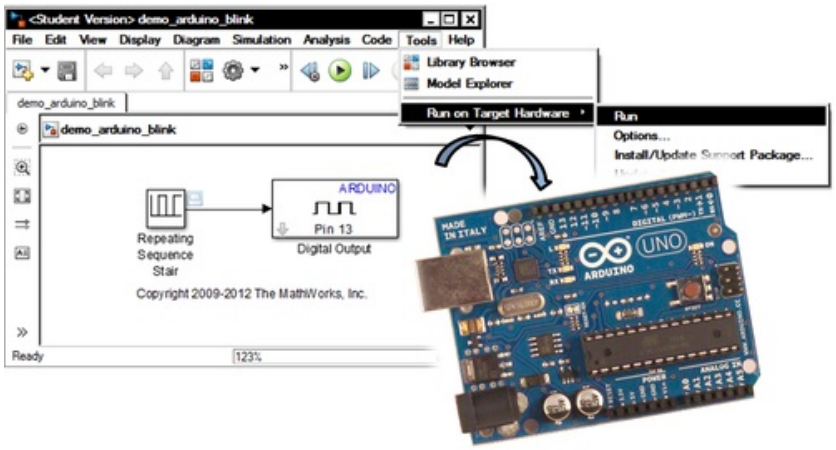
adafruit learning system

Set up and Blink - Simulink with Arduino

Created by Anuja Apte



Last updated on 2015-01-28 06:45:11 PM EST

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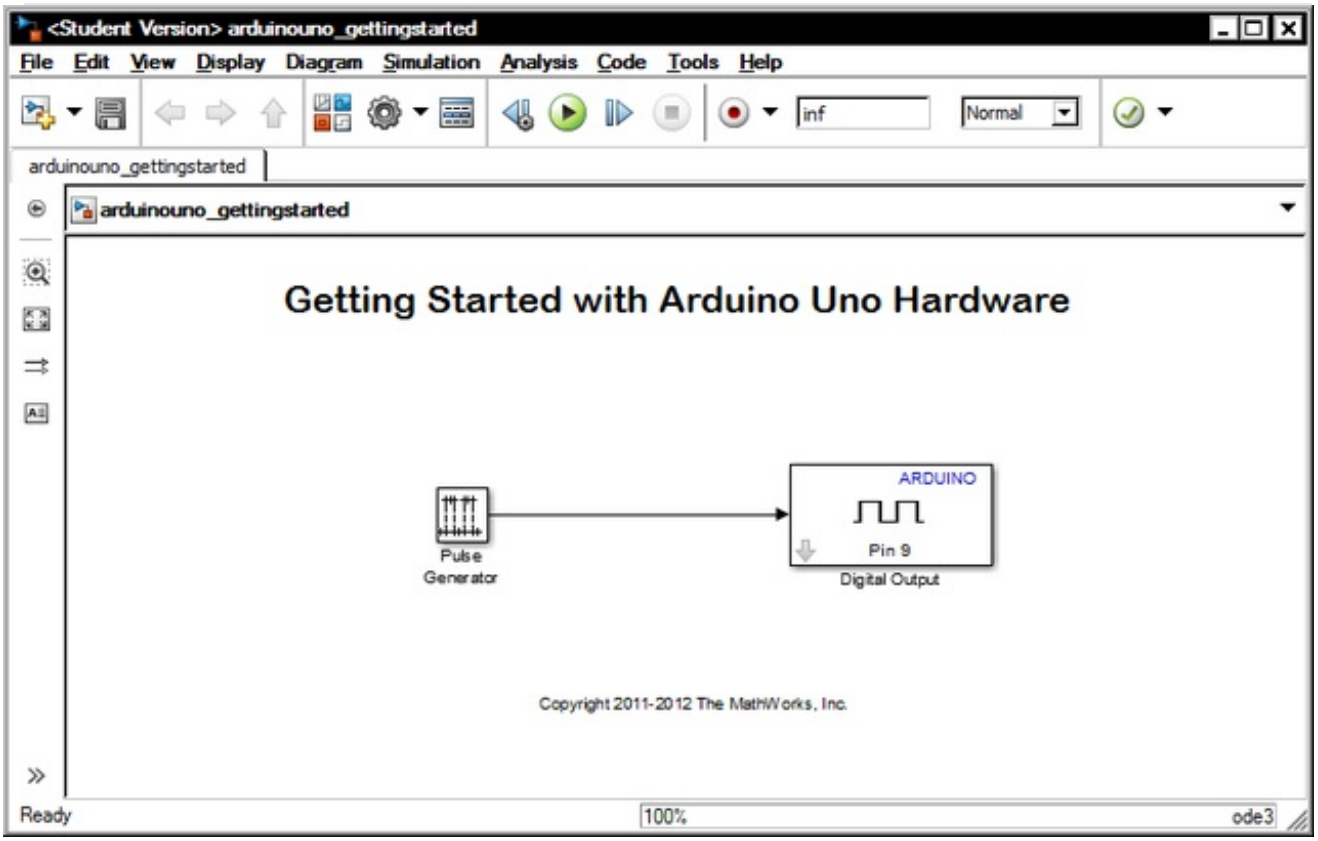
Overview



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)

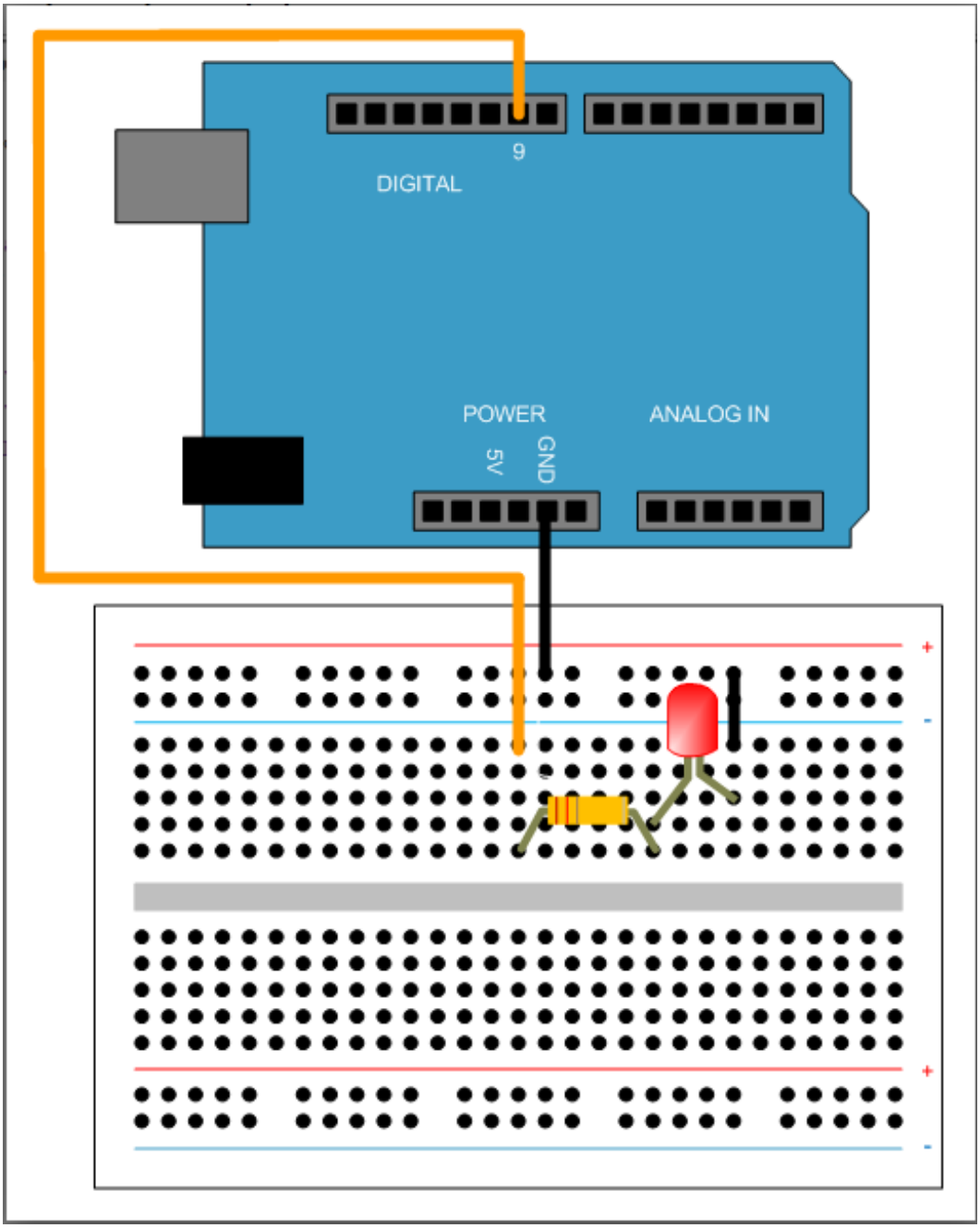
Build the circuit

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.


9
DIGITAL
POWER
ANALOG IN
5V
GND
+
-
+
-

Set up compiler support

Install a supported compiler

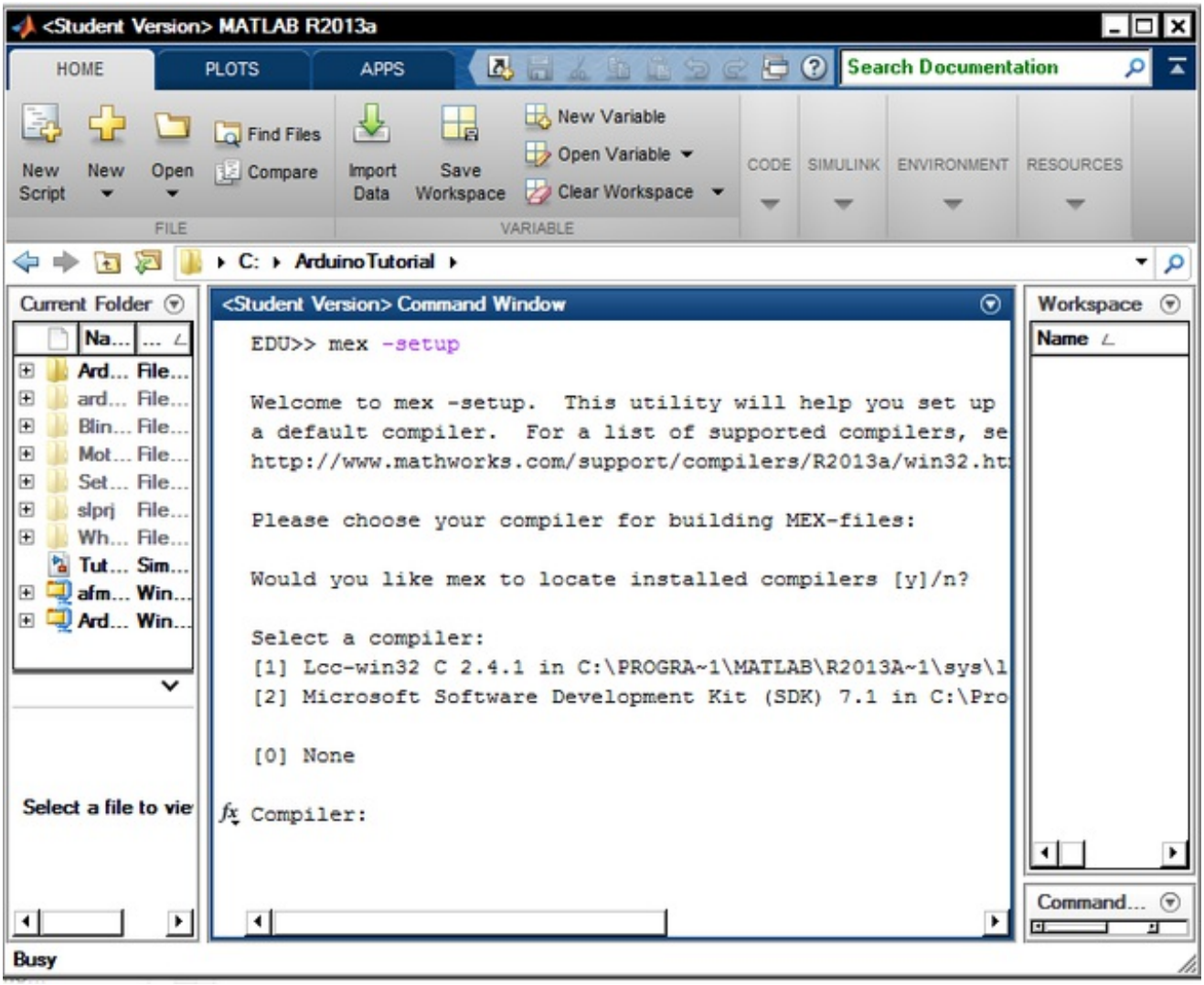
Simulink support package for Arduino is supported on 32-bit and 64-bit Microsoft Windows and Mac OS X. For the code generation process to work, a supported compiler installation is required. Refer to the following page on MathWorks website for a list of supported compilers on Windows and Mac OS:

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

For example, you can download a Simulink supported compiler from the Microsoft website (http://adafru.it/d5J) for free.

Compiler set up in MATLAB

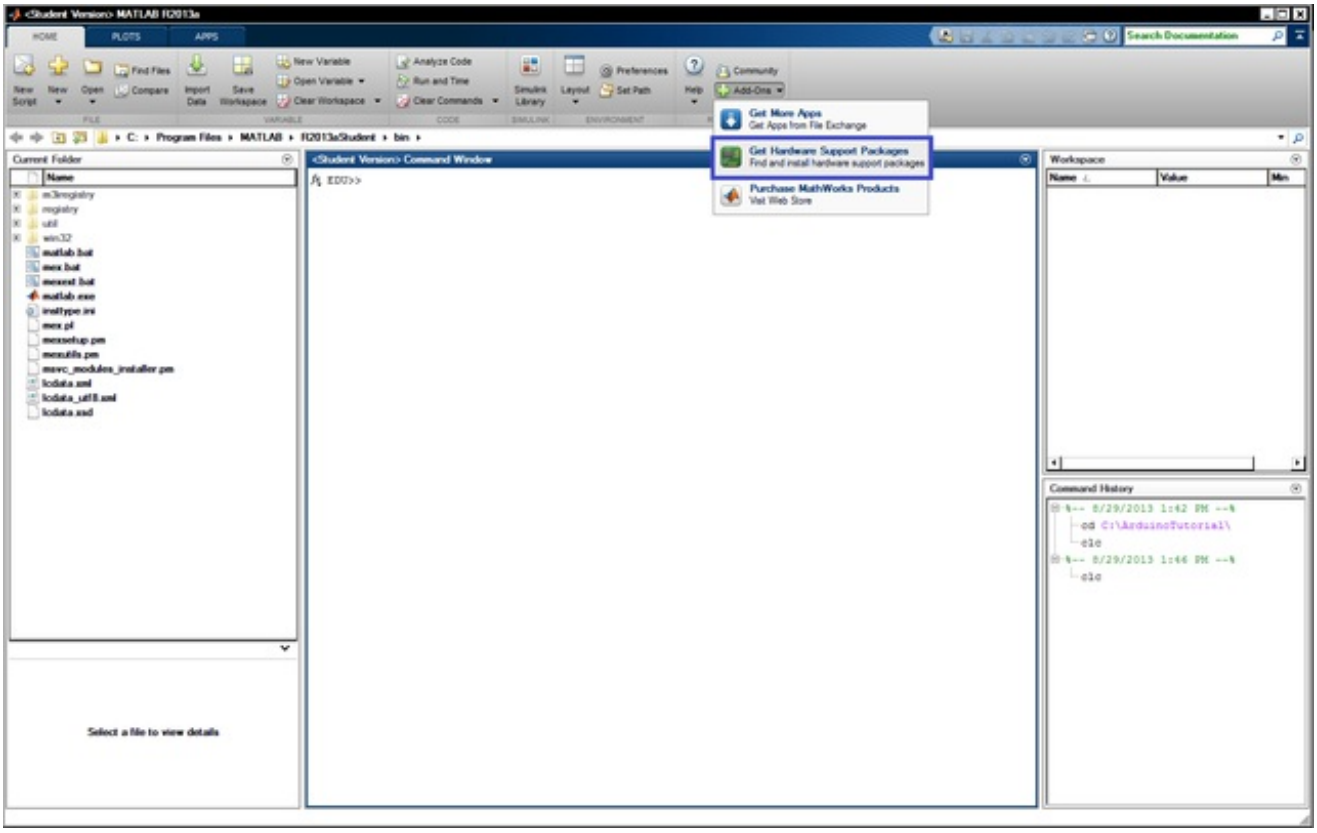
Enter mex -setup at the MATLAB command prompt to start the compiler set up. Enter y to see a list of installed compilers. Enter the number corresponding to your preferred compiler. Confirm your selection and the compiler set up is complete.


<Student Version> MATLAB R2013a
HOME
PLOTS
APPS
Search Documentation
New Script
New
Open
Find Files
Compare
Import Data
Save Workspace
New Variable
Open Variable
Clear Workspace
CODE
SIMULINK
ENVIRONMENT
RESOURCES
FILE
VARIABLE
C: ▸ ArduinoTutorial ▸
Current Folder
Name
<Student Version> Command Window
EDU>> mex -setup
Welcome to mex -setup. This utility will help you set up
a default compiler. For a list of supported compilers, se
http://www.mathworks.com/support/compilers/R2013a/win32.ht
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\l
[2] Microsoft Software Development Kit (SDK) 7.1 in C:\Pro
[0] None
Compiler:
Workspace
Name
Select a file to vie
Command...
Busy

Set up Simulink support package for Arduino

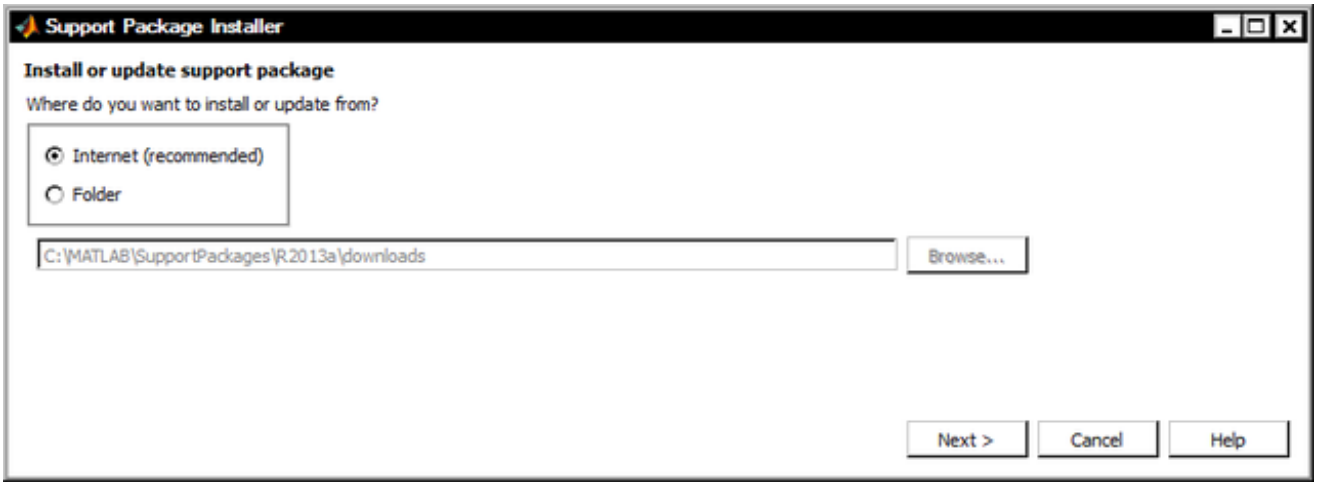
Start MATLAB

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



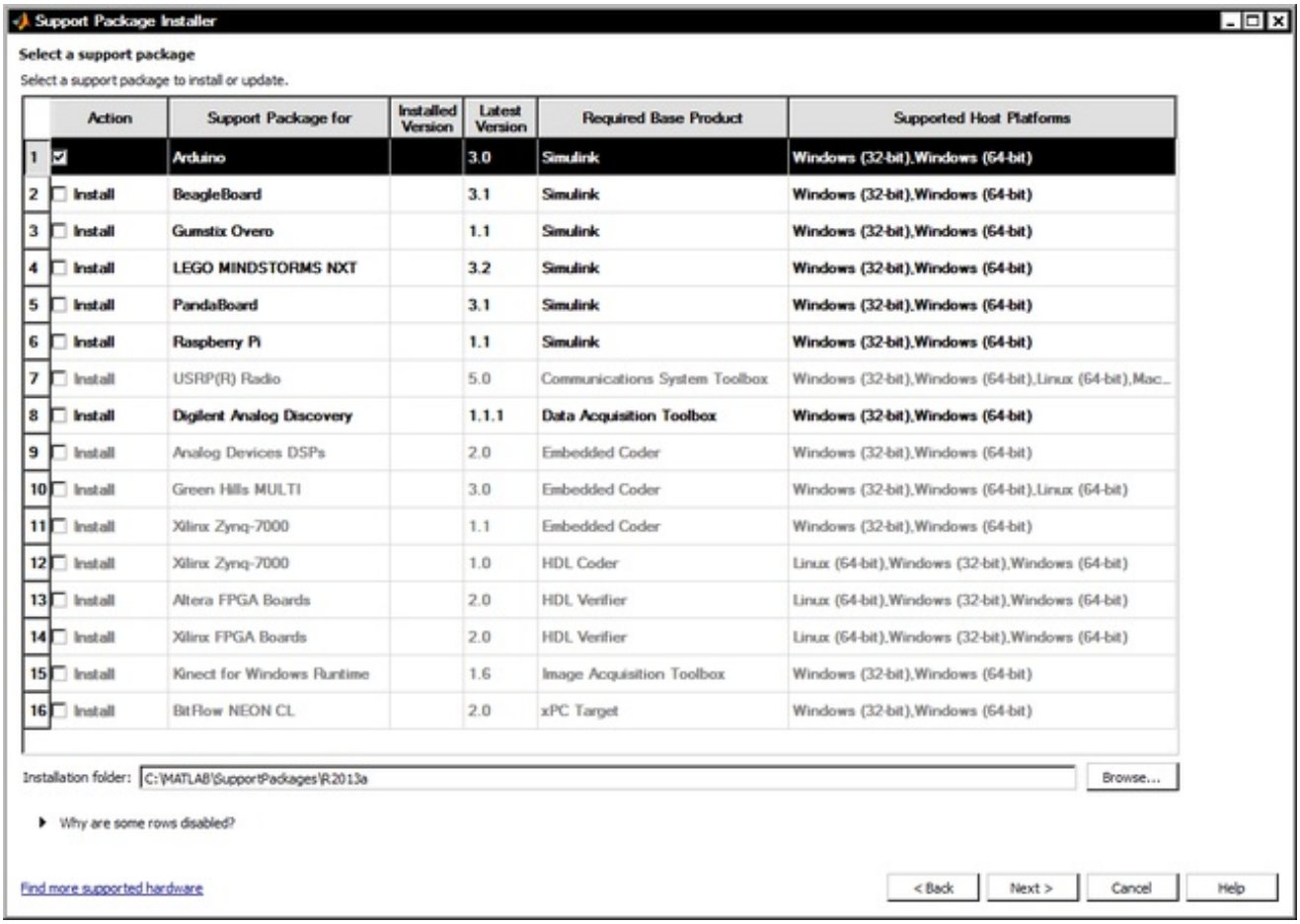
Start Support Package Installer

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



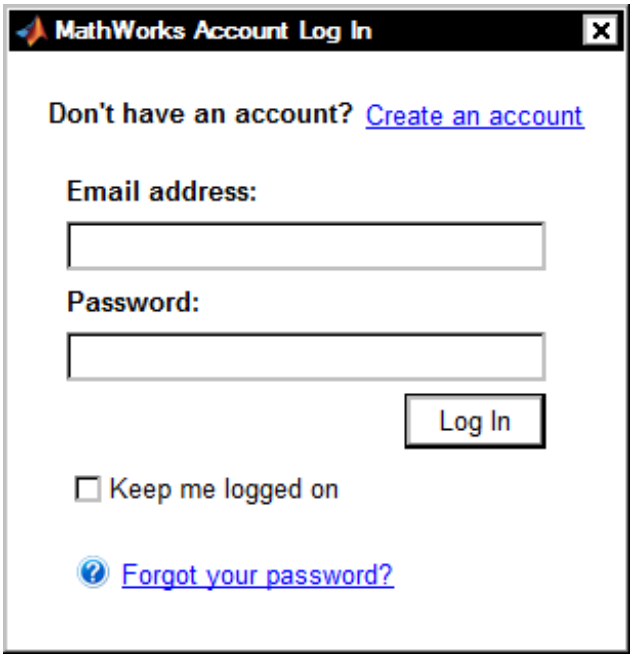
Select Arduino from a list of support packages

Click Next to see a list of support packages and select Arduino from the list



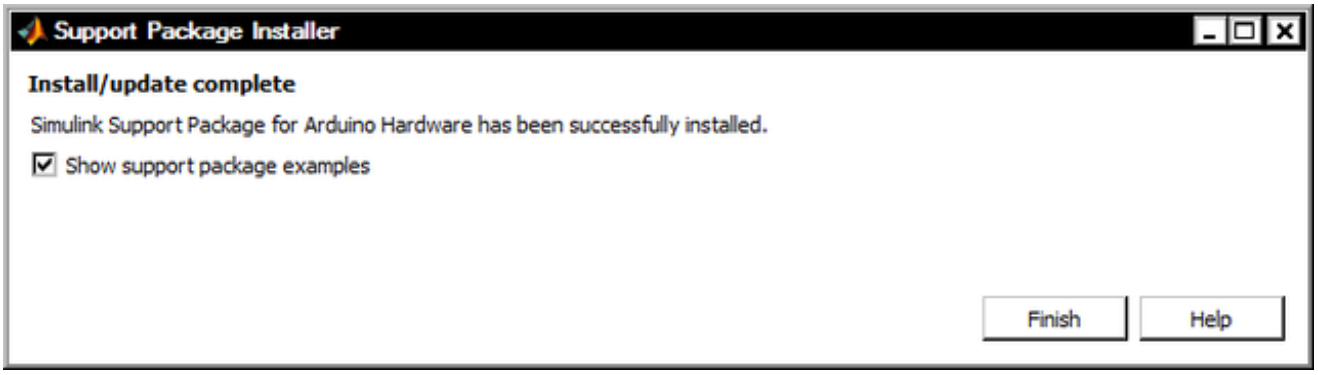
MathWorks Account

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/d5K). (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



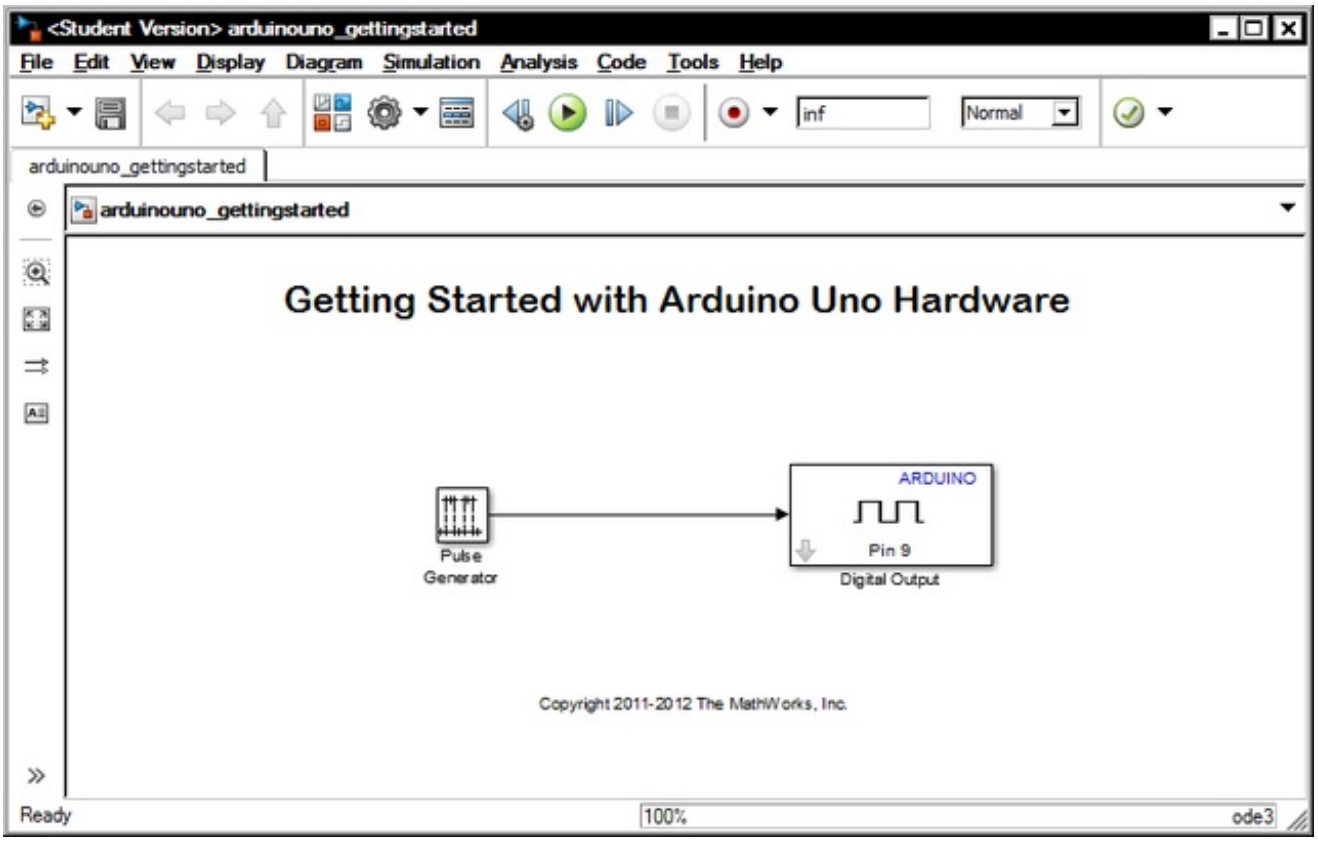
Simulink model

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.

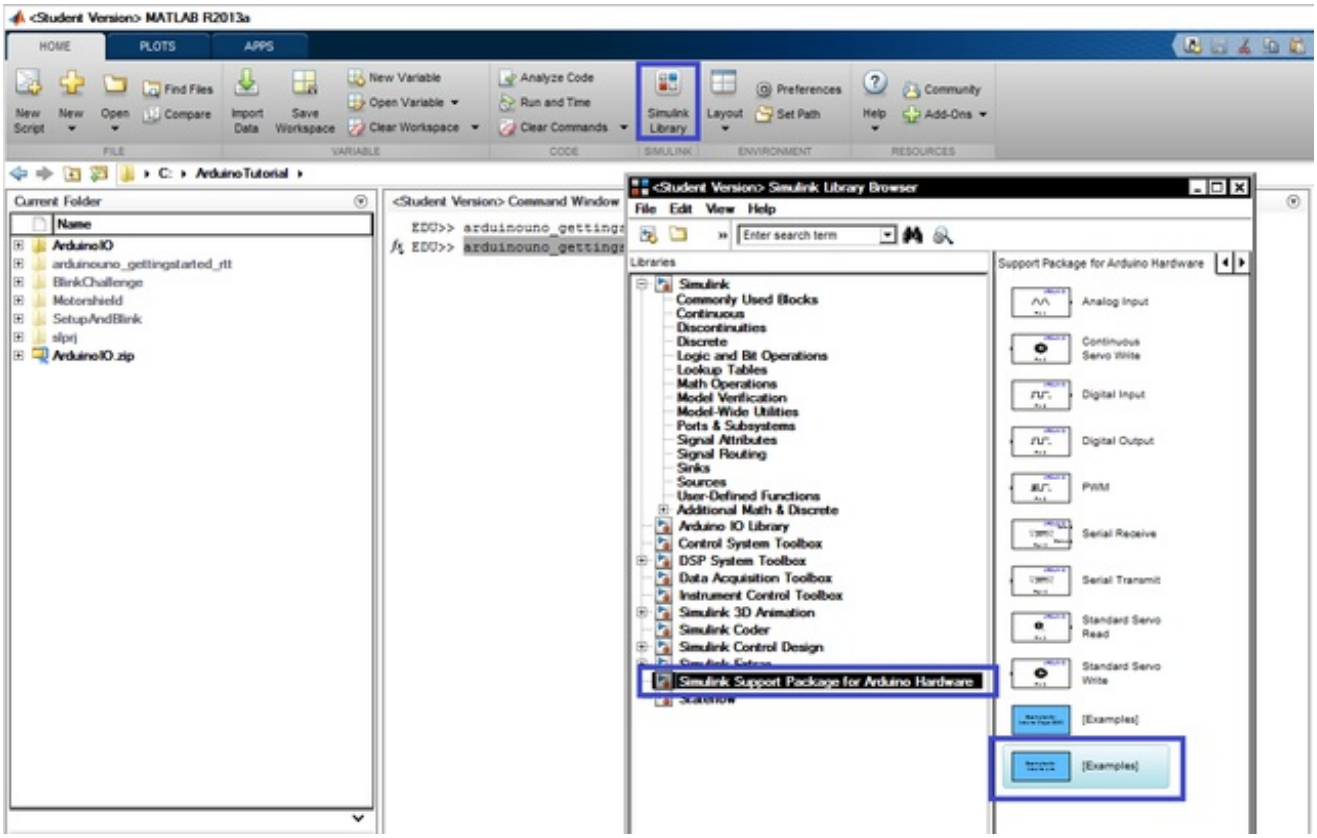
The Digital Output block is set up to send the output of the Pulse Generator to pin 9 of the Arduino Uno. Double-click the block to explore its pre-configured parameters.

You are now ready to program your Arduino Uno!



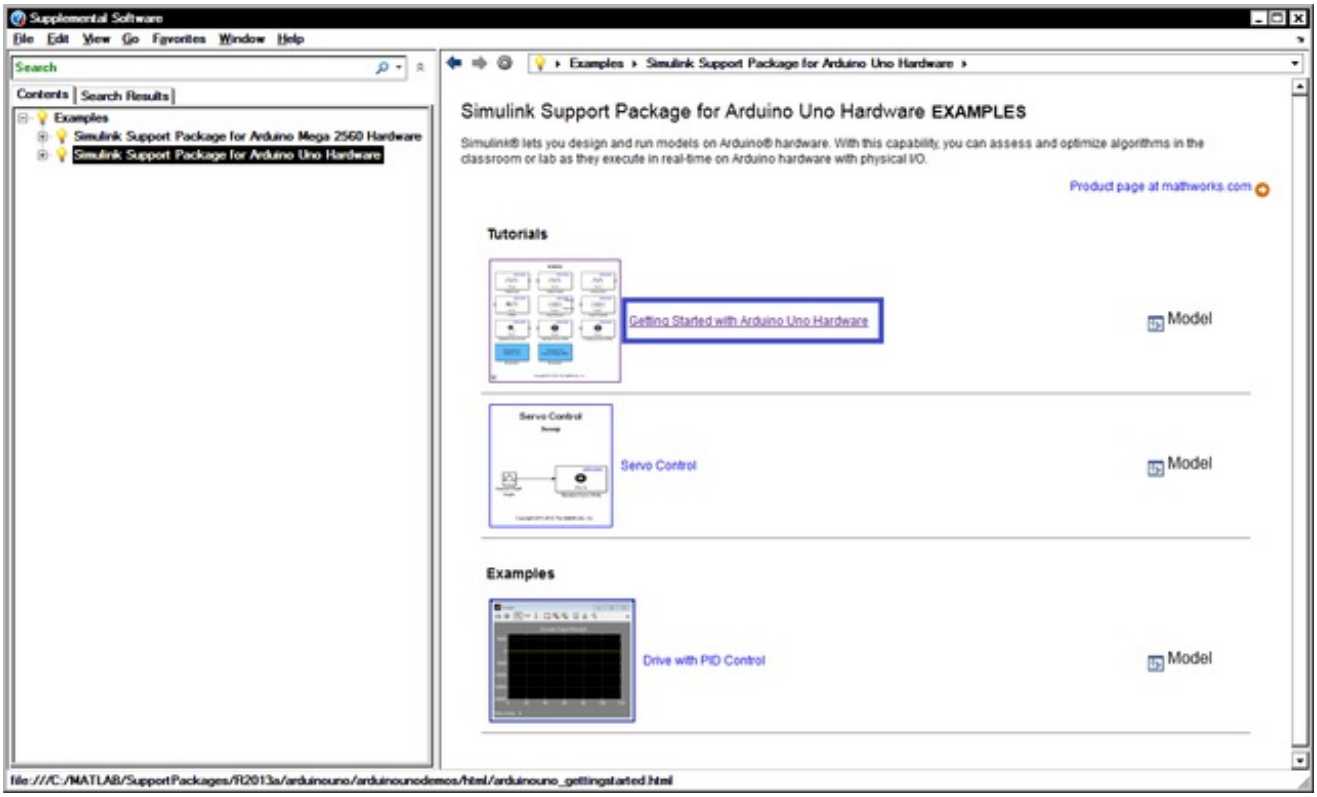
Optional - Create the model on your own

- 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.


Supplemental Software
File Edit View Go Favorites Window Help
Search
Contents Search Results
Examples
Simulink Support Package for Arduino Mega 2560 Hardware
Simulink Support Package for Arduino Uno Hardware
Examples ▸ Simulink Support Package for Arduino Uno Hardware ▸
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
Model
Servo Control
Servo Control
Model
Examples
Drive with PID Control
Model
file:///C:/MATLAB/SupportPackages/R2013a/arduinouno/arduinounodemos/html/arduinouno_gettingstarted.html

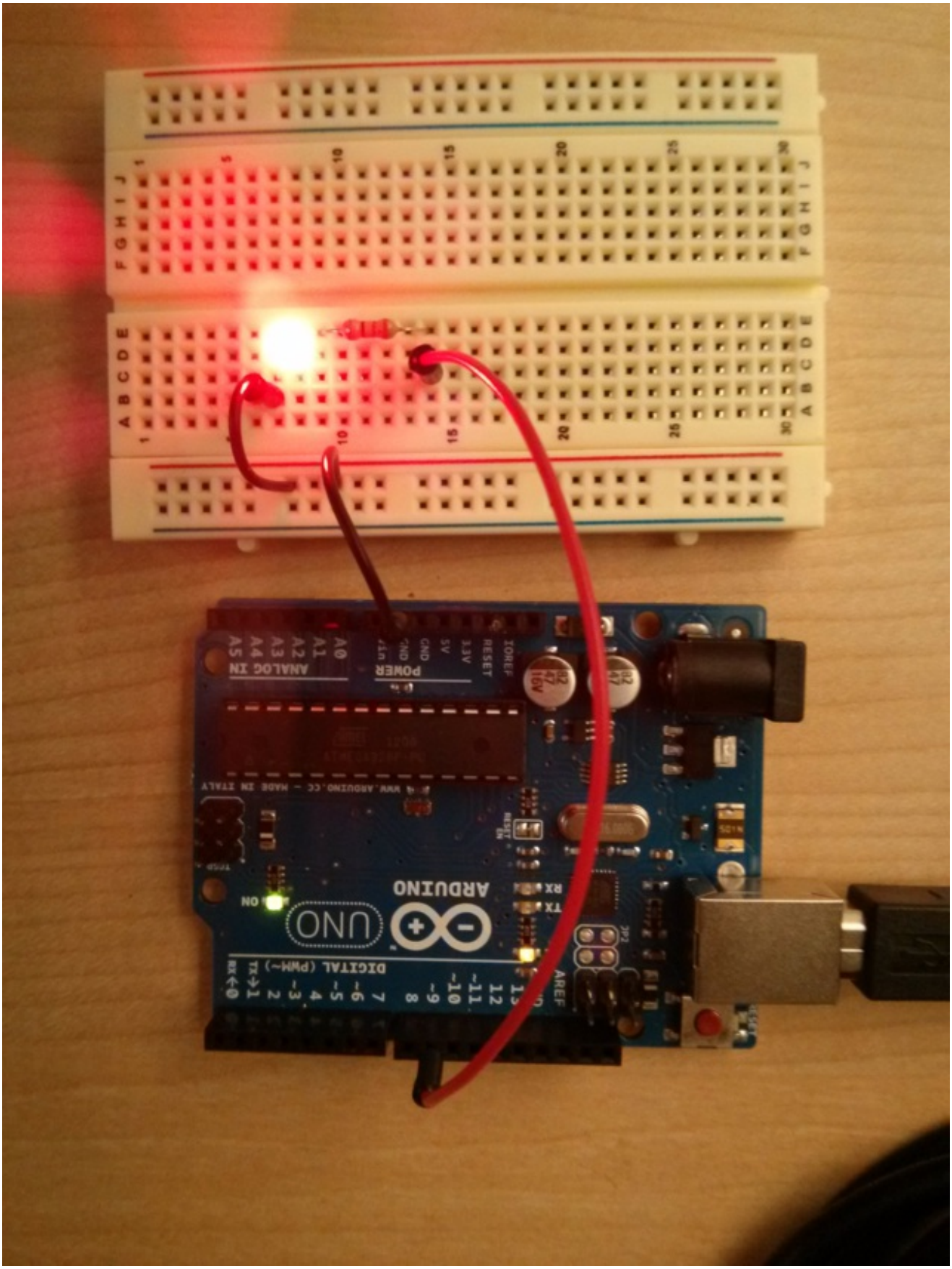
Generate code, Load and Run

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


ARDUINO
UNO
POWER
ANALOG IN
DIGITAL (PWM~)

Simulink Resources

Examples for getting started

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

Full tutorials

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