## Guide Contents

<table>
<thead>
<tr>
<th>Topic</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Guide Contents</td>
<td>2</td>
</tr>
<tr>
<td>Overview</td>
<td>3</td>
</tr>
<tr>
<td>Parts and Software</td>
<td>4</td>
</tr>
<tr>
<td>Build the circuit</td>
<td>5</td>
</tr>
<tr>
<td>Set up compiler support</td>
<td>7</td>
</tr>
<tr>
<td>Set up Simulink support package for Arduino</td>
<td>9</td>
</tr>
<tr>
<td>Simulink model</td>
<td>12</td>
</tr>
<tr>
<td>Generate code, Load and Run</td>
<td>15</td>
</tr>
<tr>
<td>Simulink Resources</td>
<td>18</td>
</tr>
</tbody>
</table>
This tutorial covers a step-by-step guide to:

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

This is the first tutorial in a series on using Simulink to program an Arduino.
Parts and Software

Software

MATLAB and Simulink Student Suite Release 2014a - now available for 99 $

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

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

- MATLAB home-use (http://adafru.it/eoe)

Hardware

1. Small breadboard (http://adafru.it/64)
2. 220 Ohm resistor
3. LED (http://adafru.it/845)
4. Connecting wires (http://adafru.it/153)
5. Arduino Uno (http://adafru.it/50)
6. USB connector (http://adafru.it/62)
Build the circuit

Circuit

Use the following image to build a simple circuit that connects an LED to pin 9 of Arduino Uno.

Connect the hardware

Using the USB connector, connect Arduino Uno to the computer that has a MATLAB & Simulink installation.
Set up compiler support

Install a supported compiler

Simulink support package for Arduino is supported on 32-bit and 64-bit Microsoft Windows and Mac OS X. For the code generation process to work, a supported compiler installation is required. Refer to the following page on MathWorks website for a list of supported compilers on Windows and Mac OS:

List of supported compilers (http://adafruit.it/eof)

For example, you can download a Simulink supported compiler from the Microsoft website (http://adafruit.it/d5j) for free.

Compiler set up in MATLAB

Enter mex -setup at the MATLAB command prompt to start the compiler set up. Enter y to see a list of installed compilers. Enter the number corresponding to your preferred compiler. Confirm your selection and the compiler set up is complete.
Welcome to mex -setup. This utility will help you set up a default compiler. For a list of supported compilers, see http://www.mathworks.com/support/compilers/R2013a/win32.htm

Please choose your compiler for building MEX-files:

Would you like mex to locate installed compilers [y]/n?

Select a compiler:
[1] Lcc-win32 C 2.4.1 in C:\PROGRA~1\MATLAB\R2013A-1\sys\lib\matlab\src\compiler\...
[2] Microsoft Software Development Kit (SDK) 7.1 in C:\Program Files\Microsoft SDKs\Windows\v7.1

0] None

Compiler:
Set up Simulink support package for Arduino

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 'Internet' as a source for installing the support package
Select Arduino from a list of support packages
Click Next to see a list of support packages and select Arduino from the list

<table>
<thead>
<tr>
<th>Action</th>
<th>Support Package for</th>
<th>Installed Version</th>
<th>Latest Version</th>
<th>Required Base Product</th>
<th>Supported Host Platforms</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Arduino</td>
<td>3.0</td>
<td>Simulink</td>
<td>Windows (32-bit), Windows (64-bit)</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>BeagleBoard</td>
<td>3.1</td>
<td>Simulink</td>
<td>Windows (32-bit), Windows (64-bit)</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Gumstix Overo</td>
<td>1.1</td>
<td>Simulink</td>
<td>Windows (32-bit), Windows (64-bit)</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>LEGO MINDSTORMS NXT</td>
<td>3.2</td>
<td>Simulink</td>
<td>Windows (32-bit), Windows (64-bit)</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>PandaBoard</td>
<td>3.1</td>
<td>Simulink</td>
<td>Windows (32-bit), Windows (64-bit)</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Raspberry Pi</td>
<td>1.1</td>
<td>Simulink</td>
<td>Windows (32-bit), Windows (64-bit)</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>USRP(II) Radio</td>
<td>5.0</td>
<td>Communications System Toolbox</td>
<td>Windows (32-bit), Windows (64-bit), Linux (64-bit), Mac...</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>Digilent Analog Discovery</td>
<td>1.1.1</td>
<td>Data Acquisition Toolbox</td>
<td>Windows (32-bit), Windows (64-bit)</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>Analog Devices DSPs</td>
<td>2.0</td>
<td>Embedded Coder</td>
<td>Windows (32-bit), Windows (64-bit)</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>Green Hills MULTI</td>
<td>3.0</td>
<td>Embedded Coder</td>
<td>Windows (32-bit), Windows (64-bit), Linux (64-bit)</td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>Xilinx Zynq-7000</td>
<td>1.1</td>
<td>Embedded Coder</td>
<td>Windows (32-bit), Windows (64-bit)</td>
<td></td>
</tr>
<tr>
<td>12</td>
<td>Xilinx Zynq-7000</td>
<td>1.0</td>
<td>HDL Coder</td>
<td>Linux (64-bit), Windows (32-bit), Windows (64-bit)</td>
<td></td>
</tr>
<tr>
<td>13</td>
<td>Altera FPGA Boards</td>
<td>2.0</td>
<td>HDL Verifier</td>
<td>Linux (64-bit), Windows (32-bit), Windows (64-bit)</td>
<td></td>
</tr>
<tr>
<td>14</td>
<td>Xilinx FPGA Boards</td>
<td>2.0</td>
<td>HDL Verifier</td>
<td>Linux (64-bit), Windows (32-bit), Windows (64-bit)</td>
<td></td>
</tr>
<tr>
<td>15</td>
<td>Kinect for Windows Runtime</td>
<td>1.6</td>
<td>Image Acquisition Toolbox</td>
<td>Windows (32-bit), Windows (64-bit)</td>
<td></td>
</tr>
<tr>
<td>16</td>
<td>BitFlow NEON CL</td>
<td>2.0</td>
<td>xPC Target</td>
<td>Windows (32-bit), Windows (64-bit)</td>
<td></td>
</tr>
</tbody>
</table>

Installation folder: C:\MATLAB\SupportPackages\2013a

Find more supported hardware

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://adafruit.it/d5K). (http://adafruit.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.

Simulink Support Package for Arduino Hardware has been successfully installed.
Show support package examples
Simulink model

Open a Simulink demo model

Enter arduinouno_gettingstarted at the MATLAB command prompt to open a model that uses a Pulse Generator block to create a signal that varies between zero and one every second. Double-click the Pulse Generator block to explore its pre-configured parameters.

The Digital Output block is set up to send the output of the Pulse Generator to pin 9 of the Arduino Uno. Double-click the block to explore its pre-configured parameters.

You are now ready to program your Arduino Uno!

Optional - Create the model on your own

- Click on the Simulink Library icon to open the Simulink library browser
- In the left navigation pane, select Simulink Support Package for Arduino Hardware
- On the right navigation pane, double-click the second [Examples] entry to open the documentation
**Open step-by-step guide**

Click 'Getting started with Arduino Uno Hardware' in the list of demos to open the step-by-step guide to build this model on your own.
Simulink Support Package for Arduino Uno Hardware EXAMPLES

Simulink® lets you design and run models on Arduino® hardware. With this capability, you can assess and optimize algorithms in the classroom or lab as they execute in real-time on Arduino hardware with physical I/O.

Product page at mathworks.com

Tutorials

Getting Started with Arduino Uno Hardware

Examples

Drive with PID Control
Generate code, Load and Run

Prepare the model to run on Arduino Uno

- Select Tools > Run on Target Hardware > Prepare to Run....
- Review the parameters in the dialog that opens
- Unless already set, set the Target hardware parameter to Arduino Uno
- Do not change any other settings
- Click OK
- Save the model

Run the model on Arduino Uno

- Connect the Arduino Uno board to your computer with a USB cable
- In your Simulink model, select Tools > Run on Target Hardware > Run
- Look at the LED attached to pin 9. The LED should blink one time every second
Simulink Resources

Examples for getting started

- Simulink (http://adafruit.it/d5L) examples (http://adafruit.it/d5L)
- MATLAB examples (http://adafruit.it/d5M)

Full tutorials

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