Describe the effect each of the P, I, D components had in your implementation.

PID controllers are reactive controllers that tries to minimize the error. Following are formulas and descriptions of each of the three components.

- Proportional (P) component: $\alpha p = -Kp * error$
  The proportional term causes the vehicle to proportional to the error. Without other components, this will cause the vehicle to oscillate about the setpoint.
- Differential (D) component: $\alpha d = -Kd * d(error)/dt$
  The differential component will try to smooth the proportional component's tendency to overshoot the center line.
- Integral (I) component: $\alpha i = -Ki * \sum error$
  The integral component counteracts the bias in the error.

Describe how the final hyperparameters were chosen.

Hyperparameters were tuned manually. My final choice was Kp of 0.1, Ki of 0.0015 and Kd of 3.0.

I first started by playing with Kp component by setting Ki and Kd to be zero. Then I played around with Kd so that the oscillation subsided. Following that, I tuned the Ki component.