Multidisciplinary
Engineering Technology
COLLEGE OF ENGINEERING

MXET 375 Applied Dynamic Systems

Spring 2024

Final Project Description

Dr. Mohamed Gharib
Multidisciplinary Engineering Technology
Engineering Technology and Industrial Distribution

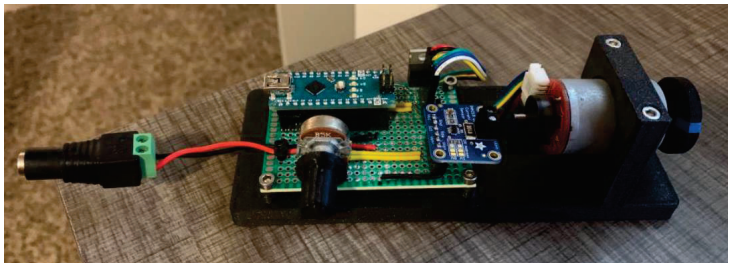
Project Requirements - Standard Track

- Dynamic Model, Simulation, Prototype, Experiment Result
- Team consists of 3 students. **MUST** be in the same lab session.
- A 10-minute presentation video should be submitted. Upload slides (in **PPTX** format) on Canvas. One team member only needs to upload one submission.
- The presentation should give the subject to work on, detailed plans, distribution of work among team members, timeline, and outcome at the demo. Use the provided **Proposal Template** (do not change the format, font type, or font size).
- The final grade will be based on the complexity of the system, modeling accuracy, depth of analysis, Quality of the demo, and final report.

Project Description

Step 1: (in case of motorized system)

- Build a DC motor setup similar to what is used in Lab 7 (with 1 motor, driver and necessary sensors). The figures is an example, but it is not necessary to be exactly the same.
- You don't need the potentiometer and other accessory components. As long as you setup can achieve motor control and measurement of key variables (speed, inputs).

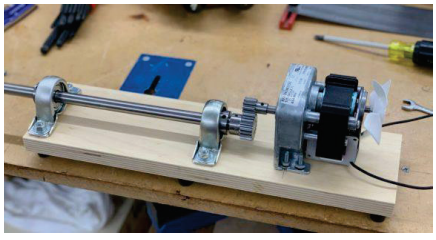


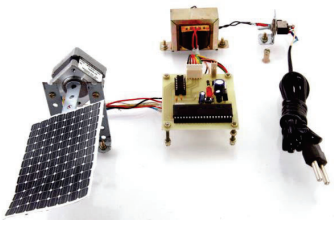
MXET 375 Applied Dynamic Systems

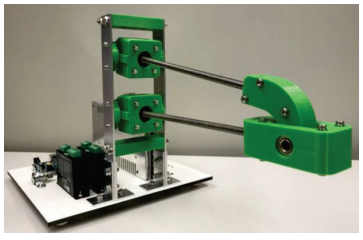
Project Description

Step 2:

- Add additional components to the motor so you can build an extended setup based on the basic motor modules.
- Examples can be adding shaft and bearings to the motor, adding a turbine to the motor, or adding wheels to the motor, 3D printed components, etc.
- You can be as creative as what you would like to add..



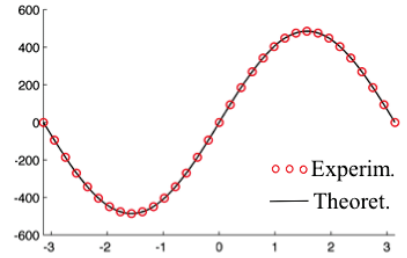


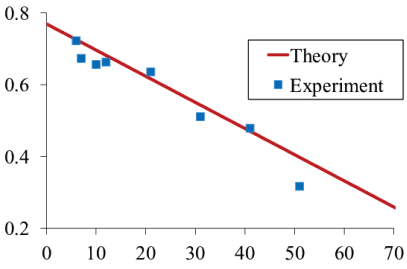


Project Description

Step 3:

- For the overall system built, measure the key state variables trajectories (such as motor rotational speed, input voltage) profile with respect to time with real-time sensors (velocity sensors, etc).
- Then, model the dynamic system using Simulink.
- Calibrate the model parameters using the parameters estimation toolbox in Simulink.
- Compare and match the hardware measurement with the simulated dynamical results.



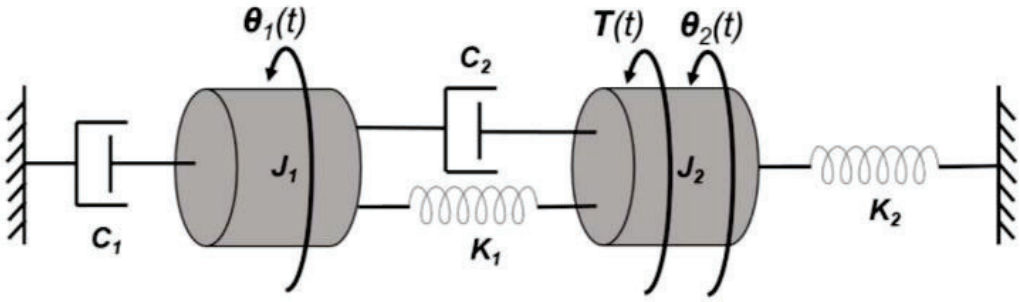


MXET 375 Applied Dynamic Systems

Project Deliverables

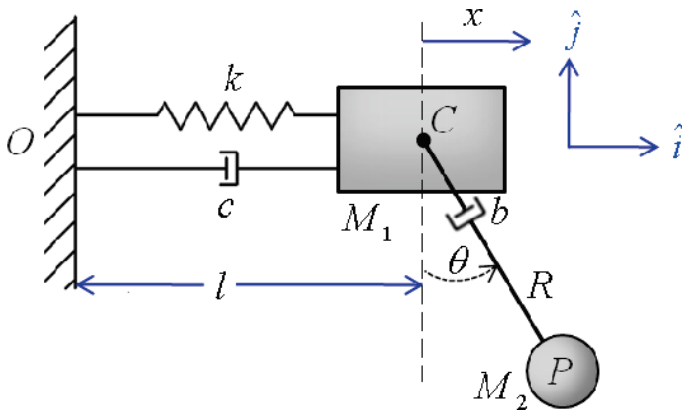
- Project Proposal (10 points)
- Project Progress (40 points – Goes to Lab Grades)
- Project Presentation/Demo (50 points)
- Peer Review Evaluation (20 points)
- File/Folder Delivery & Organization (10 points)
- Project Report (100 points)

Target System 1: 2 DOF Torsional System



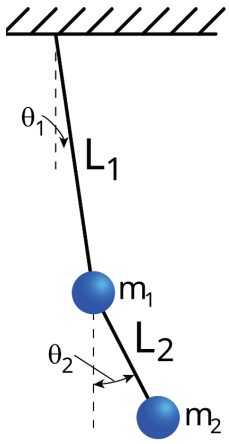
Difficulty Level: Low

Target System 2: Mass Pendulum System



Difficulty Level: Low

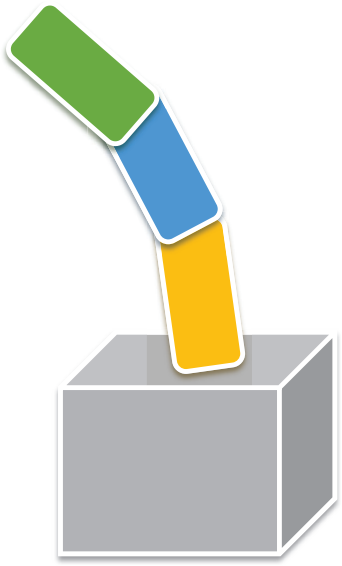
Target System 3: Double Pendulum

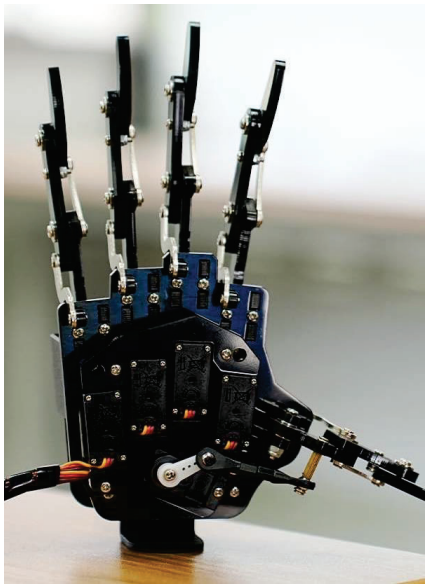


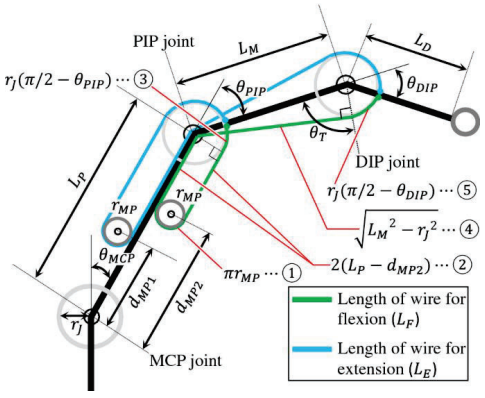
Difficulty Level: Medium

Video Link: https://www.youtube.com/watch?v=4xViPStT5II

Target System 4: Robotics Finger







Difficulty Level: High

Example: https://mdesigns.space/projects/compact-bionic-hand