

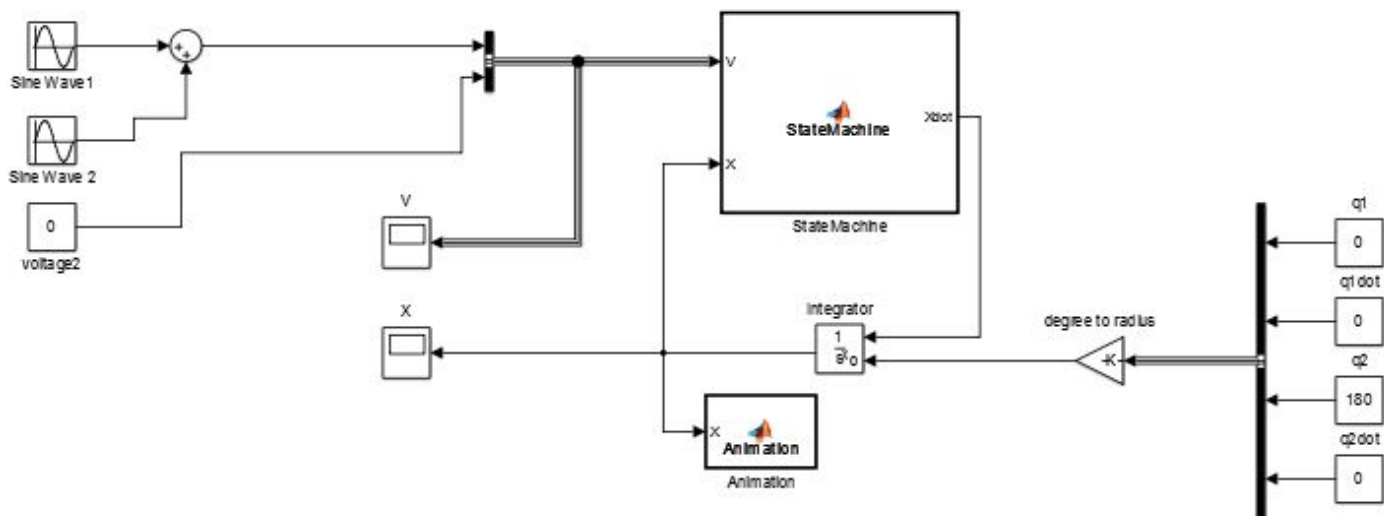
1. Items done this session:

In this session, we begin with double checking with different initial parameters and voltage in simulation to collect data. Then we realized that our result of Thetas close to pre-calculated Thetas last week was just by chance and doesn't work very well in this time. We got even negative numerical value in some of the Thetas this time.

Then we'd borrowed collected data of simulation from other group to feed into our calc_thetas.m in order to narrow down our bugs. It turn out our calc_thetas.m was correct, and that means our simulation part has a problem.

After figuring out simulation's bug, which is some mistaken equation for M and C matrix, the collected data from simulation generates more reasonably close Thetas than previous did.

The graph below is the final version of simulation model we have, starting with zeros angles of link1, 180 degree pointing down angle for link2 and both zero initial speed.

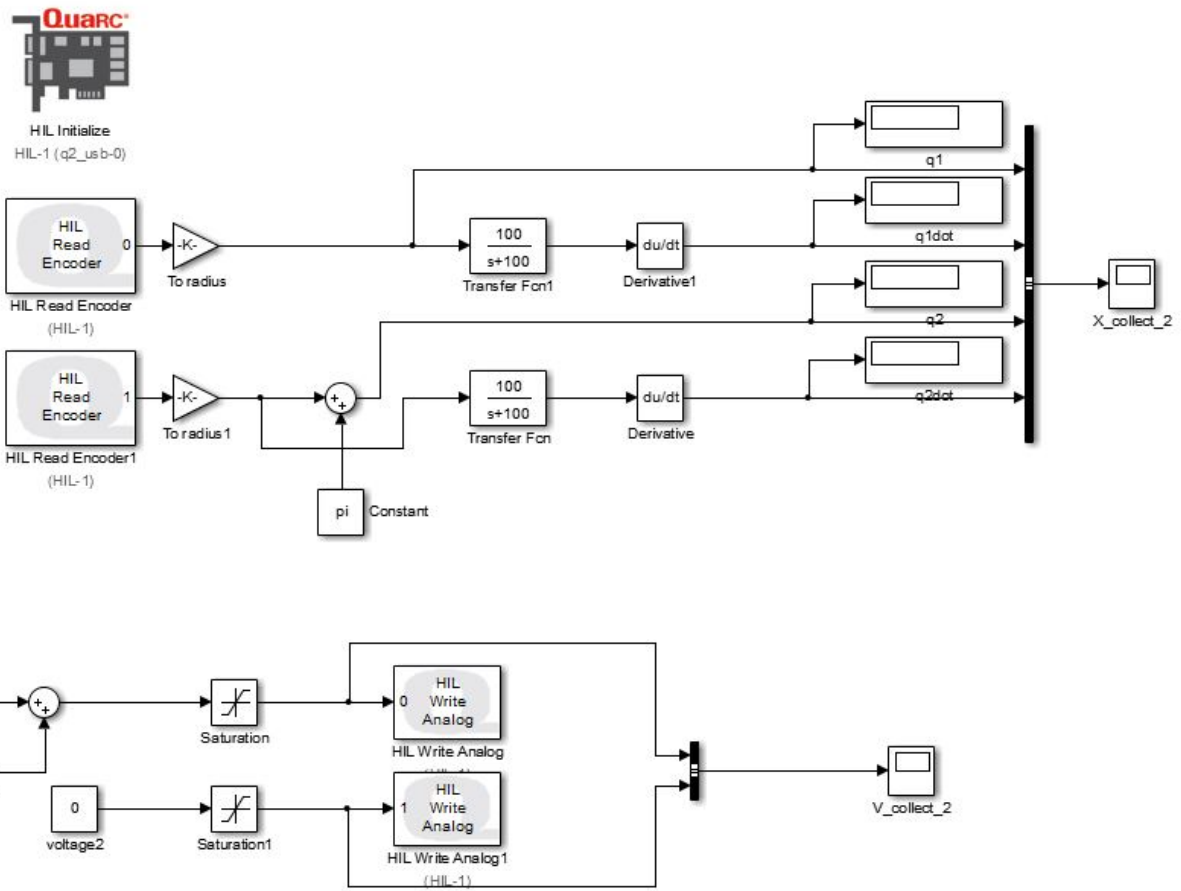


The last part, we built another simulink model to create the same parameters as in the simulation and collect data from encoder of the real world robot.

In this part, firstly we use single sine wave with 10 amplitude and 10 frequency as voltage1 input and the Thetas calculation result is not very well fit to the pre-calculated Thetas.

So we changed the voltage input into combination of two sine wave, one with 3 amplitude and 3 frequency and the other 7 for both amplitude and frequency.

The graph below is the final version of our collect from real-world model. This model feed combination input voltage to writer and recored the voltage with time table. And the model also read the angles from read encoder, converting into radius and filter out rapid impulse to avoid infinite derivative value, then record down $X = [q1, q1\dot, q2, q2\dot]$ into workspace.



After collecting X, V and time from robot, the Thetas was pretty close to those calculated from simulation data.

2. Items for next session:

Double check the result of today's lab, if no other concern then move on the next lab assignment.