For approval, send the instructor a short (~100 words) abstract for your project including a brief

description of the system to be modeled, problems to be solved, and general plans for

simulation scenarios and verification.

# Final Project Proposal

**Overview**

The project would be focused on simulating control systems (both the controller itself and the plant). My focus will be deriving models for motors (the plant), particularly stepper motors due to how frequently I use them in my projects and potentially brushless motors as well. After the plant has been derived, I will explore implementing different controllers (most likely PID) and record the responses for different Kp, Ki, and Kd values. The plant and controllers will be specified in the s domain and my hope is the code will be able to interpret that and draw the correct output responses. I would ideally like to do a multiloop system with both velocity and position control but depending on how complicated that gets, I will stick with just a position controller.

**Verification**

The simulated system response will be compared to graphs outputted from Simulink. The models for the motor will be derived from lecture notes and textbook from ECE1674 (Mechatronics) and potentially some academic papers as well. I can test the controller implementation by just running it on simple plant models and once that’s verified, I can add the actual plant model and then compare with Simulink results.

**Visual**

I’ll model the motor itself and the output shaft. I may add an end effector to the output shaft which would add a moment of inertia term that will be factored into the calculations as well. Another thing I want to explore is to render graphs in the scene in real-time behind the motor.

**Other Add-Ons**

Model a gearbox and factor that into the calculations. Probably assuming ideal gearbox (no backlash, 100% efficient).