Experiment no 3 for EE324: Control Systems Lab

Stabilization of an Inverted pendulum in the upright position:

Targets:

a) To design and implement control action for maintaining a pendulum in the upright position (even when subjected to external disturbances) through LQR technique in Arduino Mega.

b) To restrict the pendulum vibration within ±3 degrees and base angle oscillation within ±30 degrees.

Read the Inverted pendulum manual to familiarize yourself with the equipment. The parameter values are given in the manual, use them to calculate the elements of the state space matrices (A, B, C and D).

Using these matrices, run the LQR program in MATLAB and get the gain values (K1, K2, K3 and K4) by tuning the Q matrix.

Use them, along with the state variables to realize the control input to the motor.

The datasheets for the encoder and decoder are also provided; you can use them to identify the port connections (refer Circuit_Diagram.jpg image), which will be required for coding purposes.

Sample Arduino code for reading the encoder values will be provided.