**Show me that you understand what happens when you adjust the P, I, and D terms as well as their relation to vehicle speed and the angle theta between scans.**

We want the vehicle to correct itself, through PID response.

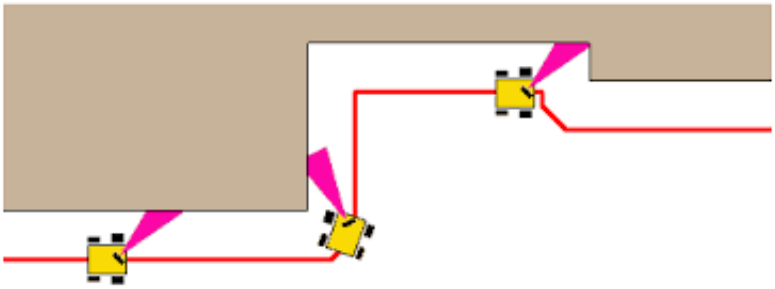
P Proportional Response
I Integral Response
D Derivative Response

We want to keep the car at the ideal centerline, and keep the car as parallel to the walls as possible.

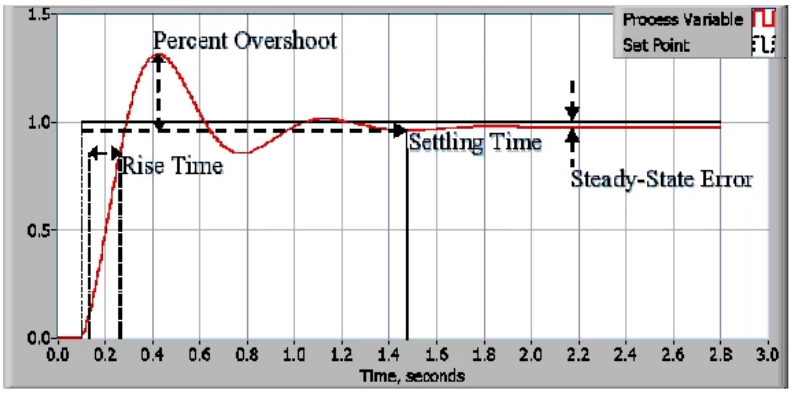
If kp is too low, it is not responsive enough to any error inputs.
If ki is too high, it would be overly sensitive to errors, and thus causing over correction.
If kd is too high the car would not really turn when it needs to,
Having a good kd value would make the car oscillate less.

Kp too high the car waves and waves like oscillations non stop.
Ki might not be as necessary though may not be the case for f1tenth.

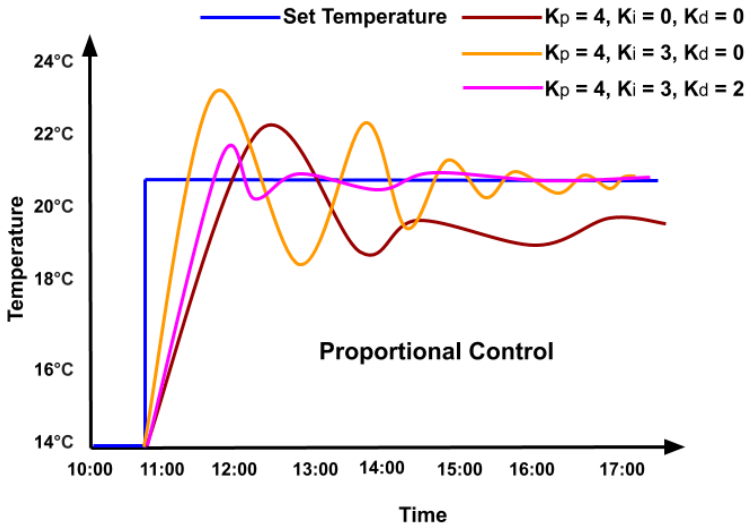
The vehicle speed does not really affect the performance as much as i expect but when the car is faster, we can see more of the pid in action and the pid seems faster acting compared to the slow moving vehicles - though i might be wrong.



Visualization of what we are trying to accomplish.




A visualization of PID.




An online reference showing the different settings and the relevant results.