Laboratory 4: Introduction to Arduino

4.1 Introduction

This lab focuses on working with virtual Arduino microcontrollers. By the end of lab you should understand the basic commands to read and write digital pins, send information to the serial monitor, and use subfunctions to break your program up into manageable pieces. The final result will be a button-controlled traffic light signal on a virtual system in Tinkercad. The additional resources required for this assignment include the following Pratt Pundit Pages: Arduino, EGR 224/Arduino Foundations Supplement You will also be following along with a couple LinkedIn Learning tutorials on using Arduinos by building circuits and programming Arduinos in Tinkercad. During a later lab session, you will build the same circuits and program an actual Arduino.

4.2 LinkedIn Learning

LinkedIn Learning - formerly Lynda - is a platform for educators and professionals around the world to provide instructional videos on a wide variety of topics. The main Duke site to get to LinkedIn Learning is: https://oit.duke.edu/what-we-do/applications/linkedin-learning. Once you have logged in and are at the LinkedIn Learning main page, you can click on the following URLs to get to the courses you need for this assignment:

- https://www.linkedin.com/learning/learning-tinkercad - **Learning Tinkercad** by Kacie Hultgren. You are specifically going to go through the first two parts of Module 10: Circuits and Codeblocks.
- https://www.linkedin.com/learning/learning-arduino-foundations-2 - **Learning Arduino: Foundations** by Zahraa Khalil. You are going to go through (most of) the whole course. The Pundit page has more information on that.

Note that the first module uses a Tinkercad version of an Arduino while the second module uses an actual Arduino. For this lab, you will be using the Tinkercad version for both.

4.3 Assignment

4.3.1 Learning Tinkercad

Go through the first two parts of Module 10: Circuits and Codeblocks for the Learning Tinkercad course ("Designing a circuit" and "Writing code for Arduino"). You will not need to turn anything in for this but are expected to be familiar with how you might be able to write code for the Arduino using code blocks.

4.3.2 Foundations

Go through the Learning Arduino: Foundations course, pausing when necessary and taking notes about the specific Arduino commands used. The Pundit page will include some amplifying information or, sometimes, differences from the module as presented. Please follow along with Pundit as you go through the module and create a Tinkercad version of the traffic light circuit and the pushbutton circuit. Use the image on Pundit as an example and carefully note the deviations from the module.

Once you have that working, read the Pundit page on how to use subfunctions and then change your traffic light code to make it use subfunctions for each light rather than having all the code in the main loop. For this assignment, you will be sharing your Tinkercad circuit with the instructional staff. To share a Tinkercad circuit, click the `Send To` button at the top right of the Tinkercad screen, then use the "Invite People" button to get a link to send to your grader TA to share your design.