1116-VC-1657 **Emese Kennedy*** (ekennedy@muhlenberg.edu). *A Modified Energy Based Swing-up Controller for an Inverted Pendulum on a Cart.*

The single inverted pendulum (SIP) system is a classic example of a nonlinear under-actuated system. Despite its simple structure, it is among the most difficult systems to control and is considered as one of the most popular benchmarks of nonlinear control theory. The most common and efficient method for the swing-up of the pendulum uses an energy based approach that was originally proposed in 1996 by Astrom and Furuta for the swing-up of a rotary pendulum. Later, the controller was modified and implemented on a cart pendulum system taking the finite length of the track into account. However, most of the existing swing-up controllers are based on a simplified model for the SIP system, and the effects of friction are frequently disregarded. In this talk, we present a new energy-based controller for the swing-up of an inverted pendulum on a cart. The controller was derived using a more complex dynamical model for the SIP system. We also consider the effects of viscous damping, and incorporate physical restrictions like the maximum deliverable voltage by the amplifier, the capacity of the DC motor that drives the cart, and the finite track length. (Received September 21, 2015)