Lab 2 - Pre Lab

ME 451 - Introduction to Instrumentation and Measurement Systems, Spring 2019

Complete the following questions for Lab 2 and submit your answers through Gradescope.

## Pre Lab Resources

* [Basic Description of FFT](https://simple.wikipedia.org/wiki/Fourier_transform)
* [Breakout boards](https://programmingelectronics.com/what-is-a-breakout-board-for-arduino/) (captioned version of video available on Canvas)
* [Intro to I2C and SPI](https://www.byteparadigm.com/applications/introduction-to-i2c-and-spi-protocols/)

## Pre Lab Questions

1. What does the Fast Fourier Transform (FFT) do?
   1. If we used FFT on a signal, what would it tell us?
2. What exactly is a breakout board? What are the advantages of using them?
3. I2C and SPI:
   1. *note:* for this section, you **do not** need to go into too much technical detail, just show me that you know the basics of what is going on after reading the link.
   2. SPI:
      1. How many wires does SPI use?
      2. What is the purpose of each wire?
      3. In a case with multiple slave devices, what wires are connected to all devices in the network? Why?
      4. What are the advantages and disadvantages of SPI?
   3. I2C:
      1. How many wires does I2C use?
      2. What is the purpose of each wire?
      3. In a case with multiple slave devices, what wires are connected to all devices in the network? Why?
      4. What are the advantages and disadvantages of I2C?
   4. *Another note:* to be very clear, we do not expect you to understand or approach this topic as an electrical engineer. We feel that it is necessary to understand the basics of these protocols because of their prevalence with small systems – the small systems that you work on in class and might run into as a mechanical engineer. It is likely you will use these communication protocols in your final project, so there’s a good immediate incentive to try our best with this lab.