

Reflection

Project 8: PID Controller

PROJECT SPECIFICATION

This project submission includes the following files:

1. The Workspace with the compiling code
2. And this Reflection explaining the effects of the P I and D components on the behaviour of the car: "Reflection.pdf"

P, I, and D Components:

a. 'P' Proportional Component:

The P value affects the cars behaviour most significantly. The effect seen on the car in the project, is as the word reads "Proportional". The car tries to steer towards the center of the road, depending on how far it is located from the center, i.e. the CTE value from the simulator. If the CTE value was very high and the car is on the right of the road, it steers drastically to the left in order to correct this high CTE and the vice-versa was observed when the car was to the left of the center.

b. 'D' Derivative Component:

The 'D' component has helped the car to steer more smoothly towards the center, and also has avoided oversteering of the car towards the opposite side of the center line.

c. 'I' Integral Component:

The integral component accumulates the error of all the previous values. This is helpful in cases where there is a steering drift as seen in the lesson, to reduce the CTE. As this component ends up having information about even small changes in error. In this as there is no drift, the value of the I component was set to 0.

Tuning the hyper parameters:

The hyper parameters for this project have been tuned manually, I firstly set the I and D components to 0 and tuned the P (the tuning was done in increments of 0.1), so as to have a steering response which isn't so wild, that it makes the car drive violently off track and correct it again. And I followed on with the tuning of the other D component with the obtained value for P (the tuning was done in increments of 1).

Another possibility is to automatically tune the parameters using the twiddle algorithm, which I haven't implemented to this project.

Tuned Parameters for Steering PID controller:

$P = 0.1$

$I = 0$

$D = 3$

Tuned Parameters for throttle PID controller:

$P = 0.5$

$I = 0$

$D = 0.5$