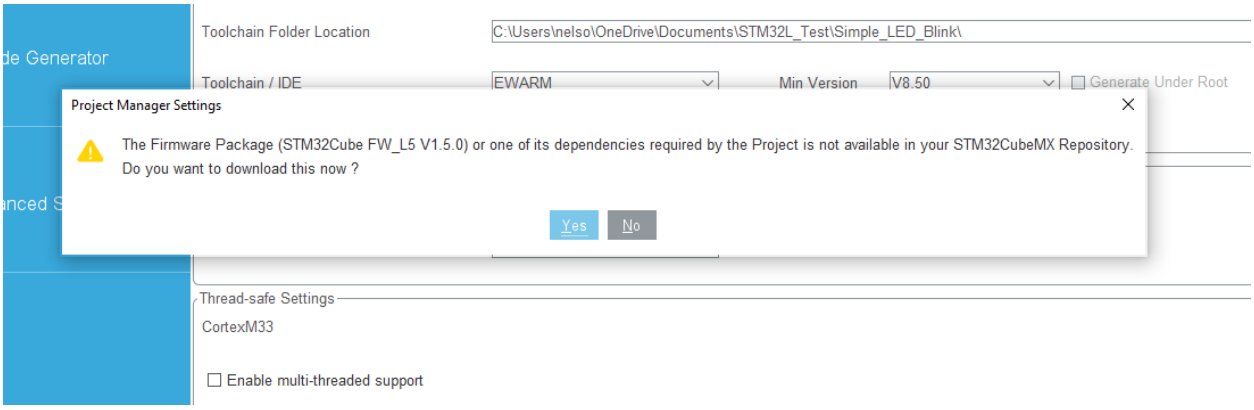
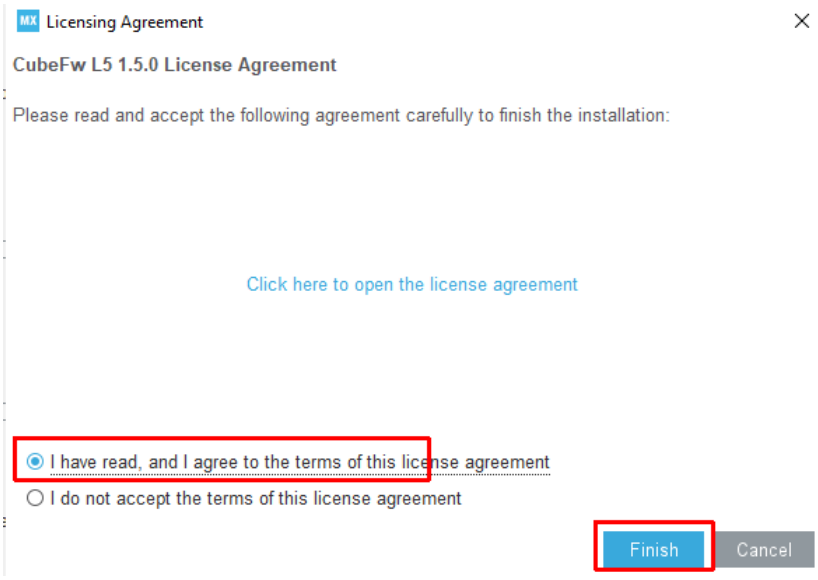


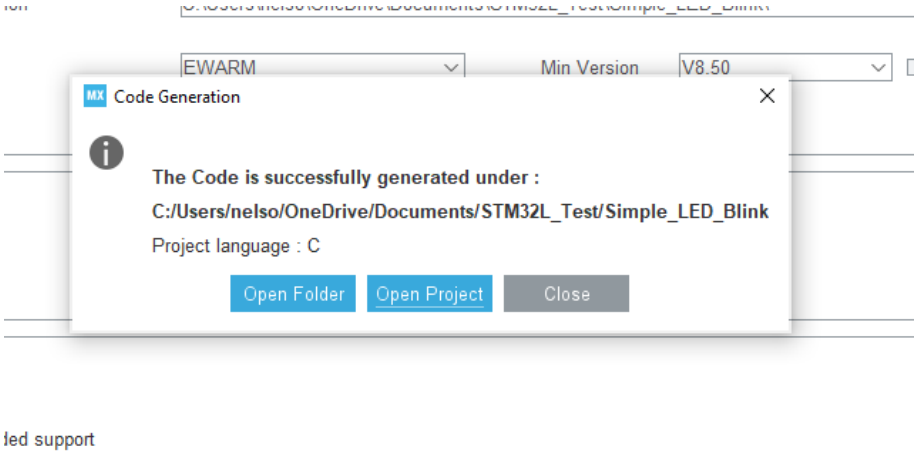
The CubeMX will probably require a download from the internet.



Accept the License and click “Finish”.



Accept any defaults during generation. Once complete, the success message will be displayed.



Click on the “Open Project”. The software will automatically open the IAR with all project files populated correctly.

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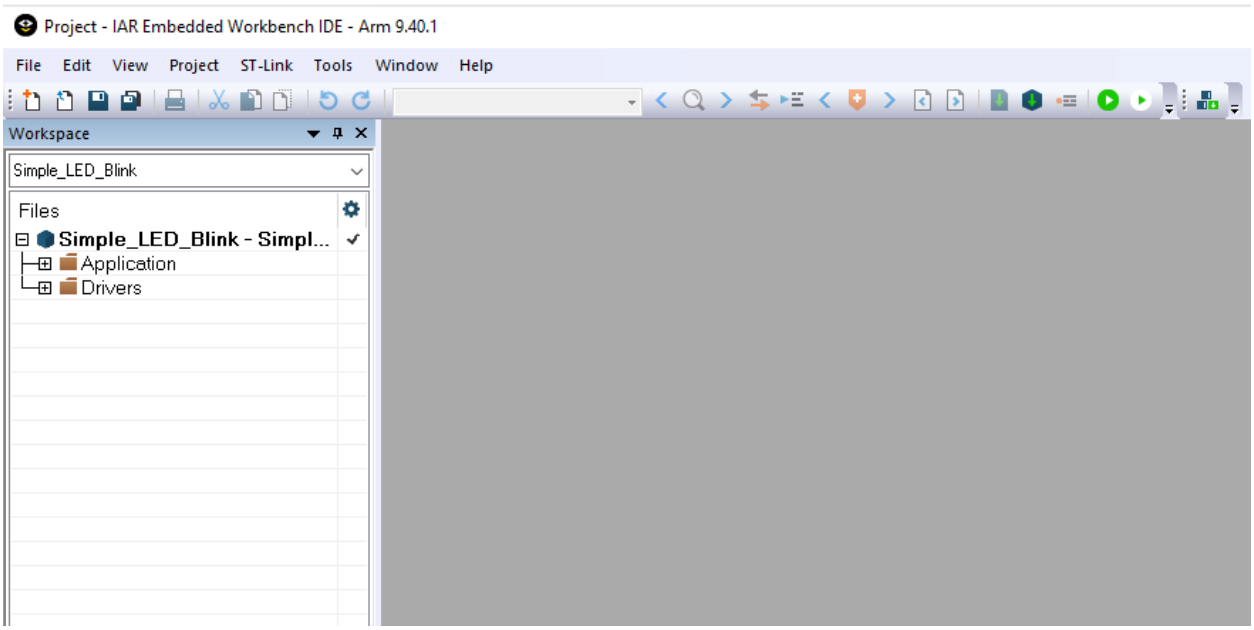
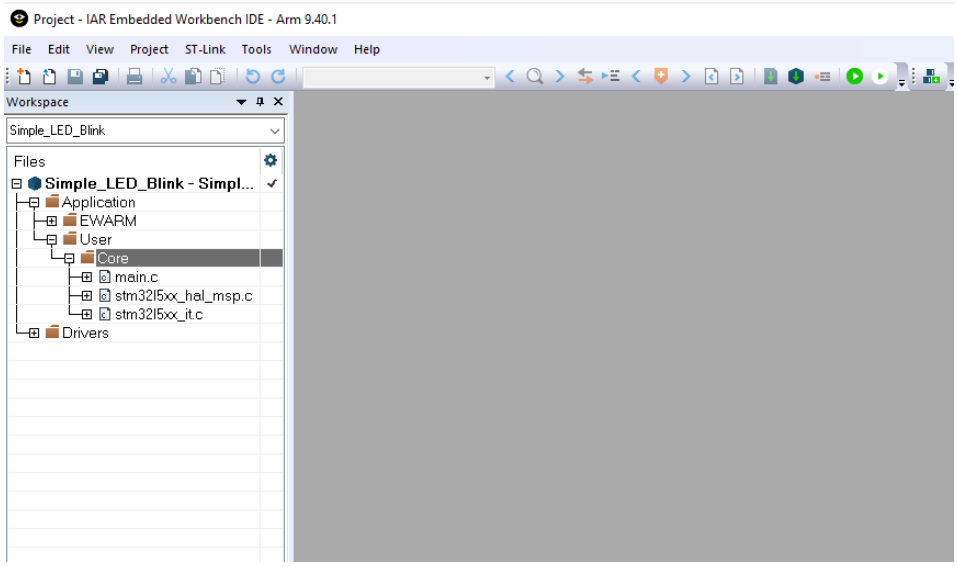


Click on the Application->User->Core to view the user files.



Double click on the “Main.c” file to view the main code.

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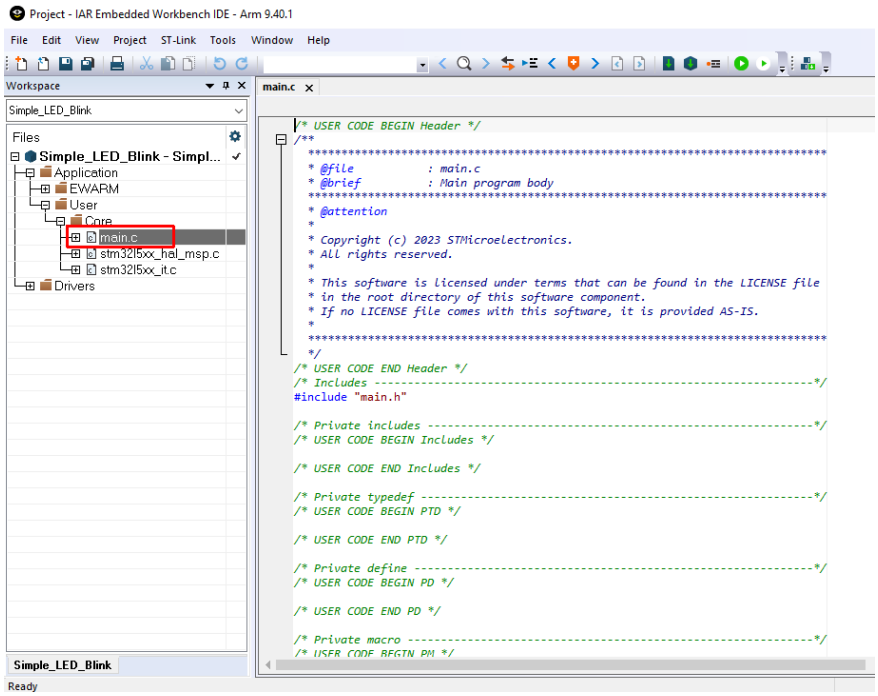
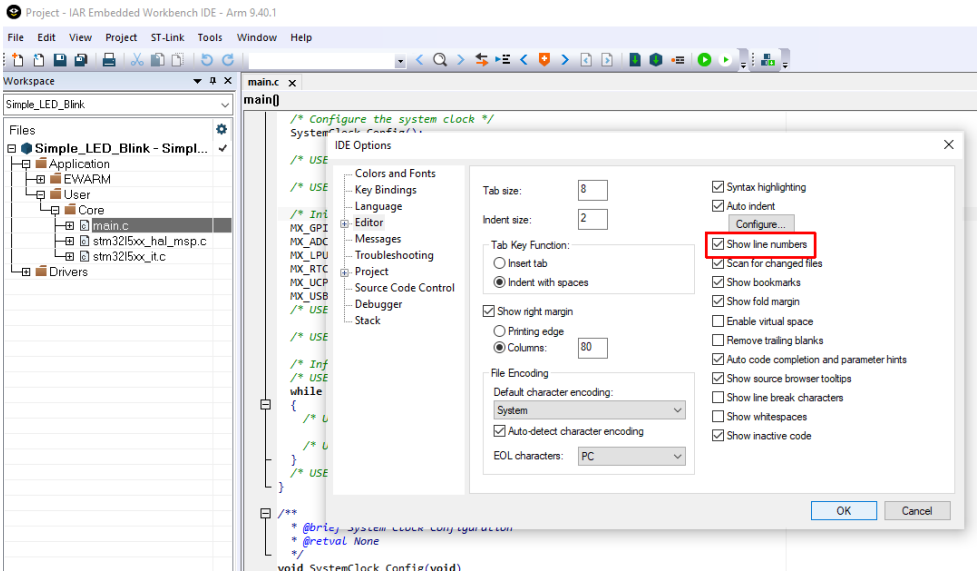
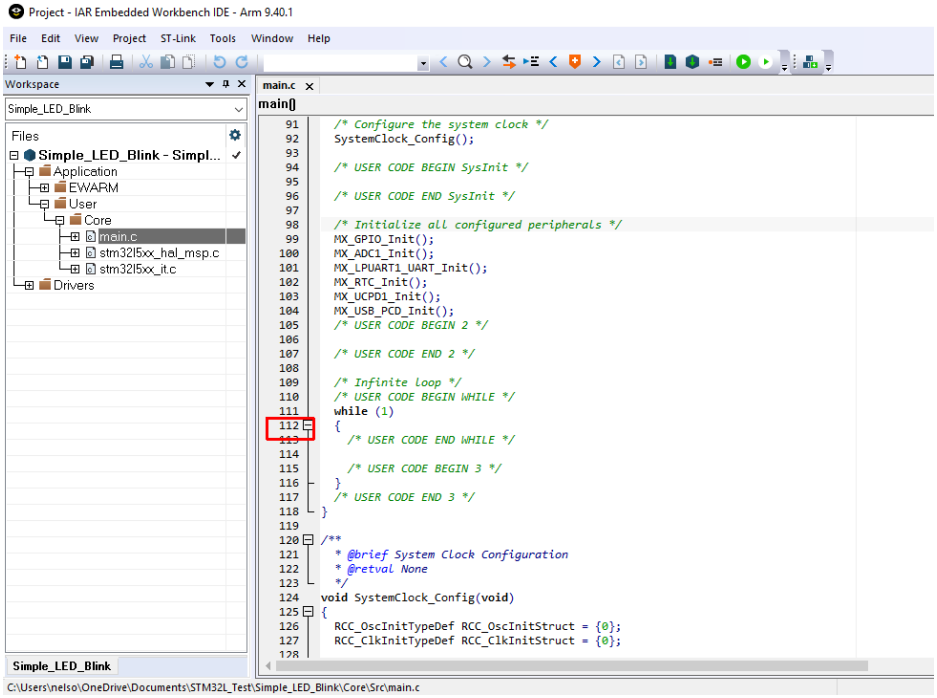


Right click on the window and select options. In the editor tab, select the “Show Line Numbers” check box.



Scroll down to line number 112.



Add the following code at line 112.

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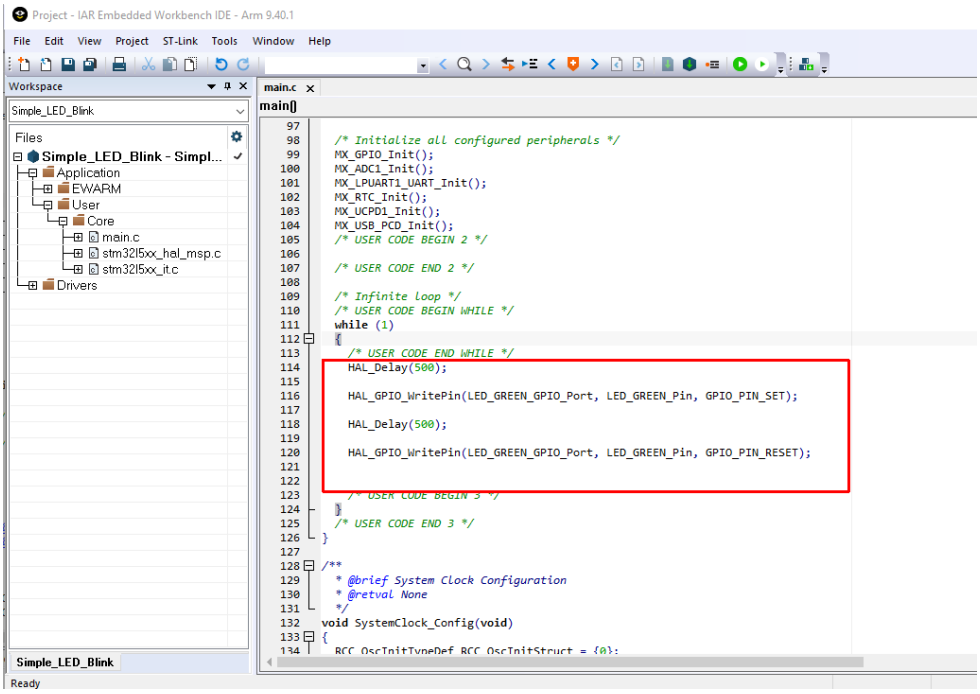

Go to Projects->Rebuild All and select.

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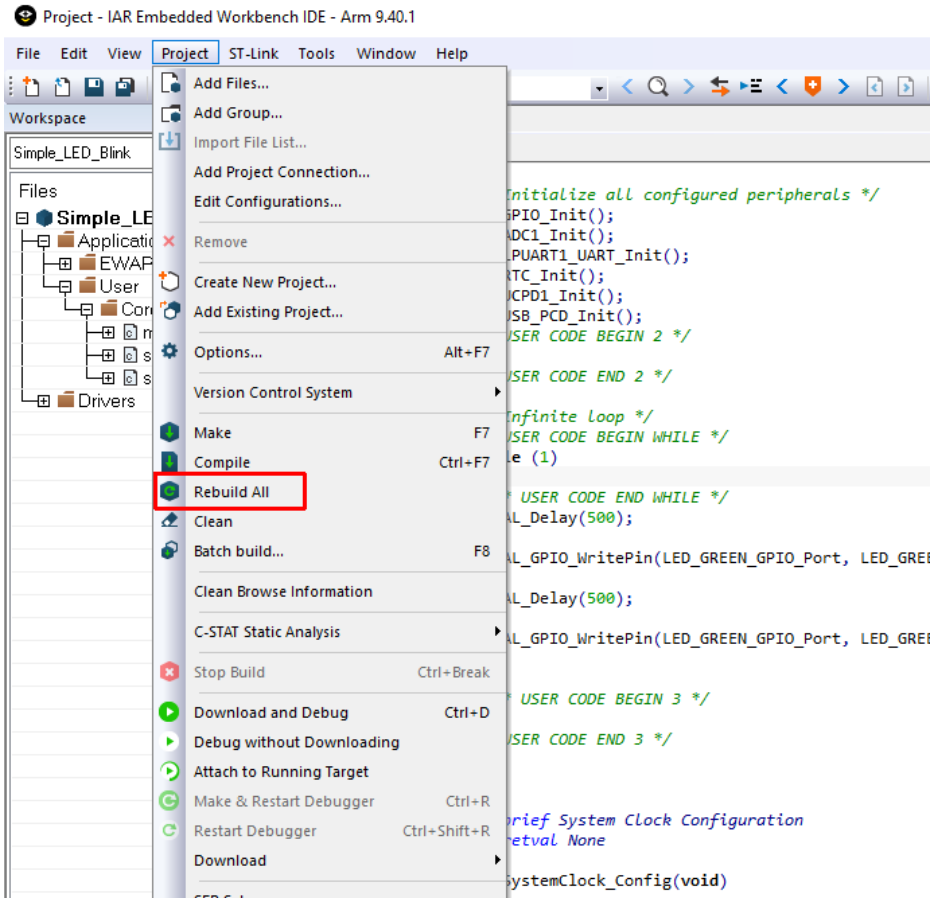

The compile process will start.

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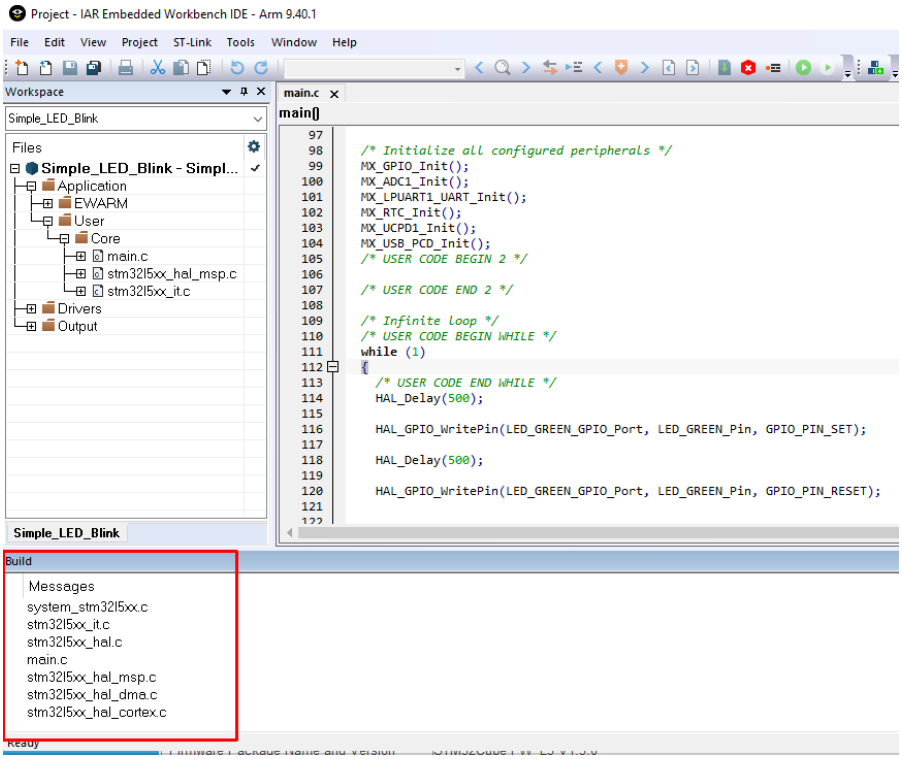

If the compile is successful, you will see the following message.

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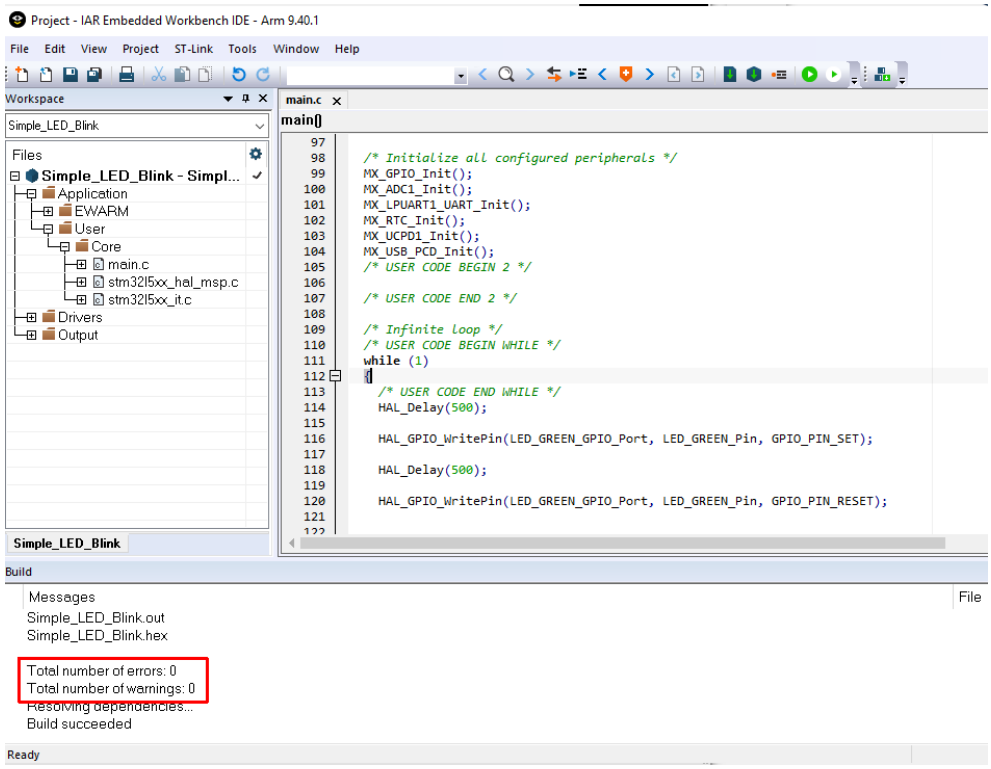

Next, connect the SWD Blaster to the PC. Then connect the SWDIO, SWDCLK, nRESET, VTREF and GROUND signals to the NUCLEO-L552ZE-Q board.

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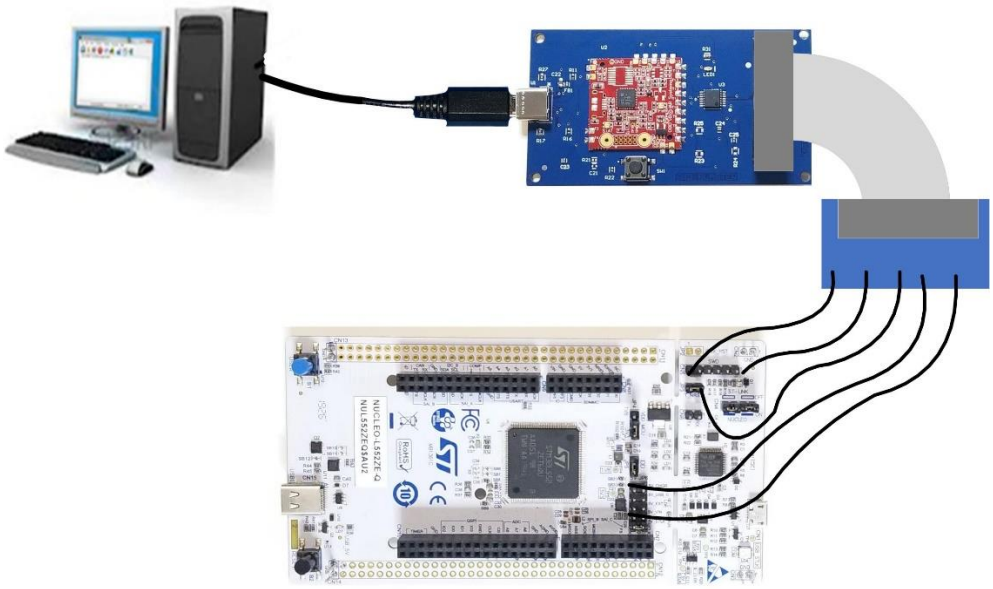

Right click on the “Simple_LED_Blink” Project. Select “Options”

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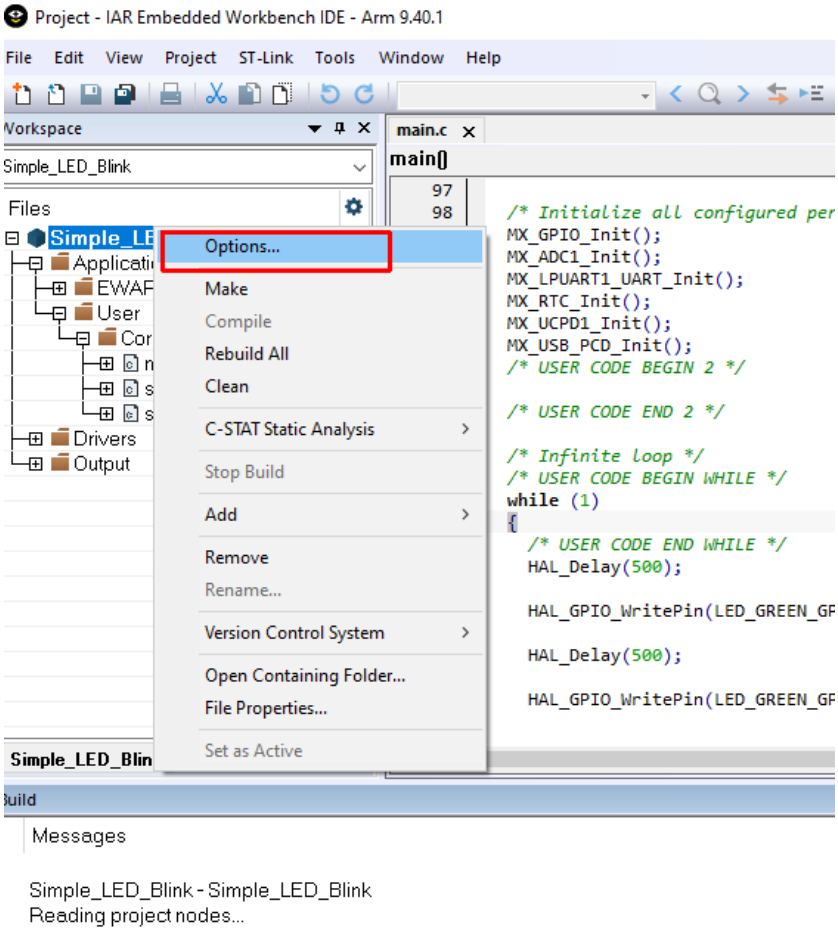
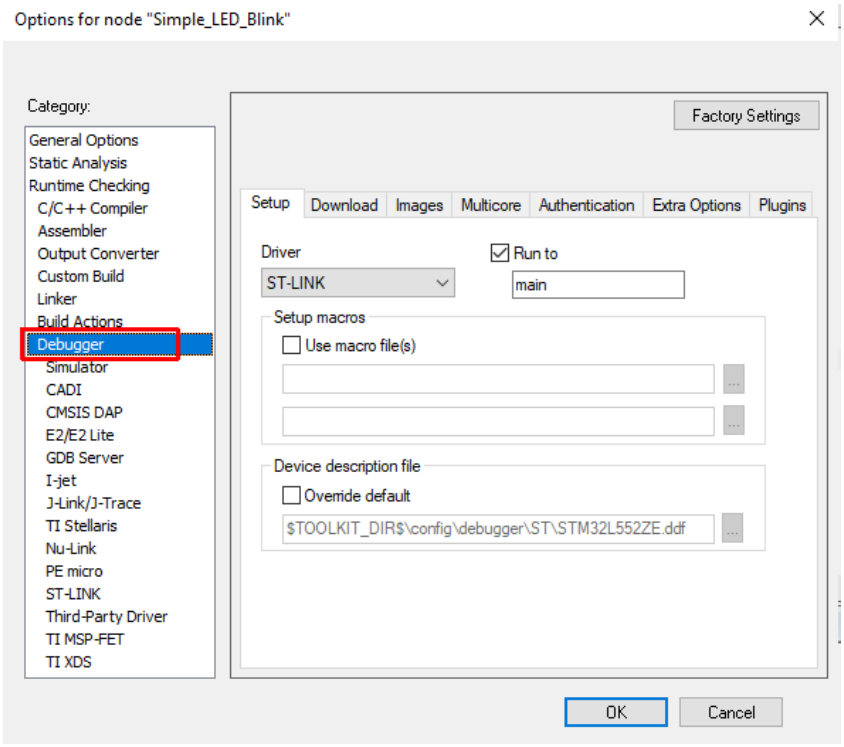


Select the “Debugger”tab.



Under the “Driver” drop down box, find “I-jet” and select it.

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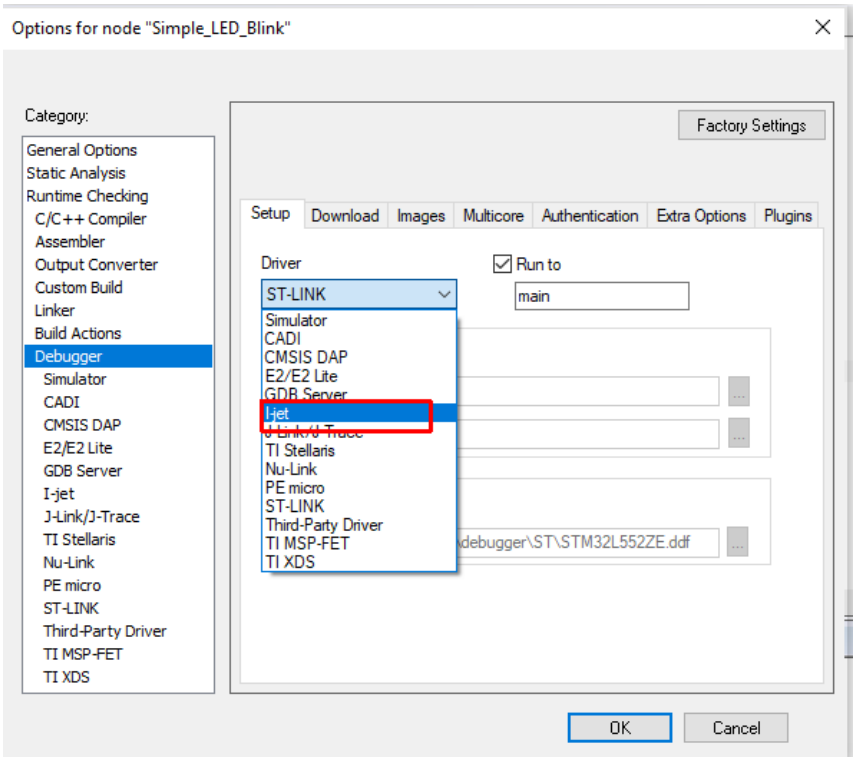
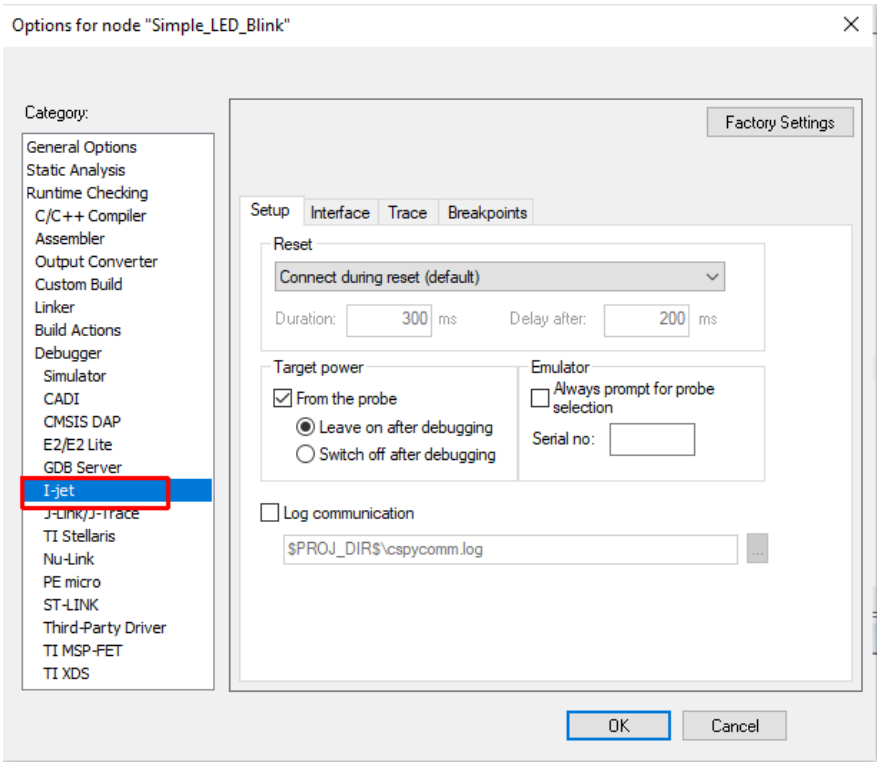
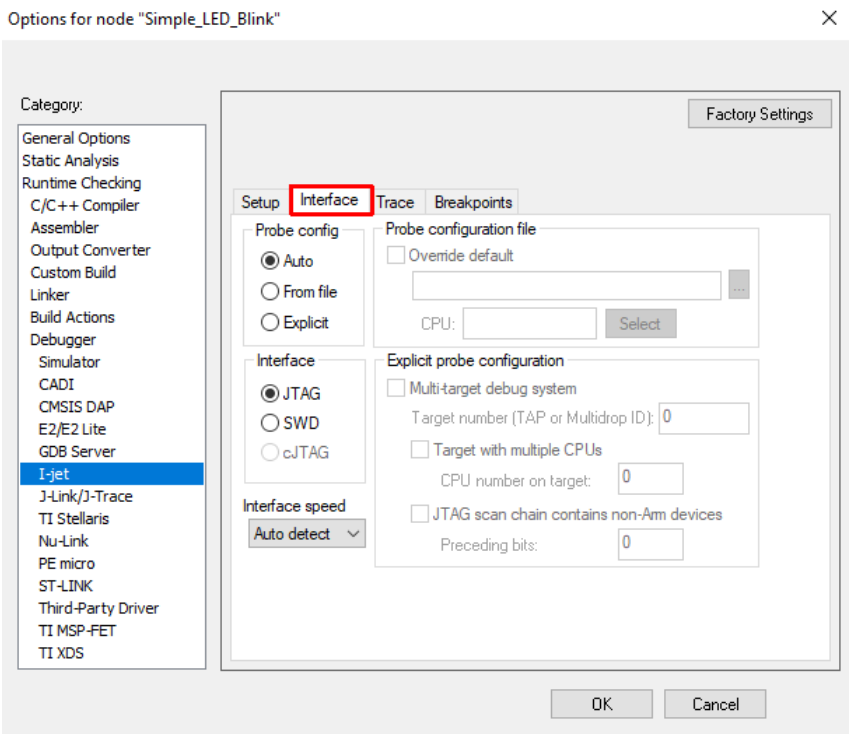


Next, click on the “I-jet” under Category.

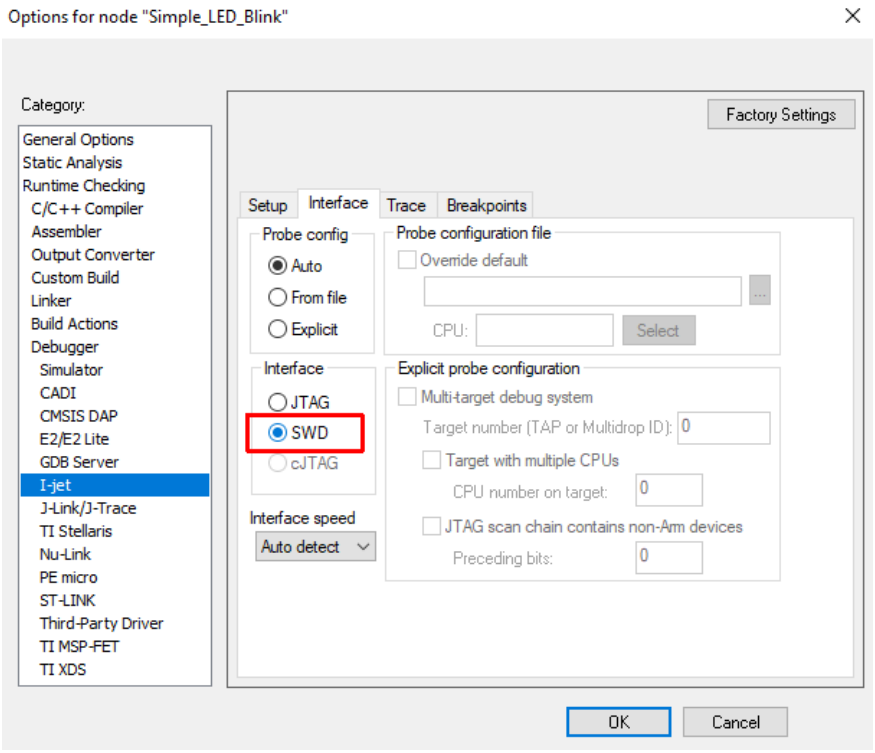
MCU Programmers User Manual



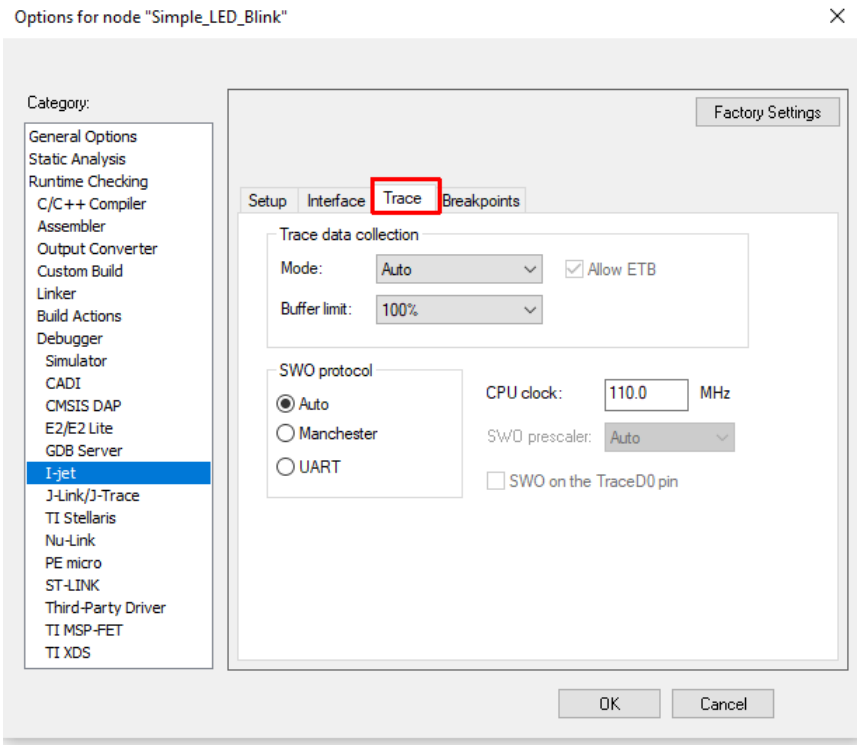
Click on the “Interface” tab.



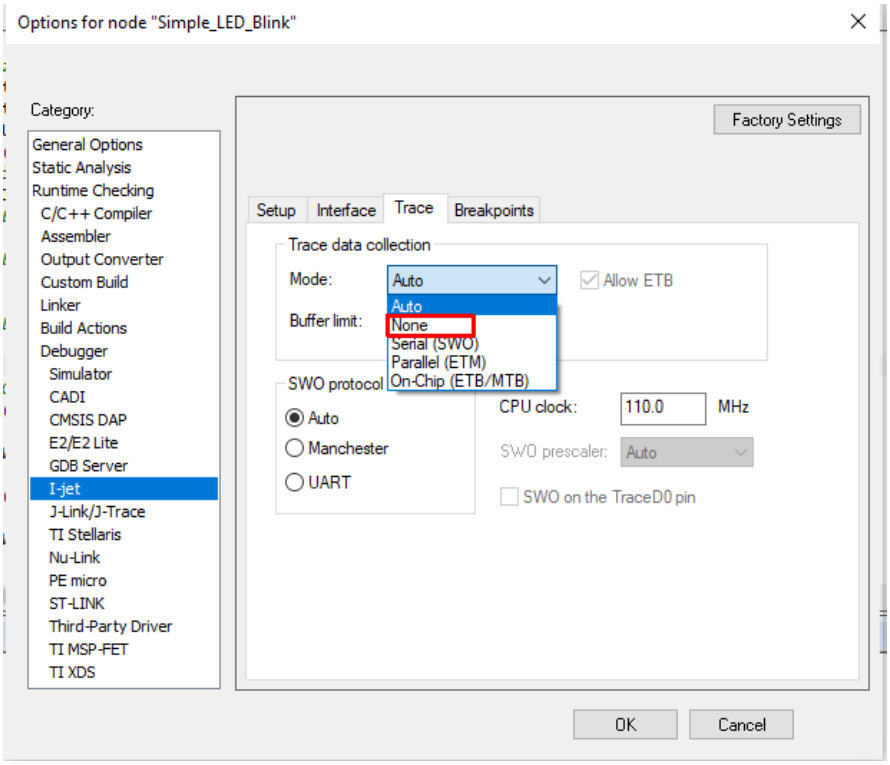
Under “Interface” select the “SWD” radio button.



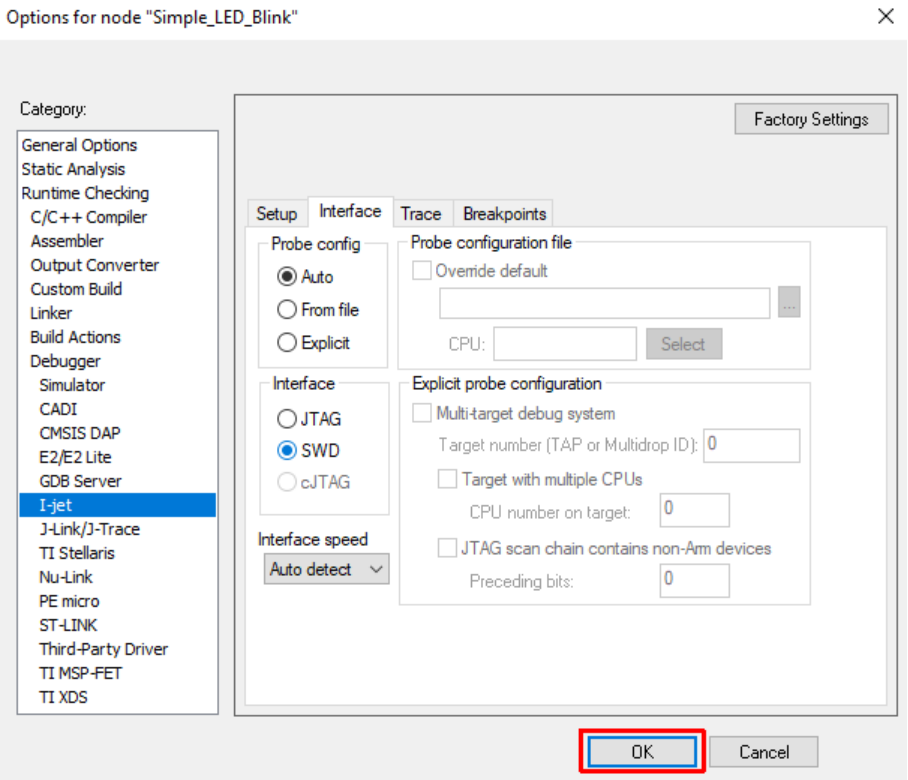
Click on the “Trace” tab.



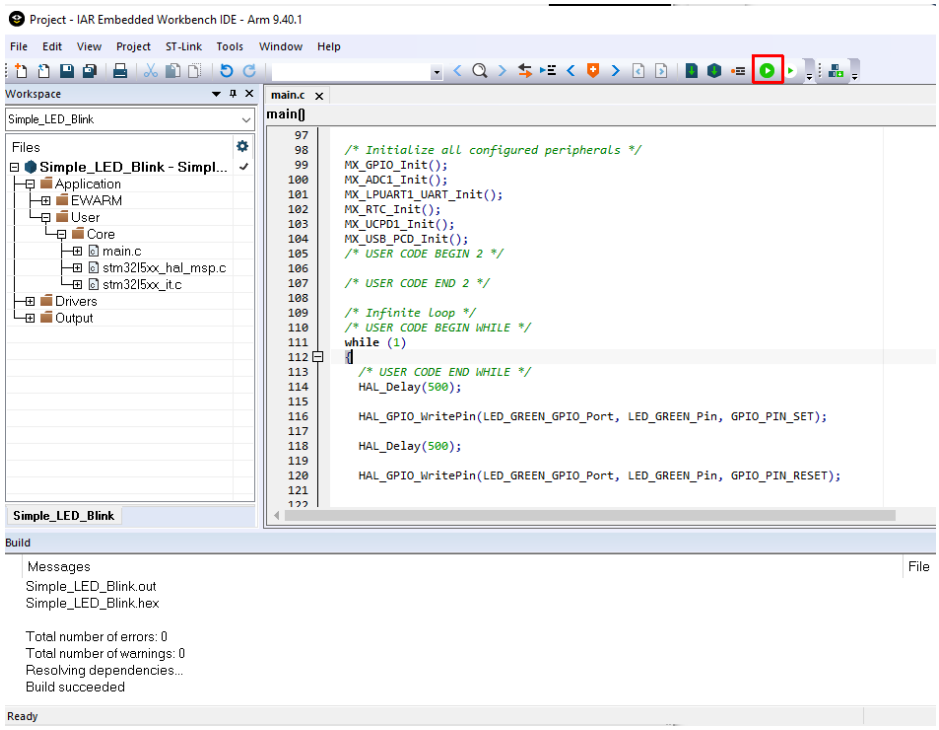
Under the “Mode:” drop down box, select “None”



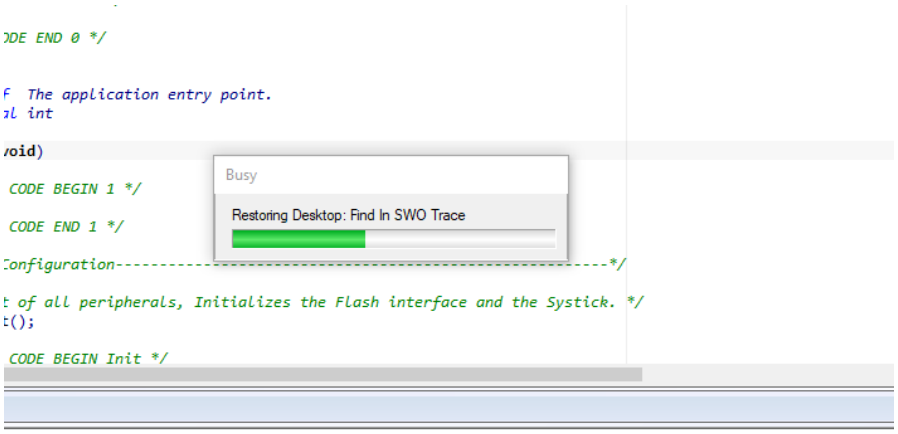
Click on the “Ok” button at the bottom of the window.



Next, click on the Green “Download and Debug" button.



The compile and download to the target board will begin.



Once the download has been successful, the EW software is ready to begin the debug process.

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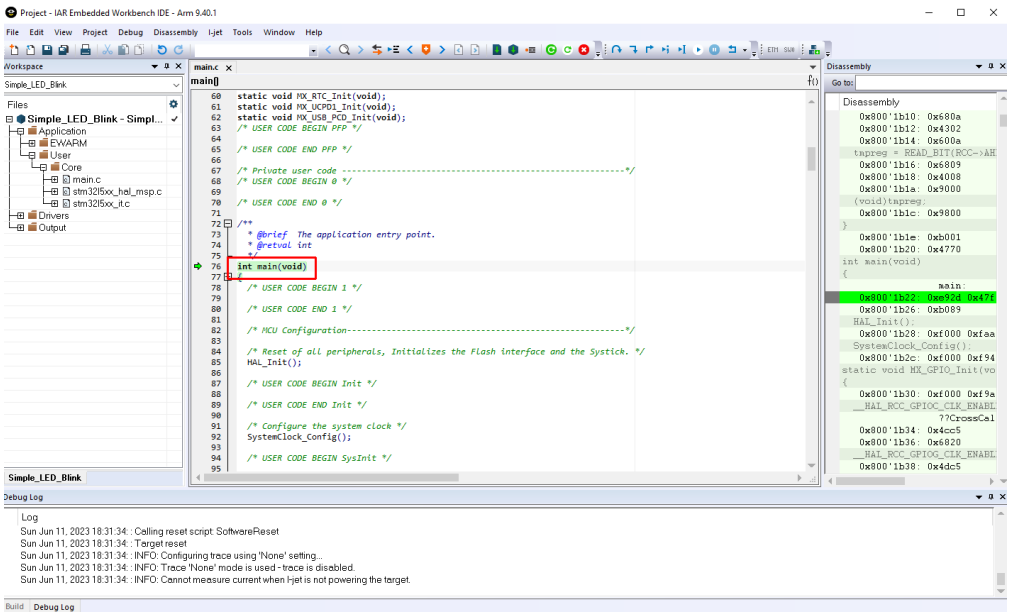
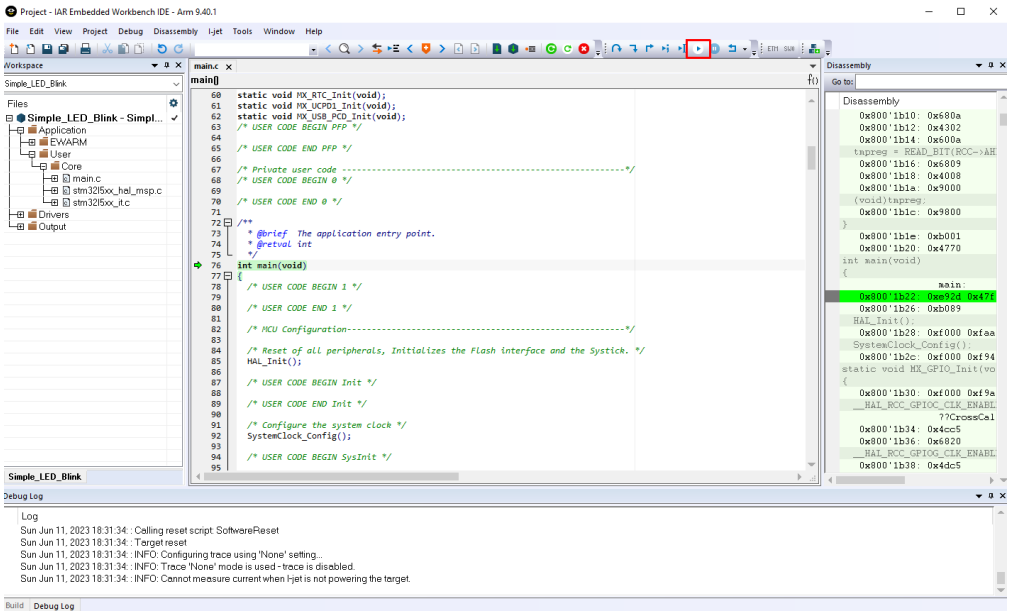
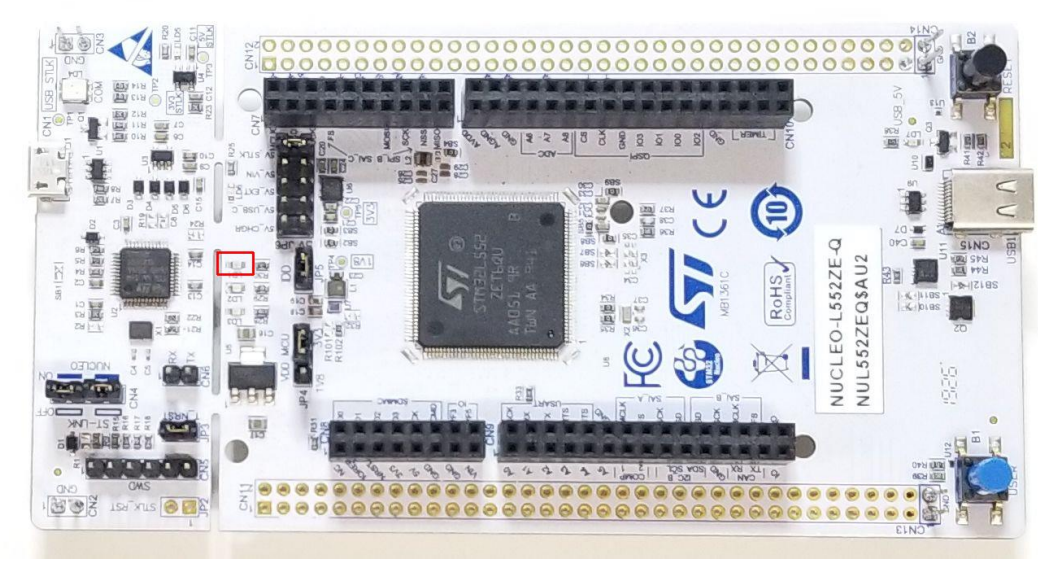


Here, click on the White “Go” button.



Once the code is running, the Green LED, LD1 will blink on and off with 500 ms between state changes.



Once you see the LED blink on and off, you have successfully completed your first project using IAR EW and the SWD Blaster.

Congratulations!

It is now time to create more advanced projects. Try adding the Red LED blink on and off at LD2.

2.4 Using NXP Board Support Package

TBD

2.5 Using Texas Instruments Board Support Package

TBD

3 IAR Embedded Workbench Tools

TBD

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