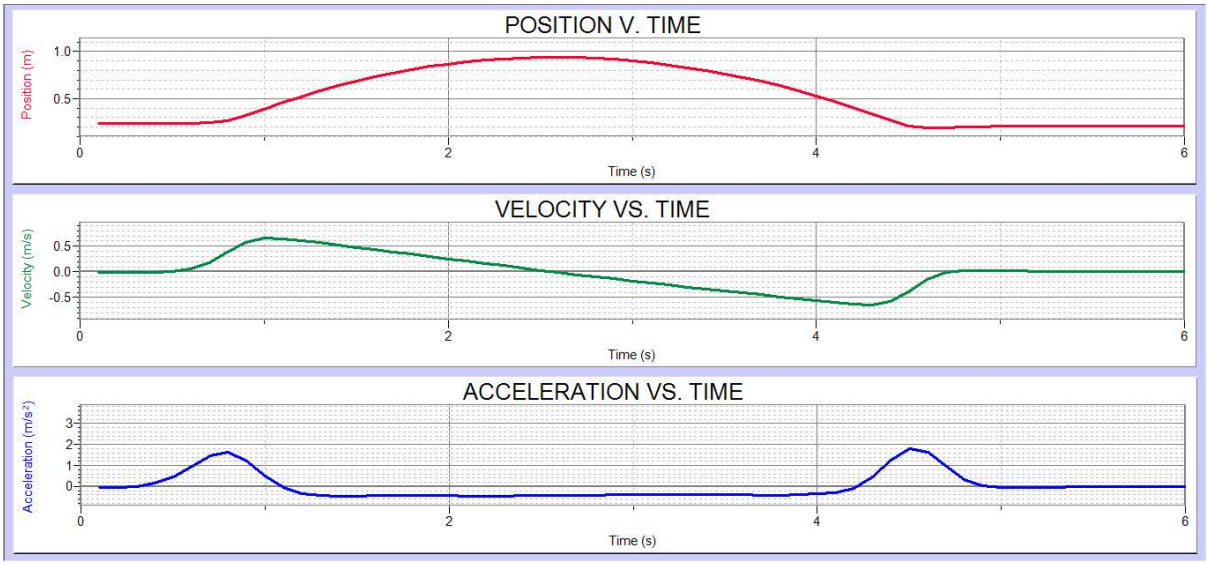
Energy of a Cart on a Ramp – Interactive Lecture Demonstration

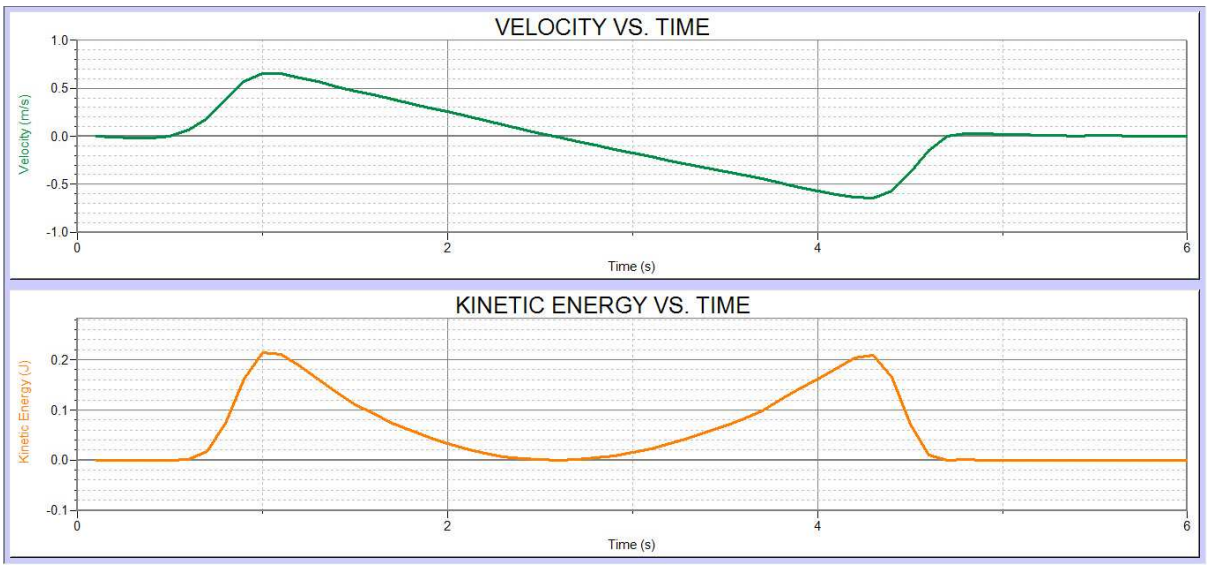
Demo 1:

Here are the curves for position versus time, velocity versus time, and acceleration versus time for the case of little friction between cart and track.



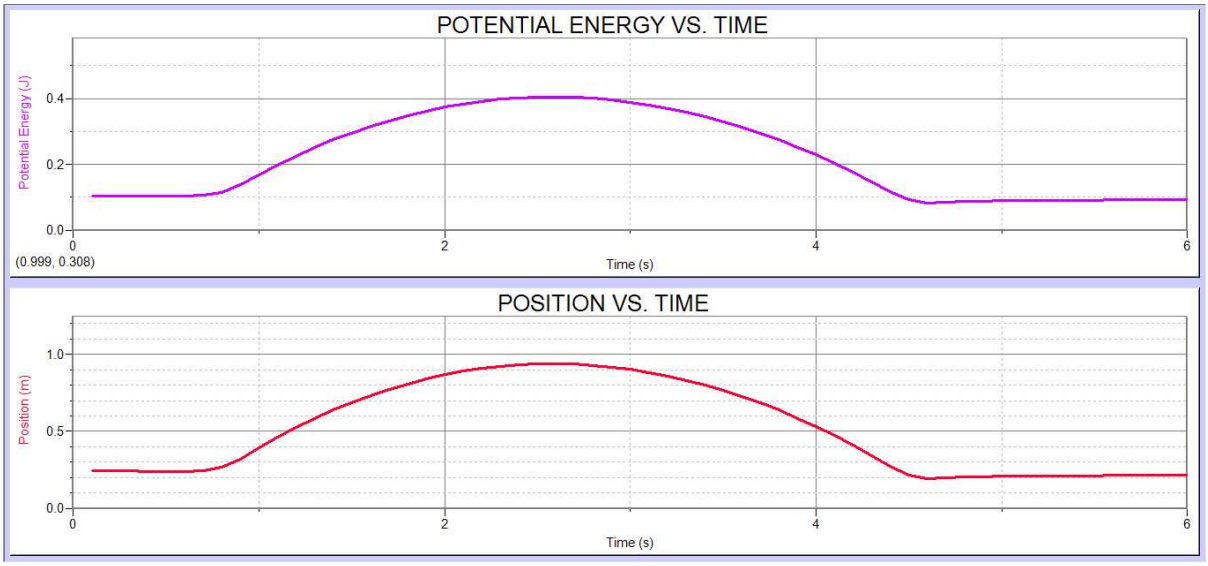
Demo 2:

Here is the curve for kinetic energy versus time for the case of little friction between cart and track. The velocity versus time curve from Demo 1 is also shown.



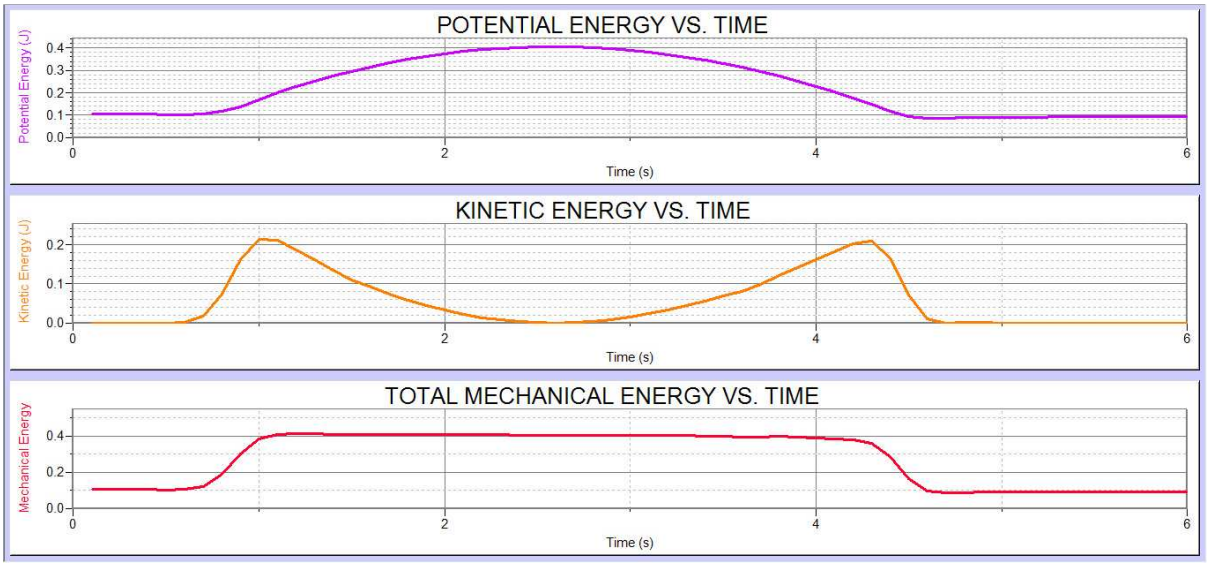
Demo 3:

Here is the curve for potential energy versus time for the case of little friction between cart and track. The position versus time curve from Demo 1 is also shown.



Demo 4:

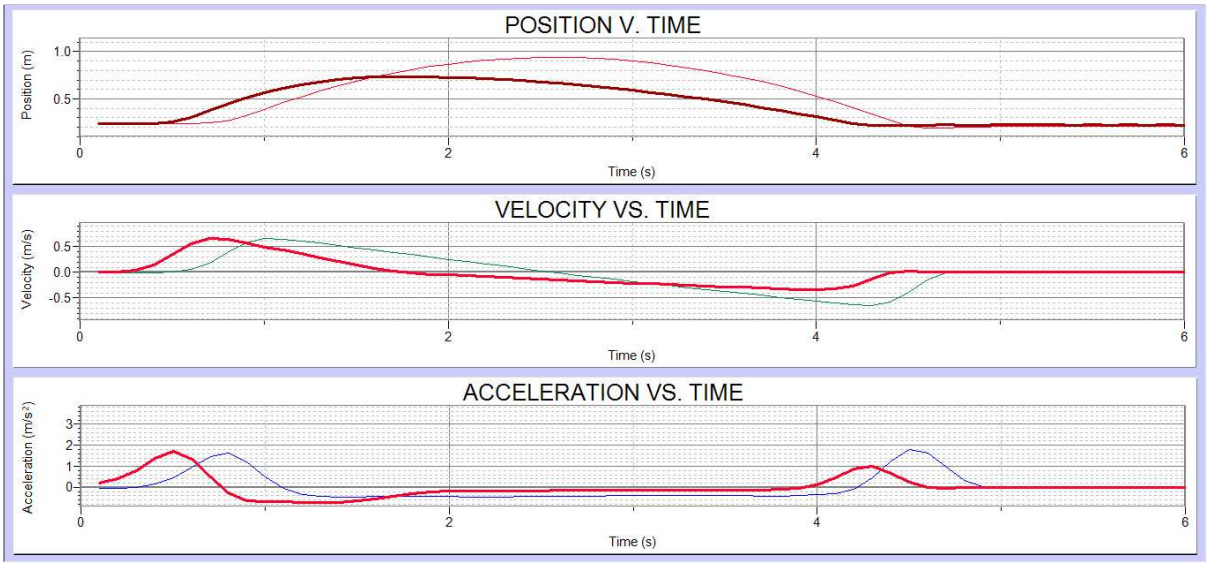
Here is the curve for mechanical energy versus time for the case of little friction between cart and track. The kinetic energy versus time curve from Demo 2 and the potential energy versus time curve from Demo 3 are also shown.



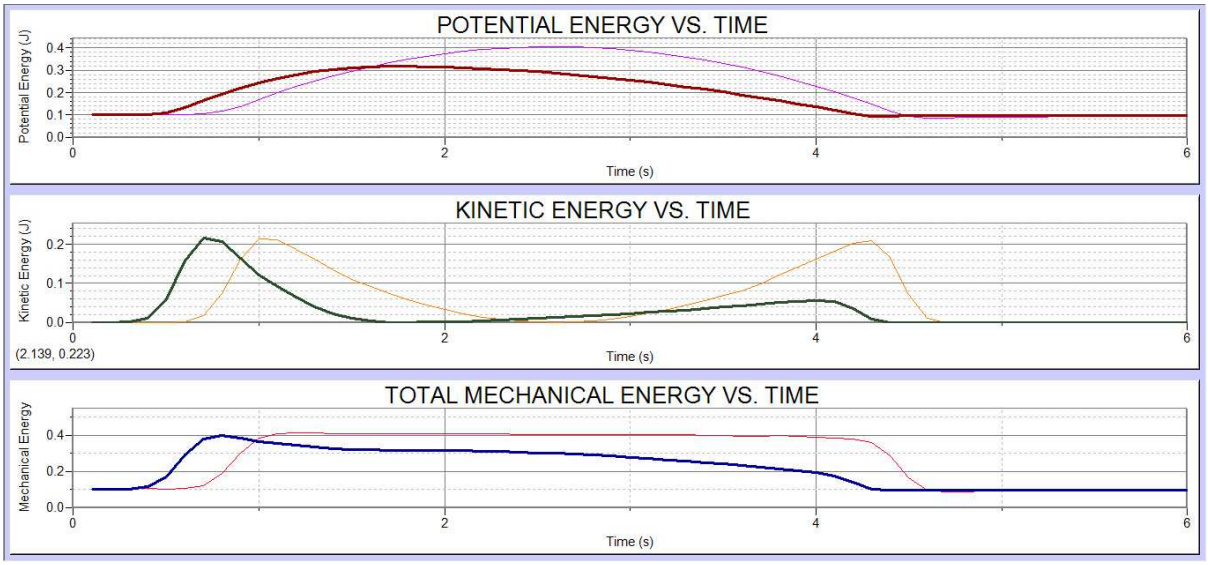
Note that the potential energy is not zero before and after the push. This is simply because, contrary to what it says is the reference level for zero potential energy on the sheet (the height at which the cart is released), in the demo it has actually been defined to be zero at the height of the motion detector, which is a little lower.

Demo 5:

Here are the two sets of curves for position versus time, velocity versus time, and acceleration versus time for the cases (a) little friction between cart and track (thin red, thin green and thin blue curves, Demo 1), and (b) large friction between cart and track (thick red curves, this Demo).



Here are the two sets of curves for potential energy versus time, kinetic energy versus time and mechanical energy versus time for the cases (a) little friction between cart and track (thin purple, thin orange and thin red curves, Demos 1-4), and (b) large friction between cart and track (thick red, thick green and thick blue curves, Demo 5).



These plots are the ones obtained in the Monday afternoon stream ILD.