Motor Control

Due Date: Wednesday, December 6

Resources

THIS LAB REQUIRES READING DOCUMENTATION AND DATASHEETS. Before you ask an officer a question, make sure your answer is not in the slides, this document, the datasheet, or the documentation for the library.

Lecture 3 Slides: **Link**
Teensy LC Pinout: **Link**
EAGLE CAD: **Link**
EAGLE Tutorial: **Link**
EAGLE Library: **Link**
EAGLE Commands: **Link**
FDP8880 Datasheet: **Link**
IRLB8721PBF Datasheet: **Link**
IPP45P03P4L-11 Datasheet: **Link**

Overview

In this lab, you will become more familiar with motor-driving circuits that will be revisited for the quadcopter.

Lab Outcomes and Expectations

By the end of this lab, you should understand the characteristics of high-side and low-side drivers. You should also have introductory knowledge of how to do schematic design on EAGLE.

A. Assembling Drivers

Make both a low-side driver and a high-side driver. Refer to the slides for the circuit topologies and look up the appropriate datasheets for the transistors to check pin configurations. Keep your design simple and clean. For an NMOS, use either the

FDP8880 or the IRLB8721PBF. For your PMOS, use the IPP45P03P4L-11. All three of these transistors can be found in the AP parts drawer.

NOTE: Do not power the circuit until it has been checked off. Do not worry about including a motor yet.

Checkpoint 1: Breadboard both drivers.

B. Incorporating Variable Control

Integrate the logic output from your microcontroller with the circuit you built in the previous checkpoint. Be sure to check the pinout for PWM pins. You will have to use the analogWrite function to write a program that increases the speed of the motor to some upper bound and then back to zero.

NOTE: Set the upper bound to a relatively small value. DO NOT write the maximum possible value to the pin.

Checkpoint 2: Using one driver selected from the previous checkpoint, vary the motor speed between zero and some upper bound.

C. Schematic Design

For this checkpoint, you will need to use EAGLE CAD. A list of commands can be found here. A tutorial can be found here.

Download the provided library, which will also be used for part selection in final schematic designs.

Checkpoint 3: Design a schematic for the motor-driving circuit from the previous checkpoint.

D. Summary

After finishing the lab, you should have completed the following:

---

1. Finished each checkpoint of the lab and were checked off by an Advanced Project lead for each. Your entire team must be present.
2. Gained a solid understanding of motor control.

3. Created a basic schematic in EAGLE.