

Compact Robot Arm Design and Control

Status:	Filled
Group Members:	Manson To, Enerson Cervantes, Ren Shi, Gabriel Chiu
Sponsor(s):	Self-funded project
Supervisor(s):	Farid Golnaraghi, PhD, P.Eng. Professor, Mechatronic Systems Engineering Mohammad Narimani, PhD, P. Eng. Lecturer, Mechatronic Systems Engineering Amr Marzouk, PhD, P. Eng. Lecturer, Mechatronic Systems Engineering

Project Description

Most undergraduate control courses have labs dealing with the time response and control of DC motors—namely, speed response, position response, speed control, and position control. In many cases, because of the high cost of control lab equipment, student exposure to test equipment is limited, which includes

three classes of experiments: finding the physical values of the control parameters, verifying the model using speed and position responses, and finally, using the developed model for a position control project.

The goal is to arrive at a miniature modular experimental testbed (similar to Lego) using an inexpensive motor, sensors, and other components for the user to conduct speed and position control as well as a pick-and place application. The testbed is intended to be used in MSE labs in multiple courses.

Constraints and requirements:

- The overall system should have a small footprint
- The overall cost of the unit and its components should not exceed \$200
- The system must communicate with a PC and MATLAB

These experiments are intended to supplement or replace the students' experimental exposure in a traditional undergraduate control course. The specific goals in this project are:

- To provide an in-depth practical discussion of DC motor speed response, position response, and position control concepts.
- To provide examples on how to identify the parameters of a physical system experimentally.
- To give a better feel for controller design through realistic examples.