FL. 2018 ESE 447.02 Robotics Lab

Lab Journal 16

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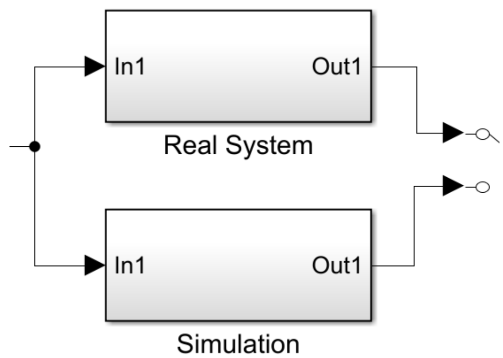
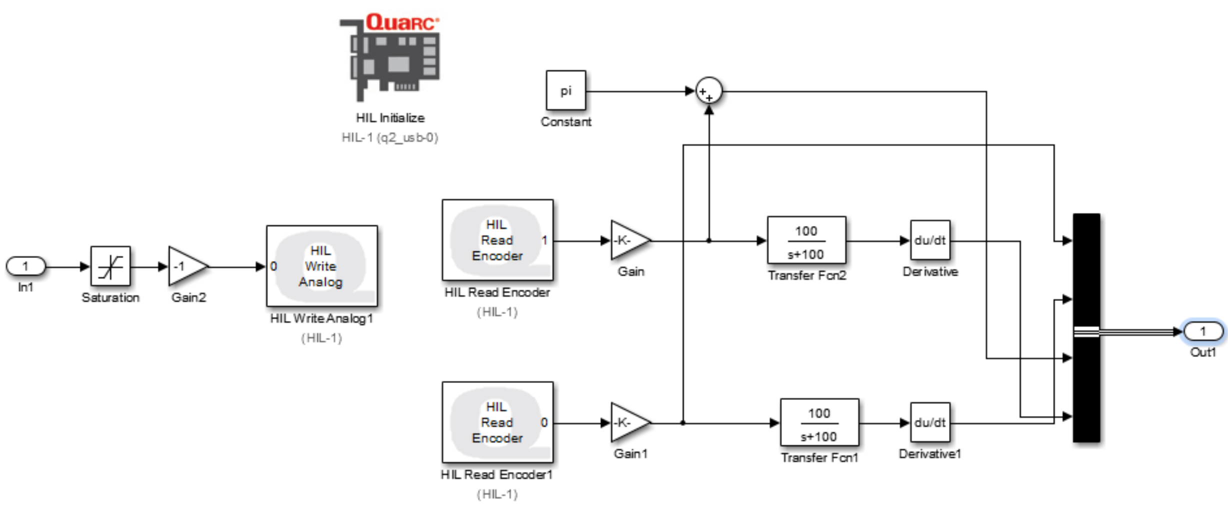
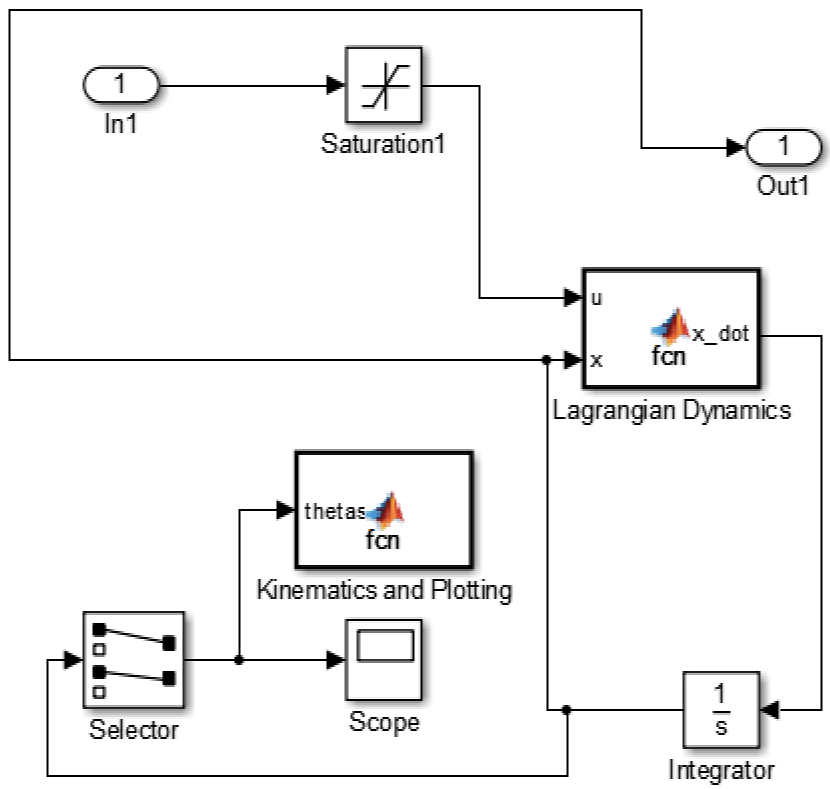
1. Create subsystems for the real and simulated system.
   As needed, we wanted to implement the control system for both the real and simulated systems, and a good way is to put these two systems into subsystems so that we could switch between these two subsystems. Drag the subsystem block onto the canvas and double click into the block, a new canvas would be shown where the user can build the subsystem. There were input and output terminals in the subsystem so that the subsystem can connect with the major system.



In the real system, the input is just whatever signal we got after the multi-switch block. The input acts as the voltage given to the motor. The output of the real system is just the vector containing the state variables q1, q1_dot, q2 and q2_dot. The model of the real system is shown below.



In the simulated system, the input is the virtual voltage given to the dynamics function. Since the dynamics function contains all the virtual parameters for the system, such as the mass, inertia and gravity, etc. all the math in the function would act as a physical engine and generate a set of parameters for the simulated system.



The Kinematics and Plotting function is used to visualize the simulated system in animation. It uses the transformation matrices to map the links onto the world frame and plot the links over time, thus creating the animation of the system. The simulated system acted similar to the real system.