PROJECT WRITEUP
PID Controller

Goal: The goal of this project was to successfully drive a lap around the track in the simulator using PID controller.

Parameter Tuning: It was observed that tuning the ‘kp' parameter helped in adjusting the cars position to centre of the track. A low ‘kp’ value was used to achieve this. I have tried out different values for ‘kp’ ranging from 0.1 to 1. For initial initialisation, I have used the ‘kp’, ‘ki’, ‘kd’ that were used in the lesson (0.2, 0.004, 3.0). A value of 0.2 for ‘kp’ helped in orienting that car towards the centre of the lane. However, a value of 3.0 for ‘kd’ resulted in wide oscillations around the centre, therefore making the car go out of the lane multiple times. It was also observed that decreasing ‘ki’ value helped in reducing the CTE. I have included two test videos: case 1 and case 2 which showcase the effect of different parameter initialisations. Case 1 ran on these parameters: P = 0.2, I = 0.004, D = 3.0, and Case 2 ran on these values: P = 0.1, I = 0.0001, D = 4.0

I have manually tuned the parameters and these are the values for which the car has successfully managed to finish the lap; P = 0.2, I = 0.0004, D = 2.0. I have not used another PID controller to adjust throttle and speed. Instead, I have increased the throttle value from 0.3 to 0.5. Car was able to drive around the track successfully even with a throttle value of 0.6.