AIN SHAMS UNIVERSITY
FACULTY OF ENGINEERING
MECHATRONICS ENGINEERING DEPARTMENT
Credit Hours Programs

Fall, 2023

MCT 343: Introduction to Bio Mechatronics

Project: Prosthetic Finger

- Project Description:

This Project aims to integrate electromyography (EMG) signal acquisition and usage for control over a simple prosthetic finger. The EMG signals should be amplified and filtered to be suitable for the microcontroller ADC range. The microcontroller is used to control the actuator responsible for the motion of the hand or fingers. The project provides a feasible approach to EMG control over the prosthetic hand using threshold-based control that changes the state of the hand from one gesture control to the other. Check this video showing a commercial prosthetic hand and how it is controlled: A not so official introduction of OHand - YouTube

- Project Minimum Requirements:
  - A single EMG channel to be used in the control of the hand.
  - The mechanical design of the finger should be based on rigid mechanical structures to move the finger links, and not dependent on a wire or cable mechanism.
  - A minimum of 1 Actuated DOFs in the prosthetic finger.
  - A minimum of 2 EMG controllers is required: Proportional Control, and Sequential Control.
  - The prosthetic Finger prototype should be running from an embedded system development board and not Laptops or PCs.
- Project Bonus Points:
  - Apply Machine Learning in pattern recognition instead of threshold-based control.

Note: Teams of more than 5 members should implement the bonus point as a mandatory requirement

- Progress Checkpoints:
  - Progress (30% on LAB#4): Present system architecture to be followed, EMG acquisition and processing circuit design, and mechanical design CAD assembly.
  - Submission (70% on LAB#6): Final Submission of the Project Deliverables shown below.
- Project Deliverables:
  - Technical Report showing the system architecture, mechanical design, electrical design, and implementation of the prosthetic hand system.
  - Video Submission (5 minutes max) showing the prototype demo and presenting features.
  - Working Prototype of the prosthetic hand on the submission day.