CPE 325: Embedded Systems Laboratory
Getting Starting with TI Code Composer Studio (IDE) and EXP-MSP430F5529lp Launchpad

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Objective:

This tutorial will guide you through installation of the TI's Code Composer Studio for MSP430. It includes the following topics:

Installing TI Code Composer Studio for MSP430
Running a sample program on EXP-MSP430F5529lp Launchpad

Notes:

The latest version of Code Composer Studio can be downloaded for free from the TI's landing web site: http://www.ti.com/tool/ccstudio. A download web page is at: https://www.ti.com/tool/download/CCSTUDIO. We recommend downloading and installing the latest version of Code Composer Studio. The latest version at the time of this writing is 10.1.0. It is available for Windows, Linux, and Mac OS. This tutorial is written for Code Composer running on a Windows machine using Code Composer Studio 10.1.0.

Contents:

1 Downloading and Installing Code Composer Studio

This section introduces you to download and install the Texas Instruments (TI). Code Composer Studio (CCS) from the official website.

1.1 Downloading the latest CCS

Code Composer Studio (CCS) can be downloaded from the official TI site at https://www.ti.com/tool/download/CCSTUDIO.

Step1: Please go to the site https://www.ti.com/tool/download/CCSTUDIO. The site should look as shown in Figure 1.

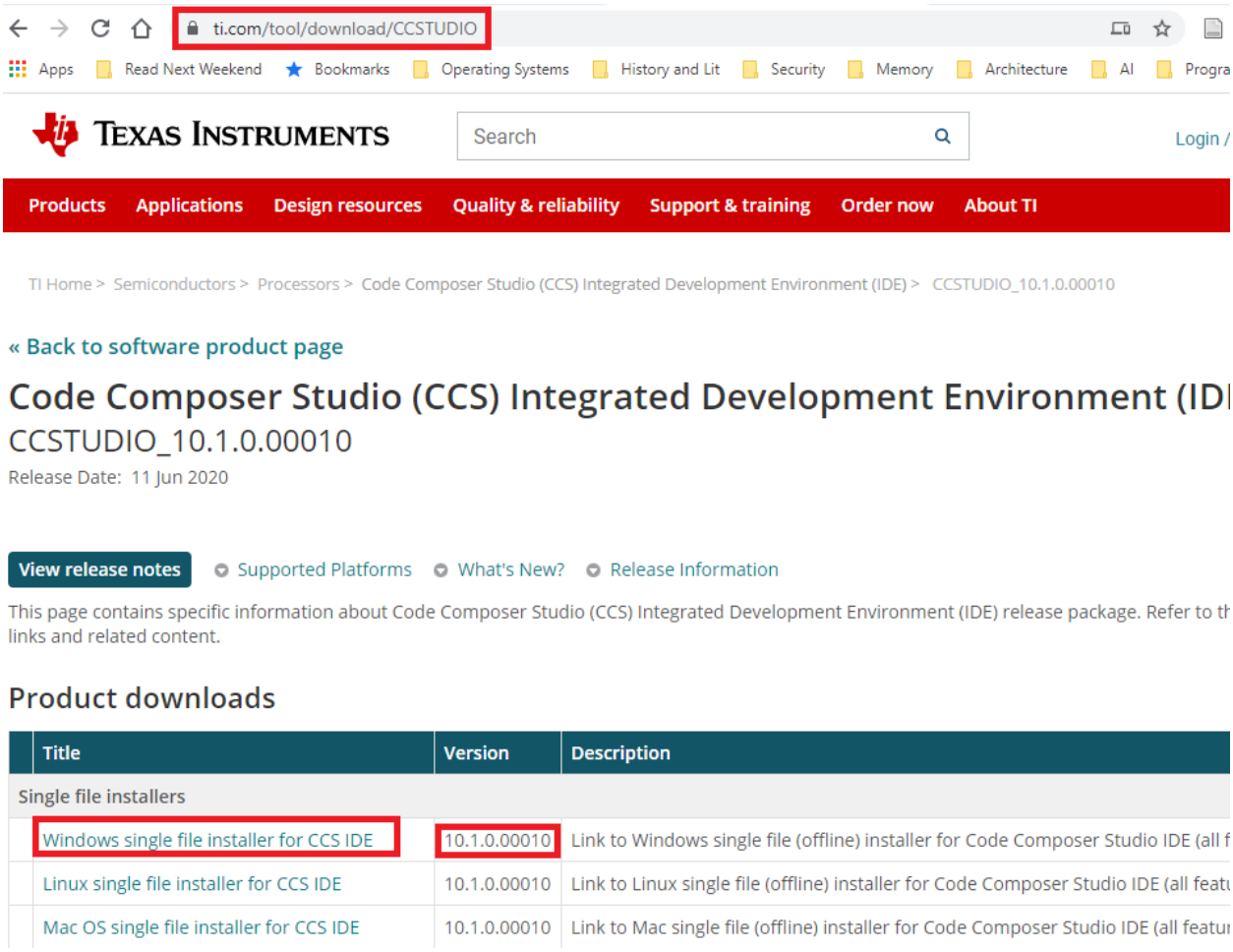

Figure 1. TI CCS Official Download Page

Step 2: Please go ahead and download the **Windows Single File Installer for CCS IDE** and save it into your local machine. The file size is 1 GiB and it will take some time to download depending on the speed of your Internet connection.

Step 3: The downloaded file is a zip file so it needs to be extracted. Extract the files using your favorite extractor. We are using **winrar** for windows.

Step 4: After the files are extracted into a folder, you should be able to see the files as shown in Figure 2. The **.exe** file, highlighted in red, is the installer. Double clicking the installer should initiate the installation process. You may need administrator privilege for moving forward with installation.

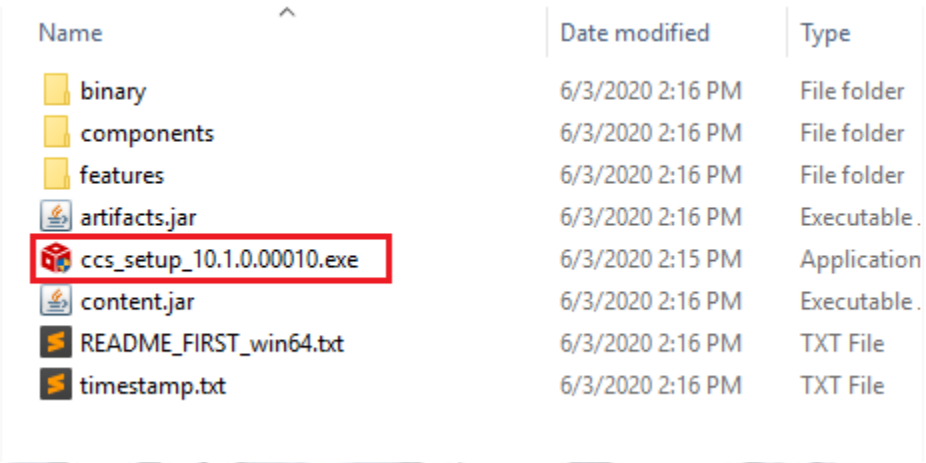

Figure 2. Extracted Files from CCS zip file

Step 5: Accept the license agreement and press **Next**.

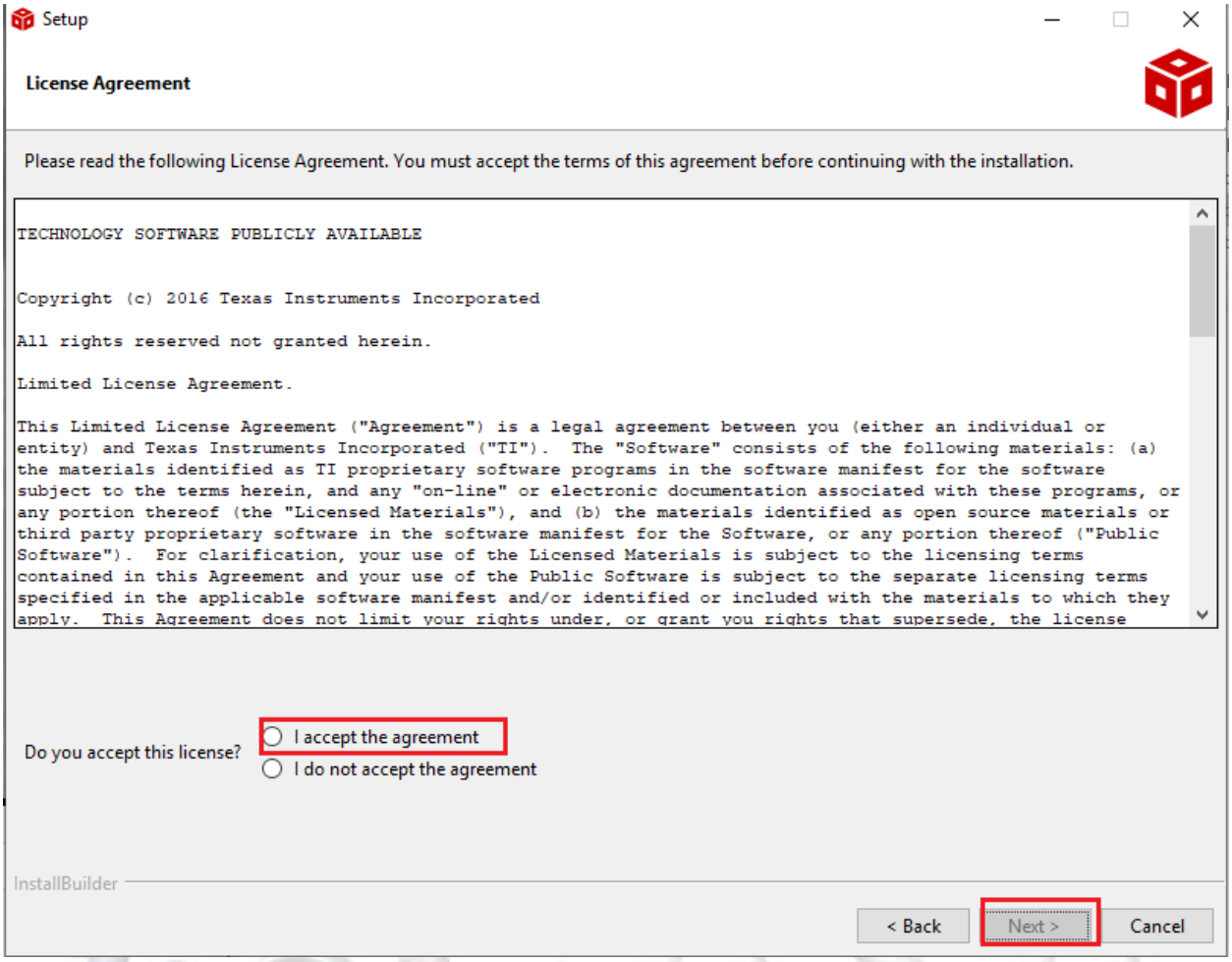

Figure 3. Accepting License Agreement

Step 6: The installer goes ahead and performs checks for Operating System, Installer Path, Antivirus etc. You may need to disable the Antivirus during the installation process.

Step 7: If there is a pending reboot, pressing **Next>** will prompt you to reboot the machine. Please go ahead and perform the reboot. You can abort the installation process, perform the reboot and restart the installation process.

Step 8: The next window will ask you for the installation folder. We recommend going with the default installation folder.

Step 9: The next window will ask you to make selections for installation types. We prefer going with **Custom Installation** as this will reduce the required disk space.

Step 10: For the custom installation, you must select the components to be installed. The Embedded Systems Laboratory focuses on ultra-low power MSP430 MCUs. Select the **MSP430 ultra-low power MCUs** option as shown in Figure 4.

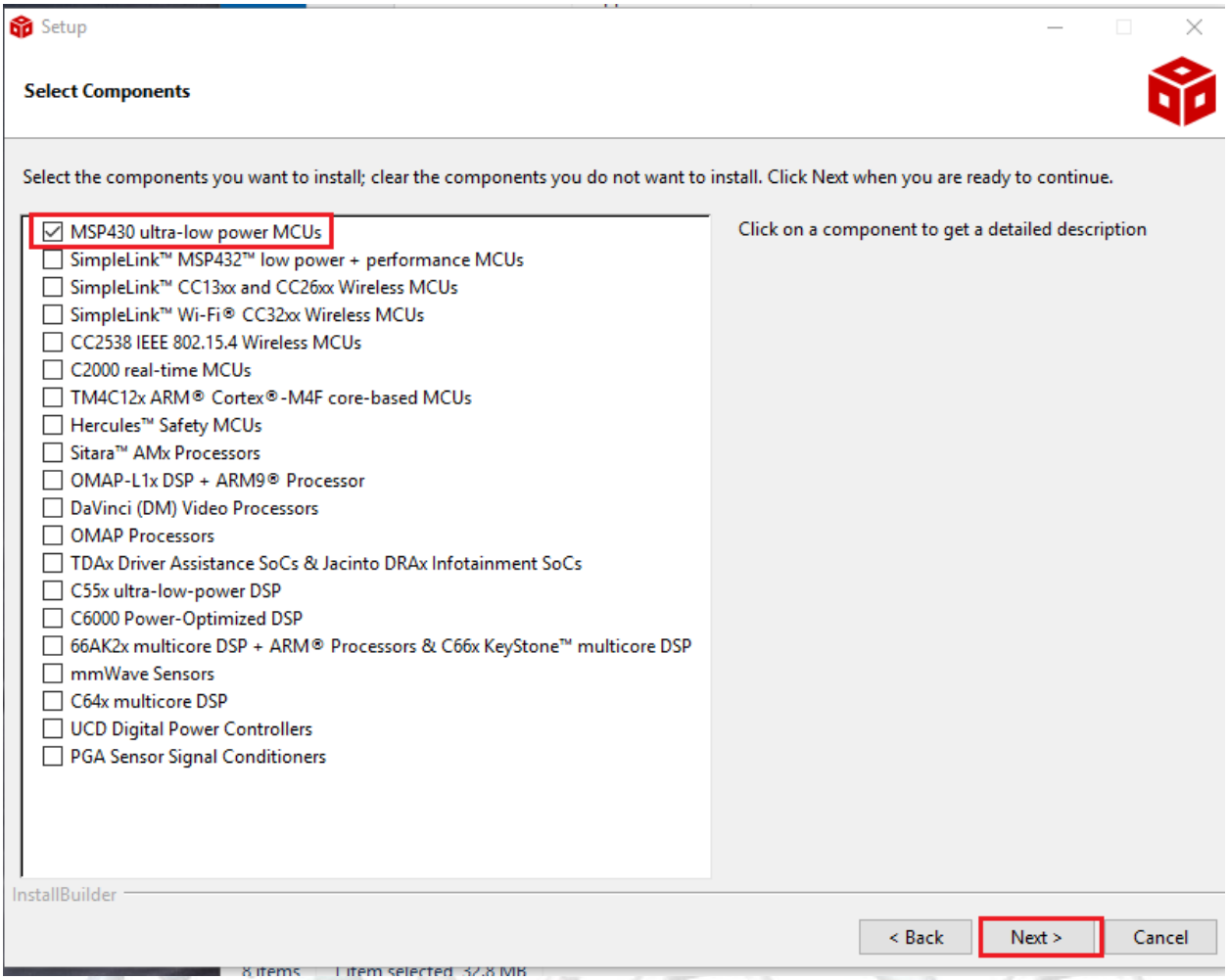

Figure 4. Installing MSP430 component

Step 11: Selecting **Next>** in the above screen will list some unsupported boards which should be fine for us. Please select **Next>**.

Step 12: Selecting **Next>** in the upcoming screen will begin the installation procedure.

Step 13: After the installation is complete, you will be prompted to choose if you wish to create a desktop shortcut. If you choose to do so, you will see an icon in your desktop that will look like the highlighted icon on the top left corner of Figure 5.

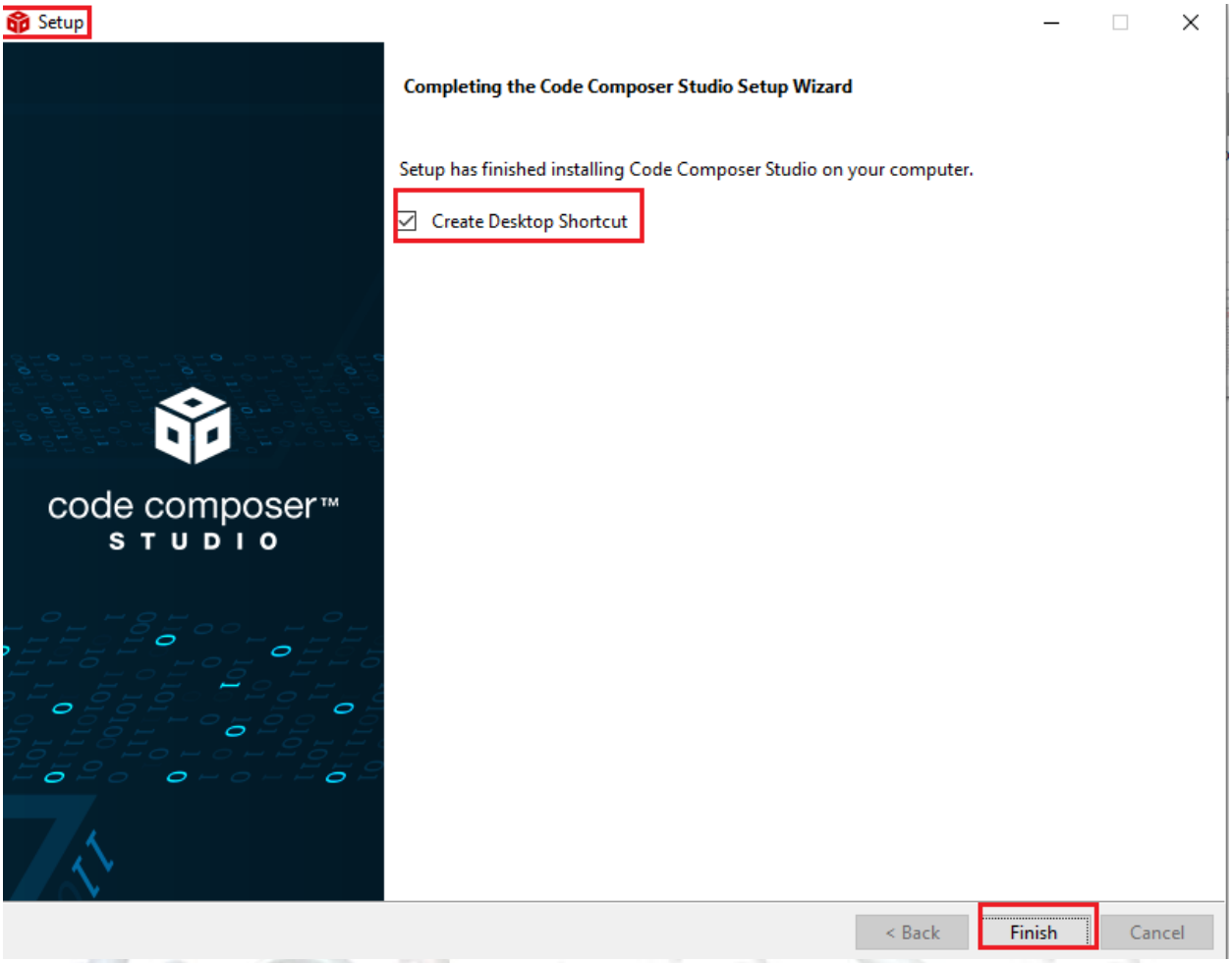

Figure 5. Completion of CCS installation

2 Running the test application

Now that we have installed Code Composer Studio, we will run our first program to see if everything is installed properly. The program for demonstration blinks the LEDs repeatedly such that you will see two LEDs blinking alternately.

The detail on how to debug and step through program will be part of next tutorial. We will see a quick way of creating a workspace and project to compile and test our installation.

Step 1: Double click the icon of CCS10 to run CCS. This will ask you to choose a workspace. If this is your first time, you can choose your workspace folder or create a new folder to act as your workspace. A workspace contains multiple projects that we will subsequently create. For my case, I created a folder called **CPE325Workspace** on my Desktop as shown in Figure 6, and chose it as my workspace.

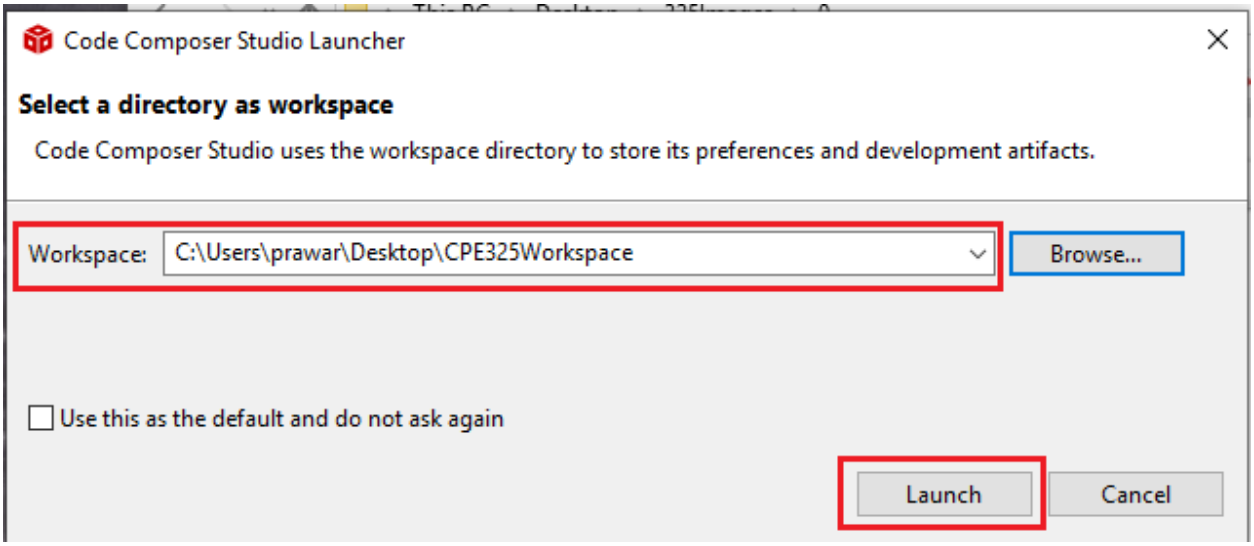

Figure 6. Opening a workspace

Step 2: Click on the **Launch** in Figure 6. This should open the CCS IDE.

Step 3. On the first run, CCS IDE might ask for some access permission to some utilities that might be blocked by windows defender. Please go ahead and **Allow Access** to those utilities.

Step 4: After allowing access, you will see a landing screen of Code Composer as shown in Figure 7. In this tutorial, we will just see the bare minimum required for running our first program, so we will not deal in nitty-gritty details of this screen. Please refer to tutorial of Lab 1 for more detail on CCS IDE.

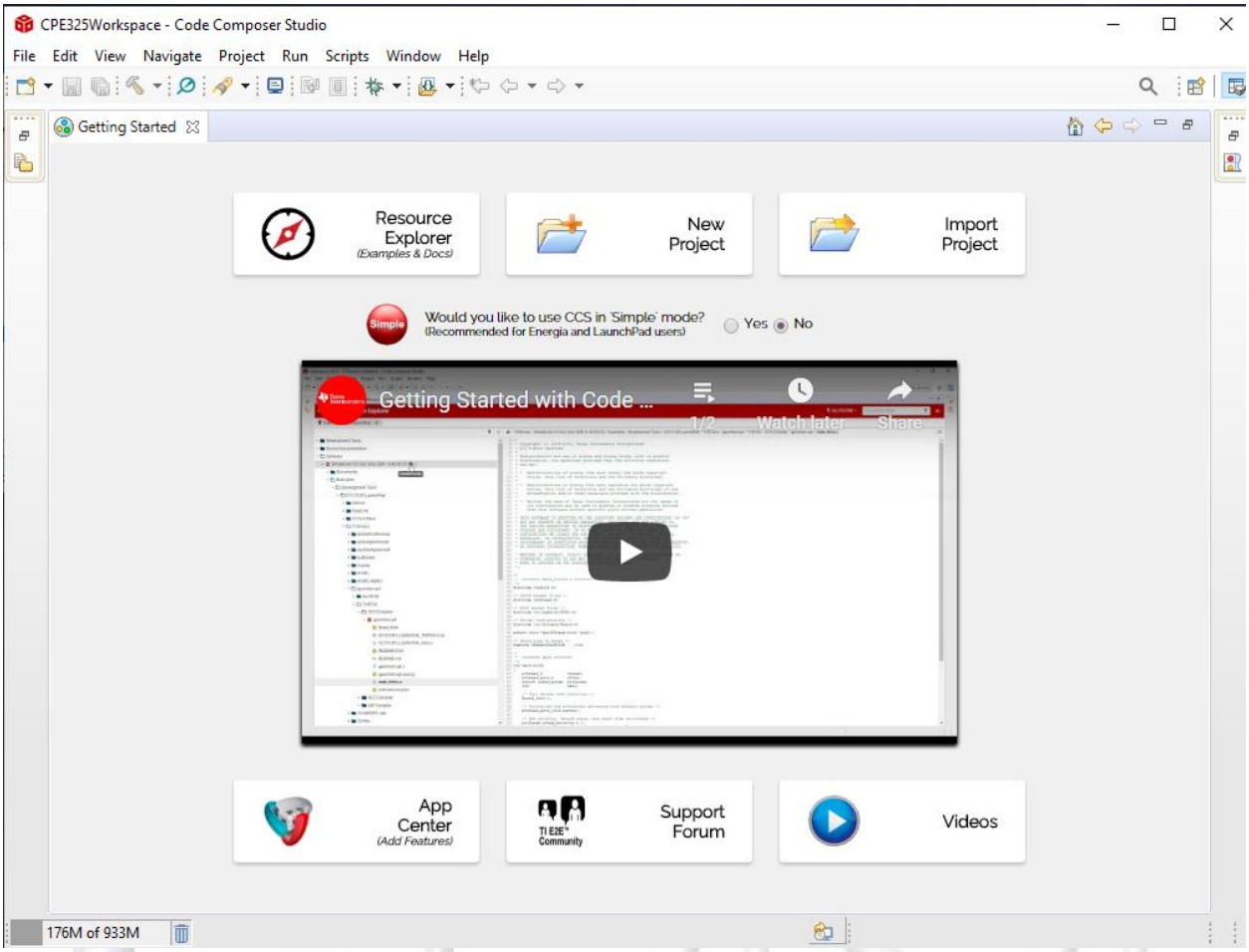

Figure 7. Code Composer Studio window

Step 5: On the Menu Bar, select **Project**> **New Project Wizard** as shown in Figure 8. This should open a window as shown in Figure 9.

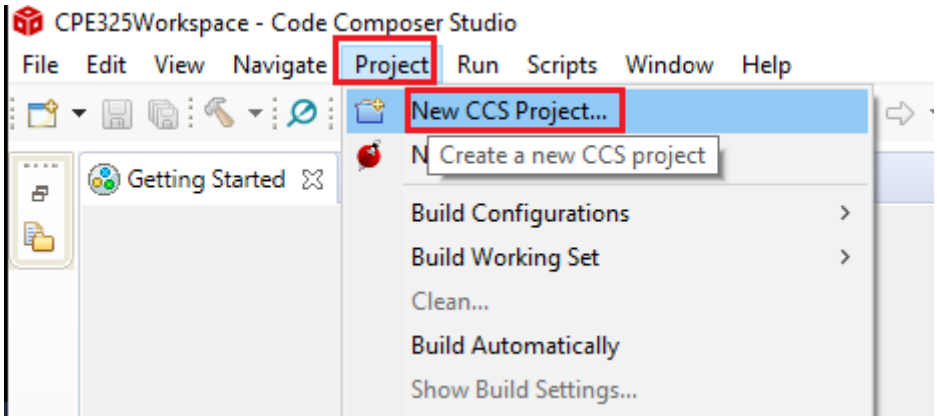

Figure 8. Creating new project

Step 6: When creating a new project, you must select the device or **target** that we are planning to program. Our device is **MSP430F5529** (a microcontroller used in EXP-MSP430F5529lp

Launchpad), so for the **Target** section, you can type **5529** to search the device. It will list matching devices in the drop-down menu to the right. Please select the appropriate device as shown in Figure 9.

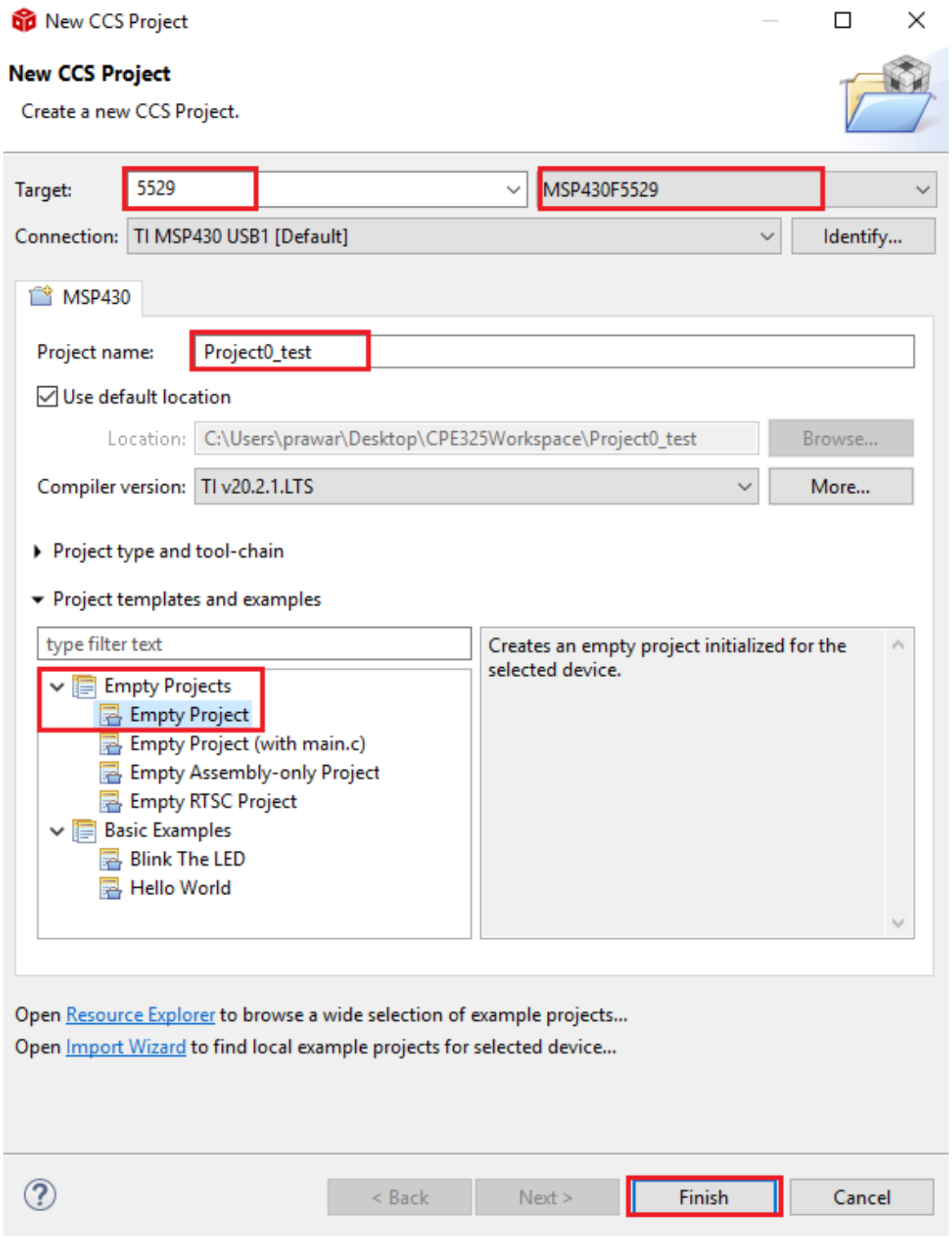

Figure 9. Project creation wizard

Step 7: Please provide a name to the project. I have named it **Project0_test**. In the **Project templates and examples** section, please select **Empty Project** and click **Finish**. This will show a **Project Explorer** in the CCS window where you can see the files in the project as shown in Figure 10.

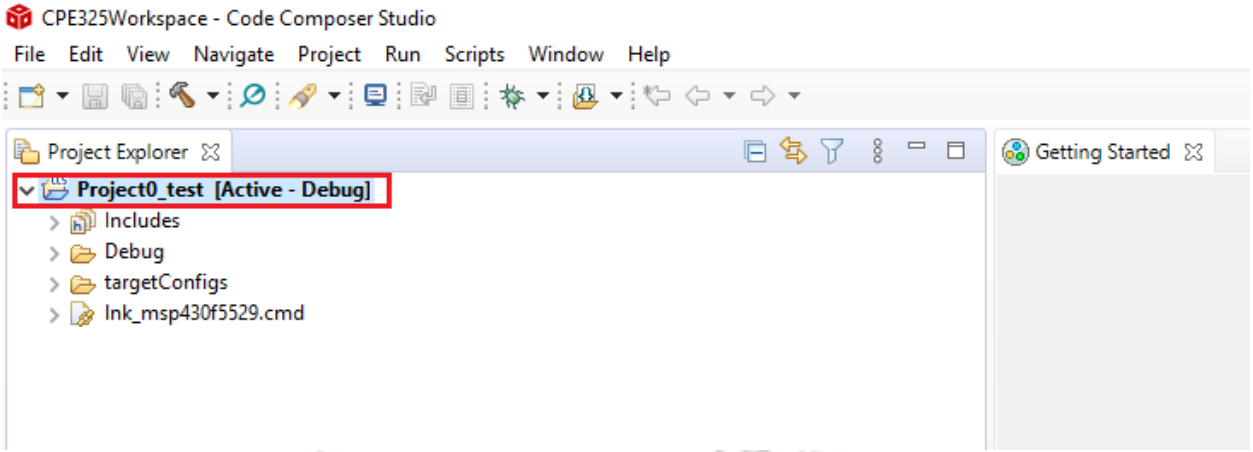

Figure 10. Project Explorer

Step 8: Please download the file **Lab0_D0.c** to your local folder. On the project explorer shown in Figure 10, right click on the project name to select **Add Files**. This will open an explorer window. Navigate to the file **Lab0_D0.c** and select the file. The file **Lab0_D0.c** will be in the list of files as shown in Figure 10.

Step 9: Right click the project name in **Project Explorer** and select **Build Project**. This will build the project. Our project is ready to be programmed to the board after the build operation is successful.

Step 10. If you have not already connected the EXP-MSP430F5529lp board to your computer's USB port, please do so now.

Step 11. On the command bar below the menu bar, select the **Debug** icon as shown in Figure 11 to program the target board. This should optionally open an **Advisor window**. Please select **Proceed** in this window to initiate the program operation.

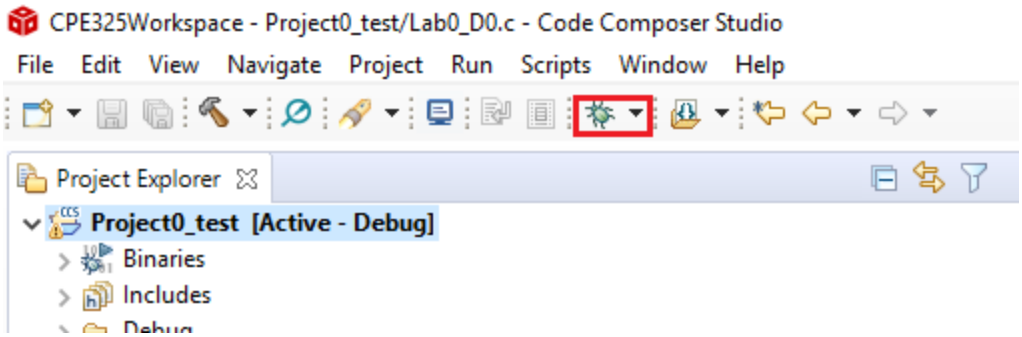

Figure 11. Command button for debug operation

Step 12: Once the operation in above step is successful, the CCS stops at the first statement inside the main function of our code as shown in Figure 12. Please select the **Resume** option in the command bar to run the program. At this point you should see the LEDs blinking.

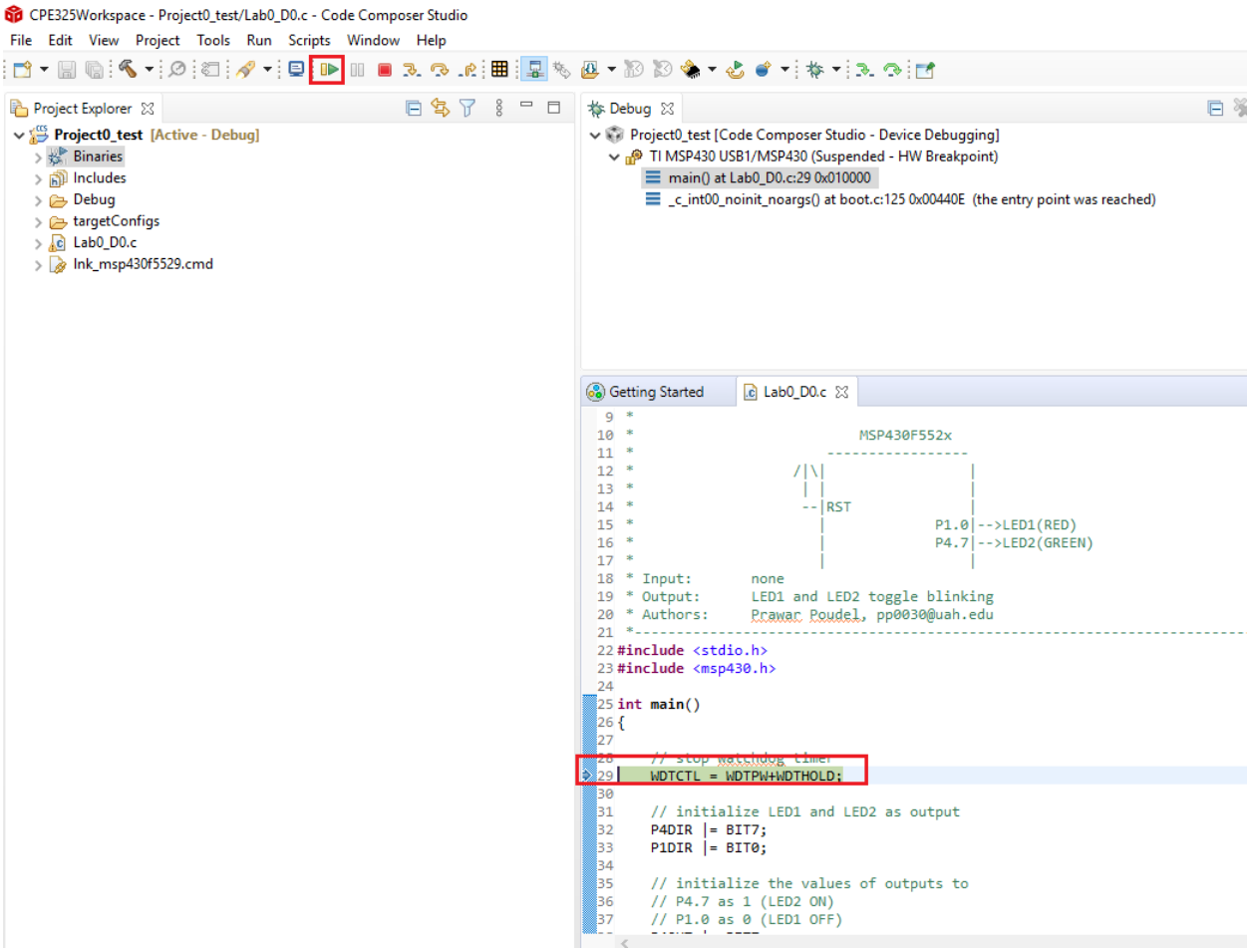

Figure 12. Debugging the program

Step 13: Once you are done with observing the LEDs blinking, you can select the **Terminate** option (the red square icon) to stop the debug operation. Note: the program continues running as long as the board is powered. As the program is written into the permanent flash memory, every time you power your board it will run the last program programmed in the flash memory.