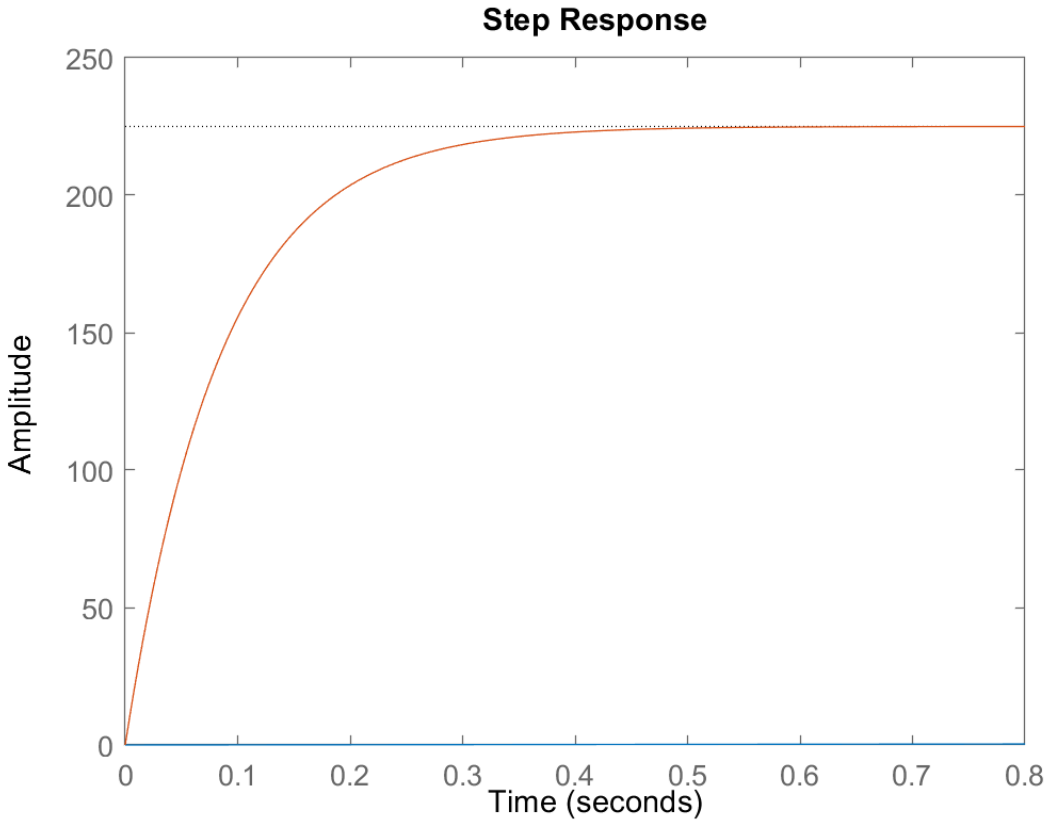

Figure 1-The simulated step response of the open loop transfer function

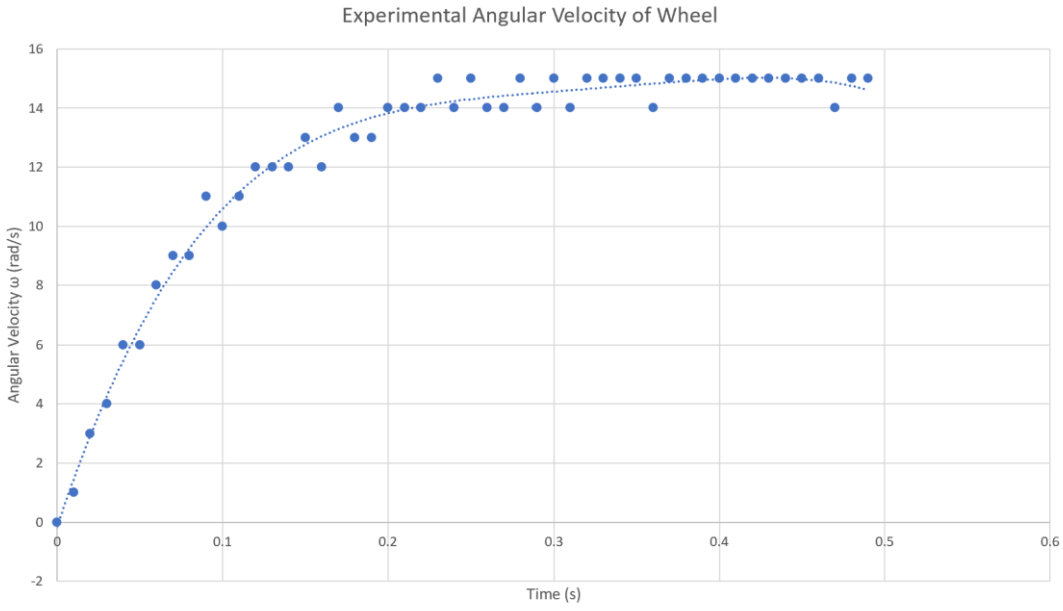

Figure 2-The open loop response of the experimental Arduino and wheel setup

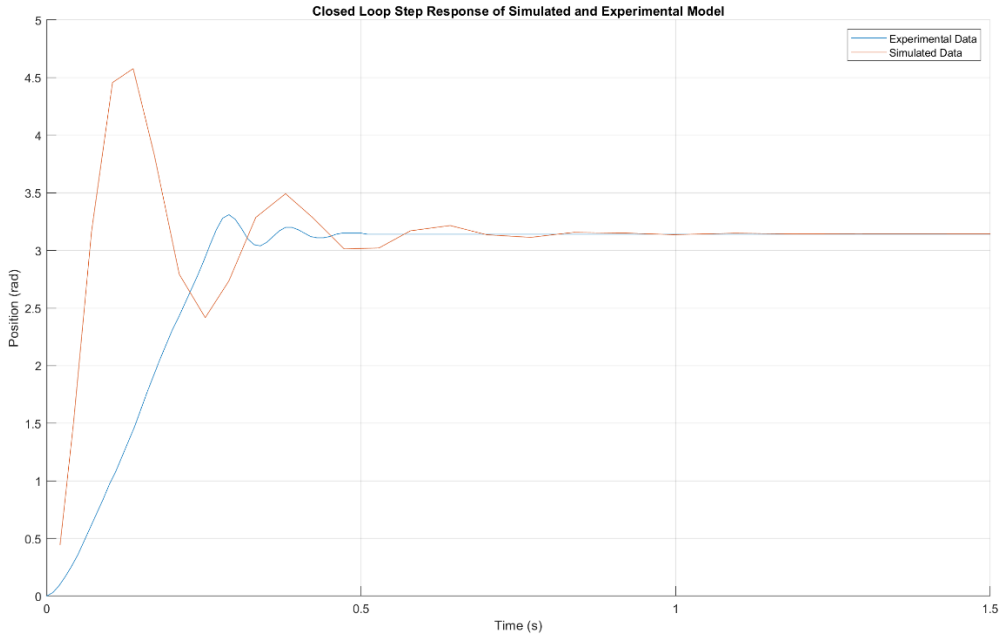

Figure 3-The closed loop response of both the simulated and experimental models

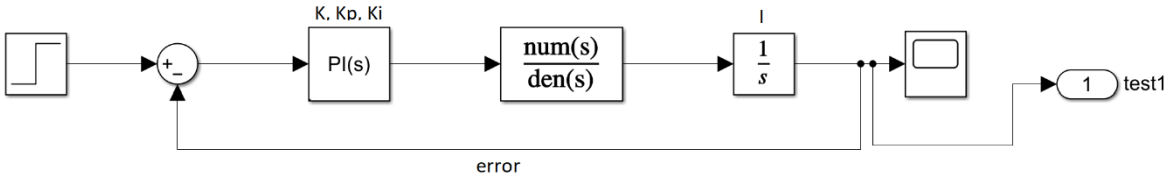

Figure 4-The Simulink model and the corresponding Arduino variables

FYI: Our simulation and control member was sick and absent for much of this project so we did our best with the time we had to learn all the simulation and control information and tools to do it ourselves, and thus it is not as refined as we would have hoped.

In figure 1 and 2 above, the step responses have the same shape which makes sense since the simulated transfer function is an estimation from the experimental data. The y scale is a bit off which likely has to do with our choice of gain, but we did get that figured out in the code. The closed loop step response, however, looks quite different. Interestingly, the experimental data yielded much better results than the simulated results. This is likely due to the gain as well as the estimation that Simulink uses to output the response. The experimental data is within the design guidelines even if the simulated response. Overall, the model transferred really well to the real world and ended up with a very responsive final setup.