

ME333 Final Project Report

Due on Canvas 3/18/15 by 11AM

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.

First, upload all of your .c, .h, and .m files to Canvas.

Second, run the following experiments, take a screenshot of each MATLAB response, and upload to Canvas.

- A. Run the current tuning with no integral gain (call this image currentA.png)
- B. Run the current tuning with your optimized gains (call this image currentB.png)
- C. Use the following motion trajectory: `gen_ref(200,[0,0;1,90;3,0;5,0],'previous')` (call this image trajC.png)
- D. Use the following motion trajectory: `gen_ref(200,[0,0;1,90;3,0;5,0],'cubic')` (call this image trajD.png)
- E. Use the following motion trajectory: `gen_ref(200,[0,0; 1,0;2,-90;3,90;4,-90;5,0;6,0],'cubic')` (call this image trajE.png)

Finally, answer the following 6 questions in a .pdf, and upload to Canvas.

1. No project is complete without a circuit diagram! Draw your circuit schematic. Label the component names and values, and label the gain and filter cutoff frequency of the current sensor circuit (you only need to show the pins on the NU32 and decoder chip that were used)
2. What components would need to be replaced if you changed the battery to 24V?
3. Draw the block diagram of the position controller. Label the arrows between blocks with the value that is passed and the range that value can take.
4. In a few sentences, describe how a position reference is created; how it is sent to the NU32; how the NU32 follows the trajectory; how the actual position followed is returned to the computer.
5. Describe the method of finding position control gains to follow the trajectory in D, above. If the inertia of the bar were to double, how would you change the gains?
6. Explain why the following trajectory is not feasible: `gen_ref(200,[0,0; 1,0;1.25,-90;1.5,90;1.75,-90;2,0;3.5,0],'cubic')`