Model Development: In order to properly model our motor, we performed a step response experiment by driving our motor with a PWM of 255, or the full 7.2V from the battery. During this, we output the encoder position as well as current time. This is copied over to an xcel spreadsheet name Step.xlsx, where we perform calculations. By insuring that our loop runs every 5 milliseconds, we can calculate the change in position per change in time. This means we can get an approximate radians/sec every 5 milliseconds. By looking at our steady state radians/sec, which we adjusted to a PWM value of 1, we can find our K value. By then finding the time at which our rads/sec is approximately 0.64\*K, we can invert the time to calculate the sigma value. Then we went to matlab and created a transfer function using these sigma and K values. We plotted the transfer function alongside our real rads/sec and time outputs from the serial output. This confirmed that our transfer function was an accurate representation for our motor. Next, we went into simulink and added our transfer function in addition to a PI feedback control and set up a feedback loop. We then tuned our P and I constants in order achieve a rise time of 0.36 seconds and 1.5% overshoot. This left us with P and I constants of ~100 and ~11 respectively. Our P constant was tested to still work at values in excess of 5,000, but is not necessary to achieve satisfactory results.