State Space Equation (Problem)
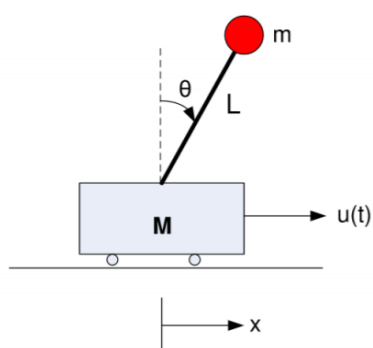
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1 Inverted Cart Pendulum

Figure 1: Inverted Cart Pendulum

Consider a Cart Pendulum system. It is a horizontally moving cart with an inverted pendulum attached to it on the top. Here a inverted pendulum is pivoted to cart of mass M and input force to the cart is $u(t)$,where mass of the pendulum bob is m will length L, if the pendulum make a angle θ with the vertical then find out the state variables for the system and them derive the state space equations and output equations of this system.