
Southern Polytechnic College at Kennesaw State University
Electrical Engineering Department
EE 3501 Laboratory Exercise 1: Getting Started with the DISCO board

Name: _____

Date: _____

Learning Objectives:

- Learn to start an account on mbed, install the proper drivers and flash the latest firmware on to the DISCO board.
- Identify a compatible project on the mbed site and input into your Integrated Development Environment (IDE).
- Learn to import a project, build the project and observe the effects.
- Learn to import the class project, build, and observe output messages on the terminal.

Prelab

1. Pick up your kits from the tech lab.



Do not plug in your board until step 4

2. Getting started on mbed

Go to <https://www.mbed.com/en/>

Select the 'Hardware' drop-down menu at the top of the page and select the 'Boards' menu item link. This takes you to the Development Boards page. Notice the array of boards on that page. We will come back to here.

Across the header on the Development Boards page, select the menu item 'Log In/Sign Up'.

Follow the instructions to sign up for an account if you have not been to mbed before.

Once you have an account, go back to the Development Boards page. Find the NUCLEO-F401RE board by ST Micro and select that board. Read the page on the NUCLEO-F401RE board (bookmark for future use).

Laboratory procedure:

3. Windows: Download the drivers and install. Download the firmware and install.

Depending on when your board was manufactured, you may not have to upgrade.

If you have a Mac, skip to step #4.

Windows users:

Scroll down to **Getting Started**. Locate the "Nucleo ST-LINK/V2-1 driver installation and firmware upgrade" section. Click on the hyperlink labeled 'LINK' located in the 1st bullet point to download the ST-LINK/V2-1 driver.

Follow the instructions to install the ST-LINK/V2 driver before connecting the board to your PC the first time.

For optimum performances, ensure that the ST-LINK/V2 firmware is upgraded to the latest version.

To do this, go back to the previous page and return to **Getting Started**. Locate the "Nucleo ST-LINK/V2-1 driver installation and firmware upgrade" section. Click on the hyperlink labeled 'LINK' located in the 2nd bullet point to download the ST-LINK/V2-1 firmware upgrade.

Read that page and follow the directions for firmware upgrade.

4. Plug in the board and find the new removable drive

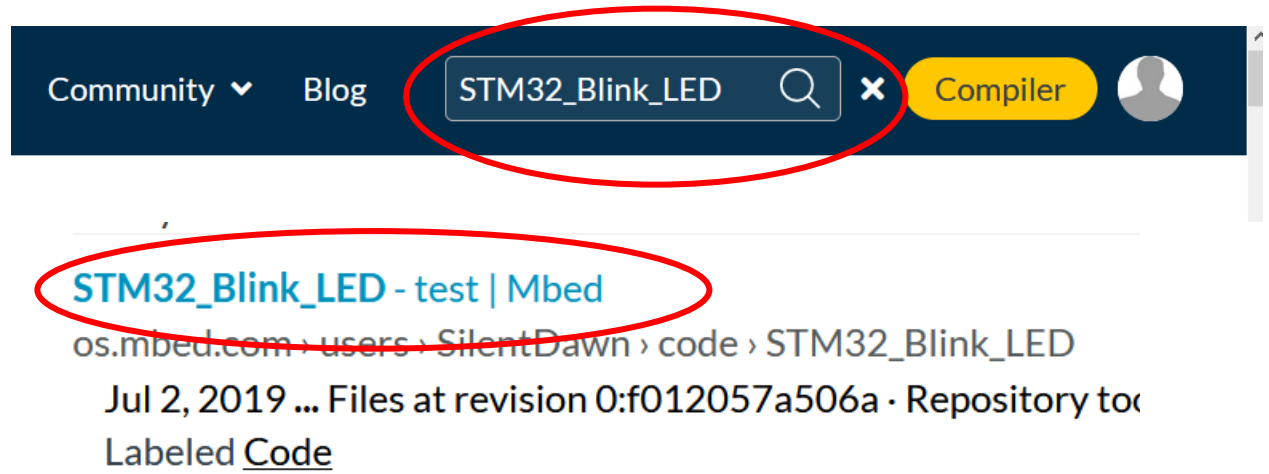
Mac users: If a removable drive does not appear, go back to step #3. You will have to install the latest firmware on your board with a windows computer.

Everyone should have a removable drive, which is the flash memory on the board.

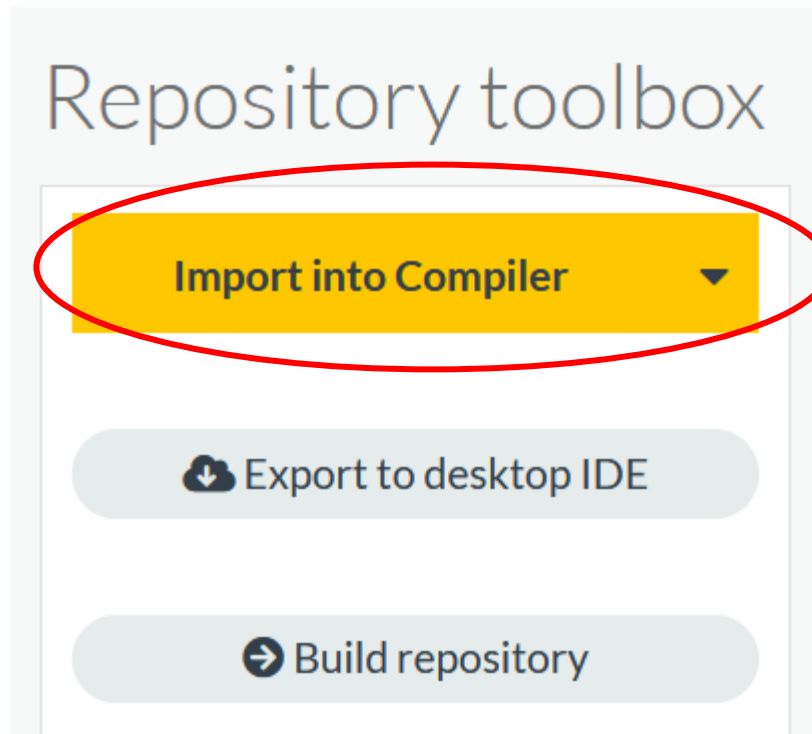
5. Create the blinking LED program by following the instructions below.

On the top of the mbed webpage, enter NUCLEO-F401RE in the search box and press enter. Bookmark this, for this is the home for all the information on your board. You will find many of the solutions to the labs, homework, and project starting from here.

On the top right side of the page, click the Search symbol. In the search box type “STM32_Blink_LED” and press enter. Follow the first link “STM32_Blink_LED - test | Mbed” to the corresponding page.

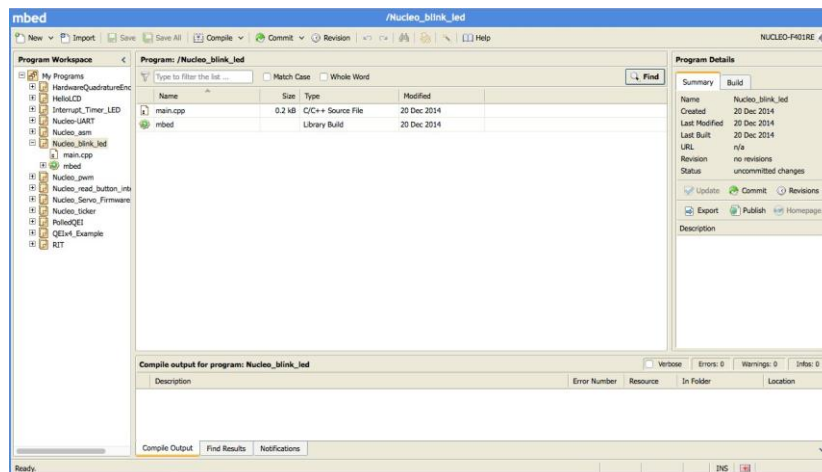


On this page, click the “Import into Compiler” button to import the Blink LED program into the Mbed compiler Integrated Development Environment (IDE).



You will also be asked what platform you will be using. Chose the NUCLEO-F401RE. Your IDE will open in a new tab or window. Once you set up your account, you should get a “Manage your Program Workspace’ with the “STM32_Blink_LED” in the program list. If you don’t have the program there, go back and click ‘Import this Program’ again.

Double-click on the “STM32_Blink_LED” program.



You can develop all your code in this environment. Advanced users: You may also find and use other tool-chains such as uVision2 or CoolCox. If so, you can export the code into these other IDE tools. This gives you a way to develop code when off-line. The following

instructions assume you are using the online IDE at Mbed.

6. Compile and run the blinky program

Click on the compile menu item. If compile is successful, a bin file should automatically download to your computer. You may have to put Mbed on your approved site list to do so

Find the .bin file, drag and drop the .bin file into the microcontroller drive (the removable drive representing your microcontroller board). The USB LED should flash as the program is saved.

Verify that LED1 blinks.

7. Change the blink rate and repeat.

Go to your IDE. Double-click on 'main.cpp.' You should see the c code for the program.

To change the blink rate, change the number in the wait() instructions (**time off/time on in seconds**), compile again, find the new .bin file, drag and drop this new bin into the microcontroller drive.

8. Add a print line to the main.cpp

Add the following line to the main.cpp program immediately after the line: `while(1) ;`

```
printf("Hello ARM world.\n");
```

Compile and download the bin file to your microcontroller board.

9. Download a suitable terminal program (Putty for Windows or CoolTerm for Mac)

If you don't have a serial terminal on your laptop, download and install one now. I use Putty on Windows and CoolTerm on Mac.

10. Find the com port (Windows) or serial Port (Mac).

For Windows Users: Go to your control panel, open Device Manager. Under serial ports, you should have a Com port for STLink. Make note

of the port number (i.e. COM4 or COM5).

Open the terminal program and follow the directions for opening a serial connection.

11. Press the reset button (black button) and verify the messages that appear in the terminal window.

These lines should appear:

“Hello ARM world.”

Every time the LED Turns on

12. Take a screen shot of mbed IDE window and terminal window.

Comprehension:

Answer these questions:

1. Explain how to change the processor type or board type in your IDE environment?
2. How would you print “Goodbye ARM World.” to the terminal when the LED turns off?

Approved by: _____

Date: _____

Results due: _____