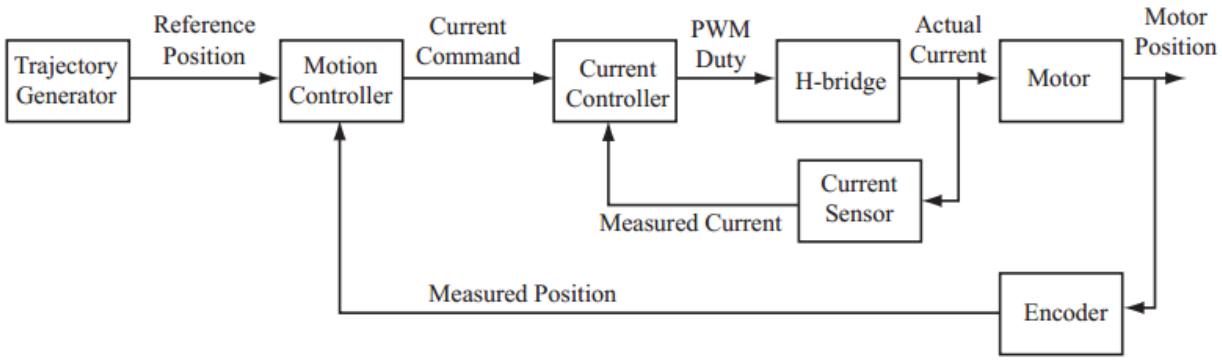
ME 333 Final Project Report

You have finally finished your project! Hopefully you have a working demo. There are just a few more things to turn in before you can call this project complete.

Answer each of the 9 questions below, include the screenshots asked for, and turn in all of the .c or .h files that you had to modify for your project (this should only be current.c and motion.c, unless you decided to play with some more). Turn in the questions, screenshots, and the code on Canvas by 3/19/14.

Screenshots:
- from the nScope, pin E0
- using the step motion trajectory [0,0; 1,90; 3,0; 5,0], show the tracking you achieved in Matlab
- using the cubic motion trajectory [0,0; 1,90;3,0;5,0] show the tracking you achieved in Matlab
- in holding mode, knock the arm out of position and show the response



General Block Diagram (used in questions 1-2)

Questions:

1. Above is a general block diagram for a motion control system. Which parts of the block diagram were implemented on the NU32? On matlab? On another chip?

2. What are the units of each of the signals listed in the block diagram? Which ones live in the real world, and which ones live in software?

3. List all of the PIC32 peripherals that were used to complete the project (e.g. Timer 2, Output Compare 1), and give a one or two sentence description of how you used each one. Also mention if you wrote code for the peripheral directly, or if it was used behind the scenes for you.

4. Draw the circuit diagram for your motor controller (no electronics project is complete without a diagram!) Include all of the connections between chips, component values, and filter cutoff

frequencies.

5. What components would you need to replace if you increased the battery voltage to 24V?

6. Which trajectory did your controller follow more closely (the cubic or the step trajectory)? Why?

7. What would happen if you increased the PWM frequency to 40kHz? What would happen if you decreased it to 100Hz?

8. What gains did you use for the motion controller, and how would you change them if the inertia bar were doubled in length?

9. If you replaced the encoder for one with only 50 lines, which PID term would be most affected and in what way?