**System Identification Exercise**

In class:

Video clips 3volts\_run1.mov, 4volts\_run1.mov, 5volts\_run1.mov show the open-loop response of a DC motor-driven car to input voltages of 3, 4, and 5 volts respectively.

We can use these data to estimate parameters of a transfer function if we know the form of the transfer function. What is the form of the transfer function between linear speed and voltage of a motor-driven car? What are the (unknown) parameters of this transfer function?

Using Tracker software (<https://physlets.org/tracker/>), track a point on the car to obtain the response (position vs. time in x- and y-directions) for one of the open-loop responses. Video instructions are provided in the video Tracker\_demo\_-\_20180612\_143320\_7.mp4. Note that you should place the coordinate system at a fixed location. The granite tiles can be used to provide a length reference. One tile is 24 inches long.

Copy and paste the data into MATLAB as shown in the video instructions. Calculate the velocity in the x-direction by taking a derivative numerically. Plot vx vs. time. Estimate the transfer function parameters from the data.

For later:

Video clip Example\_step\_response\_gain4.7.mov shows the closed-loop response of the DC motor driven car to a step reference input.







