Our Control Design

A diagram of a computer

Description automatically generated

The method to choosing our gain values was a bit of guess and check with some rusty feedback control knowledge. I knew from doing an initial trial where both Kp and Ki were 1 that Kp was going to need to be higher while Ki is close since there was a bit of overshoot but no oscillation. Through so more trial and error, a Ki of 0.75 and a Kp of 5 we got a good-looking graph.

Open-Loop

A graph of a line

Description automatically generated

Closed Loop

A graph of a line

Description automatically generated with medium confidence

From these graphs we can see that without the closed loop the system never knows how close to the it is to the desired orientation because it has no idea where it’s current position is. This is why we see the position and voltage constantly go up. When we introduce our feedback our system know can keep track of its own position and is able to recover when it overshoots a bit.