

Learning Goals:

- Get familiar with the Arduino programming environment.
- Learn how to build a circuit to connect external components to the Arduino.
- Learn how to program the Arduino to control external components.
- Bonus: Pretty blinking lights.

As working with microcontrollers and electronics is new to most of you, don't worry if some of this seems weird or confusing. Please attend the lab during your scheduled lab time, or any of the office hours, in order to get help setting everything up.

Prelab:

Get a blinking LED on Pin 13. (Note: Pin 13 controls both the onboard LED, and the external pin 13. If you do this correctly, your onboard and external LED should blink at the same time.)

You will first need to get the Arduino IDE set up. [You can download it here for free.](#) There are plenty of [tutorials for setting up Arduinos on the Arduino website.](#)

You can follow one of the many online tutorials on how to do this, such as: <http://arduino.cc/en/Tutorial/Blink>.

Notes:

- A good way to approach this is to get your onboard LED blinking first, and then connect an external LED.
- The Arduino IDE comes with sample code to get your LED blinking.

Lab 1: Due Monday Lab on ~~9/9/19~~ 9/16/19

Use the onboard LED on pin 13, a red LED on a second digital pin of your choice and a green LED on a third digital pin of your choice.

Have these three LED's cycle so only one LED is on at any given point in time. So your onboard LED should turn on, then it should turn off and your red LED should turn on, then it should turn off and your green LED should turn on, then onboard, then red, then green, etc . . .

The digital pins should be labeled 0-13 on your board.

Each off-board LED should be connected to a 220 Ohm resistor.

Note that this will mean you have to connect two separate LEDs to the ground pin. I recommend using a breadboard for this.

If you wish, you may wish to connect a third off-board LED to the Digital Pin 13. If so, pick a different color than Red or Green for the LED. Using a third off-board LED is not a requirement for the lab.

Due by Lab Time Week 3 4: Have a TA check out your board by the end of your lab on Monday ~~9/9/19~~ 9/16/19, **AND** submit the code via gradescope by prior to the demonstration of your lab.

What should I include with my .ino Code File?

As with any code file, it should be written in Good Coding Style: in a manner that will help other people read and understand the intent, purpose, operation of the code. So your code must include:

- Name the .ino file with your NetId and Lab Number – 3 points
 - I.E. something like: ptroy4Lab1.ino
- Header Comments (including the following) - 12 points
 - // FirstName LastName, UIN and NetID
 - // Lab x - Title
 - // Description - what is this code supposed to do?
 - // Include any assumptions you may have made, what do you expect from the hardware, pinouts, particular arduino versions, etc.
 - // References - where did you find code snippets, ideas, inspirations? if no references used say: "no references used"
- Code is well documented/formatted with comments, indentations, and descriptive variable names - 10 points
- Actual code - the functions in the cpp/ino file - 25 points

Total: 50 points per lab based on the code file submitted.

So, if you just submit working code, you will only get half of the total allocated points.

Academic Integrity Guidelines for this lab: You are allowed to consult resources linked from this lab write up, and anything provided by the professor or TAs via blackboard, as well as any resources you need in order to get the Arduino software and hardware working with your computer. You should NOT look up any of the code you need to get the LEDs to turn on and off as described, you should be able to figure this out yourself from the materials provided. This is an individual assignment, and you should not look at anyone else's code, or show anyone your code.