SE101—Lab Project

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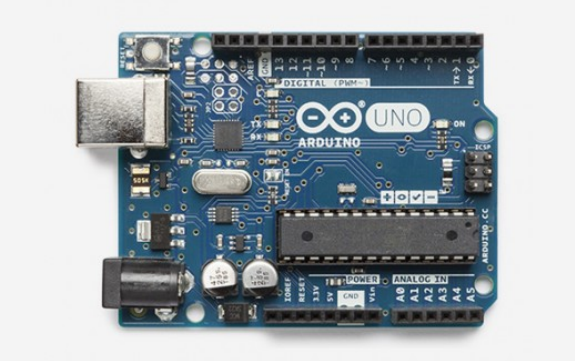

Figure 1: The Arduino Uno R3 [1]

Introduction

In this lab you are given an opportunity to follow the full software development cycle and to be creative with a microcontroller board. You will need to acquire an Arduino Uno R3 (or other Arduino of your choice) and possibly a shield in order to extend functionality. Only one is required per group. This lab is flexible. However, your mark is proportional to both the difficulty of the project you attempt as well as the performance of your execution. Keep in mind that you should be able to complete the project with minimal assistance.

Requirements

- Form a group of 3 students
  - Email Rollen D'Souza (subject line "[SE101] Project Group") with the Quest/WATIAM ID and Student Number of group members.
  - Rollen D'Souza will respond with your project repository on `git.uwaterloo.ca`.
- In your group, submit a proposal of the project you would like to complete. The document must:
  - Be a PDF.
  - Clearly state full name and Quest/WATIAM ID for group members.
  - Be at most 1 page long.
  - Be submitted to your project group repository as `Proposal.pdf`.

- The proposal document must describe the following:
  - Your project. What will it do?
  - The major software components of your project (e.g. implement LCD user interface, implement accelerometer data collection).
  - The hardware you acquired for the project and intend to use.
  - The challenges you anticipate. For example: if you are using an LCD screen, you may anticipate the challenge of drawing and moving a complex object.
- *If you are unable to formulate a proposal, you must see me in office hours else you forfeit your proposal grade. These are easy marks, don't lose them.*
- You must *develop* and submit the project using `git.uwaterloo.ca` in the directory provided to your group. Marks will be deducted for not using source control effectively. That is, we expect to see at least two non-trivial commits. Trivial commits are those that consist of only changes to whitespace.

Important Dates

Proposal Due Date	October 12, 2017 @ 23:59	*Note: This is a logical tuesday.*
Proposal Feedback	October 19, 2017 @ 11:30	
Project Demo Due Date	November 30, 2017 @ 11:30	

Marking Scheme

	Criteria	**Mark Contribution**
	Project Proposal	
Execution	Low Difficulty	
	Average Difficulty	
	Above Average Difficulty	
Style	Naming	
	Whitespace Usage	
	Easy to Modify	
	Use of Control Flow and Types	
	Use of Source Control	
	Total	
	Bonus	

Suggested Resources

- Although you can acquire the official Arduino Uno R3, you might find cheaper alternatives made by SainSmart or Elegoo. We have tried the Elegoo brand and have found no apparent differences yet paid $14 each.
- There are a variety of shields out there. Ensure that, if you purchase a shield, it *comes with the header pins attached*. If it doesn't, you'll have to solder them on yourself.
- There are a number of LCD character display shields available, with buttons, such as this or this . Keep in mind every shield is different, so keep a look out for what features are available, and what aren't!
- The RigidWare store — operated by EngSoc — has a decent amount of hardware available for you to purchase, including Arduinos.
- There are options for if your project really doesn't work out; talk to Rollen if disaster strikes.

Suggested Projects

- Mimic a clock app on the phone. e.g. keep track of time, implement an alarm clock, implement a stop watch, support UTC.
- Make a small game on a computer and turn your Arduino into a controller.
- Make a game on the Arduino with a LCD shield (make sure it isn't just a character display!)

Submission

You must submit your project into the provided `git.uwaterloo.ca` repository. You are graded on your use of `git`. We expect to see at least two non-trivial commits. Trivial commits are those that consist of only changes to whitespace. Email Rollen or Yunzhe if you can't commit to that address.

Tips

- The moment you have a working program, commit it! If things go wrong, you can always go back.
- Expect to stumble upon unexpected hurdles. Always give yourself an ample amount of time to finish the project!

References

[1] Arduino. (2017). *Arduino Uno Rev3 - Boards & Modules - Arduino.* `https://store.arduino.cc/usa/arduino-uno-rev3`