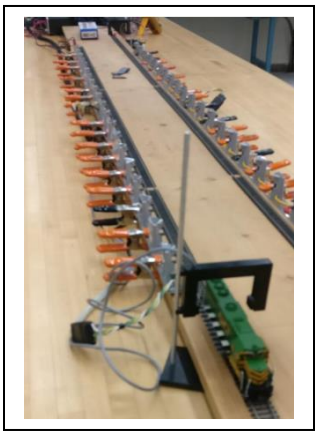
PH132 Team Design and COMPASS Labs
Experimental Activity 1: Experimental Measurements for Constant Voltage

Goal: We will collect experimental data for the velocity of a model train powered by a constant voltage source. We will organize and plot this data in a meaningful way allowing us to extract the operational parameters for a model train which can later be used to predict the train performance.

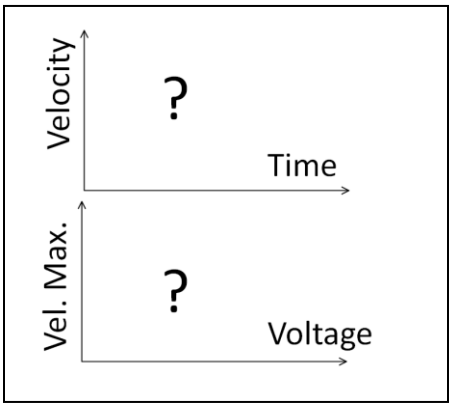
Equipment: HO Scale model train, straight level track section at least 2.0 m in length, picket fence mounted on train to be used with a series of photogates, computerized data acquisition system.



Data Collection Procedure

1) **Set up your train for collecting data as described in the Train Constant Voltage Data User Guide (available on course website)**
2) **Collect 5 trials of data for 12 volts, 10 volts, 8 volts, 6 volts and 4 volts.**
3) **Analyze and organize your data.**

Data Analysis: The specific procedure for data analysis is to be designed and built by individual groups with the aid of the instructor. Plot a) is a sample of Velocity verse Time graphs for similar data.



Format of Lab Submission

Abstract: Summary of the lab Experiment: Describe the experimental setup and include what data was collected and how it was collected

Hypothesis: Describe how you theoretically expected the system to behave prior to the experiment in terms of a rough sketch of the velocity. Specifically, sketch 1) the velocity verse time for a medium voltage, 2) the velocity verse time for a higher voltage, and 3) the maximum velocity verse voltage.

Comparison: Discuss how the actual data look compared with your hypothesis. What features of your data are similar to your prediction? What features of your data differ from your prediction?

Analysis: The data collected in this lab will be used to predict the performance of your train when it is powered by a time dependent voltage source. Specifically, we will look at both the steady state velocity (once the train has reached a constant velocity) and the transient velocity (changing or speeding up). How did you select a cutoff for considering the "steady state" region?

Future Work: How could you adjust your experiment to learn more about how the train functions for different voltage profiles?