Process Dynamics and Control
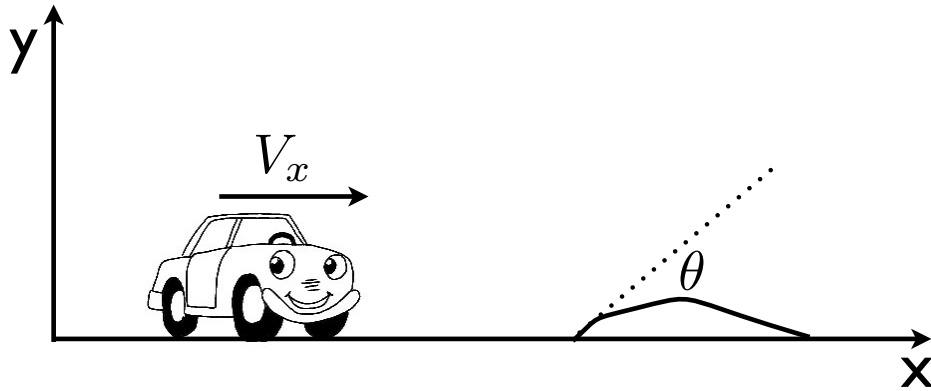CHEN 461, Spring 2013

Project Guidelines
CRUISE CONTROL

As a controls engineer, you are required to tune a cruise control system for a LEGO MIND-STORM car that is based on PID control. Like any typical cruise control system found in modern cars, this system only controls the speed of the car and not the direction. The controller you design is used to maintain the car velocity (in the face of disturbances) and make set-point changes to the car velocity by adjusting the power supplied to the car motor.

Following deliverables are required by the due date of this project:

1. ***The process model*** describing the relationship between the inputs and car velocity obtained using the step tests data provided (Step_Test_Data.xlsx).

2. ***PID tuning parameters*** that your group thinks will give the best performance during the competition.

3. ***A 10-20 page final report*** that presents (not exclusively) all the calculations and analysis your group did in order to convince yourselves that the process model and the PID parameters you obtained are most appropriate for the given objective.

The group competition will test the performance of your PID controller based on the following metrics:

1. The car's ability to maintain velocity set-point in the presence of disturbance (θ, etc). We measure this by calculating the sum of squares error between the measured velocity value and its set-point.

2. The car's ability to make *good* set-point changes in velocity. We measure this by calculating the sum of squares error between the measured velocity value and its set-point.

The above metrics will be equally weighed towards your grade in the project.