Indian Institute of Technology Guwahati
Center for Intelligent Cyberphysical systems

Control Engineering for Robotics (RA-602)

Term Project For Control Engineering for robotics
Submission Date:6/04/23 by 5 p.m

Set-12 Even Semester

1. Consider an inverted pendulum on a moving platform, assuming $M = 2$ kg, $m = 0.5$ kg, $l = 1$ m.

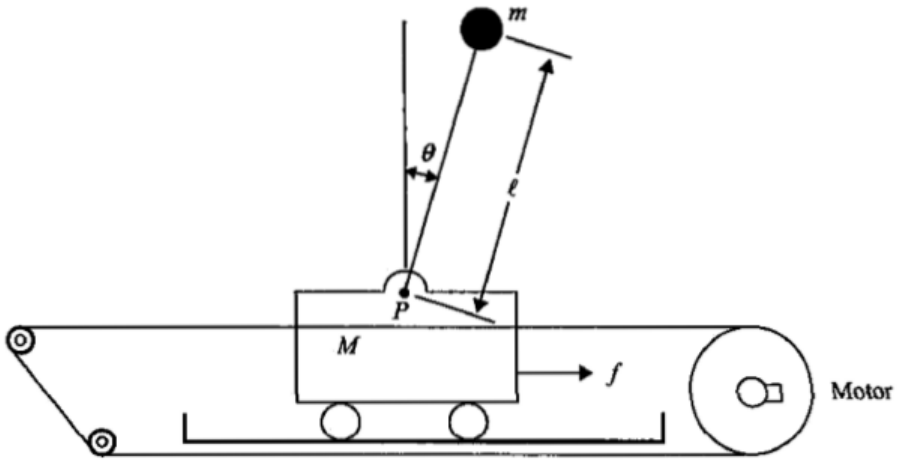

Figure 1: Inverted Pendulum system

a) Find the state-space model of the system in MATLAB if
$x_1 = \theta, x_2 = \dot{\theta}, x_3 = x, x_4 = \dot{x}, y_1 = x_1 = \theta$ and $y_2 = x_3 = x$
b) Write down system transfer function in MATLAB.
c) Design a state feedback control with gain -K so that the closed-loop poles are located at $s = -8 + 8j, s = -8 - 8j, s = 420, s = 420$
d) Check Controllability and Observability of the system in MATLAB
e) Use MATLAB to plot the step response of the system.Show simulink model