Human-Machine Interfacing for Myoelectric Prosthetics

Hosted by: Imperial College London (ICL) – Patrick Sagastegui Alva, Jumpei Kashiwakura

In this workshop, we will introduce techniques for surface EMG recordings to estimate the neural signal sent to muscles from the output layer of the spinal cord circuitries. Specifically, we will present methods for multi-channel EMG acquisition and their applications in neurorehabilitation, such as in prosthetics and neurofeedback. Students will be engaged in recording and processing EMG signals using instruments and tools provided by the organizers. They will learn to extract features from the EMG signals and train an algorithm to control a virtual cursor on the screen or a prosthetic hand.

Relevant populations: Transradial amputees, prosthesis, and orthosis users
Techniques involved: MATLAB, Signal processing, Bipolar EMG
Workshop duration: Half day (3.5h)

REQUIREMENTS:
- Matlab 2021 or latest.
- Download in advance material (Content available before workshop date):
  https://github.com/pat352/ICNR2024

CONTENT:

		Concept	Description	Speaker/ Facilitator
1h	5 min	Demo	Demo of prosthetic control with EMG	Patrick SA
	30 min	Lecture	Introduction to workshop project and EMG acquisition systems - Myocontrol pipeline - Interfacing with the nervous system - Fundamental signals for motor control - Peripheral interfacing - Data driven control - Intelligent prosthesis	Patrick SA
	15 min	Project overview	Project structure and task overview	Patrick SA
2h	30 min	Task 1	Implementation of feature extraction	Patrick SA and Jumpei K
	30 min	Task 2	Implementation of algorithm training	Patrick SA and Jumpei K
3h	30 min	Task 3	Testing algorithm	Patrick SA and Jumpei K
	15 min	Wrap up	Checking progress and solution	Patrick SA and Jumpei K
	15 min	Demo	Demo of prosthetic control with EMG	Patrick SA
	30 min	Wrap-up	Discussions & questions	Patrick SA and Jumpei K