January 17, 2021

Hiring Manager
Zaber Technologies Inc.
Vancouver, BC

<div align="center">Re: Embedded Software Co-Op</div>

Project Description: Automatic Sail Trim in C

This project was developed as a final project for a physics lab course, PHYS 319 at UBC. While this project was used for a course, I have still chosen to showcase it as it best illustrates my experience with embedded systems. The idea, design, and development for this project is my own work, though I used concepts taught earlier in the PHYS 319 course and received some advice from my professor.

This project consists of an automatic sail trimming system for a simple model sailboat. The objective of the system is to maintain an appropriate angle between the wind and the sail. A rotational position sensor is used to indicate the direction of the wind. A servo motor positions the boom and sail according to the input from the position sensor. The position sensor is attached to the mast and the servo motor is affixed to the deck of the boat and connected to the boom (figure 1). The electronic components are powered and grounded through a prototype board. A TI MSP430 microcontroller is connected to the position sensor and servo (figure 2). Control code for the microcontroller takes input from the position sensor, performs a calculation determining the optimal sail position, and then directs the servo to position the sail accordingly. The input to the microcontroller from the position sensor is an analog signal, which is converted to a digital signal using MSP430 ADC functionality. The servo motor is controlled by a pulse width modulated signal.
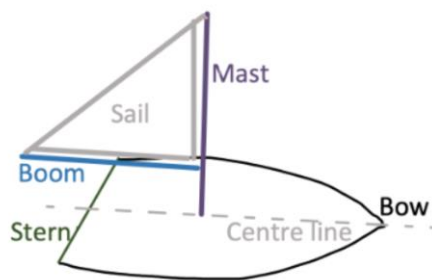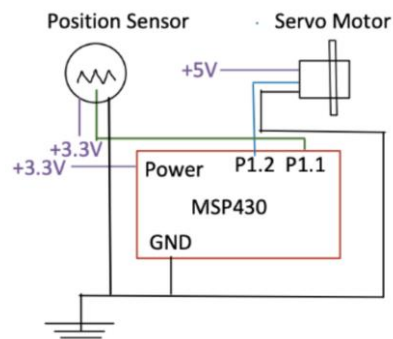

Figure 1

Figure 2

More information and source code can be found at the accompanying GitHub link:
https://github.com/kardea/automated_sail_trim.