PID control project

PID stands for Proportional-Integral-Derivative and is one of the most common algorithms used in industrial control systems. The three basic components making up the name are varied to get an optimal response.

Proportional response

The proportional response is based on the difference between a set point and a process variable, referred to as error term. If, i.e., the error term has a magnitude of 10, then a proportional gain of 5 would produce a proportional response of 50, meaning that the proportional gain determines the ratio of the output response to the error signal. If it is too large, the process variable will begin to oscillate.

Integral response

The integral response sums the error explained above over time, which even causes the integral component to increase slowly. Unless the error is 0, the integral response will continually increase as time progresses.

Derivative response

If the process variable is rapidly increasing, the derivative response causes the output do decrease, and it is proportional to the change rate of the process variable. If the derivative time parameter is increased, the control system will react more strongly to changes in the error term and increase the speed of the overall control system response.

Approach

For the solution at hand, I manually changed all three parameters until the error went down, however, this still did not result in the car successfully going around the track, and when it managed to stay on the lane, it heavily oscillated. My final PID-parameters are 2.75, 0.00005, and 15.

References

http://www.ni.com/white-paper/3782/en/