Demonstration 2

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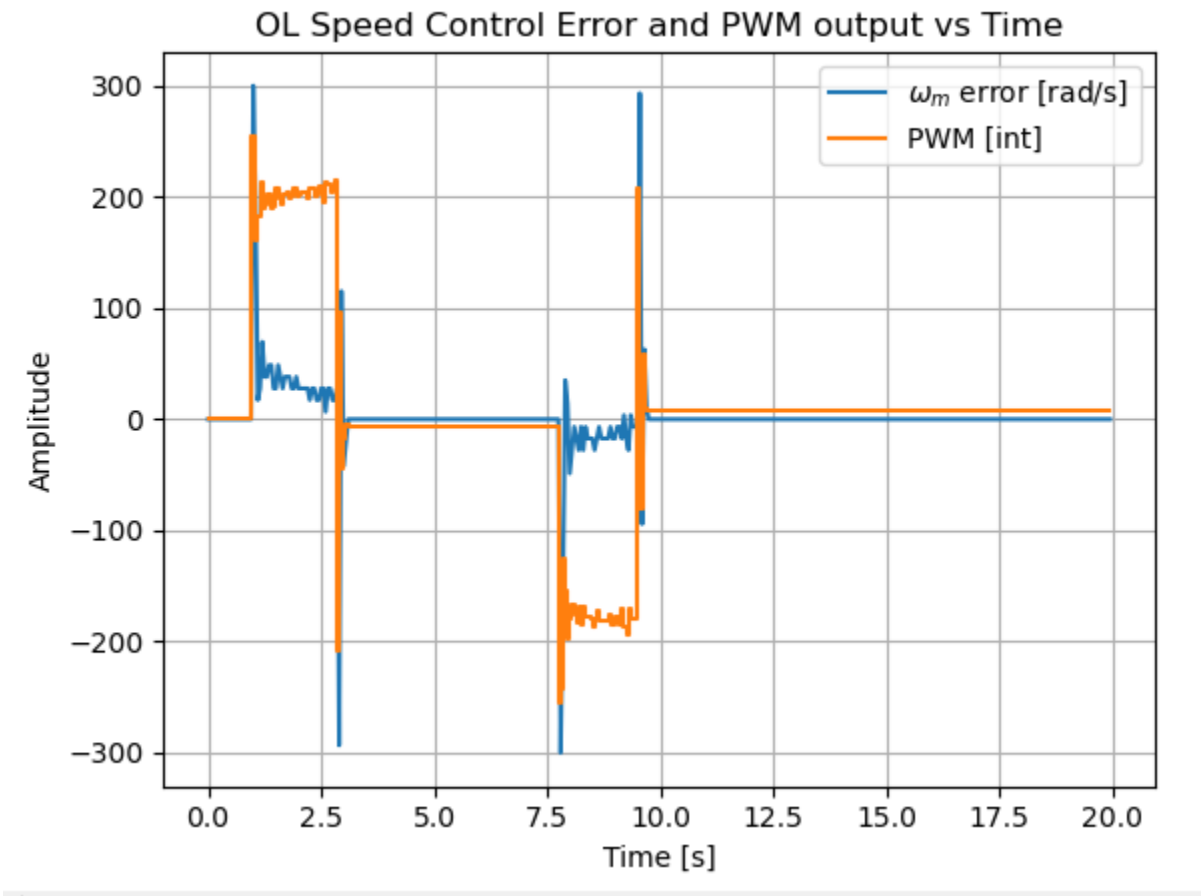
1. I tuned my gains by adjusting the three PID values until the system was barely overdamped, to minimize the response time and minimize overshoot.

Ref_speed = 300

```
# 2pi rad = 2*pi in
    run_time = 12/(ref_speed/45)
```

```
commandTimes = [     0,   0,   0,   0,   1,          1+run_time*1.05, 6+run_time,
6+run_time*2*.975 ] # Time to send command
commandData  = [OLgain,  Kp,  Ki,  Kd,   ref_speed, 0,           -ref_speed,0 ] #
Value to send over
commandTypes = [   'f', 'P', 'I', 'D', 'c',       'c',         'c' , 'c'] # Type
of command to send
```



There was a slight error in that it would take longer for it to reach operating speed on lifting versus descending, as pwm had to run higher and it took longer to reach the pwm.

Gains

```
# EDIT HERE START #
# OL Gain
OLgain = 0.5 # [PWM/(rad/s)]

# Closed loop gains
Kp = 0.6   # Determine units
Ki = 0.6   # Determine units
Kd = 0.004  # Determine units
ref_speed = 300 # rad/s change as needed
```