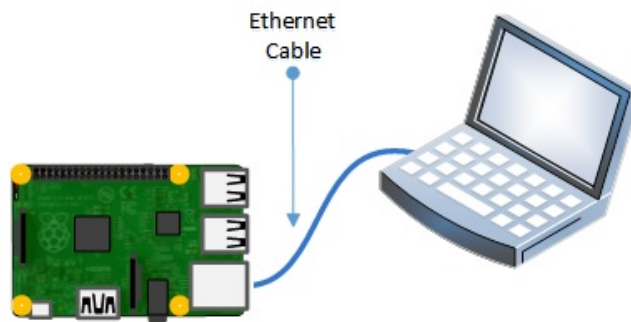




Set up and Blink - MATLAB and Simulink with Raspberry Pi

Created by Anuja Apte

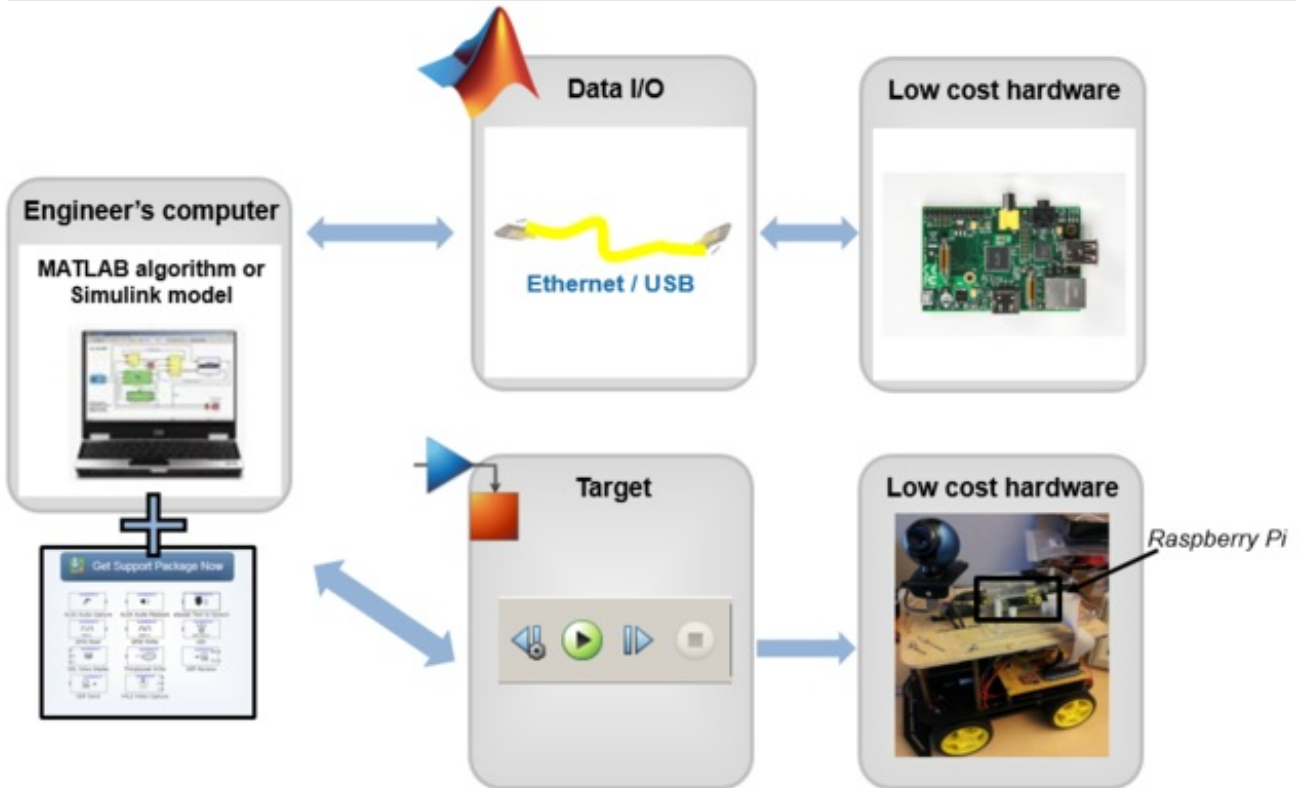


Last updated on 2015-04-16 05:50:07 PM EDT

Guide Contents

Guide Contents	2
Overview	3
Parts and Hardware	5
Set up MATLAB and Simulink support package for Raspberry Pi	6
Using MATLAB Support Package and Raspberry Pi	13
Common Error Messages	14
Using Simulink Support Package and Raspberry Pi	15
Resources	22

Overview



You can use MATLAB to communicate with a Raspberry Pi board and its peripheral devices using MATLAB Support Package for Raspberry Pi.

You can program Raspberry Pi boards to run your algorithms using Simulink Support Package for Raspberry Pi Hardware. The support package generates code from your Simulink model in a click of a button that then runs on the Raspberry Pi board.

This tutorial covers a step-by-step guide to:

MATLAB Support Package

1. Set up the MATLAB support package for Raspberry Pi
2. Send commands from MATLAB to Raspberry Pi to blink the on-board LED

Simulink Support Package

1. Set up the Simulink support package for Raspberry Pi
2. Build a simple Simulink model for controlling pins on the Raspberry Pi
3. Generate, download and run code on the Raspberry Pi to blink an LED

This is the first tutorial in a series on using MATLAB and Simulink to program a Raspberry Pi. In this tutorial Raspberry Pi 2 is used as an example, however the same steps can be used for other

boards like Raspberry Pi Model B+ etc.

Parts and Hardware

Software

MATLAB and Simulink Student Suite Release 2015a - now available for \$99

- [MathWorks](http://adafru.it/d5E) (<http://adafru.it/d5E>)
- [Amazon US](http://adafru.it/eoc) (<http://adafru.it/eoc>)
- [Amazon UK](http://adafru.it/eod) (<http://adafru.it/eod>)

If you are not a student, you can purchase the MATLAB Home-Use license for personal use:

- [MATLAB home-use](http://adafru.it/eoe) (<http://adafru.it/eoe>)

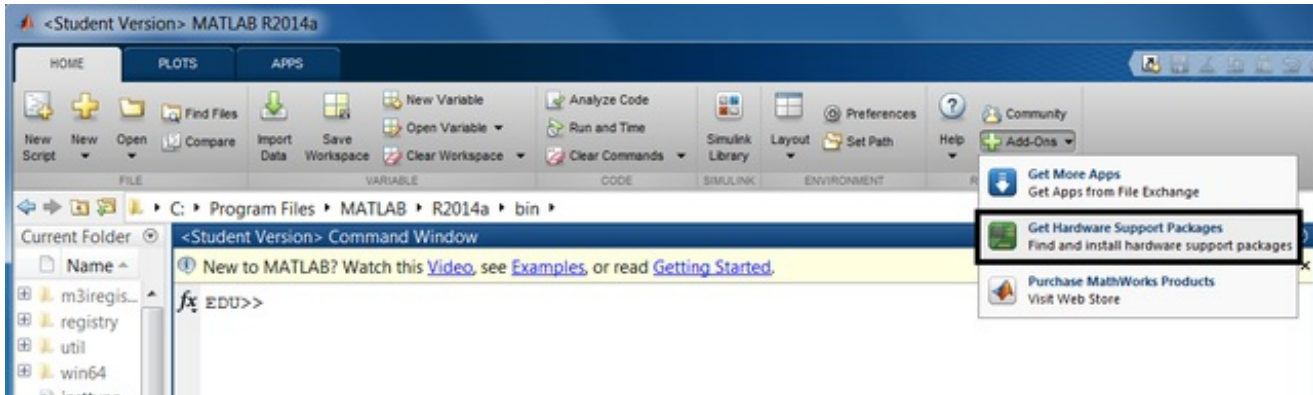
Hardware

1. [Raspberry Pi 2](http://adafru.it/2358) (<http://adafru.it/2358>)
2. [USB cable](http://adafru.it/2008) (<http://adafru.it/2008>)
3. [Ethernet cable](http://adafru.it/eY7) (<http://adafru.it/eY7>)

Set up MATLAB and Simulink support package for Raspberry Pi

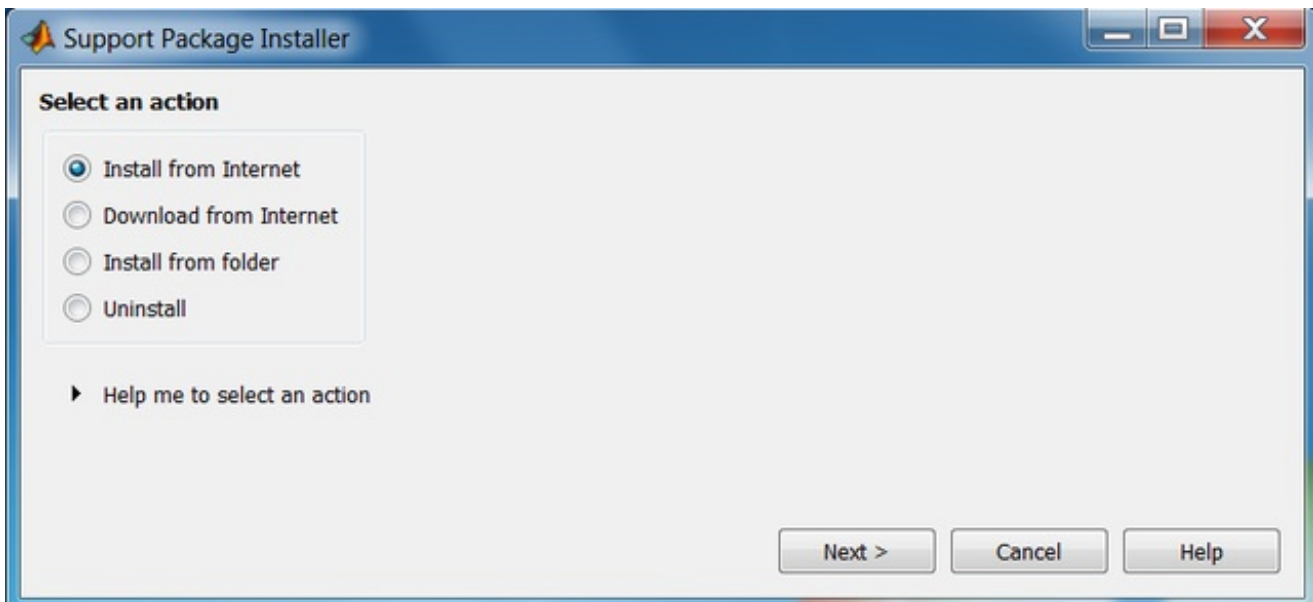
Start MATLAB

Open MATLAB and click the Add-Ons drop down menu on the top right



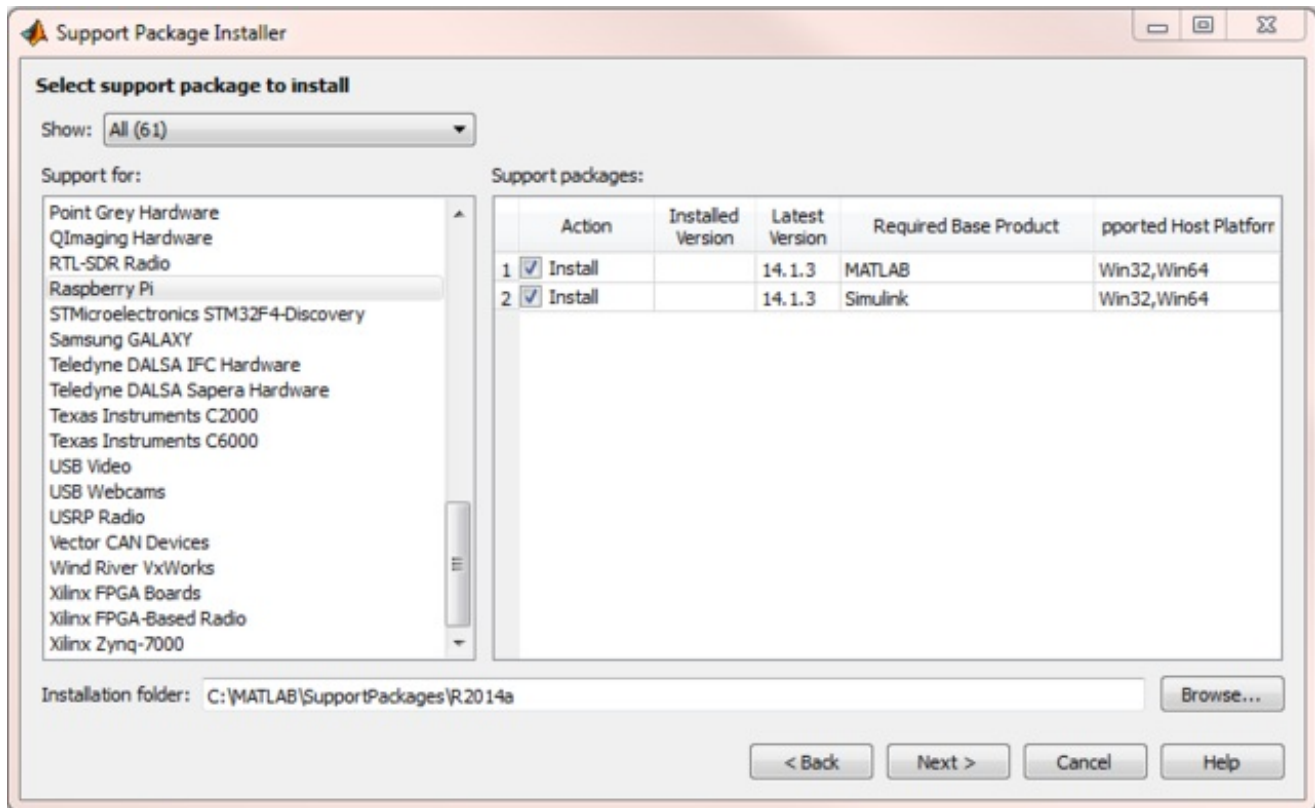
Start Support Package Installer

Click on Get Hardware Support Packages in the drop down menu to start the installer. Select 'Install from Internet' as the source for installing the support package



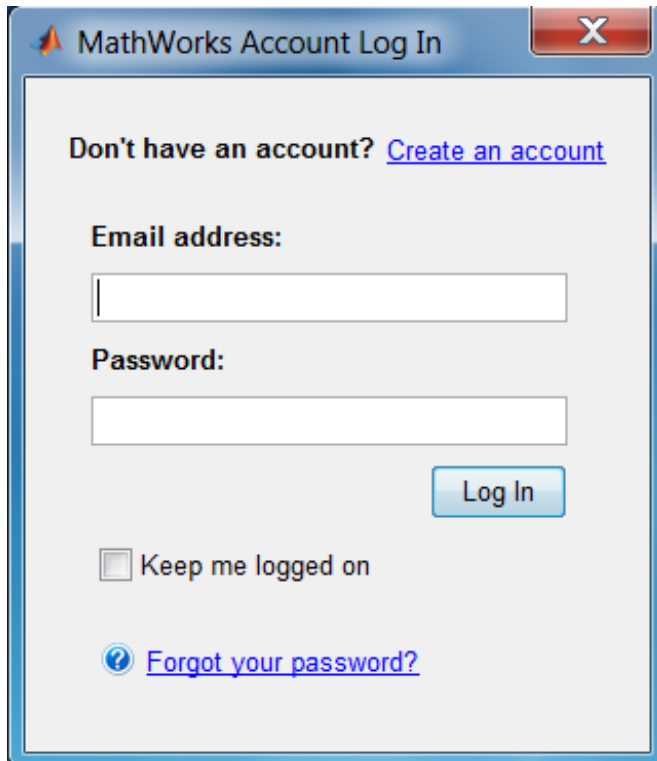
Select Raspberry Pi from a list of support packages

Click Next to see a list of support packages and select Raspberry Pi from the list to install both the support packages at once.



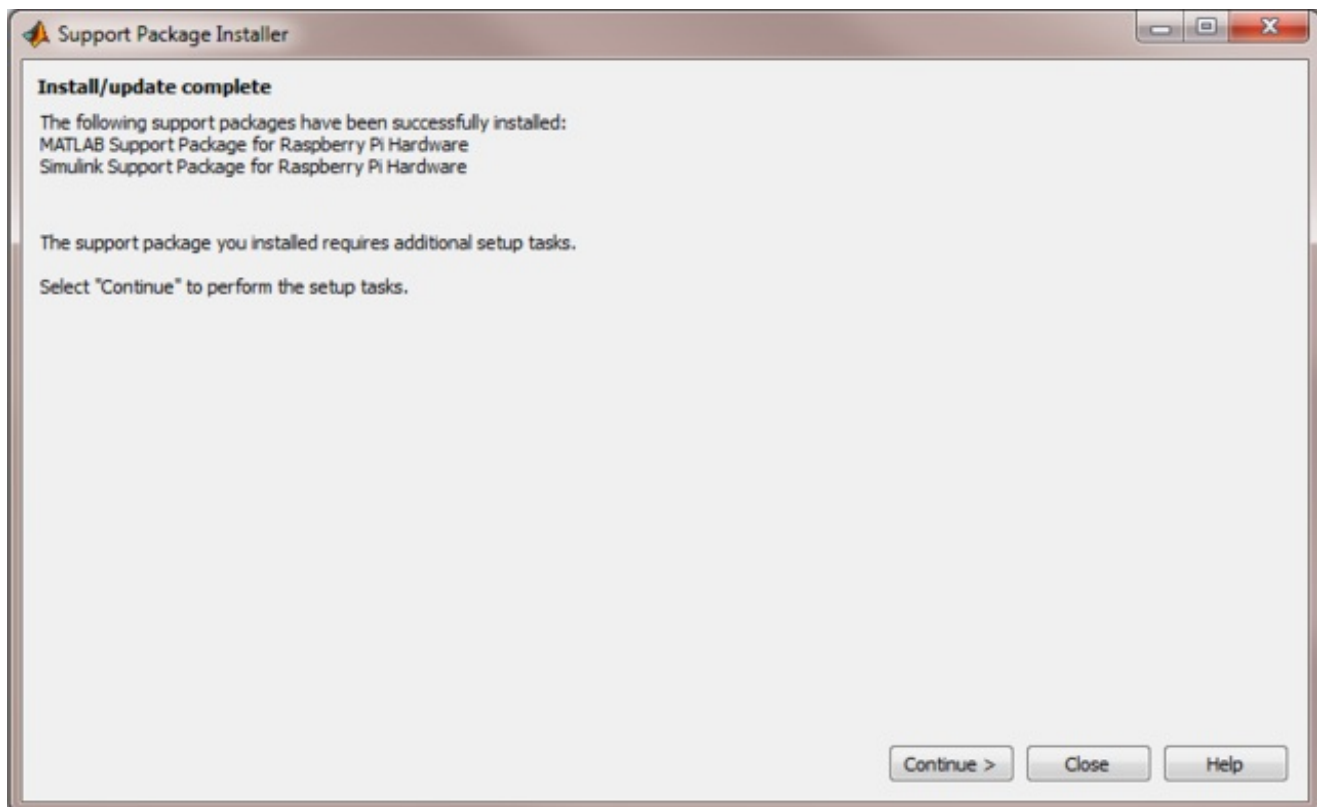
MathWorks Account

Click next and log in to your MathWorks account. If you don't have a MathWorks account, you can create one during the install process or by [visiting this page on the MathWorks website](http://adafru.it/eaA) (<http://adafru.it/eaA>). (<http://adafru.it/d5K>)



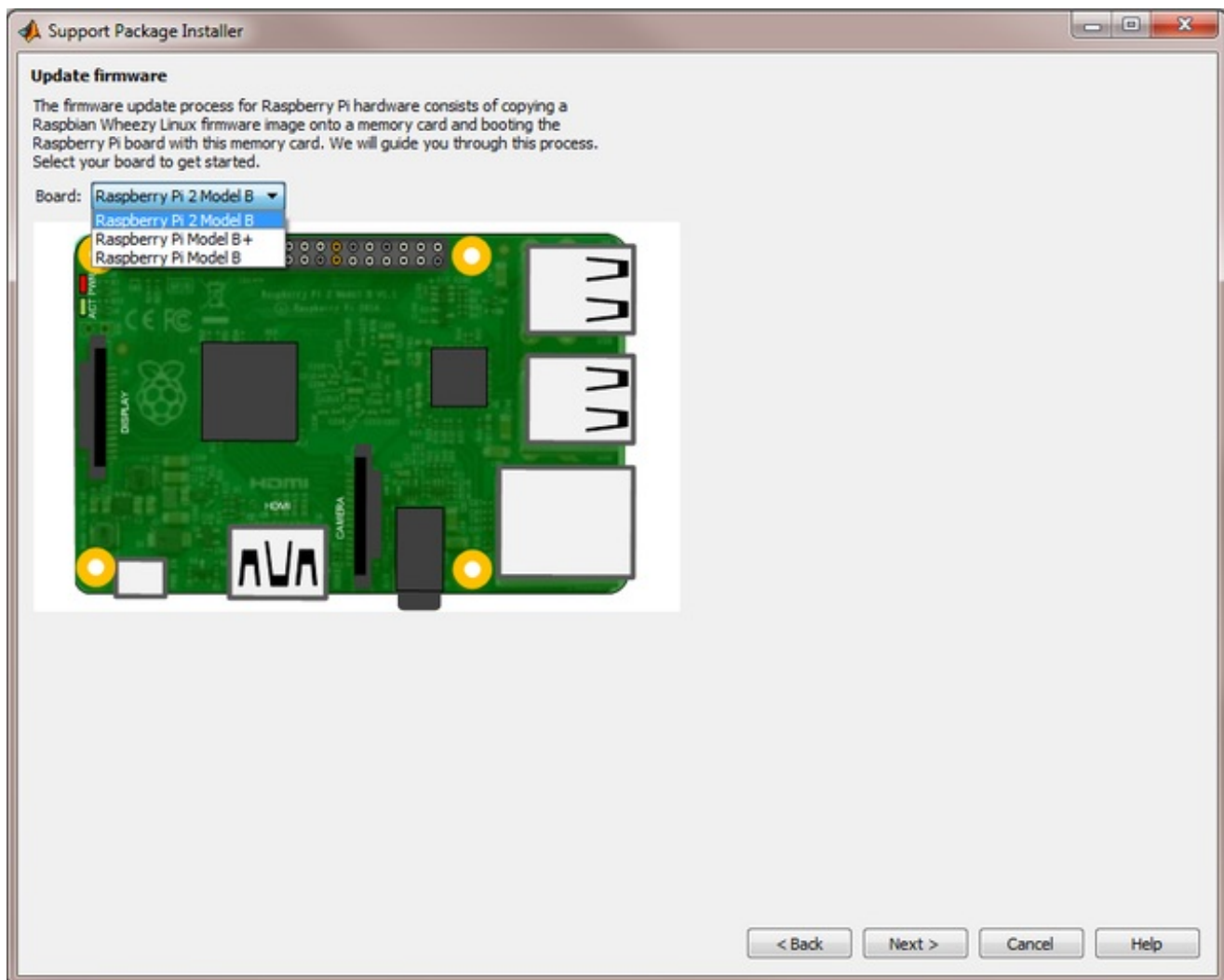
Continue and Complete the Installation

Accept the license agreement on the next screen and click Next through the following screens to finish the installation of both MATLAB and Simulink Support Package for Raspberry Pi.



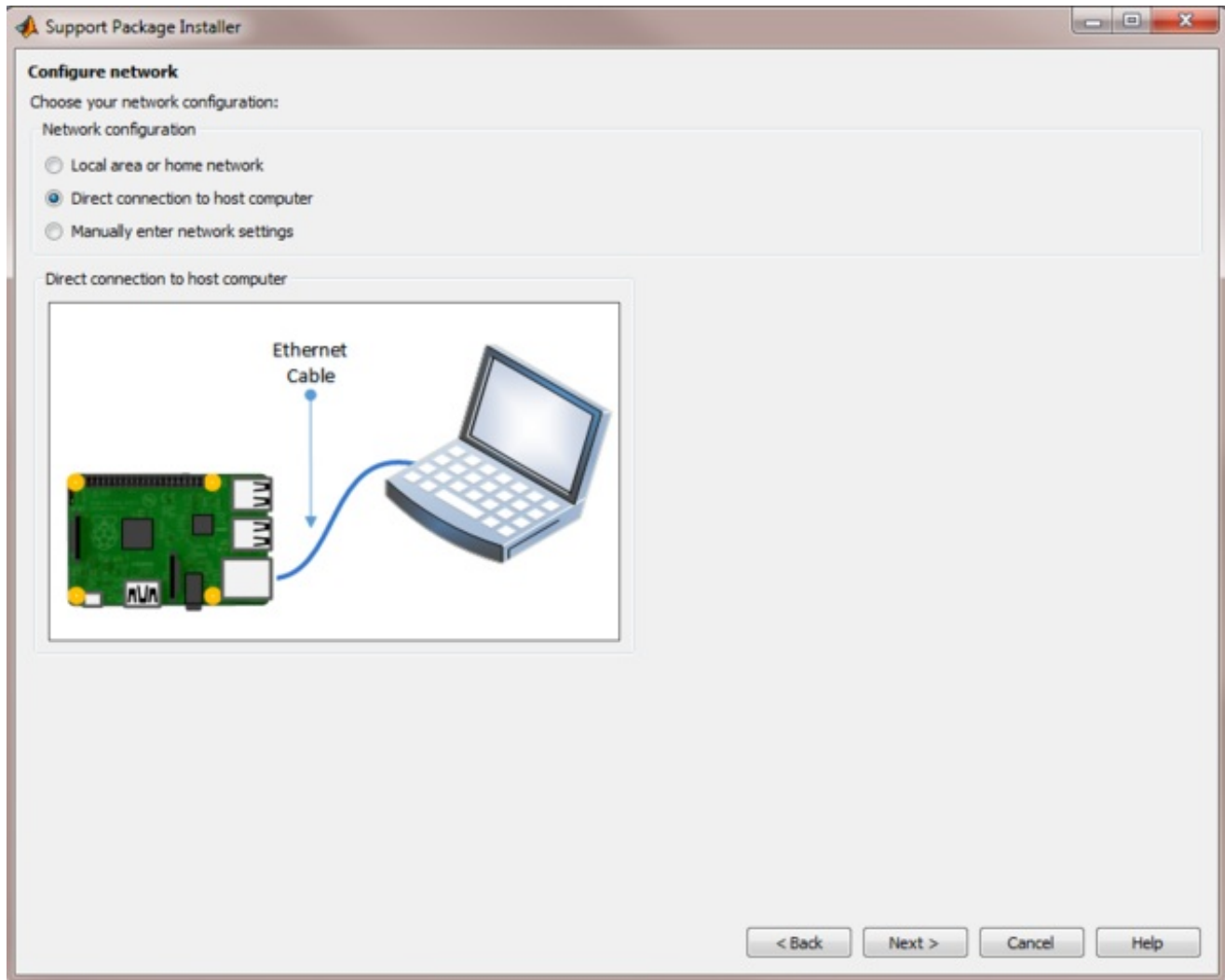
Firmware Update

Click Next and on the Firmware Update page select the appropriate board (for this tutorial, Raspberry Pi 2 Model B is chosen).



Configure Network

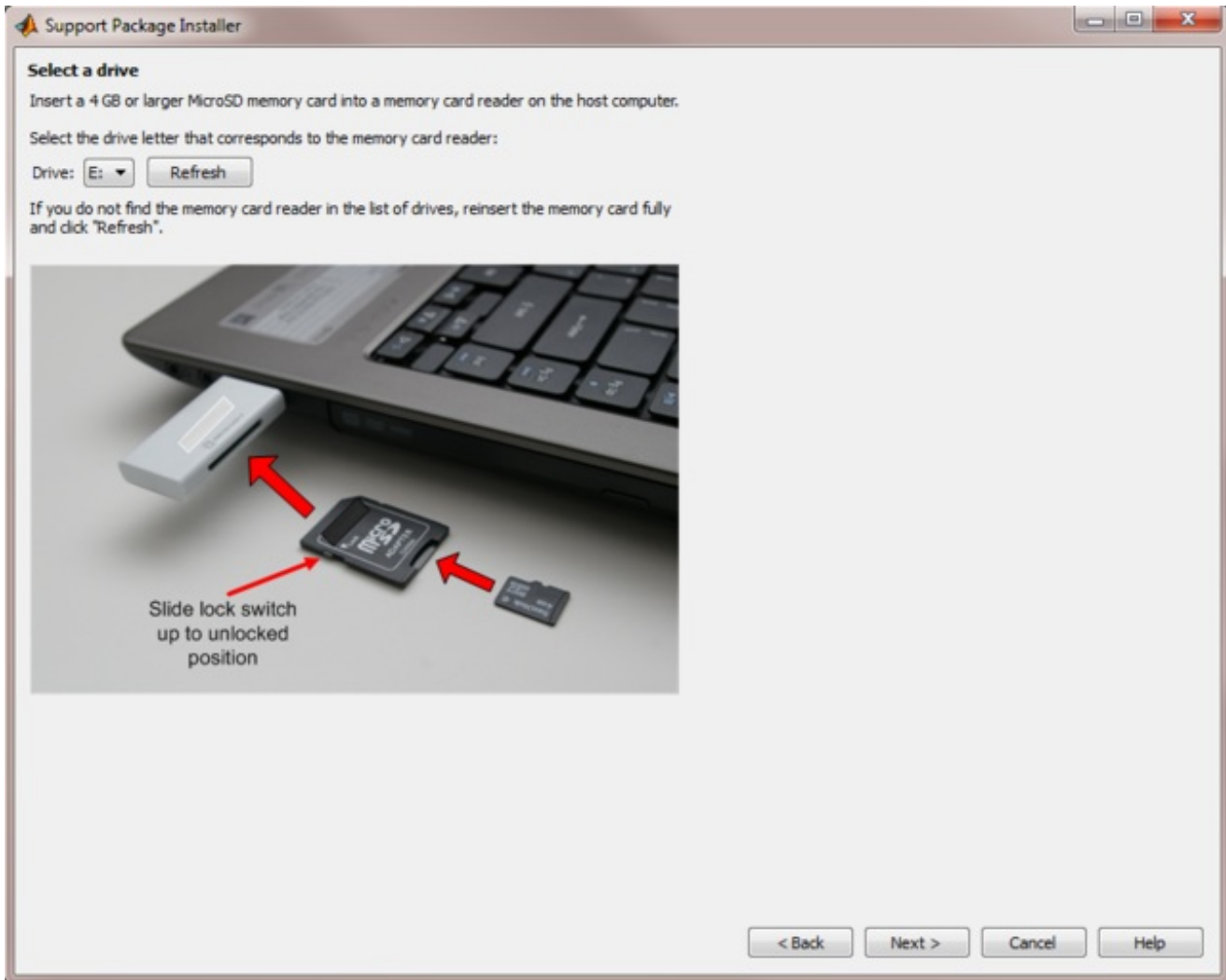
Click Next and in the configure network screen, select Direct connection to host computer (to follow along with this tutorial).



Select the drive

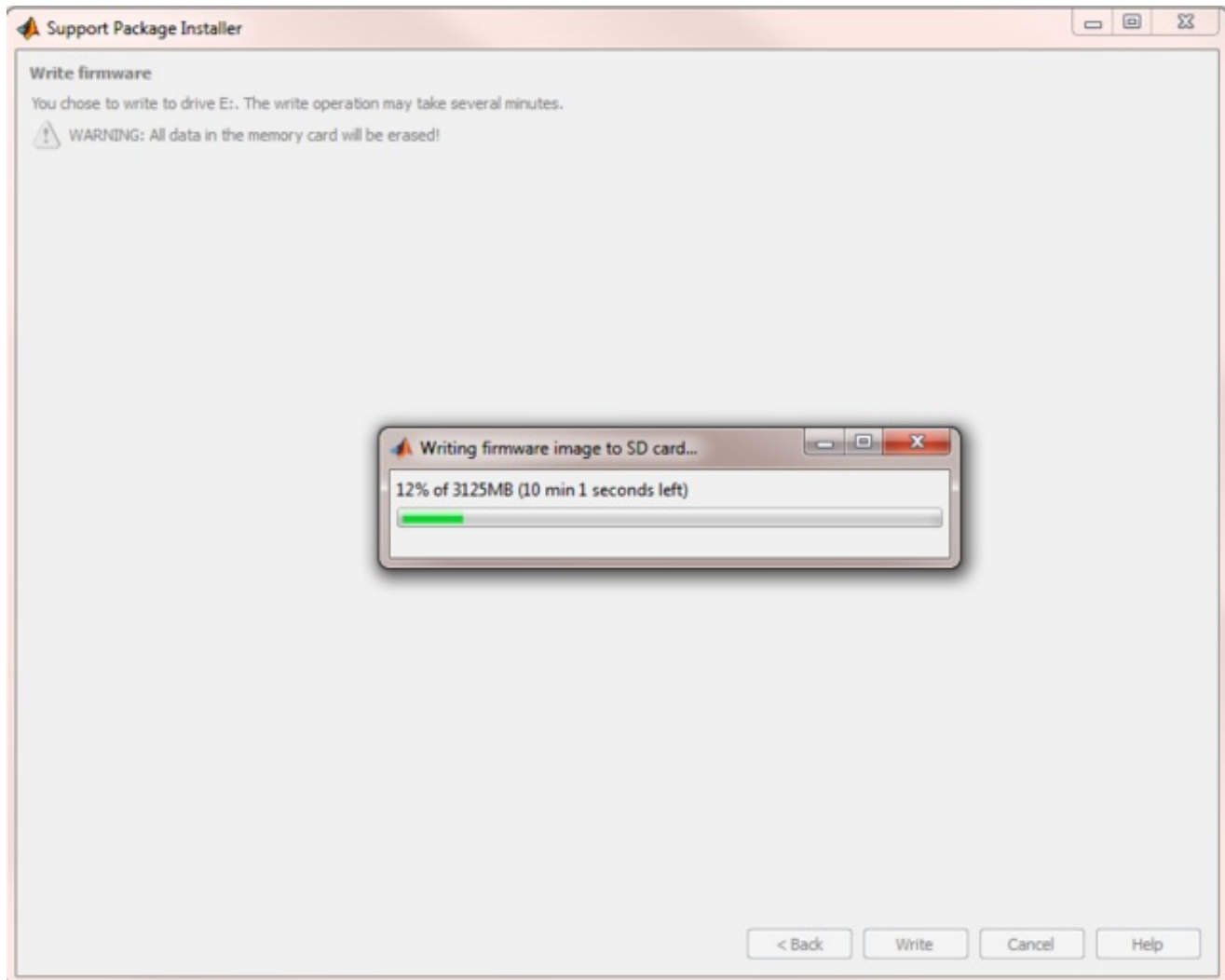
In the next window 'Select a drive', the MicroSD cards that are detected by MATLAB will show up in a list format.

If the MicroSD memory card does not get detected by MATLAB, but is detected by the OS - close MATLAB and restart MATLAB as an administrator. To continue with the process, the `targetupdater` command can be used in MATLAB.



Write firmware

In the next window, select write option to erase existing items on the memory card and flash the latest firmware that is needed by the Support package.



Continue and Complete the Installation

Click Next through the following screens to finish the installation for both MATLAB and Simulink Support Package for Raspberry Pi.

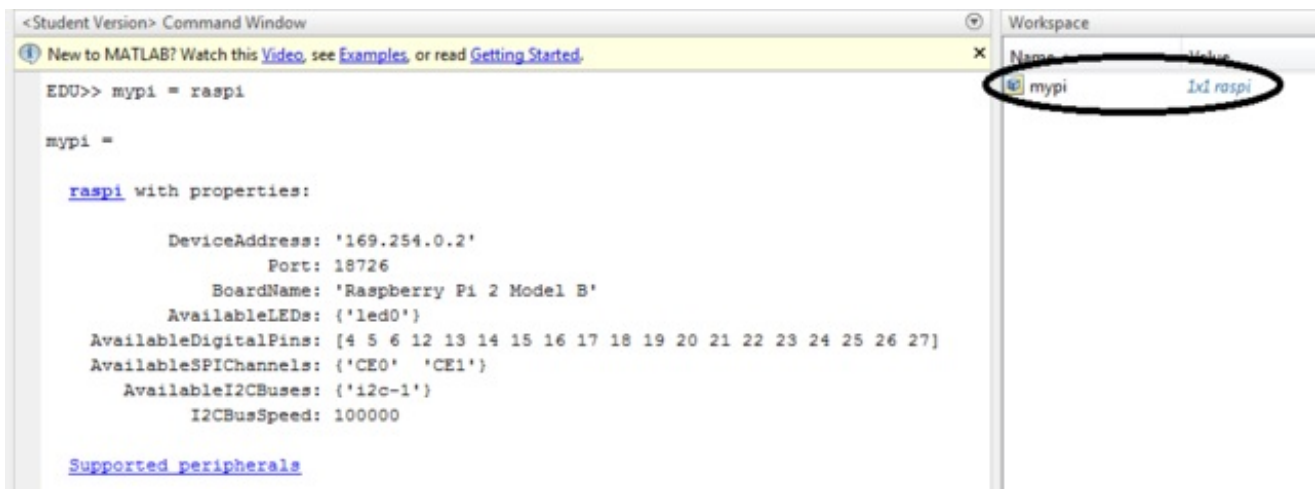
Using MATLAB Support Package and Raspberry Pi

Now that we have the necessary software installed, it's time to blink the on-board LED. In this example, we will use the MATLAB support package.

To establish a connection between MATLAB and Pi 2, the following command can be used from MATLAB.

```
>> mypi = raspi
```

This command connects MATLAB to the most recent successful connection to a Raspberry Pi board, *including the setup process*. A MATLAB variable by the name 'mypi' should now appear on the workspace or an error message indicating what went wrong. This object represents the connection that MATLAB has established with the physical object (Raspberry Pi).



To switch on the on-board LED connected, execute the following command

```
>> writeLED(mypi,'led0',1)
```

Here we are sending a request from MATLAB to Raspberry Pi board, to write the value of 1 on the on-board LED. This should switch ON your LED.

To blink the LED, we have to switch it ON and OFF periodically.

```
for i = 1:10
    writeLED(mypi,'led0',1);
    pause(0.5);
    writeLED(mypi,'led0',0);
    pause(0.5);
end
```

Other functions that are related to the MATLAB Support Package for Raspberry Pi can also

be used along with the Raspberry Pi object 'mypi'.

To take a look at the featured examples from MATLAB Support Package for Raspberry Pi, type `raspi_examples` in MATLAB Command Window.

Common Error Messages

Error using raspi (line 157)
Cannot establish an SSH connection to the board with device address "169.254.0.2".

Caused by: raspi (line 153)
Error executing command: FATAL ERROR: Network error: Network is unreachable

Ensure that the Raspberry Pi board is connected to the computer that you are working with. Usually when the lights on the ethernet port and the ACT LED are blinking, there is a connection between the Pi board and the computer.

If for some reason the connection between MATLAB and Raspberry Pi board is lost, the following error message appears.

The host and client connection is lost. Make sure the board is plugged in and/or recreate arduino and its related objects.

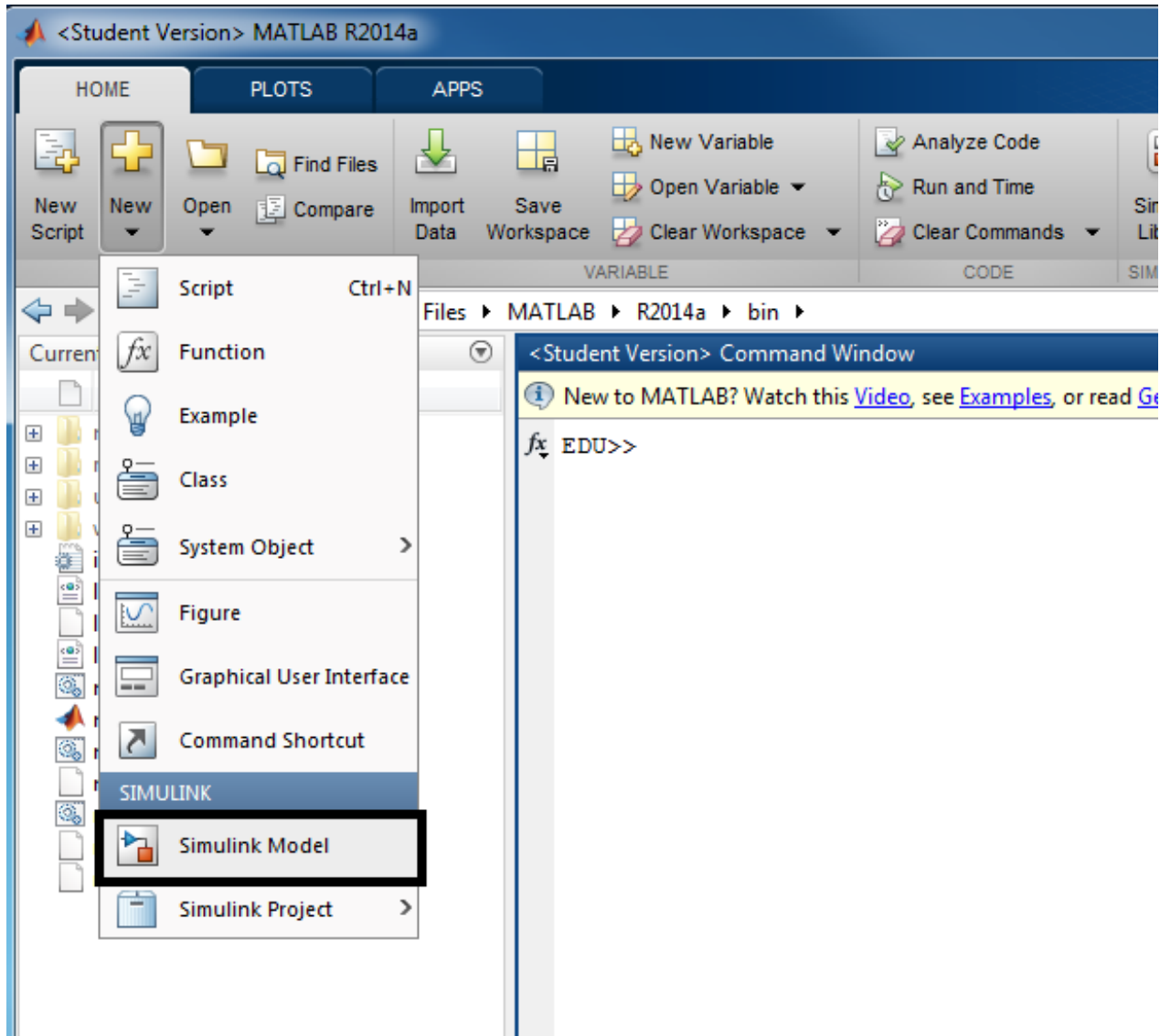
The best practices to follow to resolve this error -

1. Disconnect the USB cable and Ethernet cable from both the Pi board and computer
2. Clean up MATLAB by typing `clear` in MATLAB Command Window
3. Plug in the USB cable to computer and Pi board
4. Try connecting to the board from MATLAB by using `raspi` command

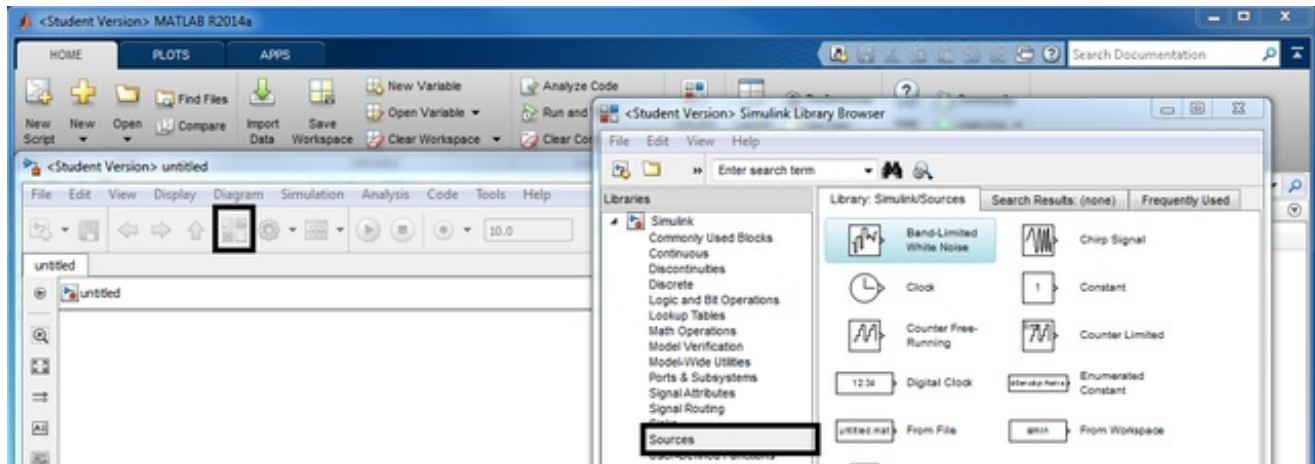
Using Simulink Support Package and Raspberry Pi

Create your own Simulink model

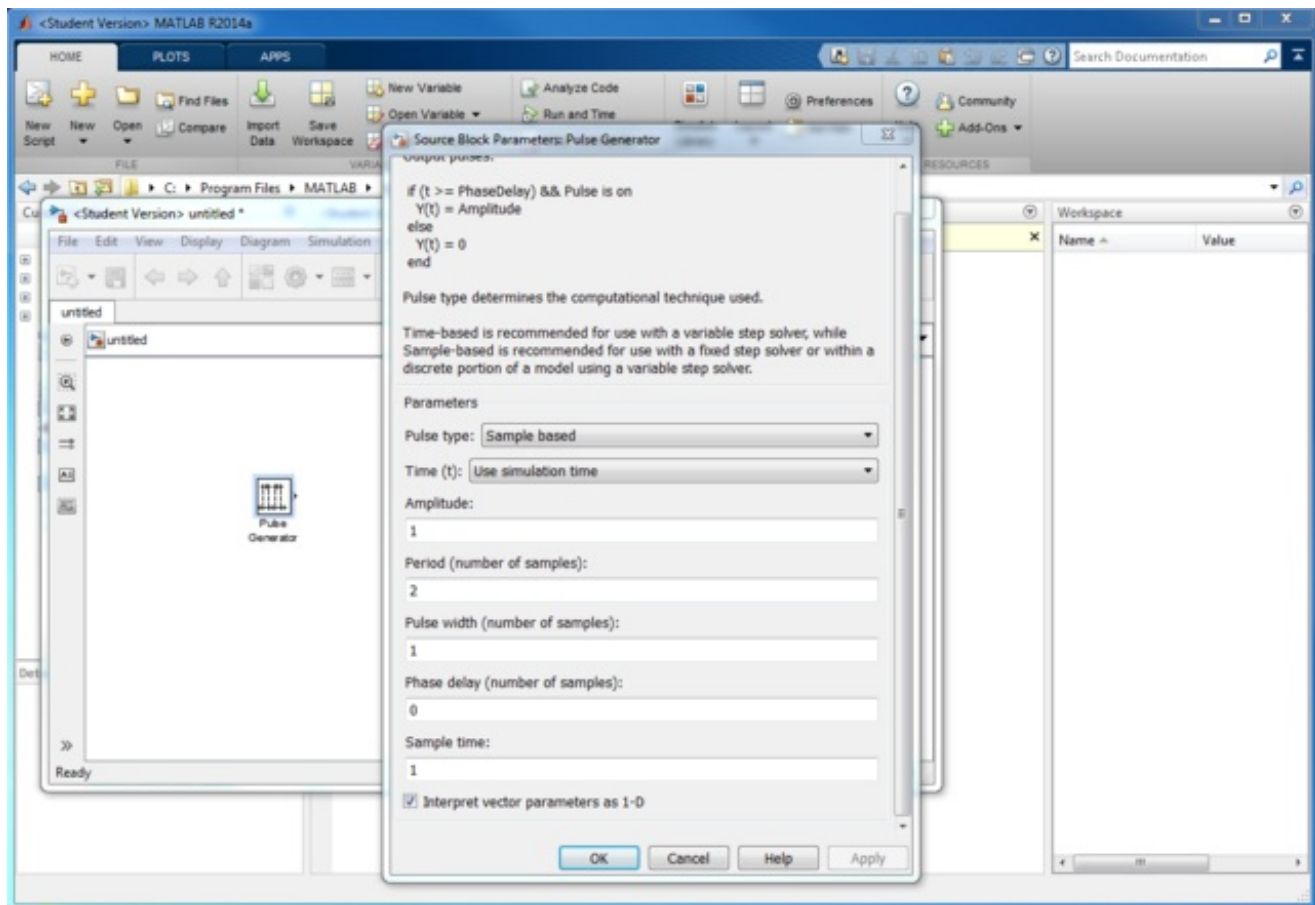
1. In MATLAB, select **New > Simulink Model** under the HOME Tab



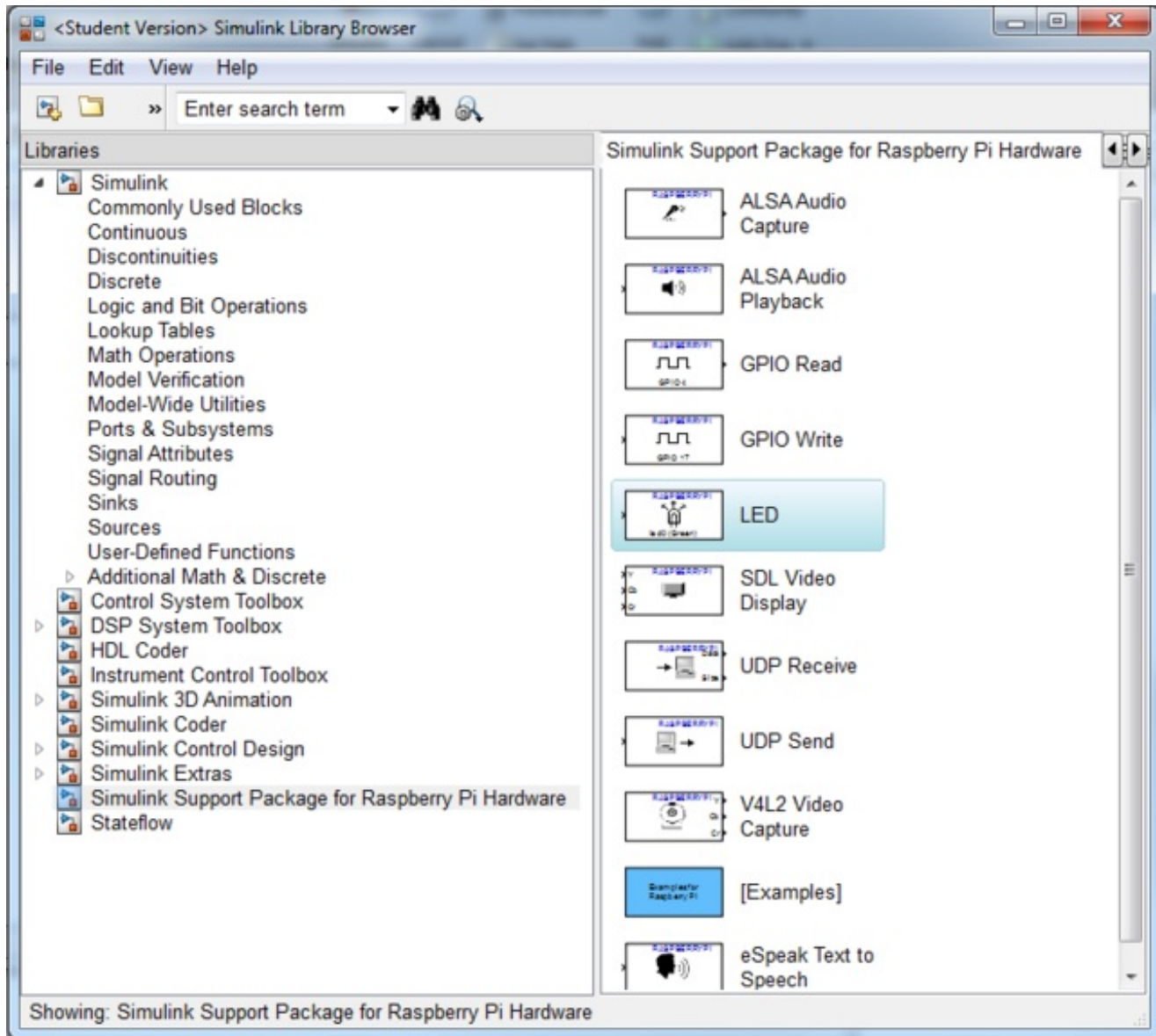
2. Click on the **Library Browser** Icon on the simulink model and go to **Sources** tab under Simulink in the Simulink Library Browser window

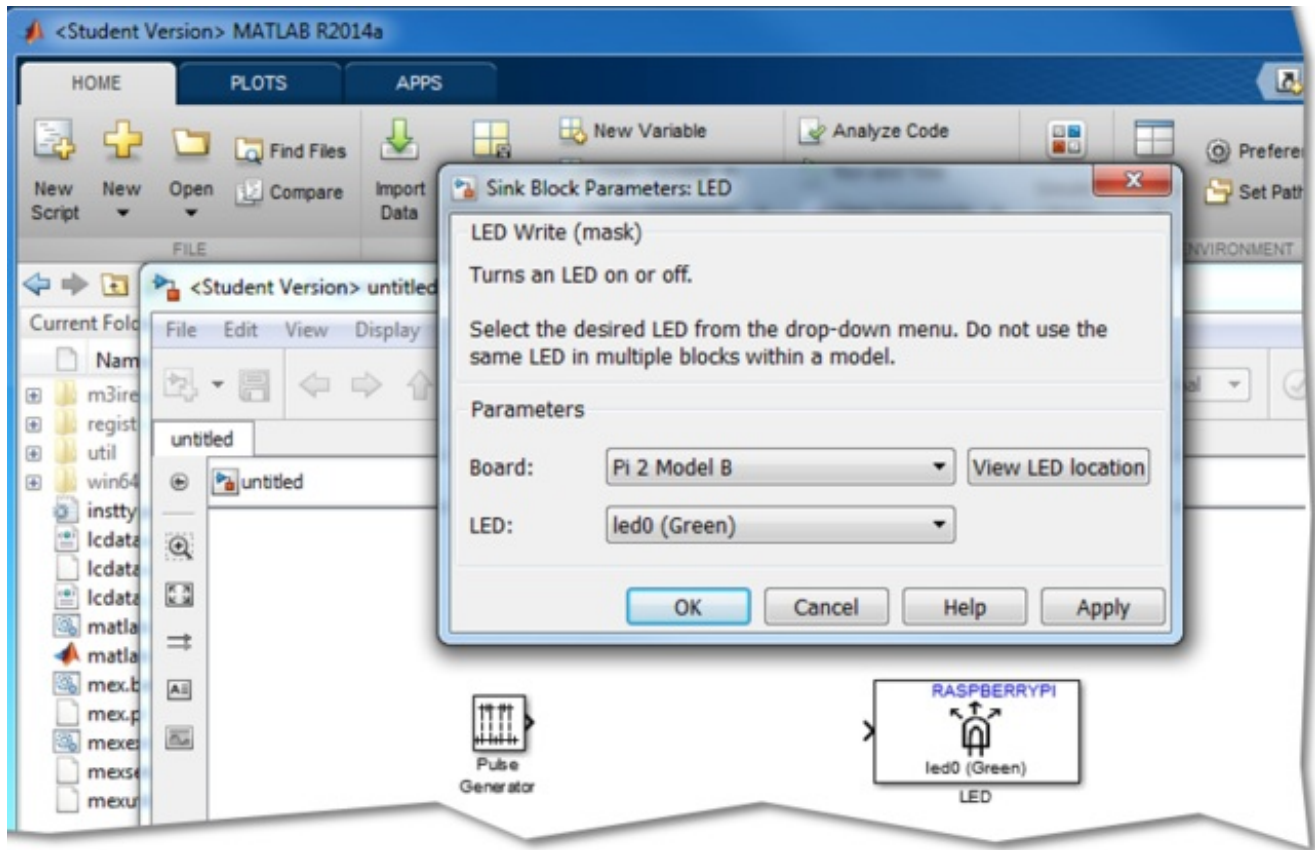


3. Drag the **Pulse Generator** block from the **Sources** library to your model and change the values as shown here

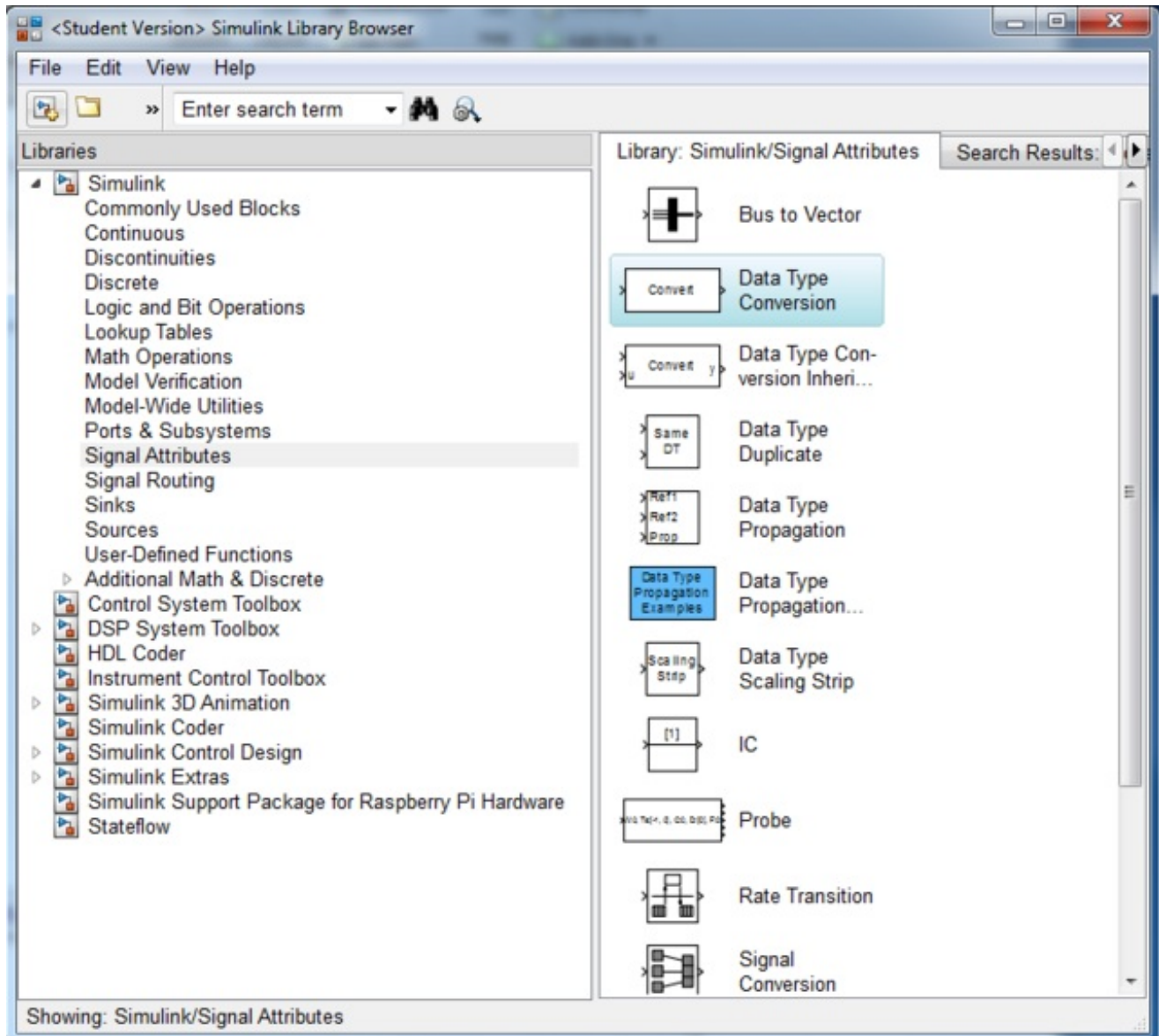


4. Use the **LED Block** from **Simulink Support Package for Raspberry Pi Hardware** in the Library Browser and change the parameters as shown here

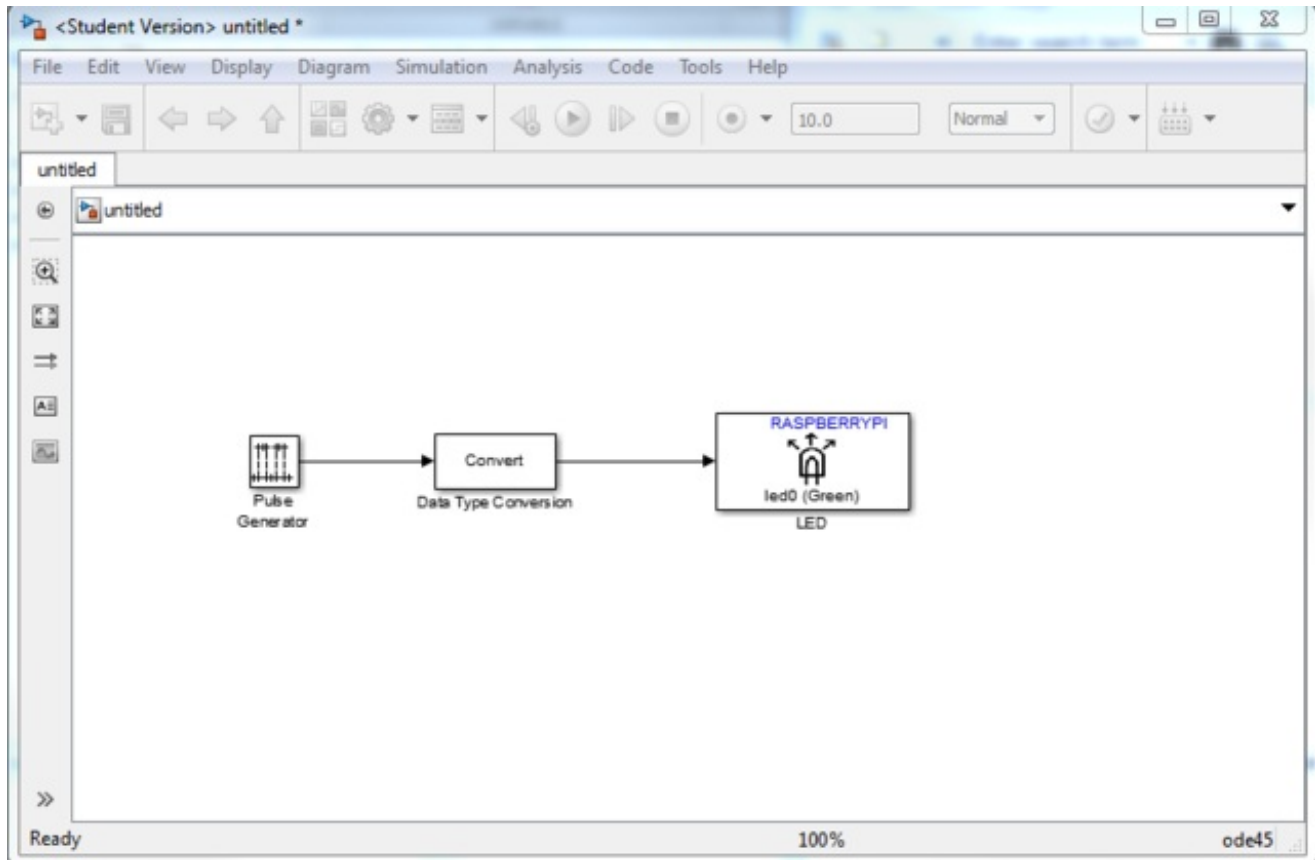




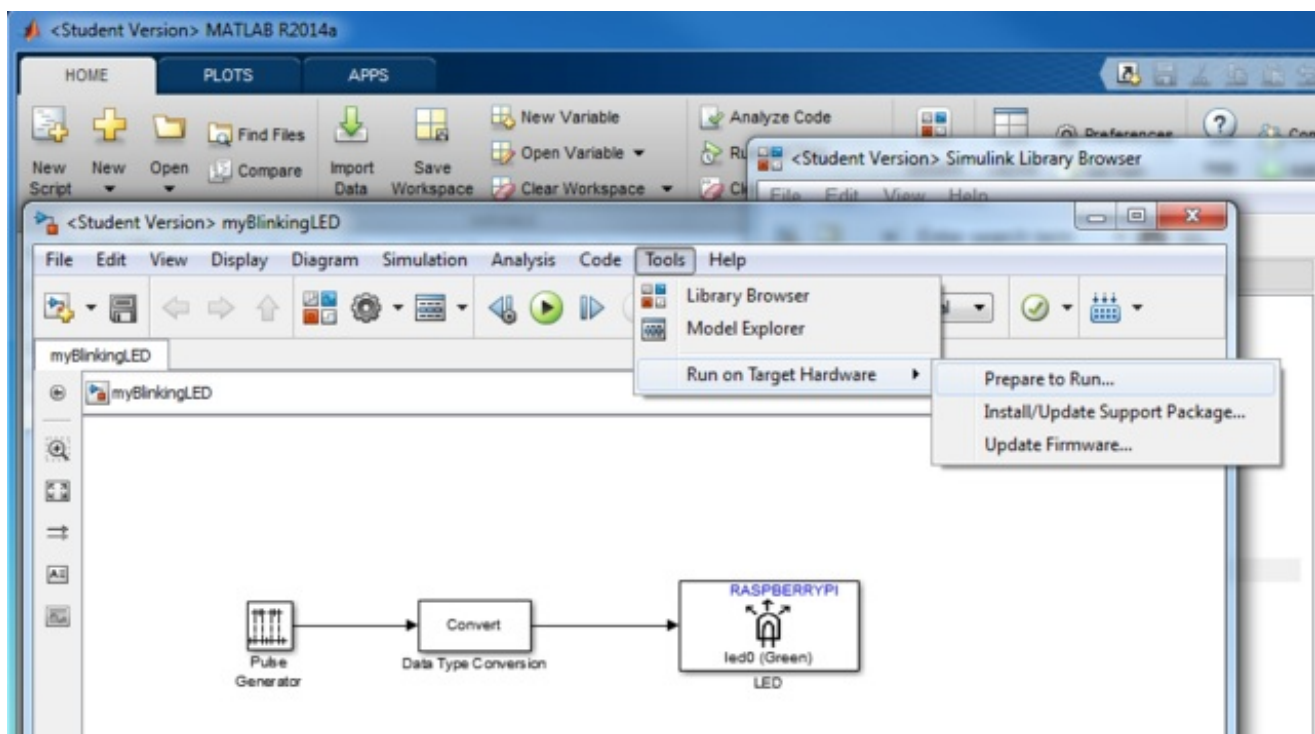
5. Drag and drop the **Data Type Conversion** block from the **Signal Attributes** tab under the Simulink library



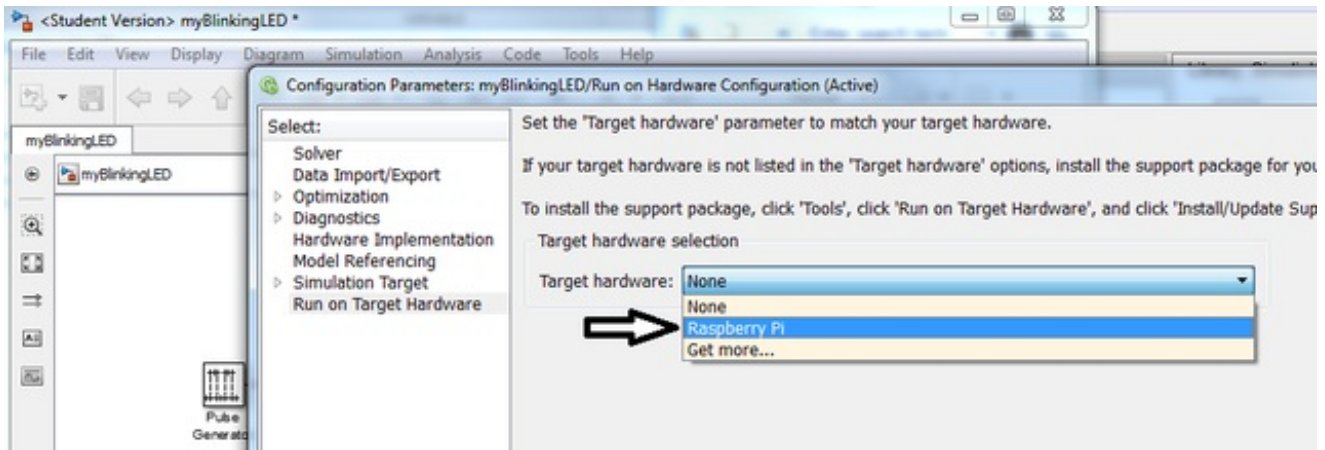
6. When you move the mouse pointer close to the arrow on the block, it will change to a plus sign. Left click when you see the plus sign and drag the mouse to make the intended connection. Once the connection is made you can release the left click button.



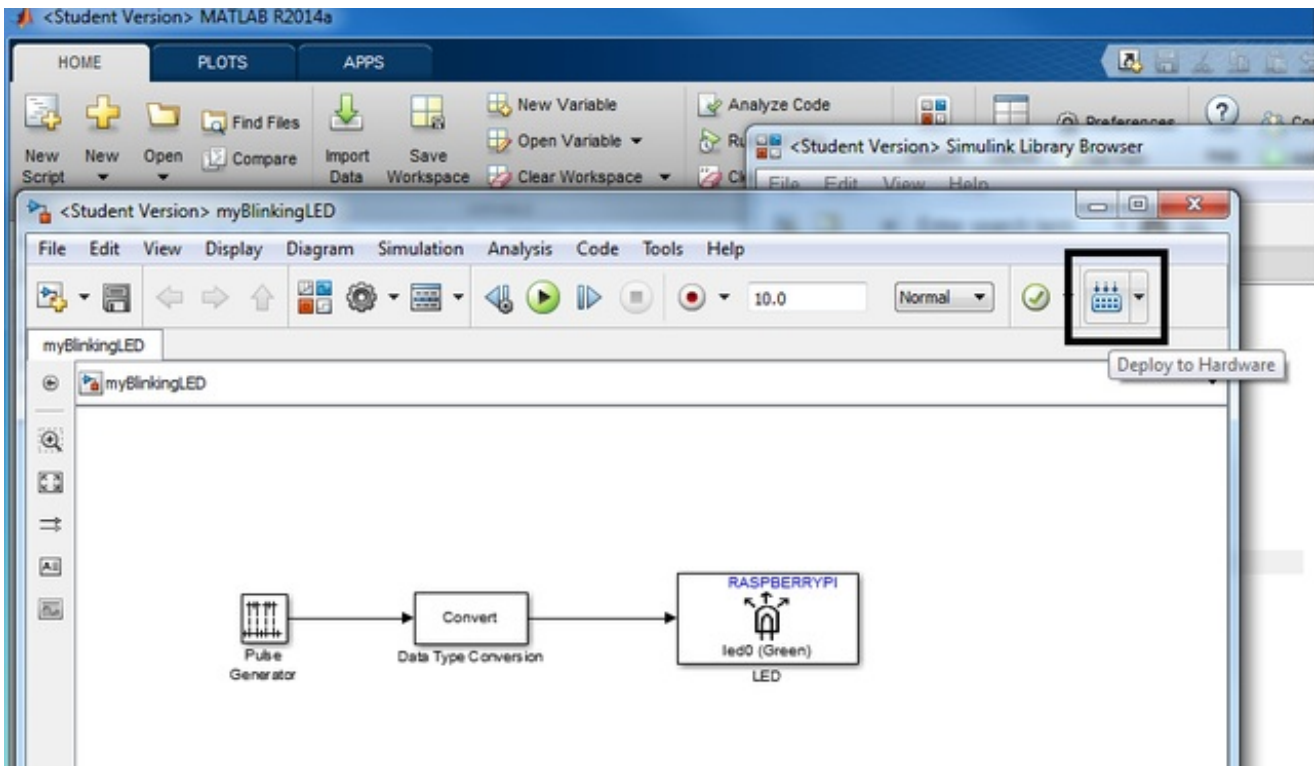
7. Save this model and to configure the model go to **Tools > Run on Target Hardware > Prepare To Run...**



8. When the **Configuration Parameters** page opens up, set the **Target hardware** parameter to Raspberry Pi. Do not change any other settings.



9. In your Simulink model, click the **Deploy To Hardware** button on the toolbar. Code will be generated from the model, which is then deployed to your Pi 2. The on-board LED should blink one time every second.



Resources

Examples for getting started

- [MATLAB examples \(http://adafru.it/d5M\)](http://adafru.it/d5M)
- [Simulink examples \(http://adafru.it/eUL\)](http://adafru.it/eUL)

Full tutorials

- [MATLAB Getting Started Tutorial \(http://adafru.it/d5N\)](http://adafru.it/d5N) (3 hrs 15 mins)
- [Simulink Getting Started Tutorial \(http://adafru.it/d5N\)](http://adafru.it/d5N) (2 hrs 15 mins - 10 mins per module)