High School Automous Vehicle Challenge: Software Installation

Using and Applying Microcontrollers for the Rest of Us!

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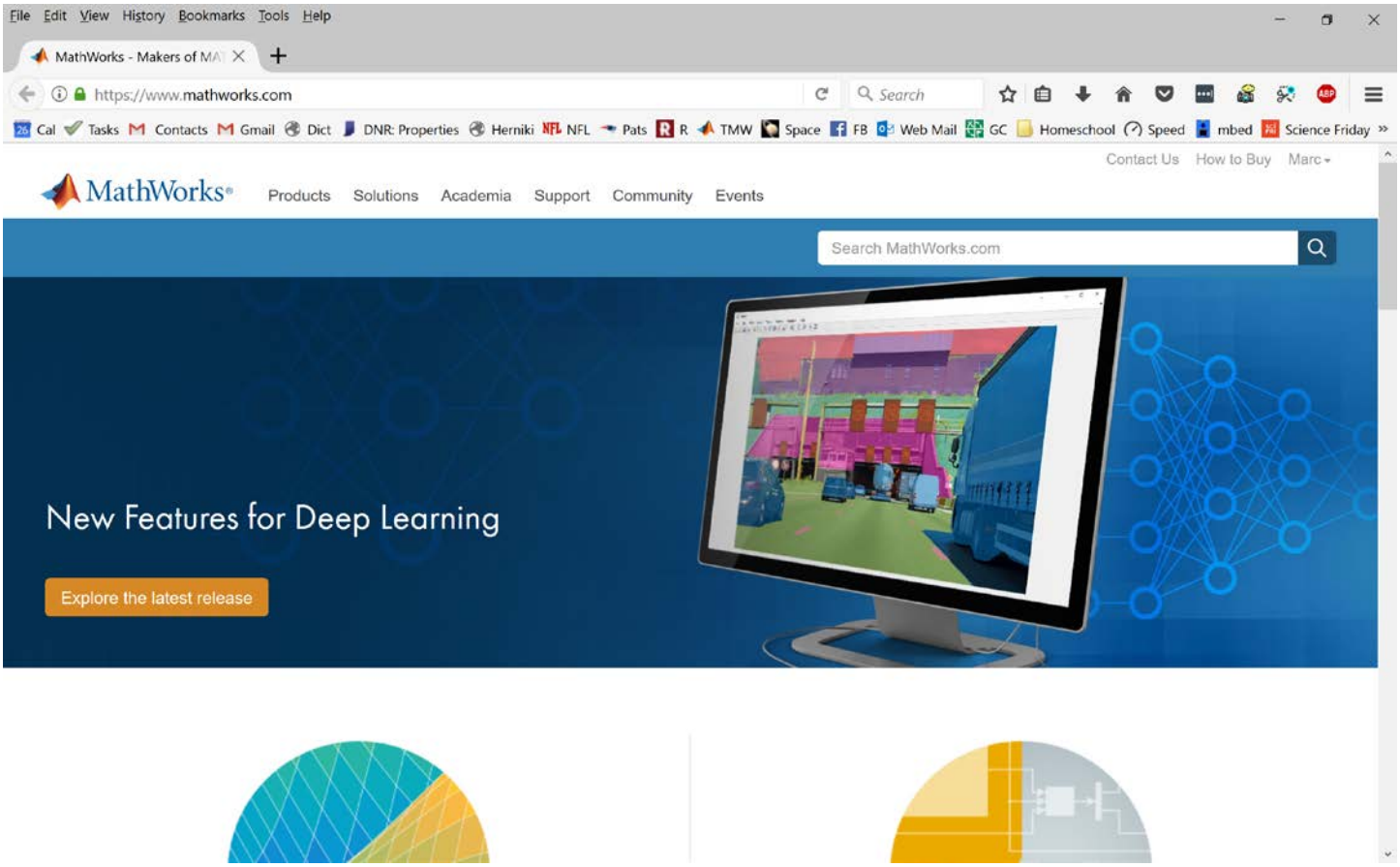
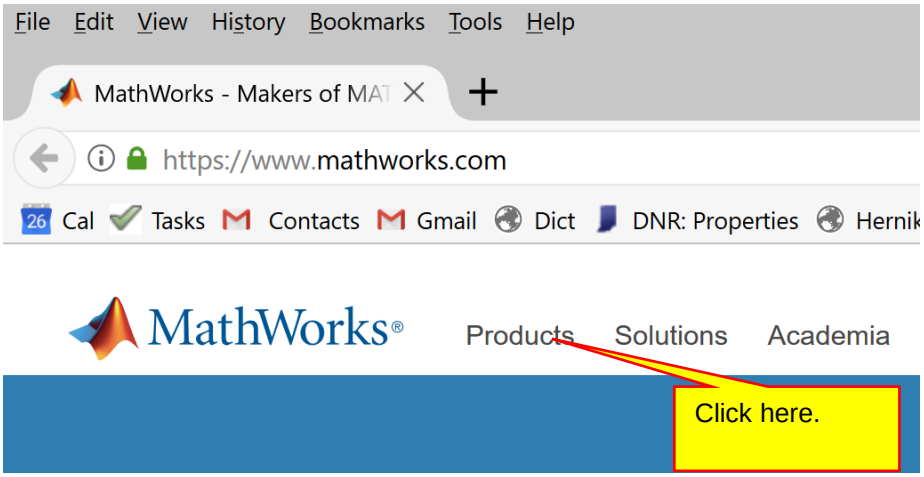
I. Installing MathWorks R2017b Software

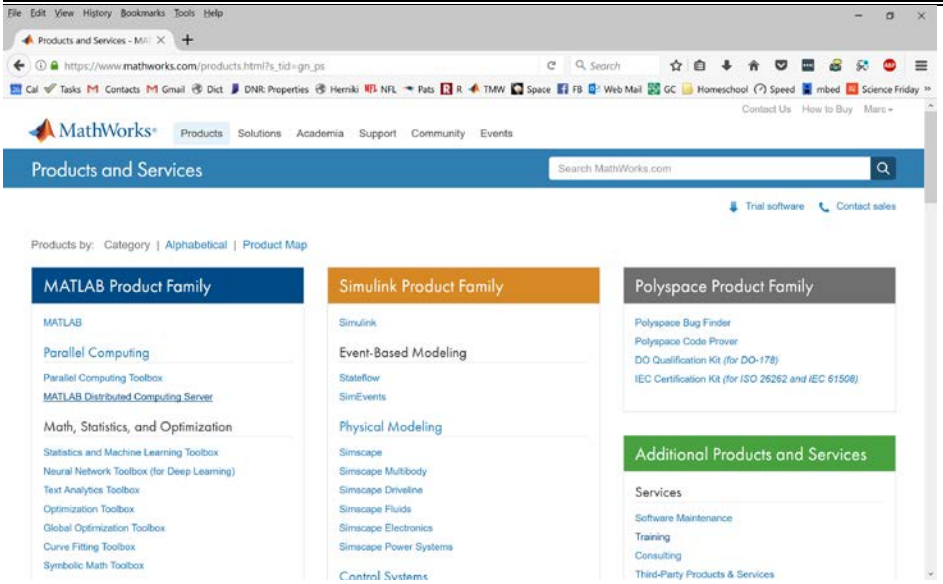
These instructions are for installing R2017b from The MathWorks. This portion of the installation can take several hours. You will need a reliable network connection, your MathWorks account name and password, and several cups of coffee. Open your web browser and go to WWW.mathworks.com:



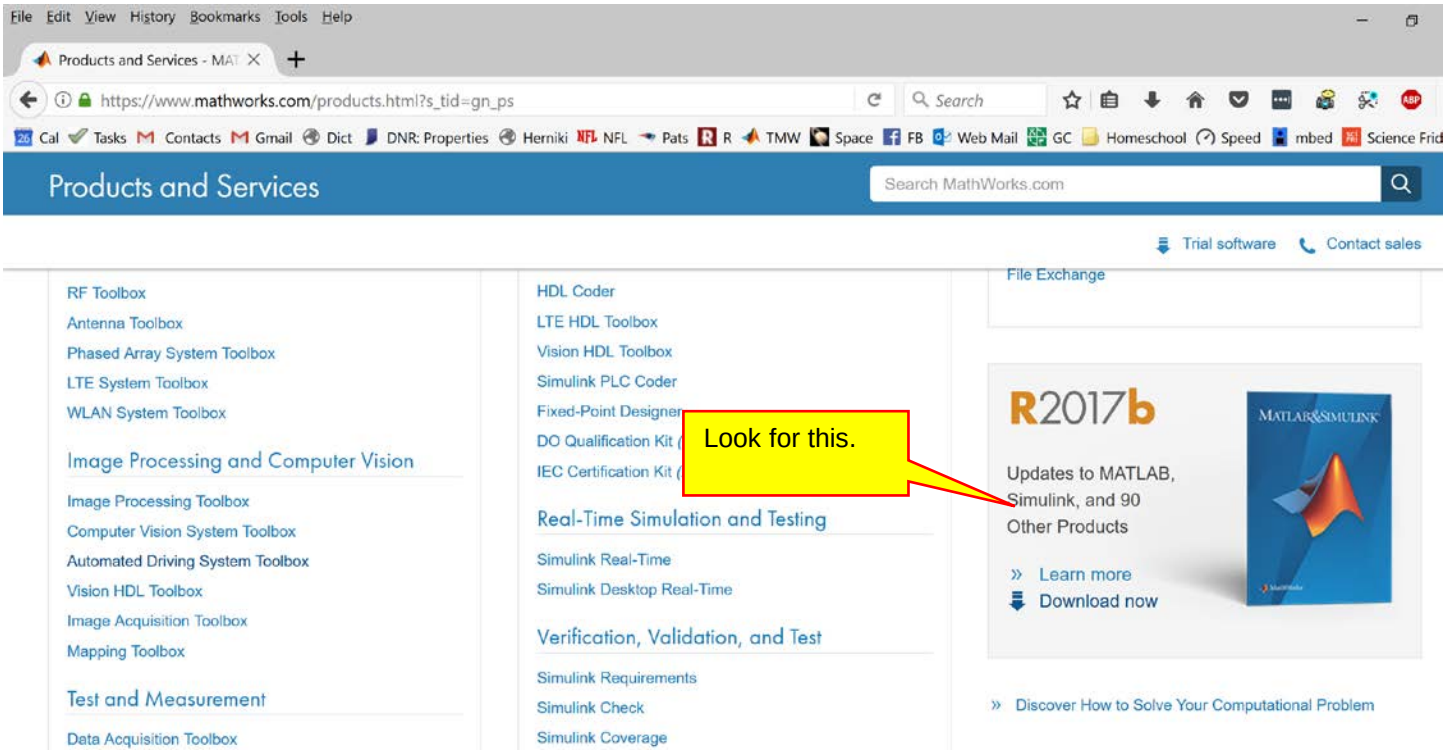
Click on the Products button:



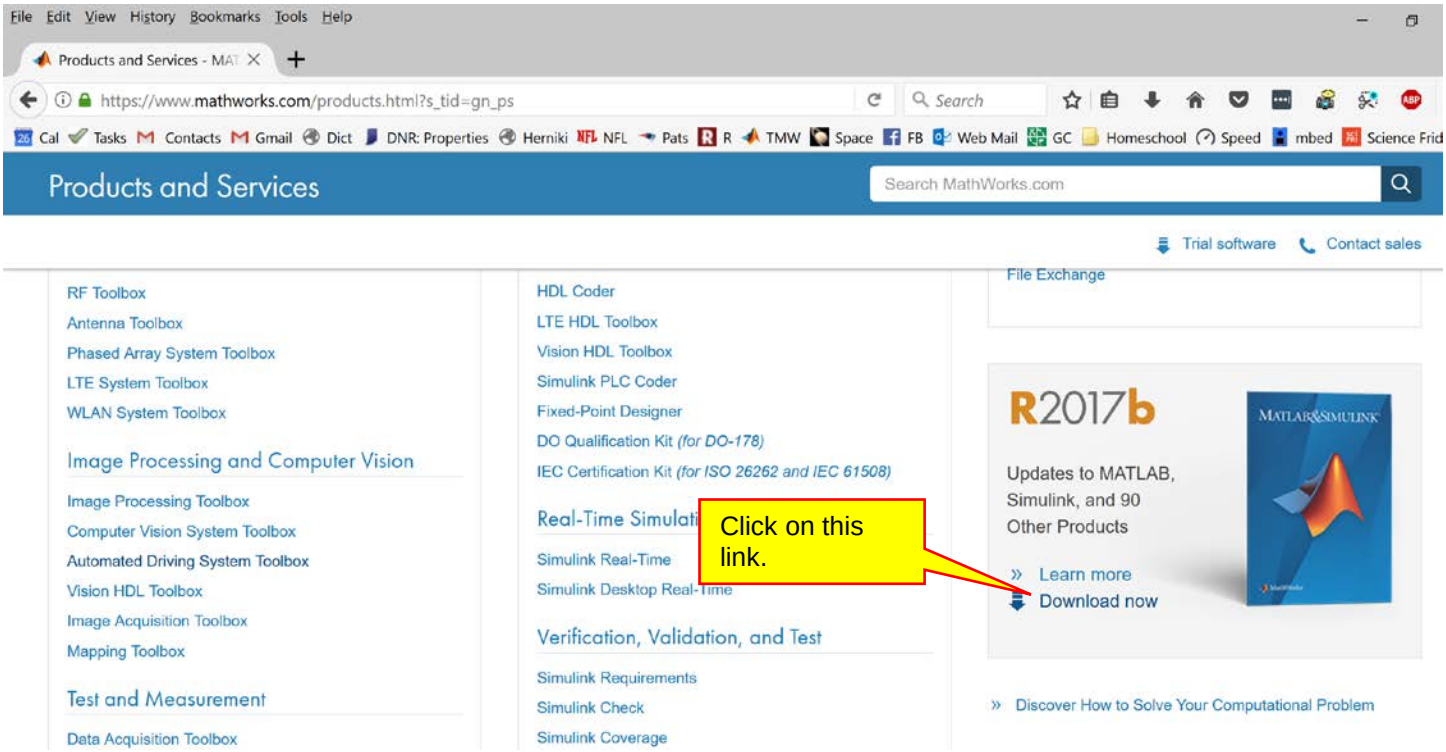
You will see the window below:



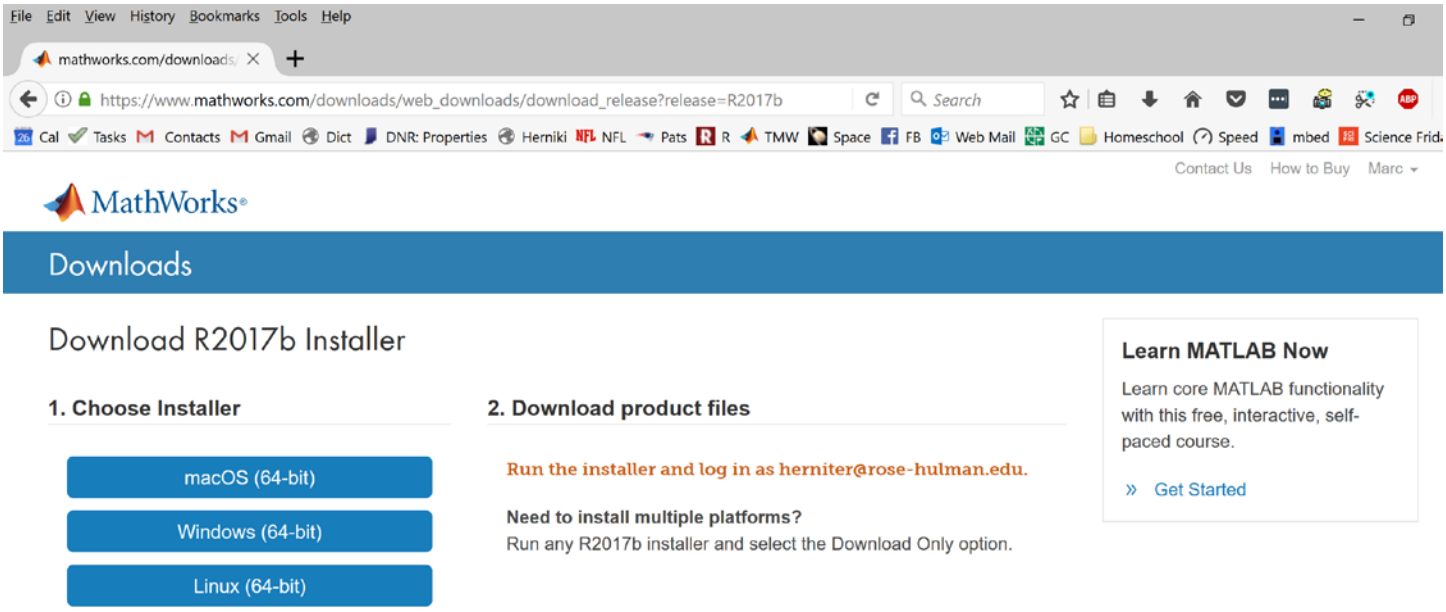
Scroll down until you see the pane for R2017b:



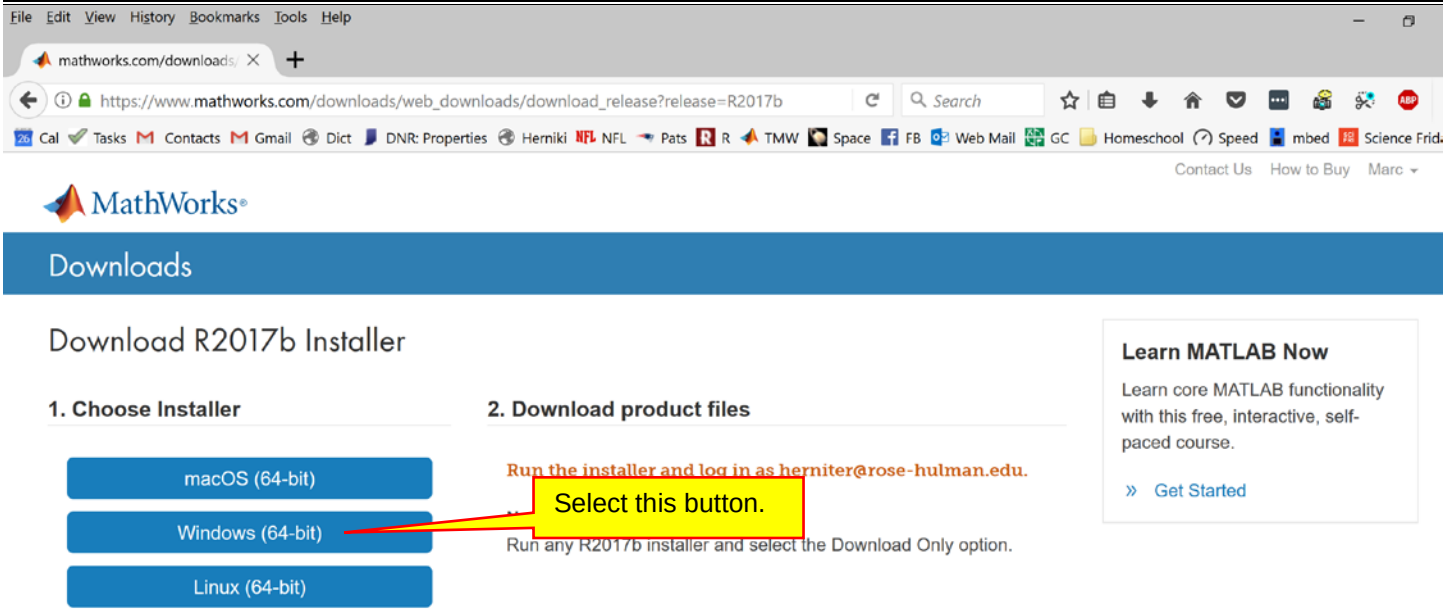
Click on the button that says **Download now**:



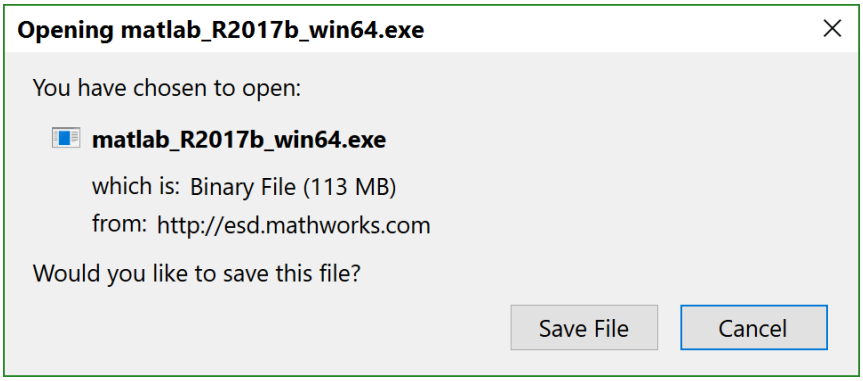
You will see the window below:



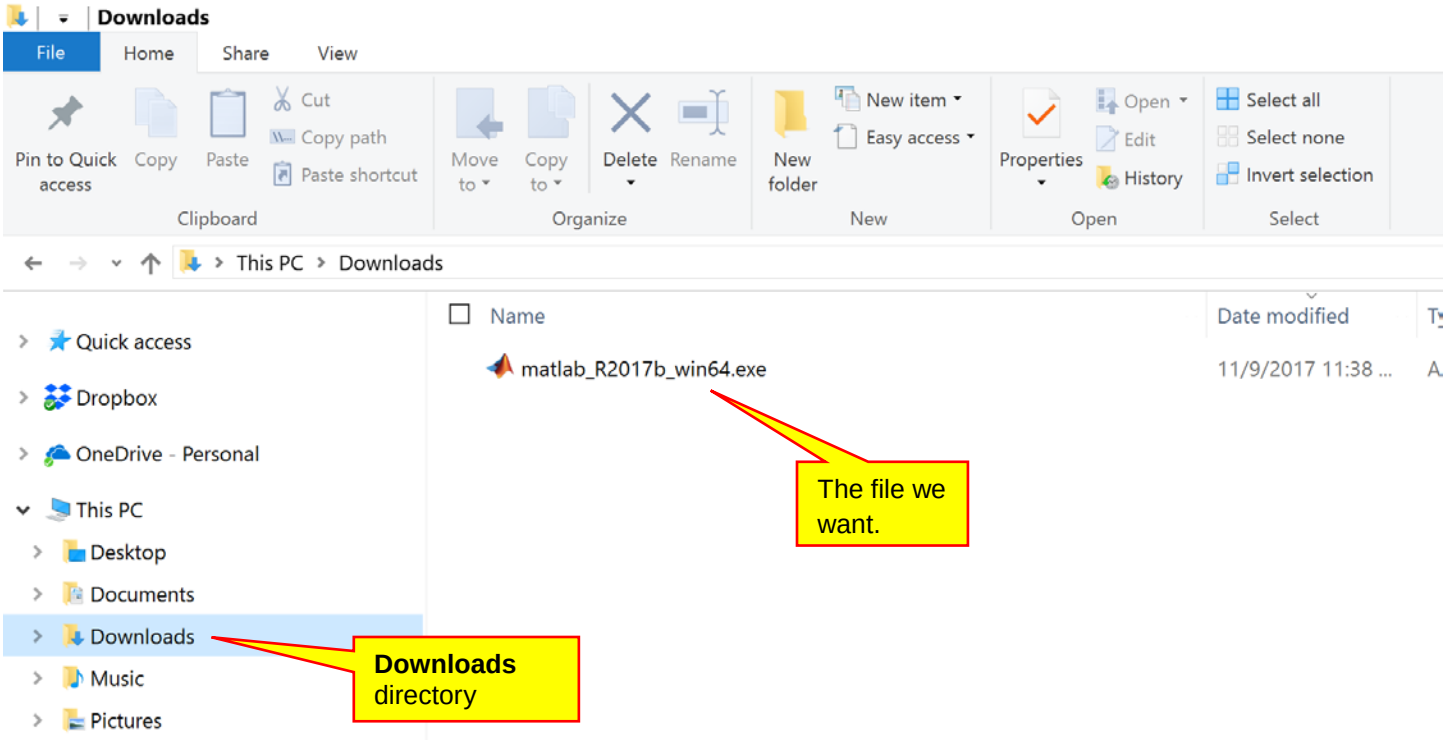
The library and manuals we have developed are for the Windows version so click on the **Windows (64-bit)** button:



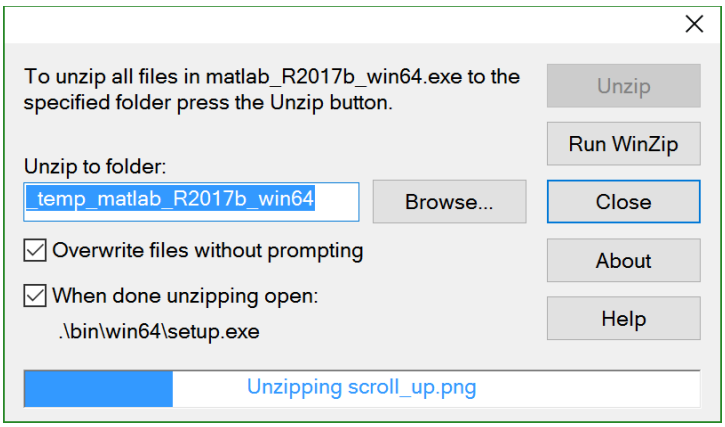
After selecting the button, you will be asked to save the file:



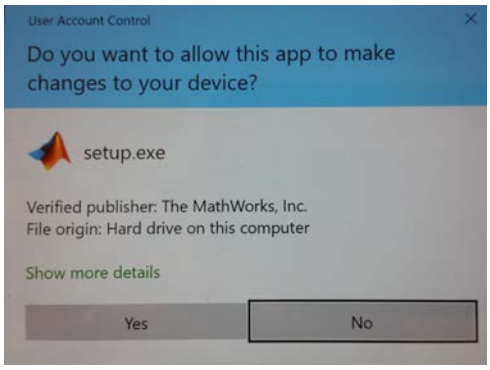
Note the name of the file and click the **Save** button. The file most will likely be saved to your **Downloads** directory. My **Downloads** directory is shown below. Yours may be different:



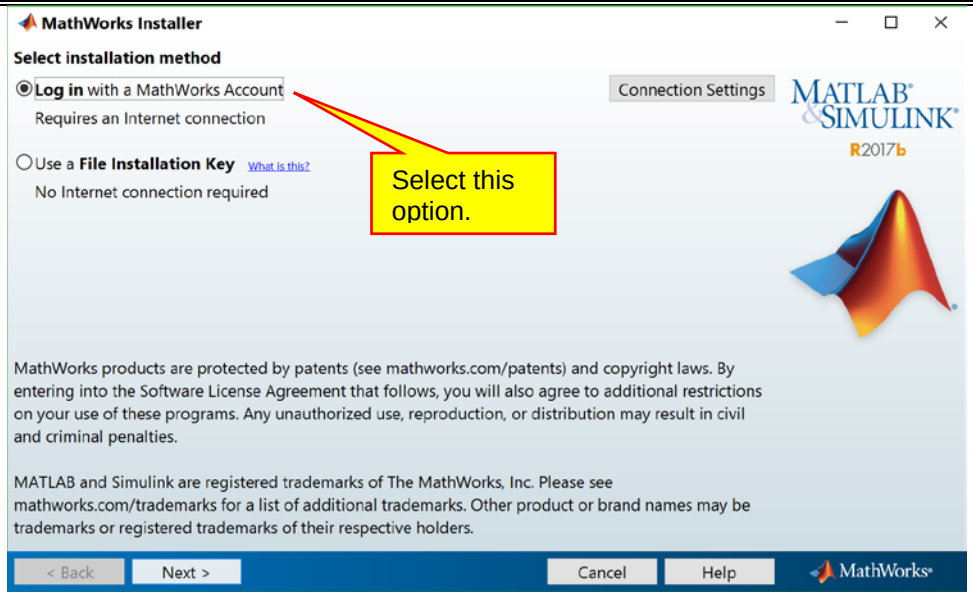
Run the file named **matlab_R2017b_win64.exe**. This is a file archive. A bunch of stuff will self-extract:



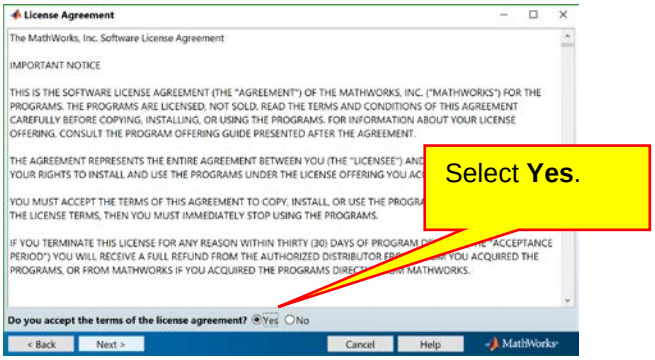
When the extraction is complete, the MathWorks R2017b installer will run automatically:



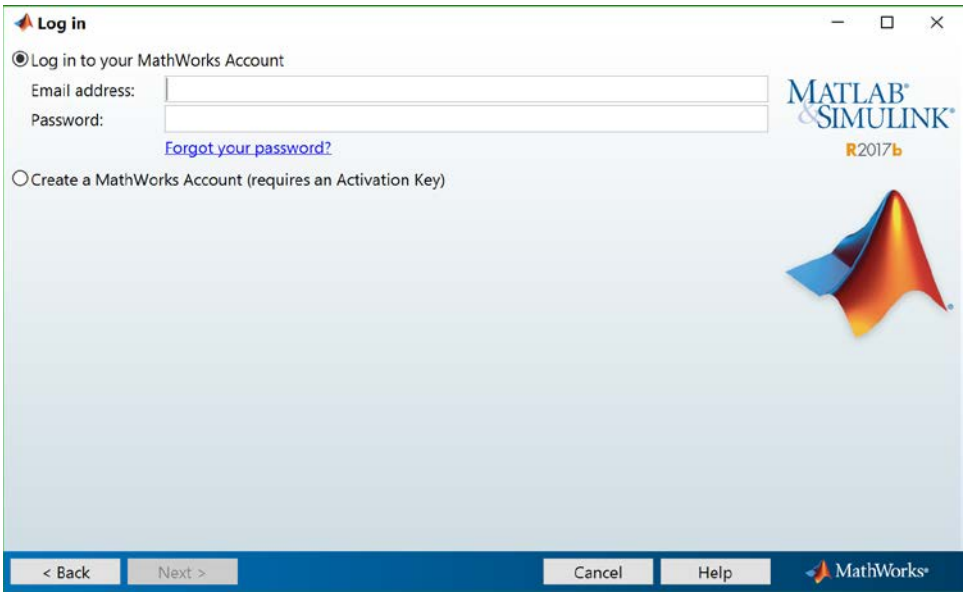
Click the **Yes** button to start the installation:



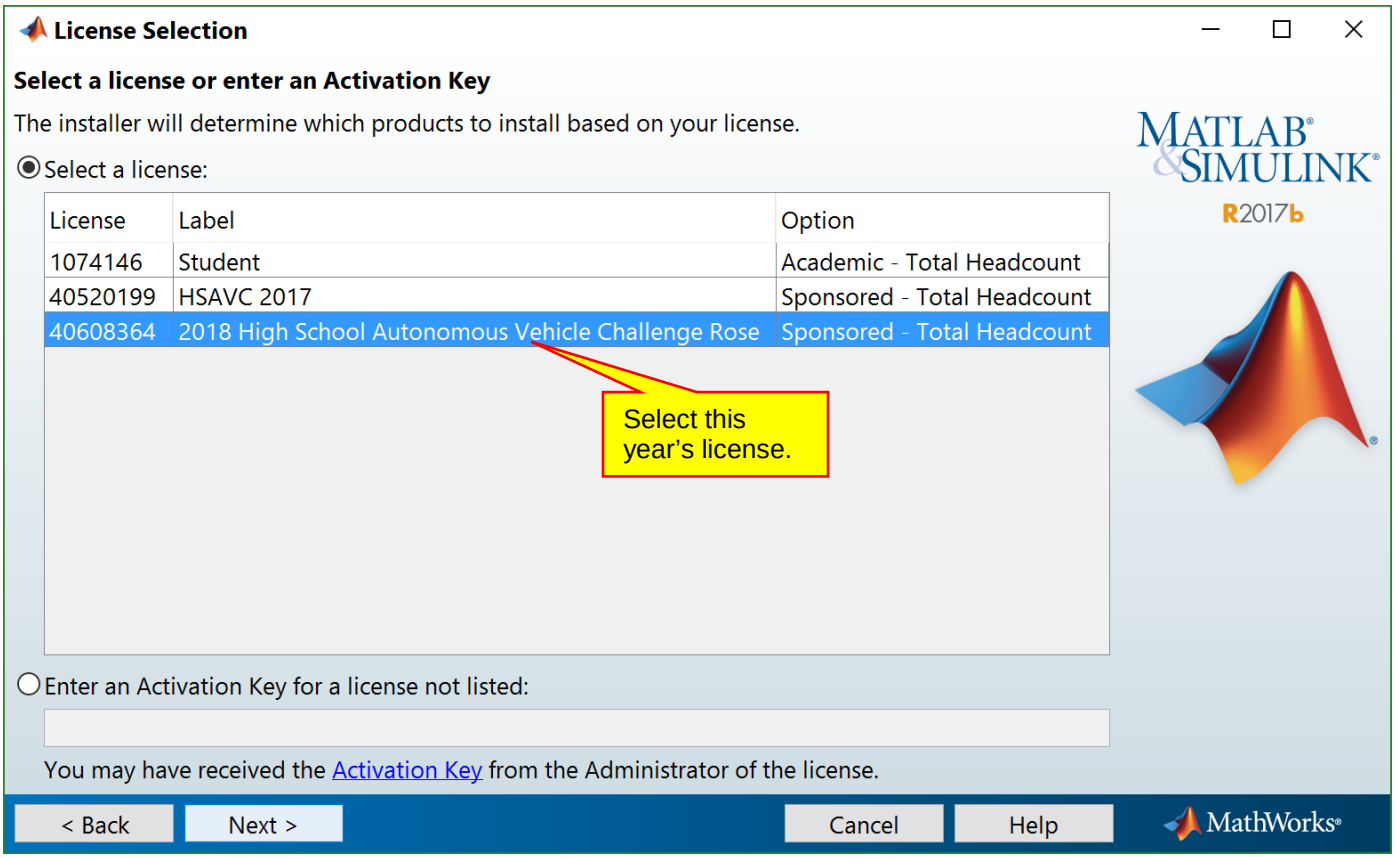
Select the option above and click the **Next** button:



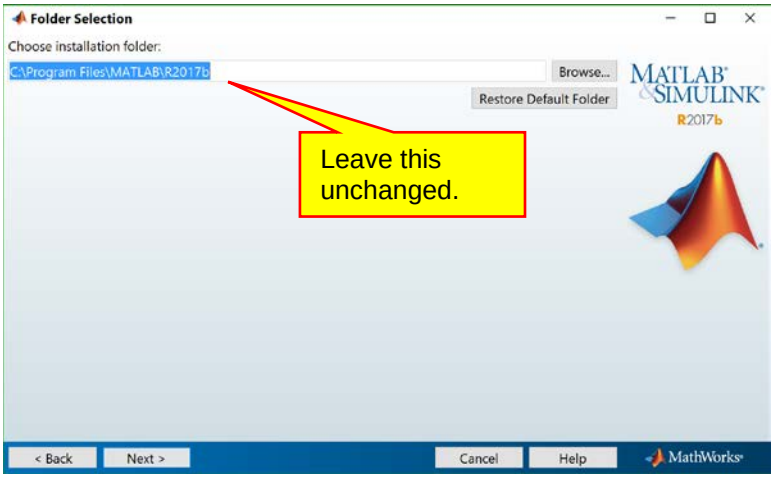
Select **Yes** and click the **Next** button:



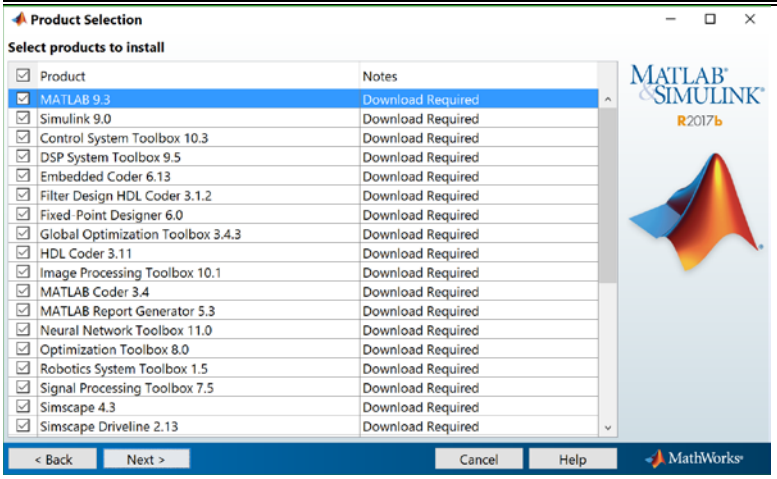
You will need to login to your MathWorks account. This is the same account and password that you used to obtain your license. Fill in your account and password and click the **Next** button:



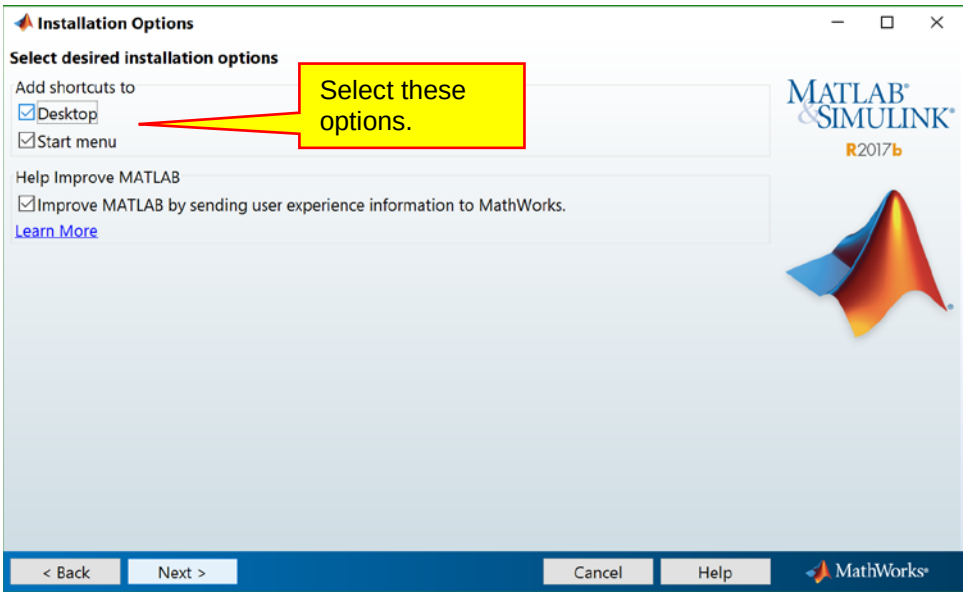
Select a license and then click the **Next** button. Your license may be named differently than the license shown above:



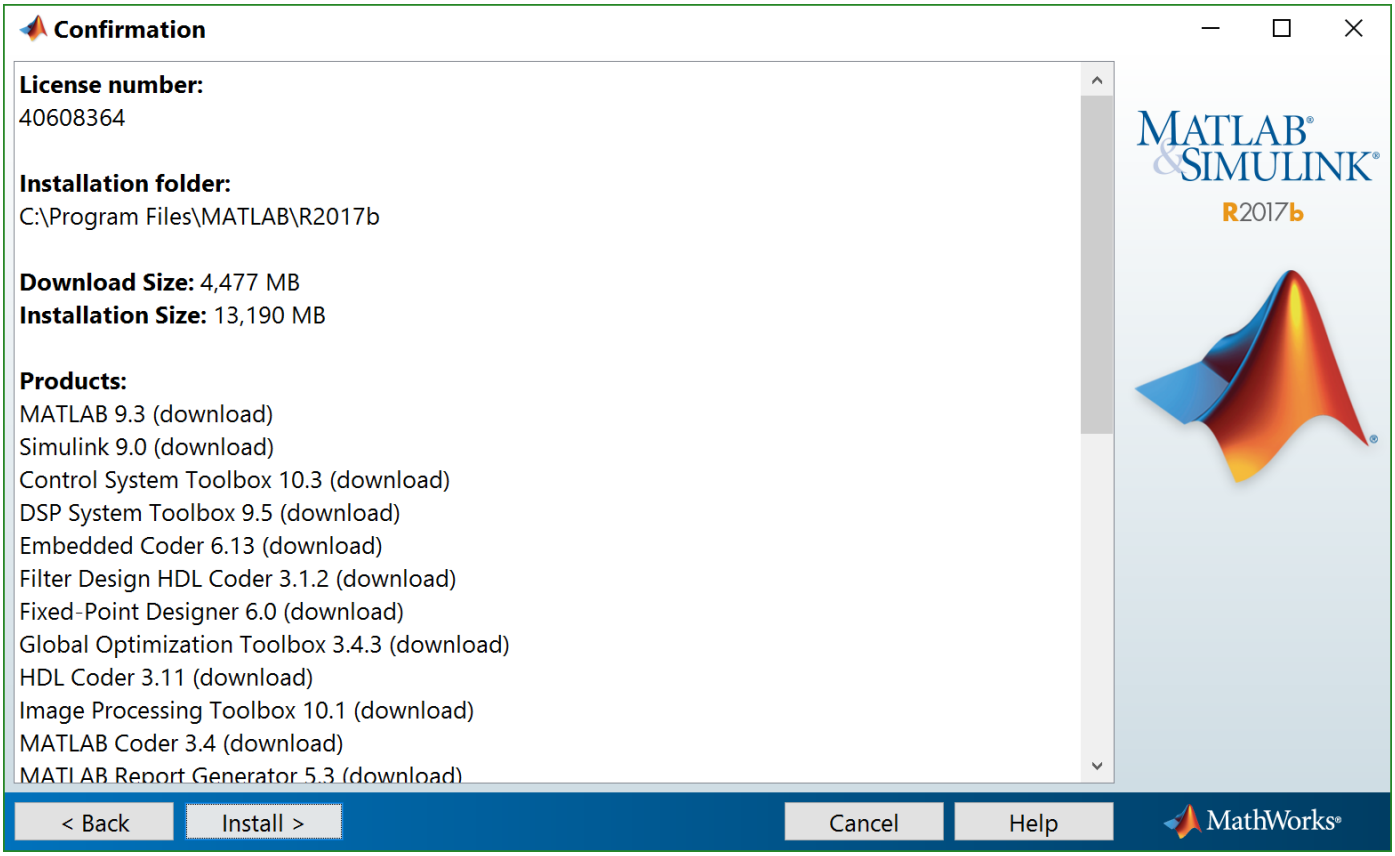
We will use the default directory, so click the **Next** button:



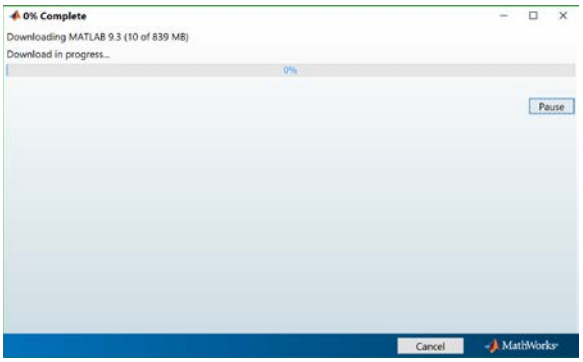
We will be installing all of this stuff, so click the **Next** button.



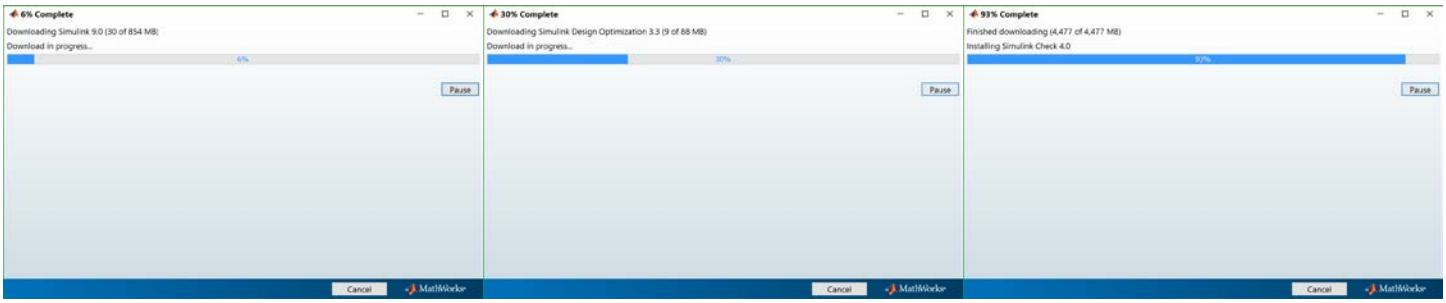
Select the options above and click the **Next** button:



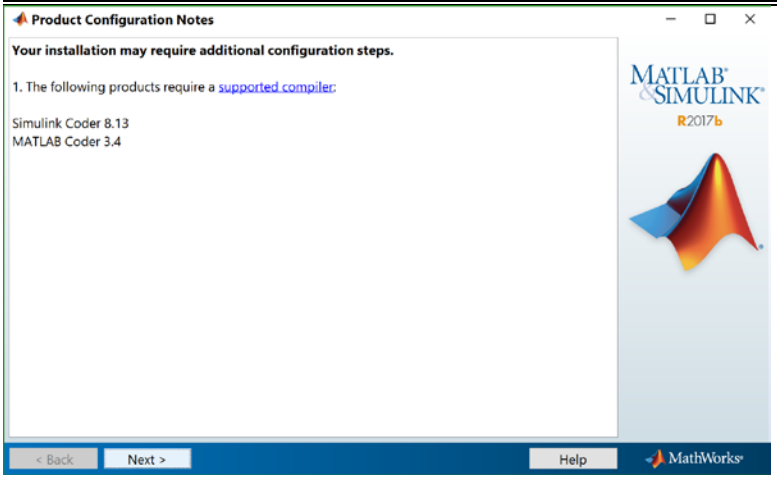
We are ready. Click the **Install** button. The installation will begin!



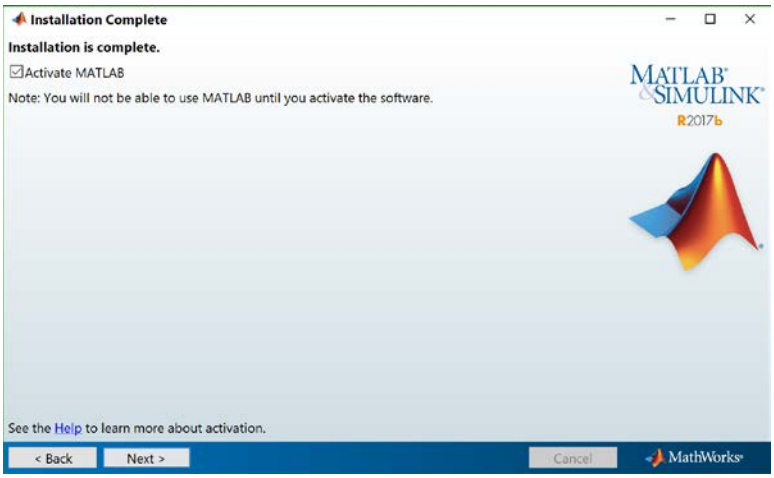
Get a cup of coffee. Get another. Get a third cup. This will take a while. Maybe a couple of hours. You do not need to watch it download. However, you should check on it occasionally.



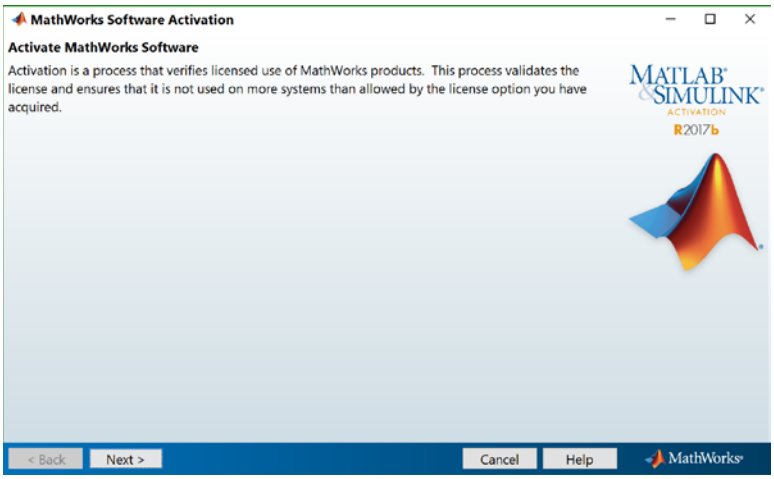
When the download/installation is complete, you will see the following screen:



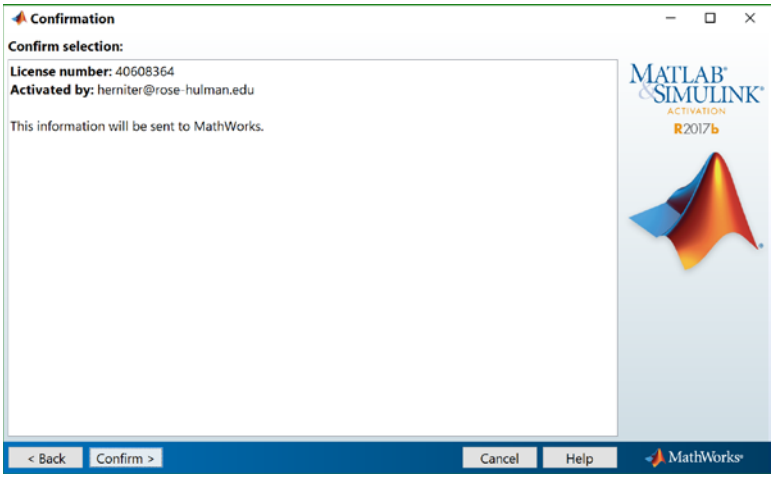
Click the **Next** button:



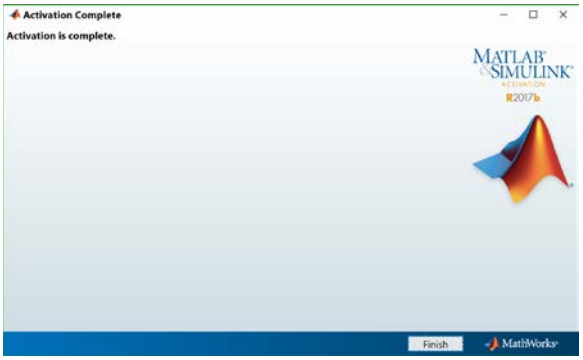
You will need to activate MATLAB. Assuming that your internet connection is active, this should go smoothly. Click the **Next** button:



Click the **Next** button:



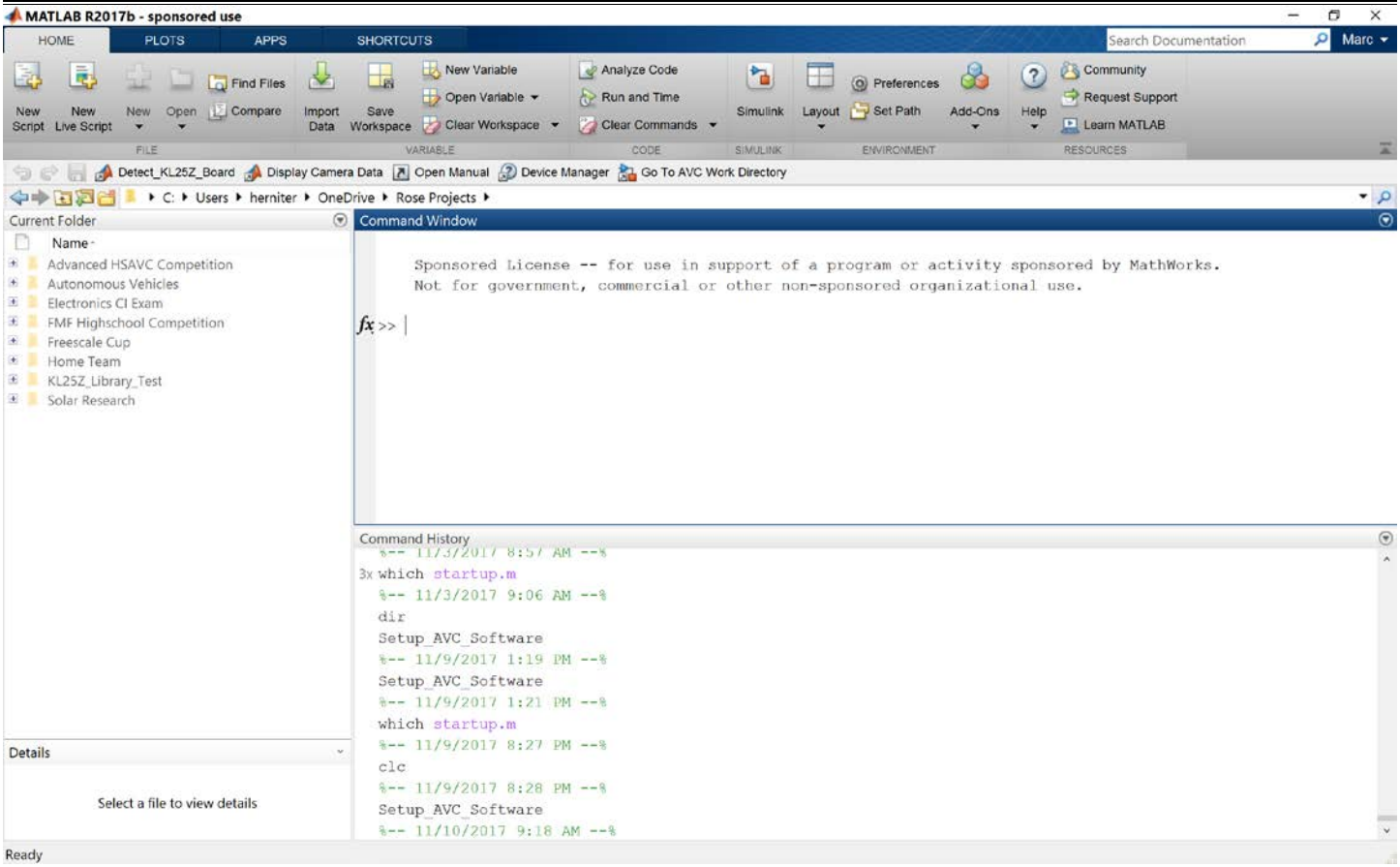
Click the **Next** button:



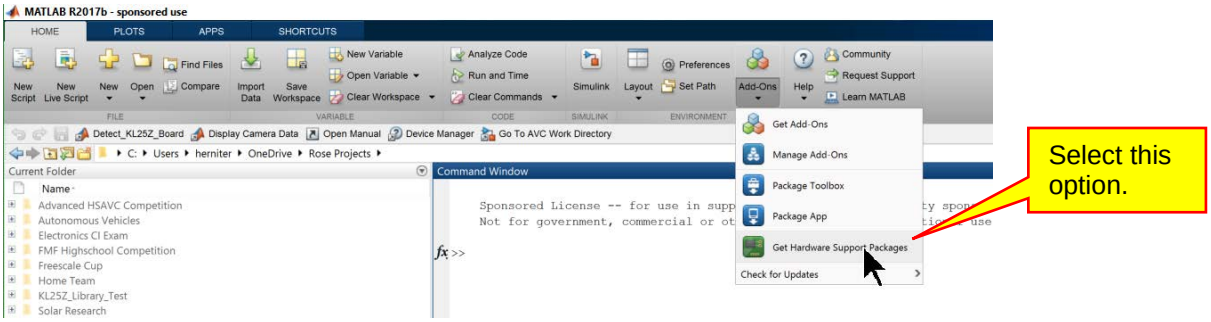
We are done! With this part… Click the **Finish** button.

II. Installing the KL25Z Support Package

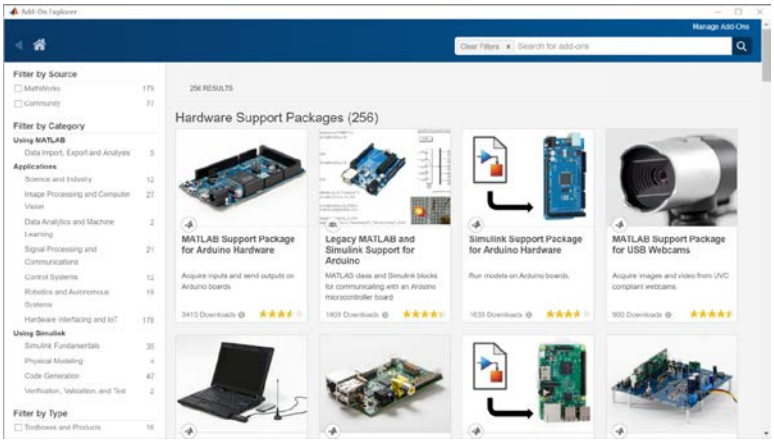
Next, we need to install the hardware packages for the KL25Z, the microcontroller we use on our cars. We will do this in MATLAB. Run MATLAB R2017b:



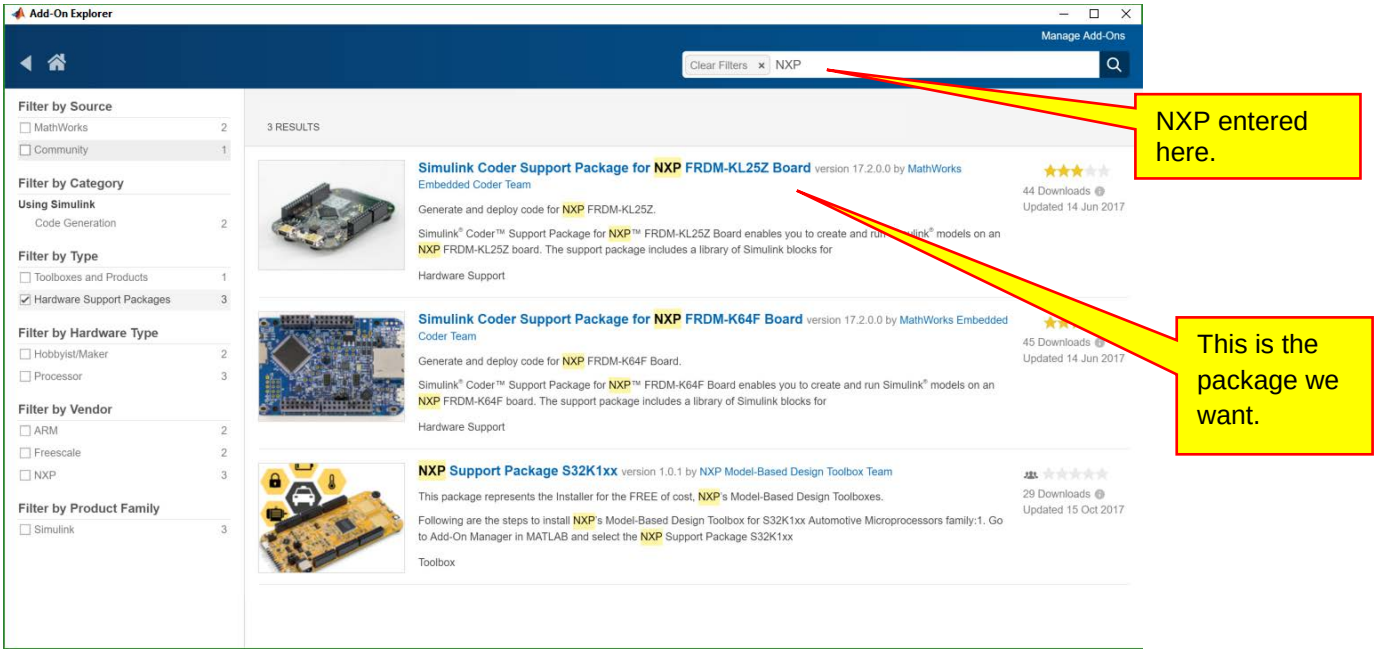
Select **Add-Ons** and then **Get Hardware Support Packages**:



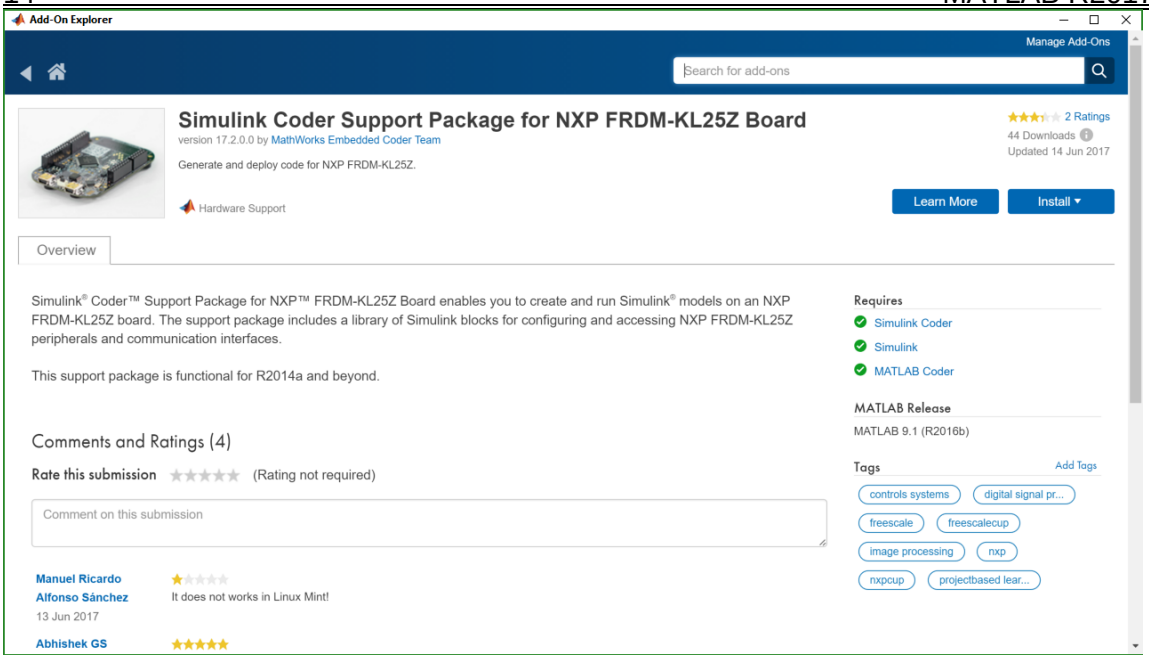
The **Add-On Explorer** will open:



Enter **NXP** in the search bar:

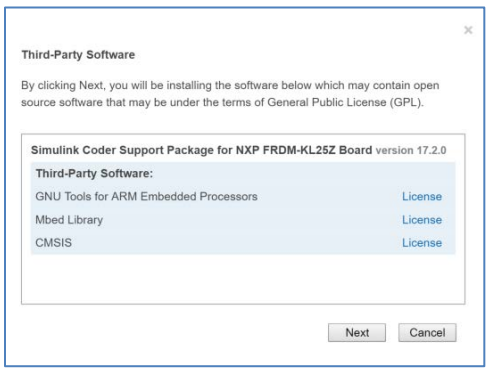


Click on **Simulink Coder Support Package for NXP FRDM-KL25Z Board** as shown above. The package will be selected as shown below:

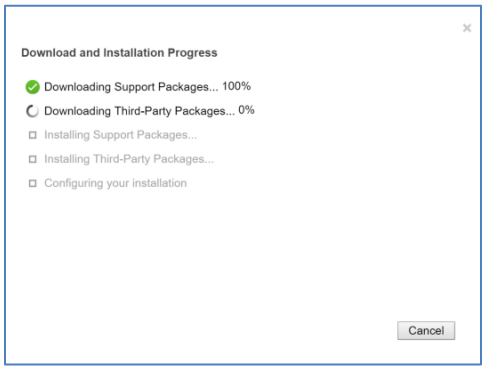


Click the **Install** button:

Accept the agreement:

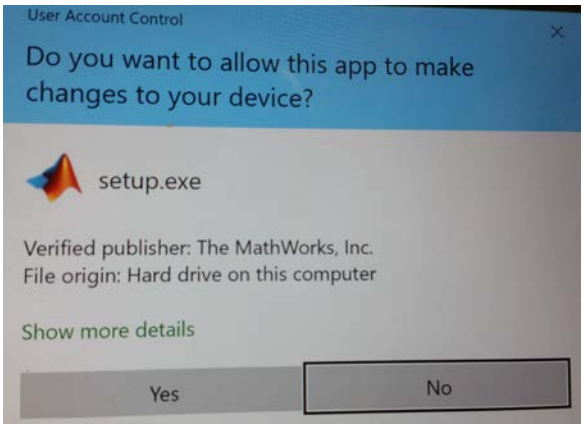


Click the **Next** button. Software will download and install. This might take a while:

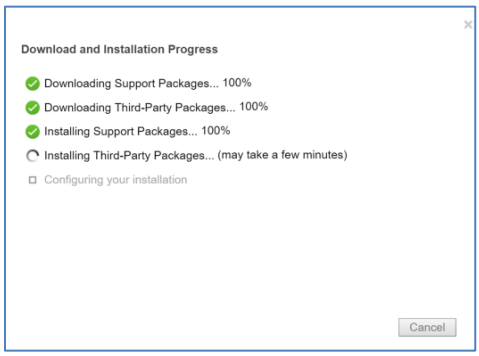


… Or a long while…..

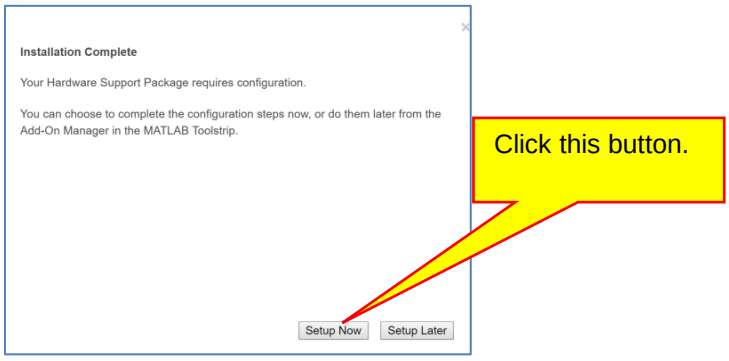
If something unexpected occurs, just try again. At some point, the screen below will appear:



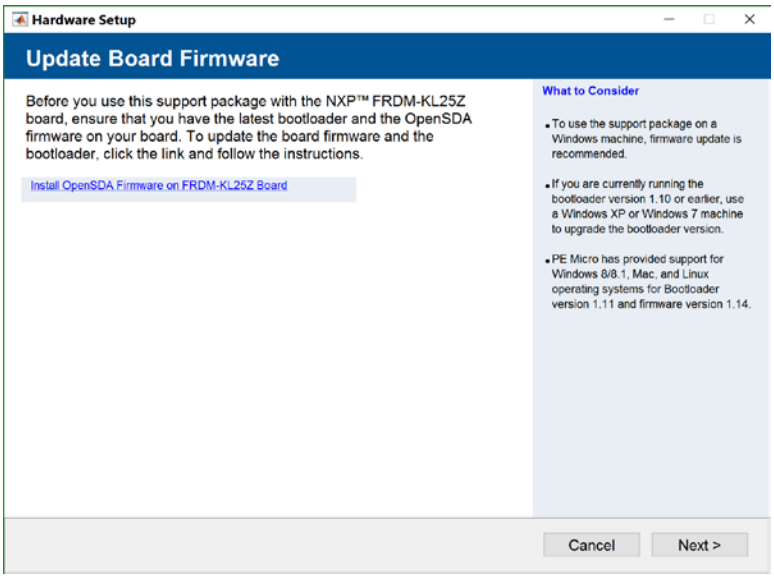
Click the **Yes** button:



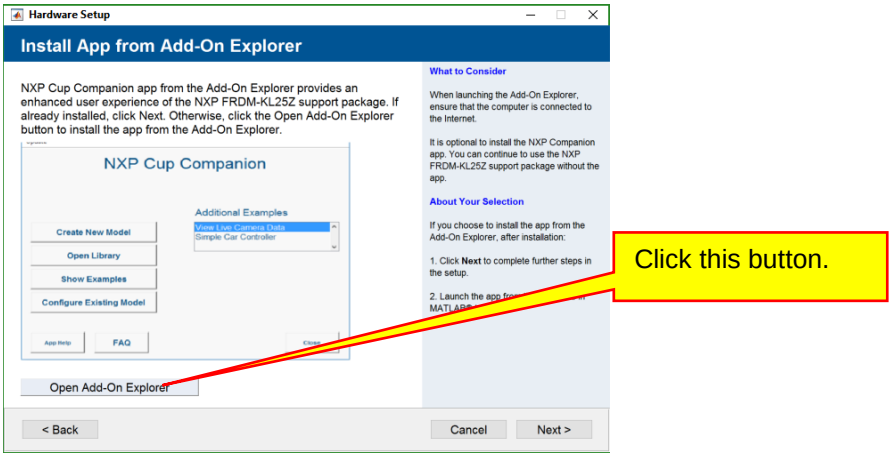
When the installation is complete, you will see the window below:



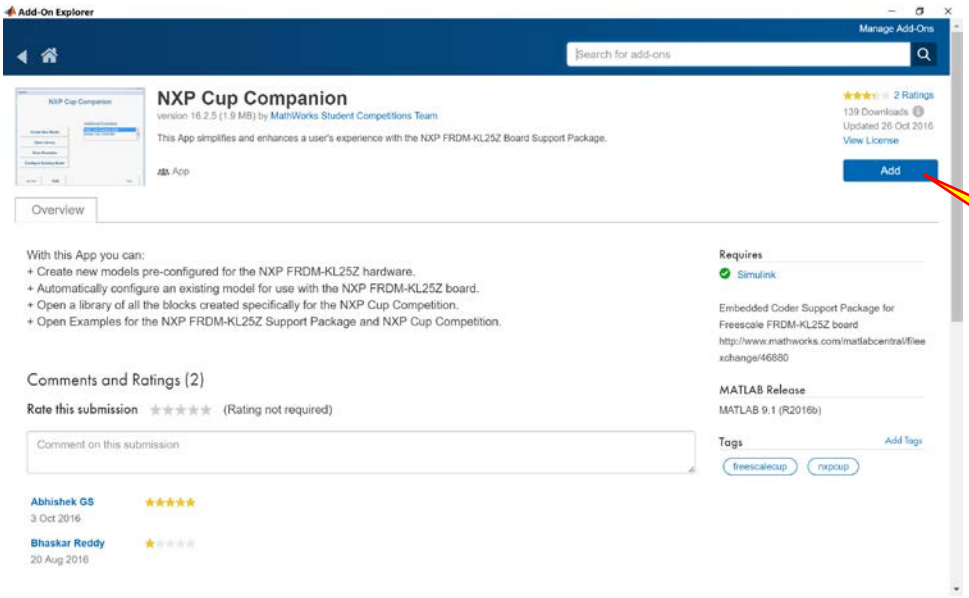
Click the **Setup Now** button:



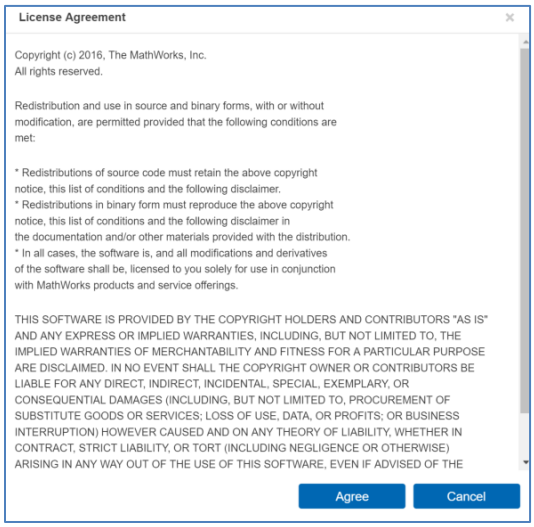
Click the **Next** button:



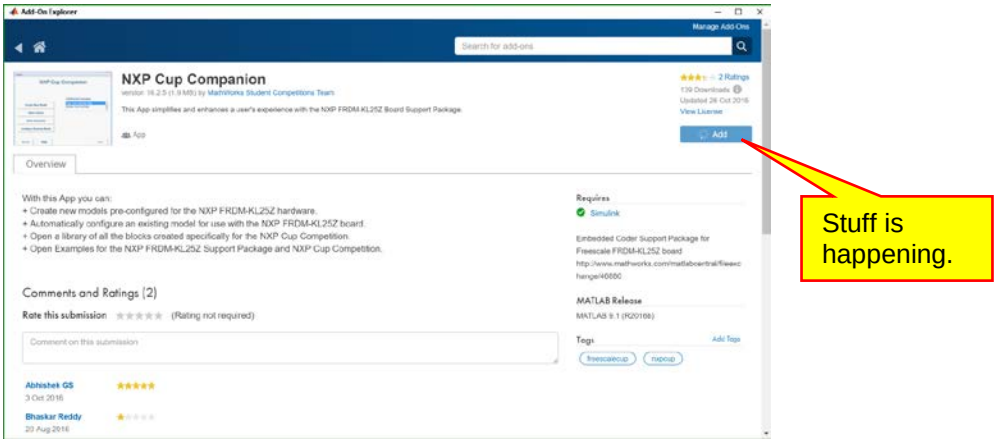
The **Open Add-On Explorer**. The window will open showing the **NXP Cup Companion**:



Click the **Add** button

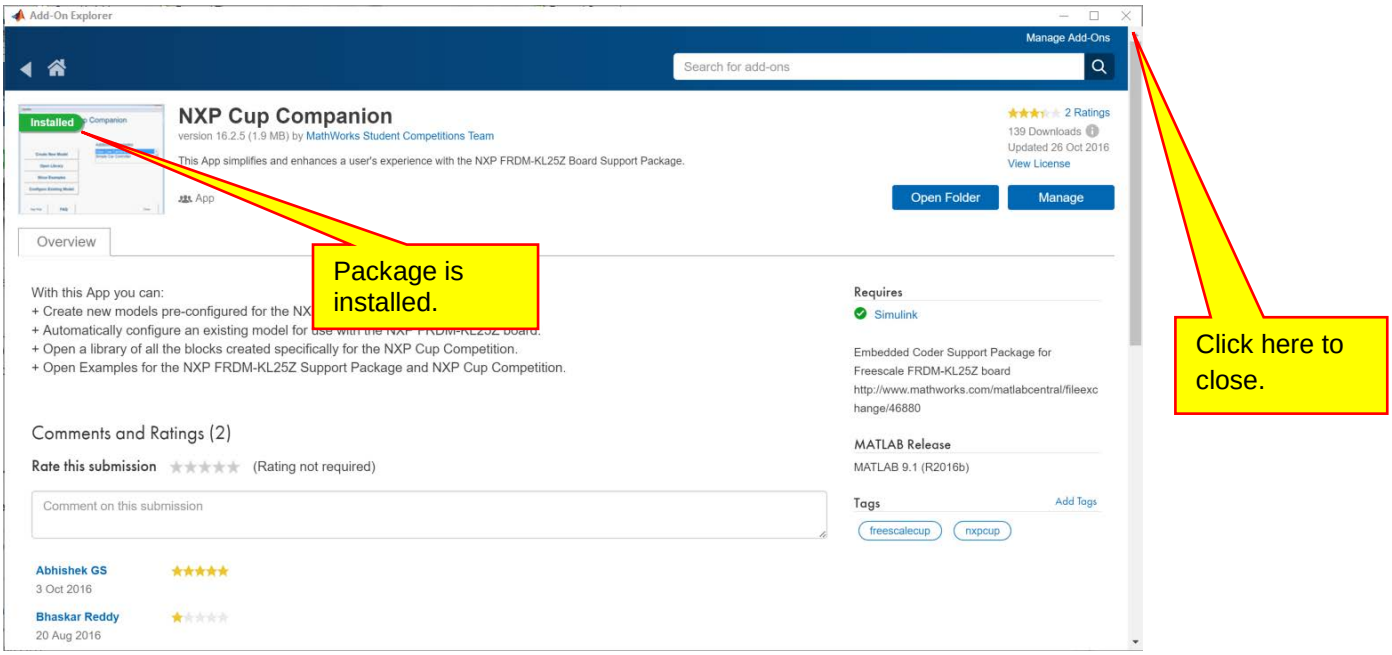


Accept the license agreement:

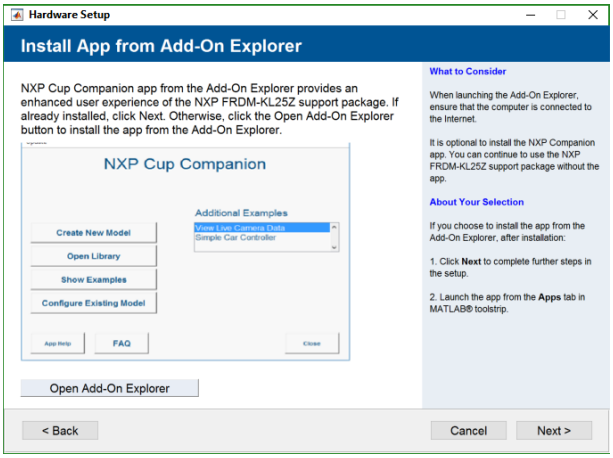


When done, the screen will appear as shown:

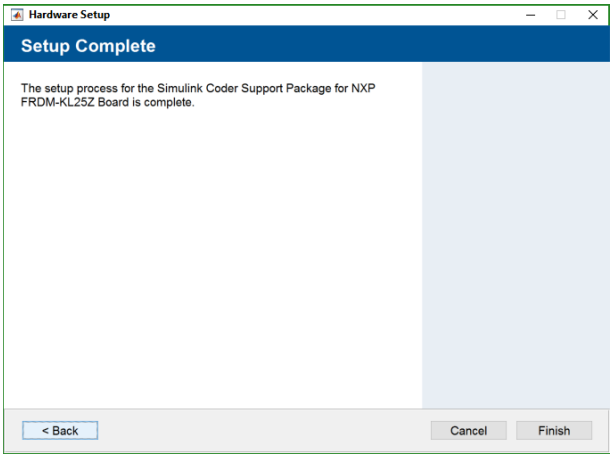
When done, the window should appear as shown:



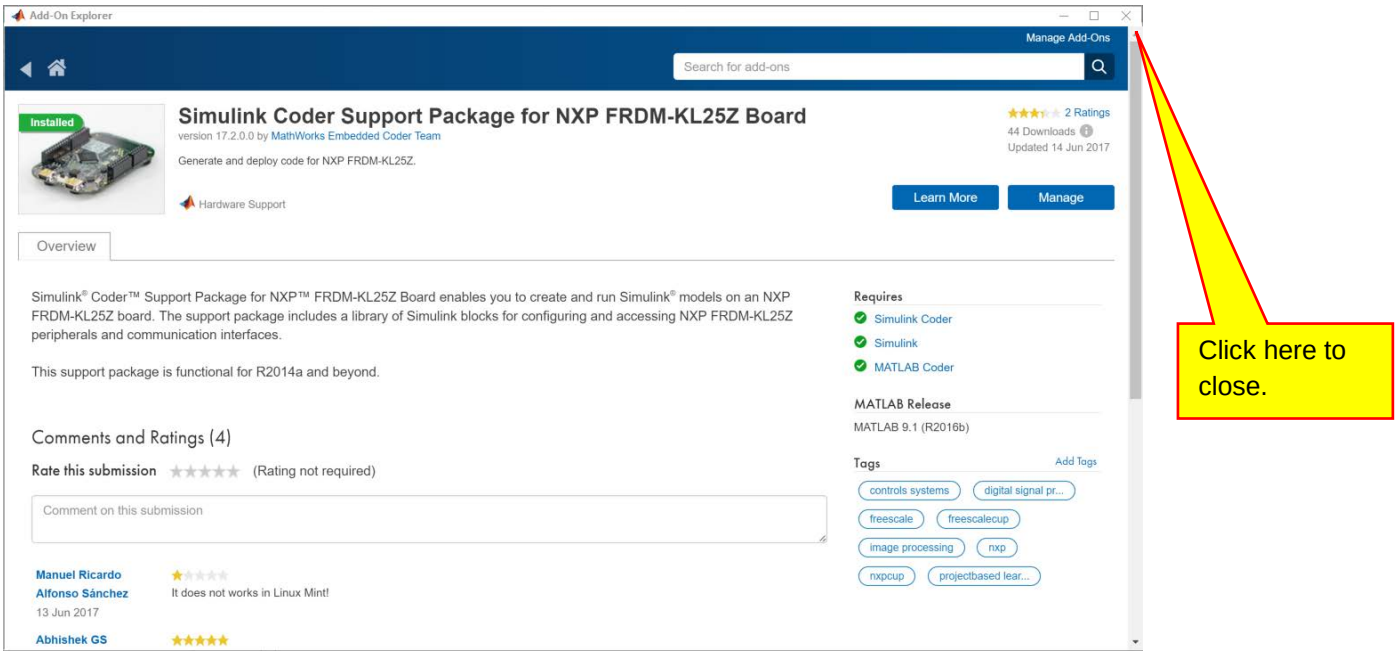
Close the **Add-On Explorer** as shown above. The window below should still be open.



Click the **Next** button:



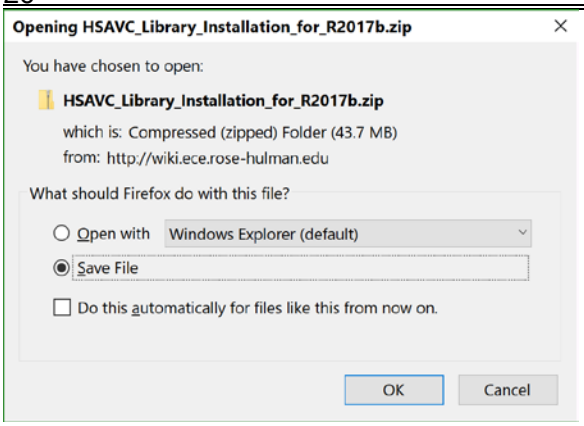
Click the **Finish** button. We are done with this part. You should still have the window below open:



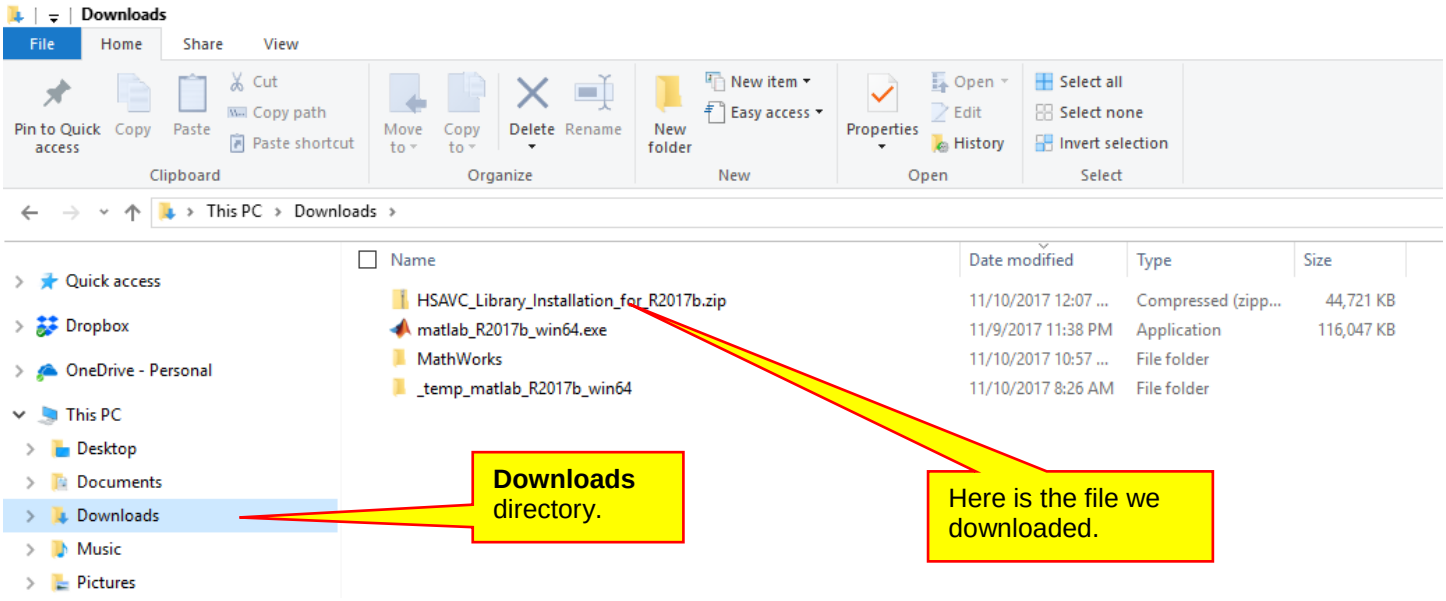
Close this window as shown above. We are done with this part.

III. Installing the Rose-Hulman HSAVC Library

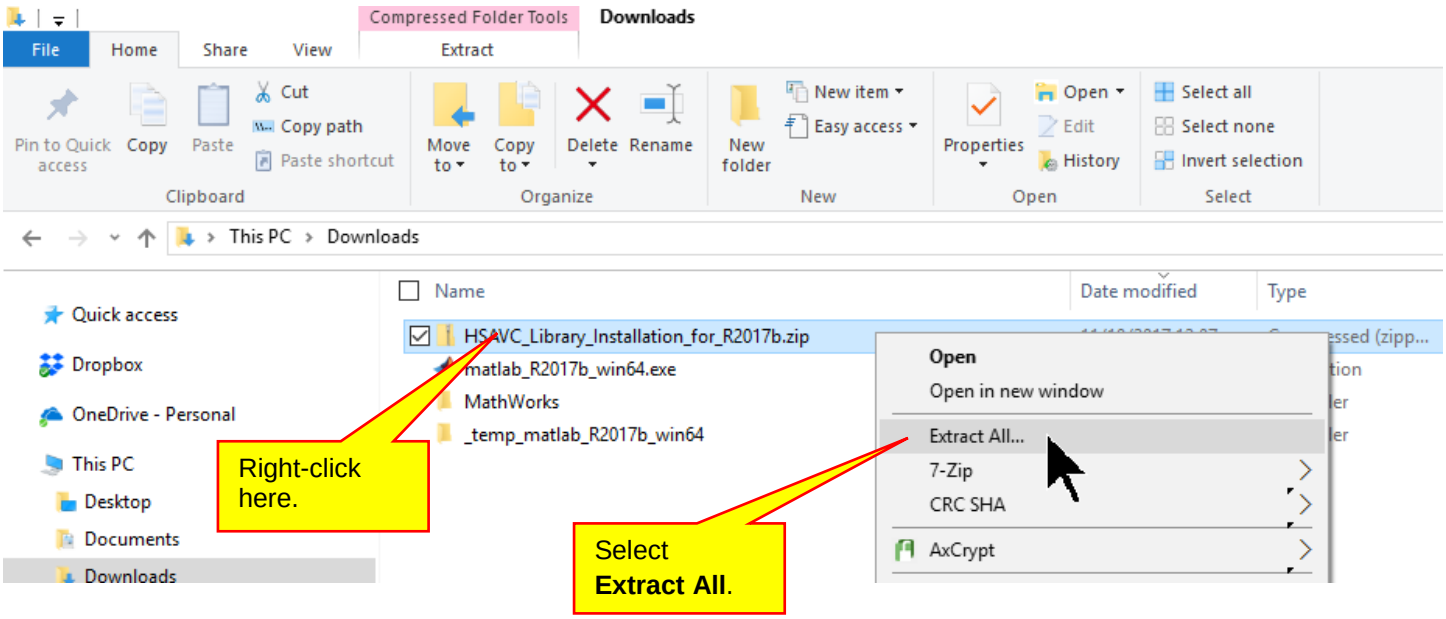
The libraries are available on my website. To download the libraries, click here. After you click the link, you should be prompted to save the file:



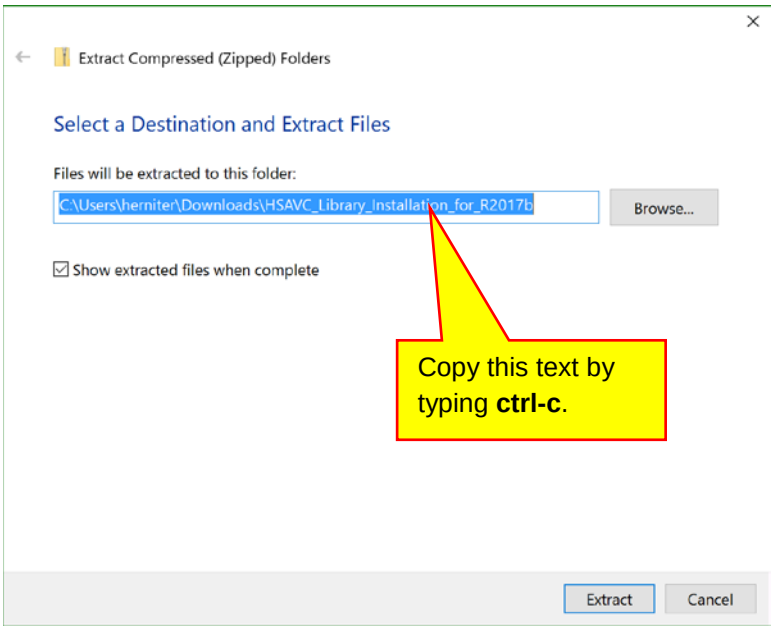
Save the file. It should be saved to your Downloads directory. If not, find it. Open the **Windows File Explorer** and find the file. Mine is in my **Downloads** directory:



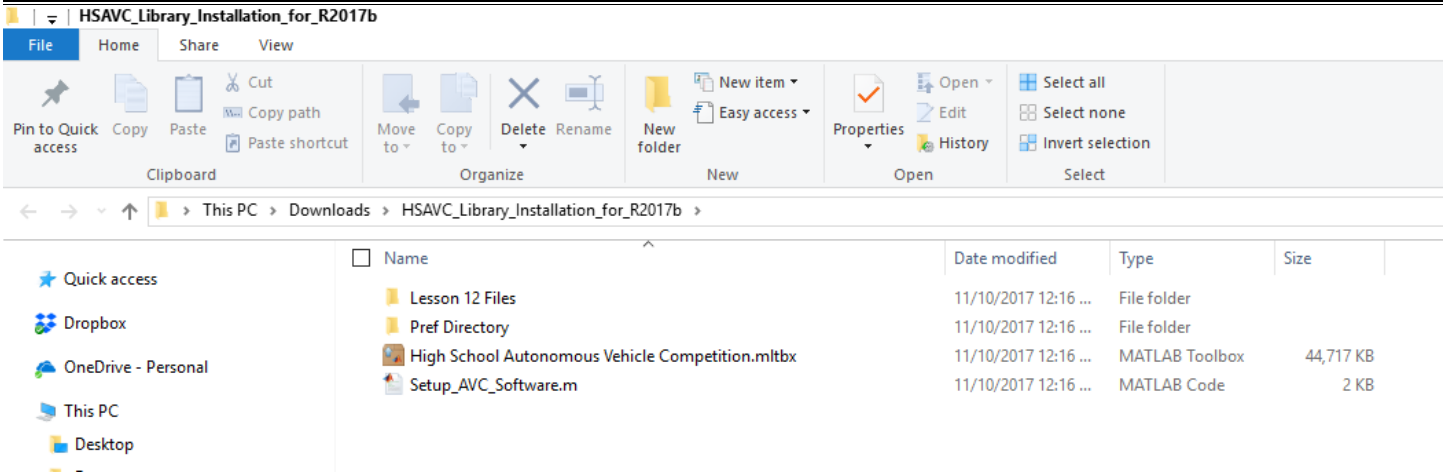
The file is a zip file archive. You should have a tool to extract the archive. Right-click on file **HSAVC_Library_Installation_for_R2017b.zip** and select **Extract All**:



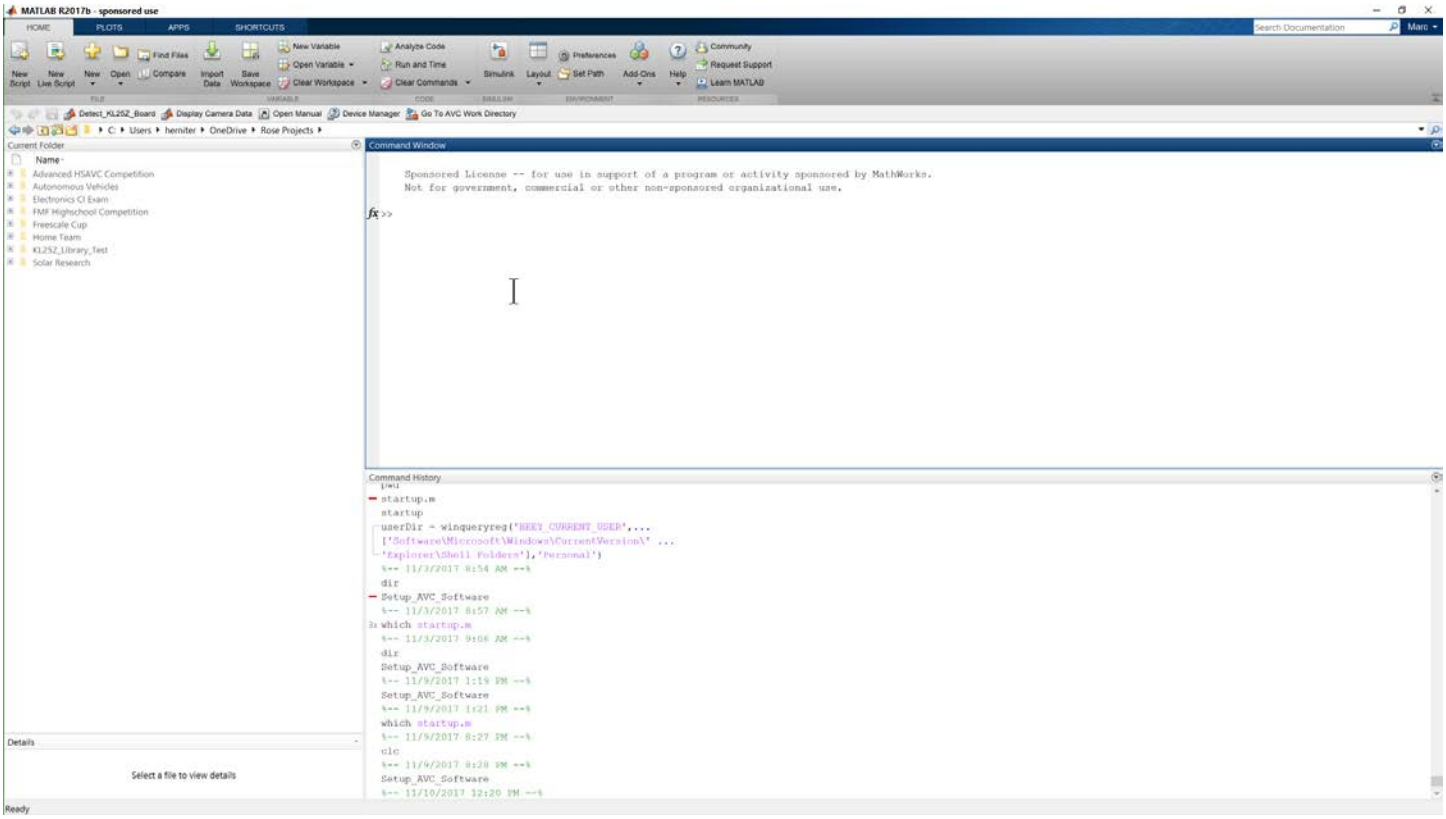
The window below will open:



Copy the name of the folder (type **ctrl-c**) that will be created and click the **Extract** button. A folder should open showing the extracted files. Your folder should look as shown below:

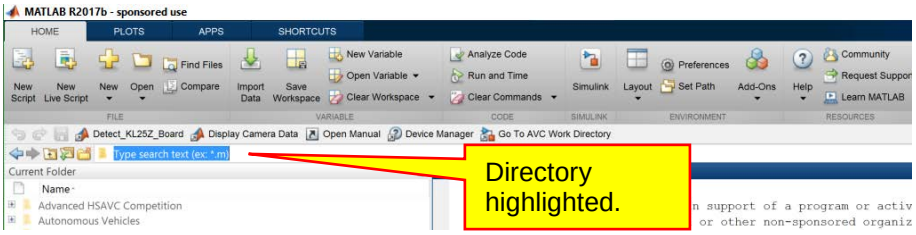


Next, we need to switch back to MATLAB:

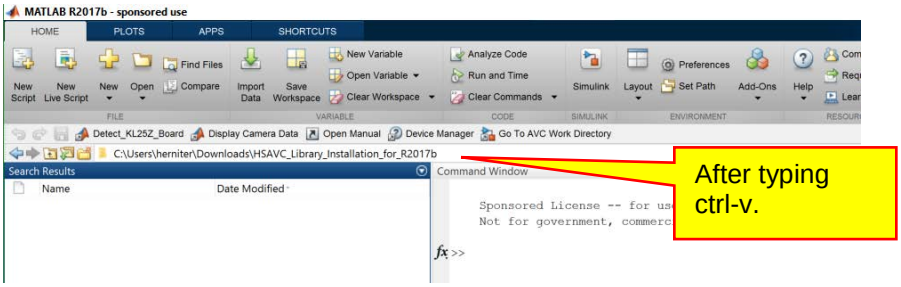


Click on the search button as shown below:

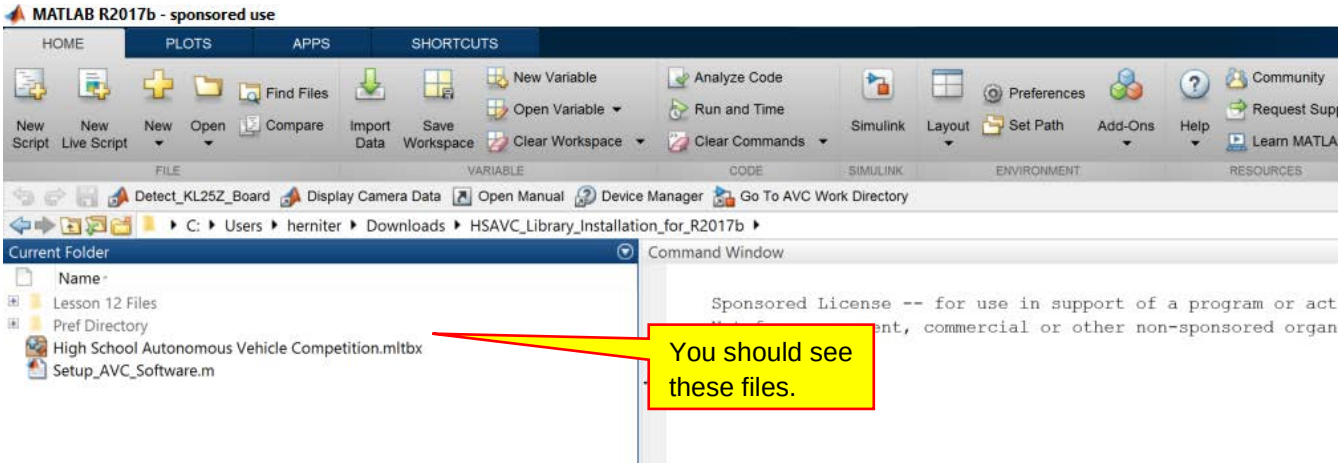
The directory name should be highlighted.



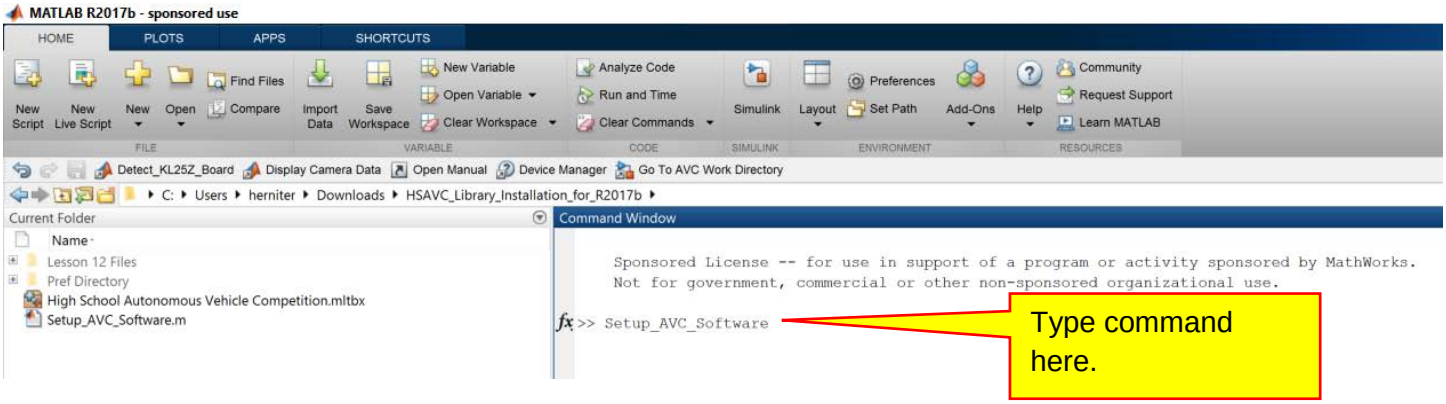
Type **ctrl-v** to paste the directory name you copied a few steps ago:



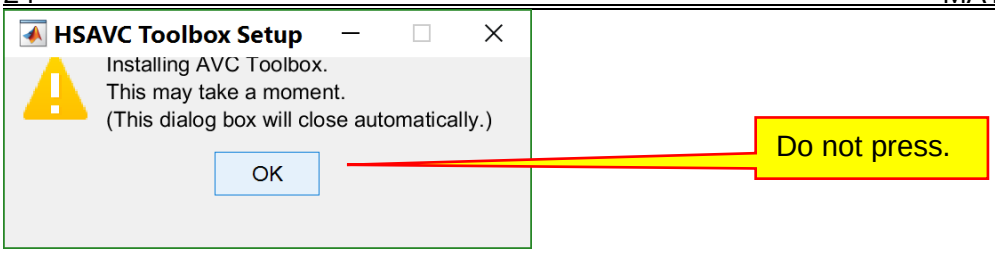
Press the **Enter** key. MATLAB should change to the directory containing the files we just extracted:



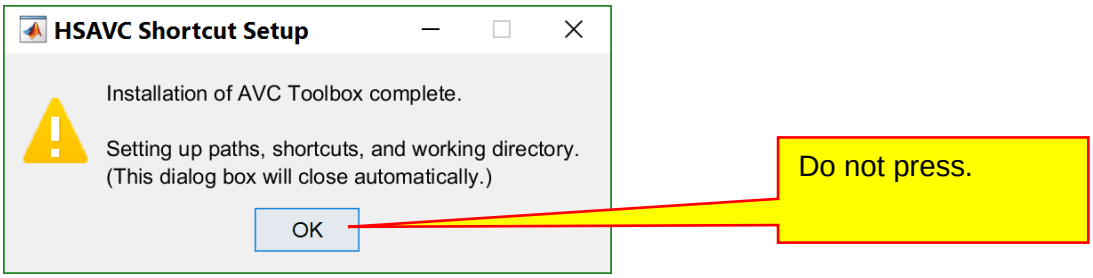
We are almost done. At the MATLAB Command prompt, type **Setup_AVC_Software**:



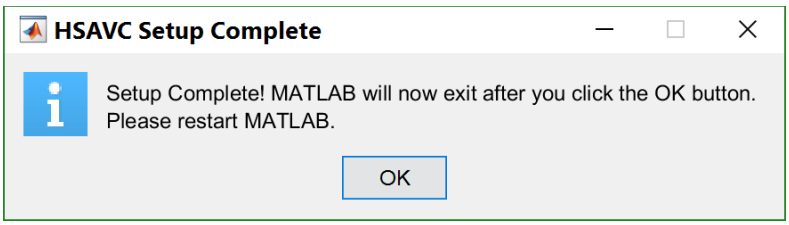
Press the **Enter** key. A message box will open.



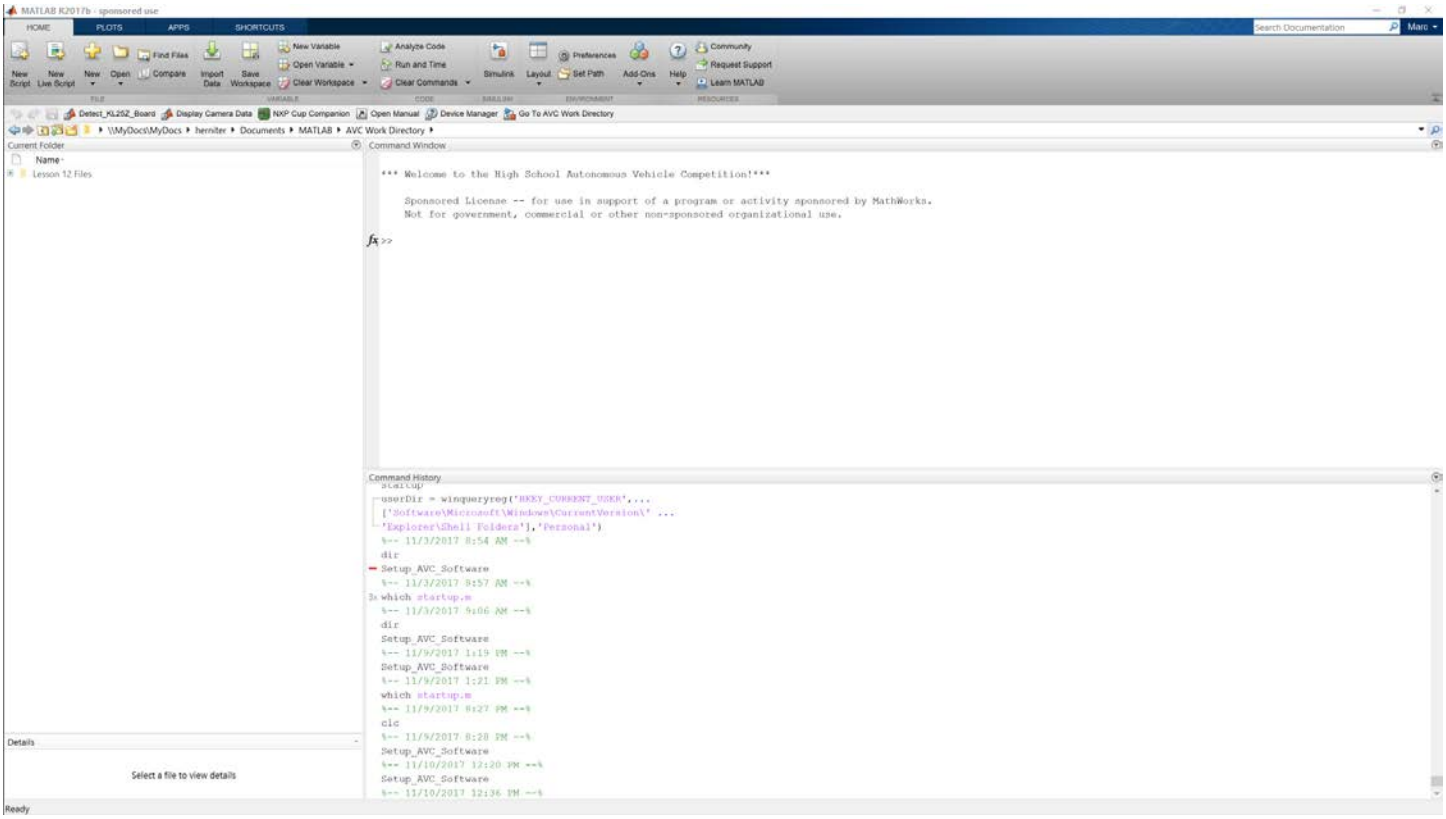
Do not press the **OK** button. The box will close automatically. After a few moments, the dialog box below will open:



After about 5 seconds, the dialog box below will open:

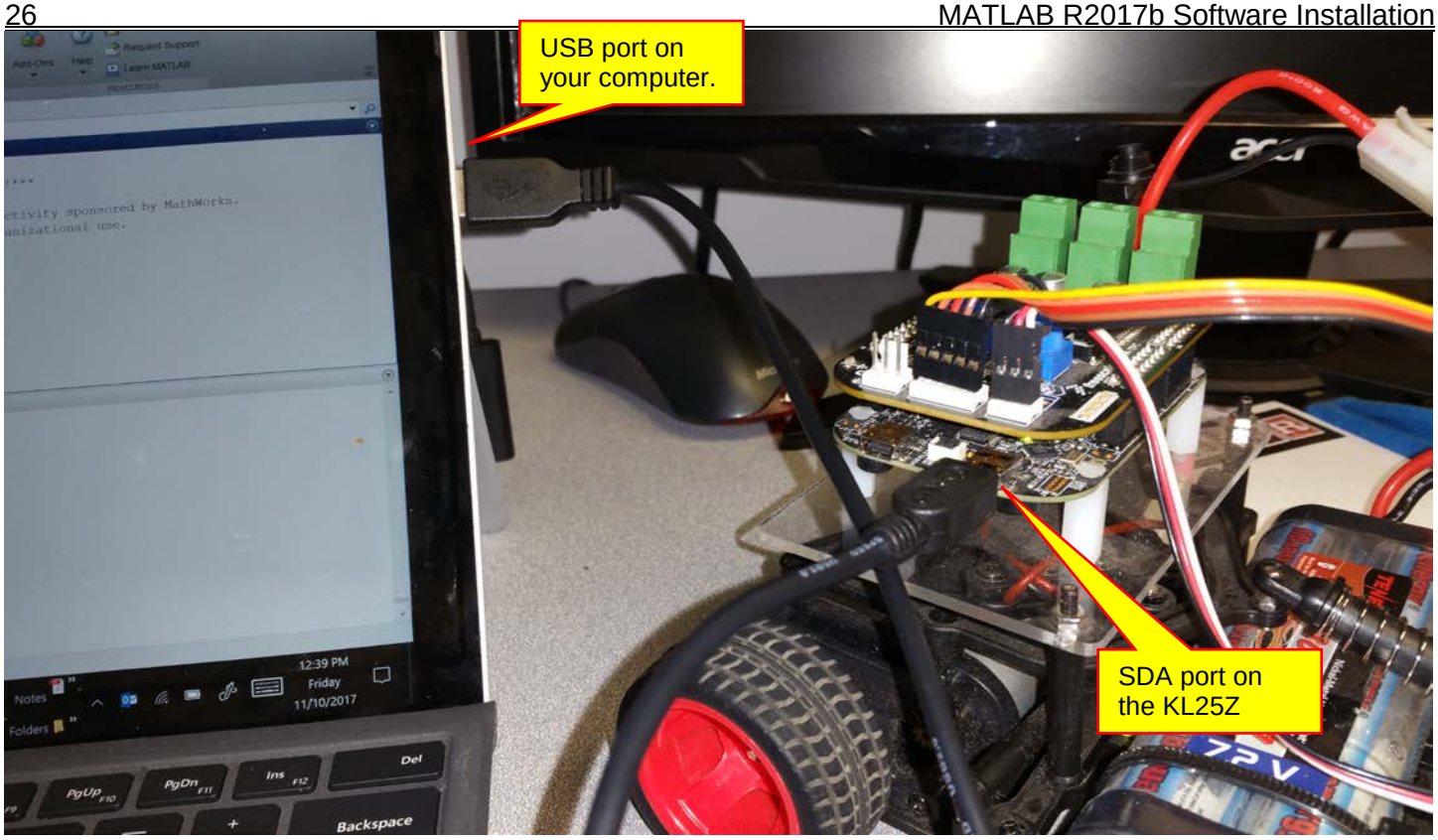


Click the **OK** button. MATLAB will close. You will need to restart MATLAB manually. When you open MATLAB, it should appear as shown:

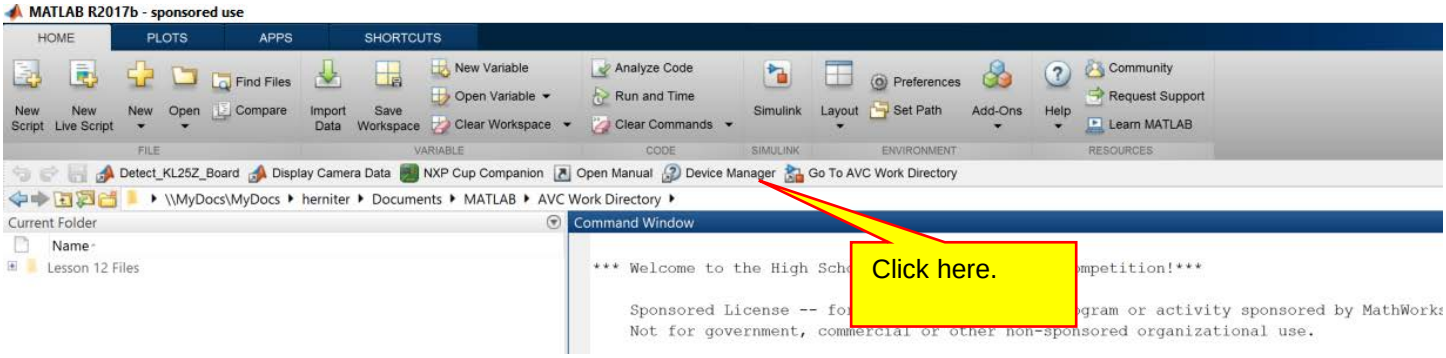


IV. **Updating the Device Driver**

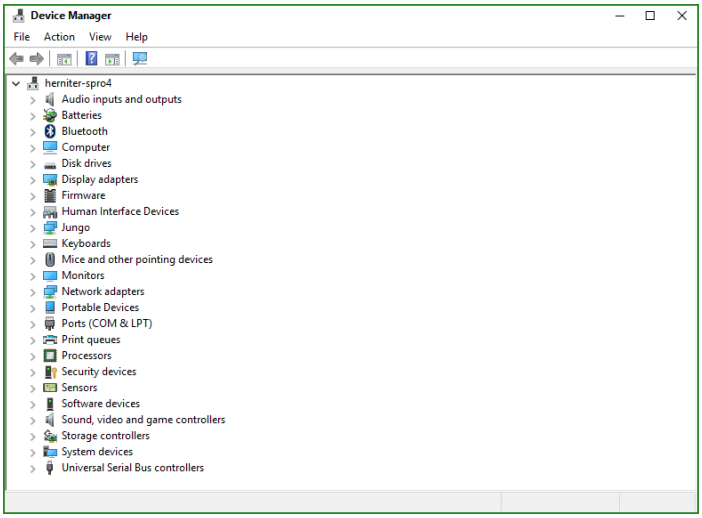
As one last step, we need to check the windows device driver. You will need to connect your car (the KL25Z microcontroller actually) to the USB port on your computer. Make sure that you use the SDA port on the KL25Z. Connect your Windows computer to the car as shown:



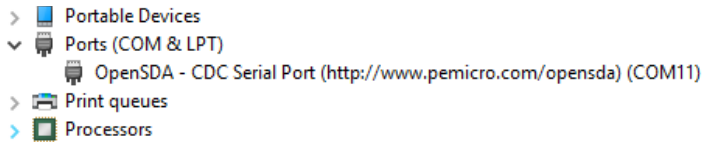
In the MATLAB window, click the **Windows Device Manager** shortcut:



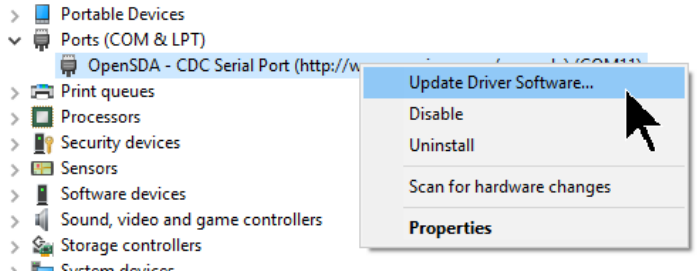
The **Windows Device Manager** will open:



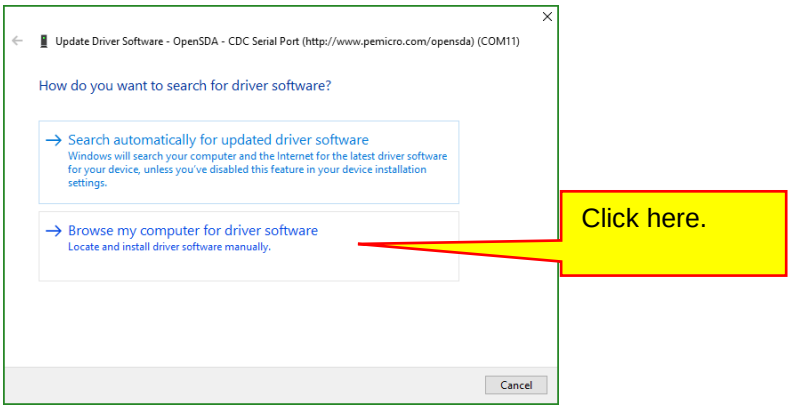
The KL25Z will be listed as a port. You may need to expand the ports menu to see it. The screen below shows how it should look:



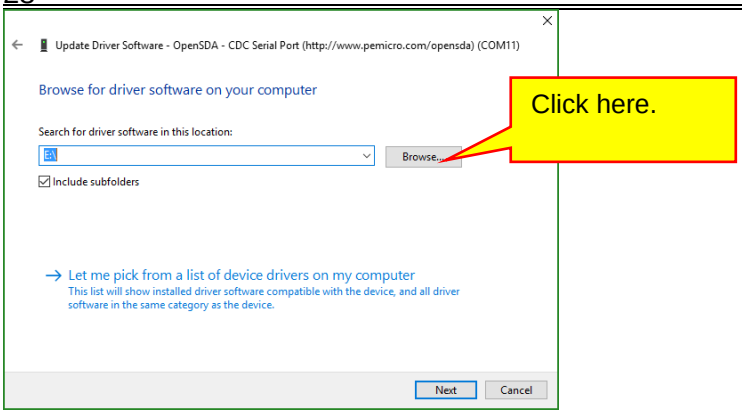
For a new installation, yours may not look like this and will need to be updated. To update the driver, right-click on the **Open SDA – CDC Serial Port** text and select **Update Driver Software**:



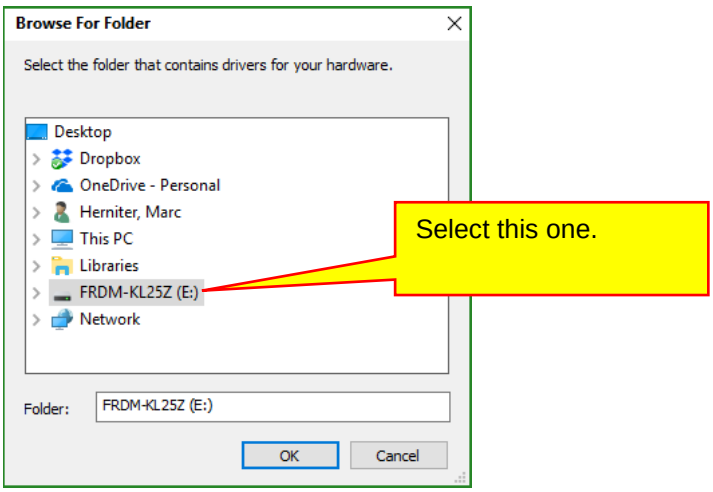
The window below will open:



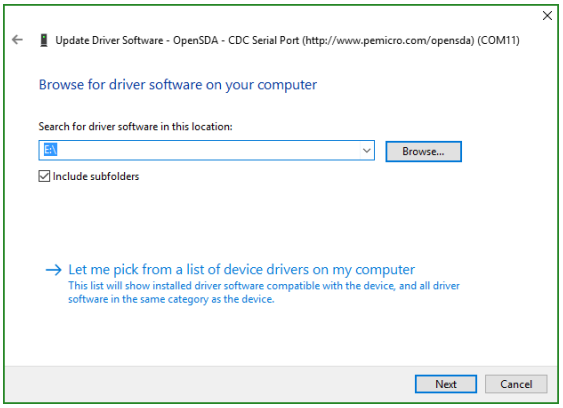
Select **Browse my computer for driver software**:



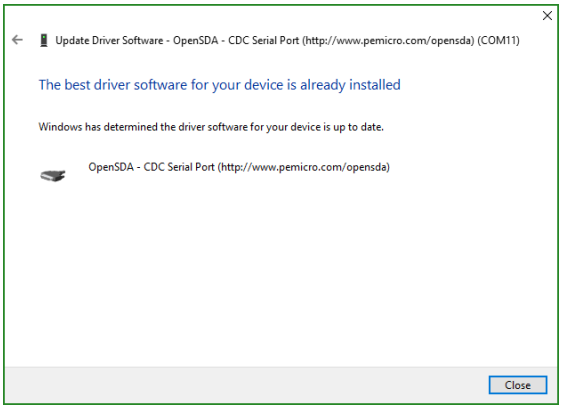
The driver is on the KL25Z board, which is listed as a drive on your computer. Click the **Browse** button:



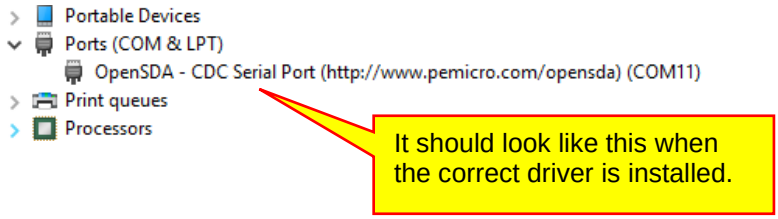
Select FRDM-KL25Z and click the **OK** button:



Click the **Next** button:



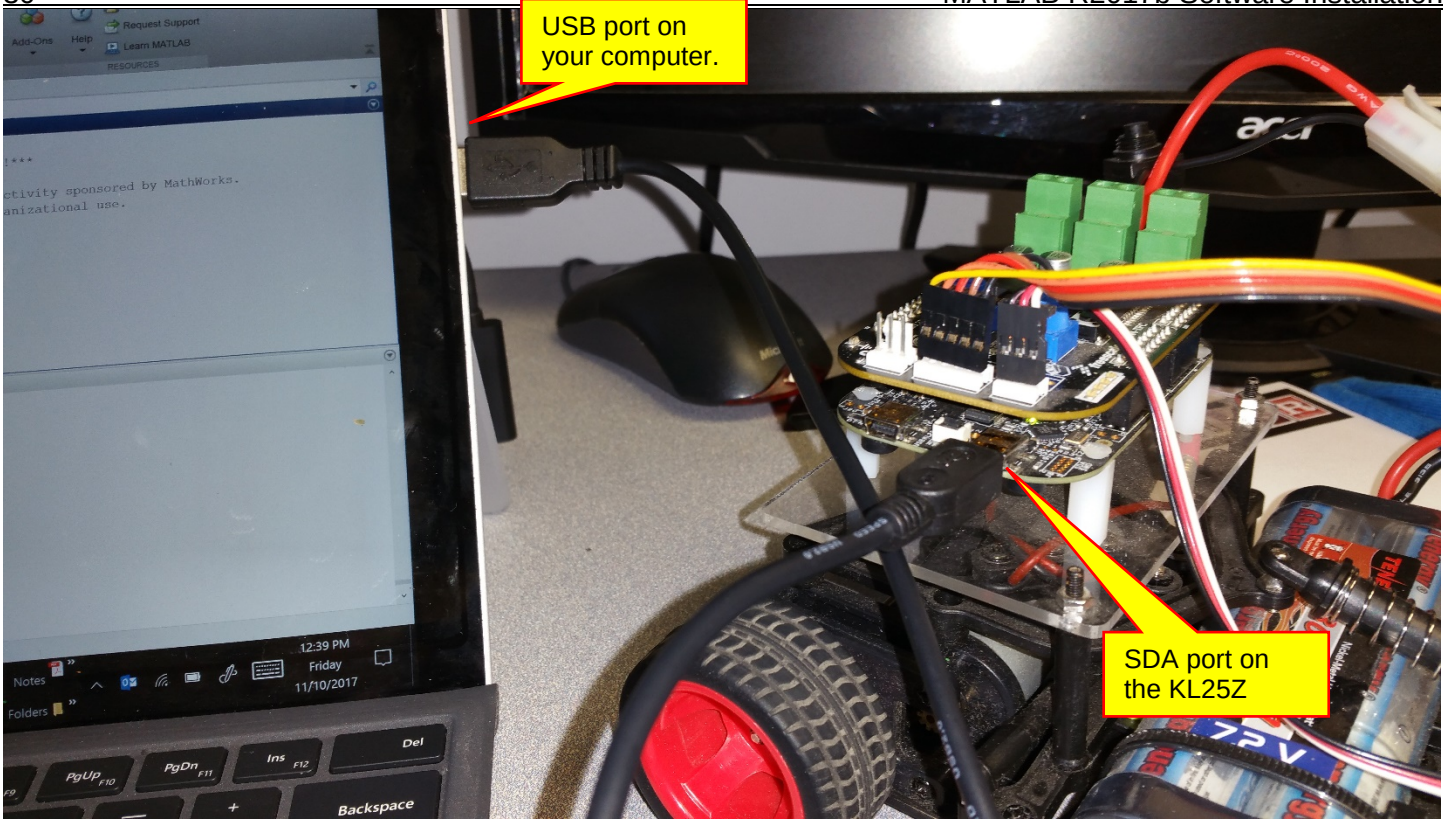
It did not work on mine because I already have the correct driver installed. If yours needs to be installed, make sure that you install it. When the driver is up to date, the device driver should show that the Open SDA port is working correctly as shown below:



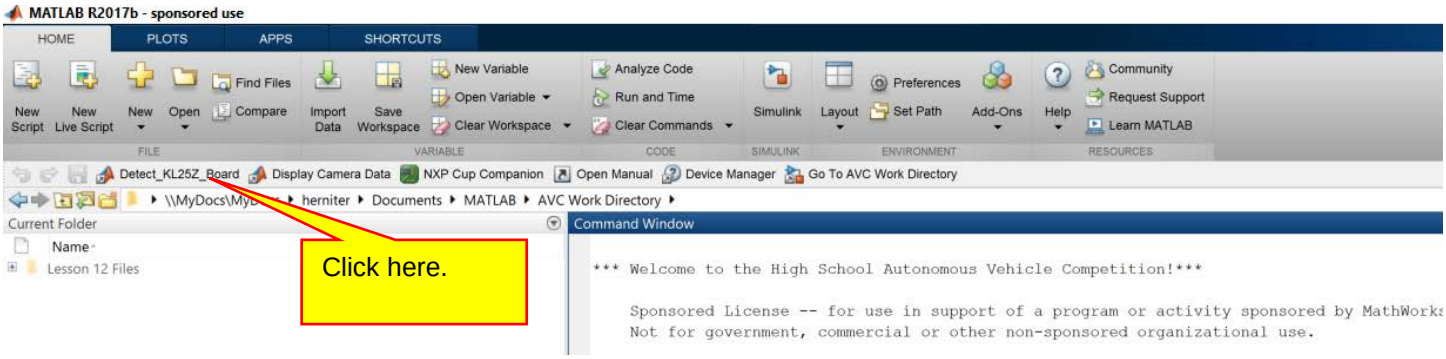
Close the **Windows Device Manager**.

V. Verifying that the Hardware Works

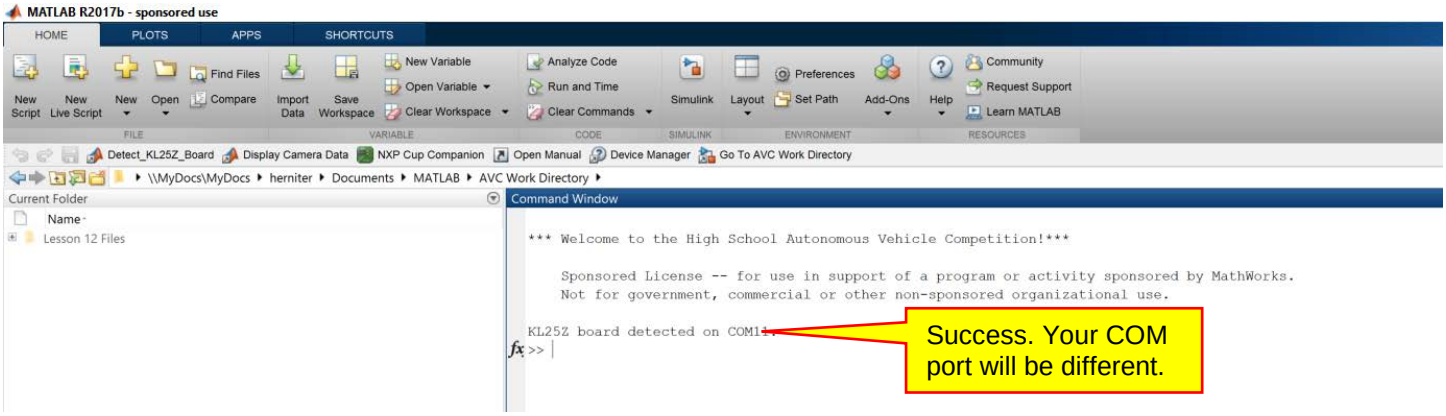
We are now ready to test the connection between the KL25Z (your car) and your Windows computer as shown below:



In the MATLAB window, click the **Detect_KL25Z_Board** shortcut:



If everything is working, you should see a message similar to the one below:



We are done. Whew…