ME2400 Measurement Instrumentation and Control (Jan-May 2019)
Assignment 04 (Submission due date: April 05th in class)

This is a group assignment. All group members are expected to discuss and do the problems together. All work must be original and should not be copied from other groups or from the internet or any other sources. *If copied codes are found, all the group members (both the group who shared and the group that copied) will be reported to the IIT Madras disciplinary committee for further action. Please refer to Circular No.6E/JN2019/B2/2019, dated 01.02.2019, from deputy Registrar, Courses.*

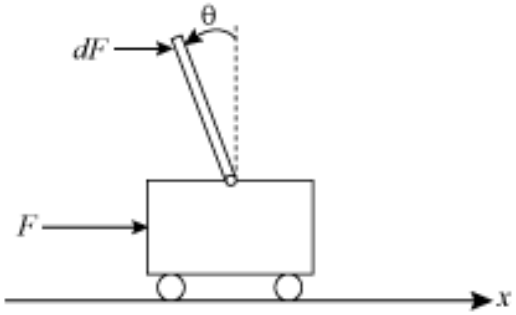

Figure 1. Inverted pendulum cart (source: in.mathworks.com)

An inverted pendulum on a cart (see Figure 1) is to be simulated and controlled using PID control in Simscape/Simulink. You may choose suitable dimensions and mass for the various components.

1. Develop the mechanical model of the inverted pendulum and cart in Simscape and show the visualized system. Given a small force F, the cart should move and so should the pendulum. Please demonstrate this clearly in a video. Show all the Simscape/Simulunk blocks and various parameters clearly in a connected diagram.

2. (OPTIONAL) Attach a PID control and show control (i.e. the pendulum should continue to stand upright) of the pendulum subject to external disturbances. This control should be demonstrated in the form of a movie/video as shown in the reference. Show all the Simscape/Simulink blocks and various parameters used clearly in a connected diagram.

Note: Your project system should also be modeled similarly in Simscape/Simulink. This should be part of your project submission.

Reference:
https://in.mathworks.com/help/control/examples/control-of-an-inverted-pendulum-on-a-cart.html