PhD Position @Translational Neural Engineering (TNE) Lab

Sensorimotor mechanisms of neuroprosthetic control

EPFL, Campus Biotech, Geneva
Deadline: 1st Nov. 2024
Start: Feb. 2025, 4 years

Background: how can we build prostheses that move and feel like our own limbs? Despite the advancement of neural decoding and movement implementation technologies, current neuroprostheses are still far from allowing natural sensorimotor integration and motor control. The TNE lab aims bridging this gap by developing novel technologies to restore sensory and motor function, such as "bidirectional" hand prostheses, which restore sensory feedback through intraneural stimulation (e.g. [1]).

Project: Dr. Tommaso Bertoni has been awarded an SNSF Ambizione grant to join the TNE lab as a junior PI and start a research group with one PhD student. The project, at the interface between cognitive neuroscience and neural engineering, will investigate the sensorimotor integration mechanisms underlying motor control in neuroprostheses users, as well as the cognitive aspects of feeling in control and "embodying" the prosthesis. We will use state of the art magnetoencephalography and data analysis techniques to pinpoint the neural dynamics of motor control in healthy individuals, and directly apply such knowledge to enhance motor control and acceptance in neuroprostheses users enrolled in TNE projects. We will work with amputees using bidirectional hand protheses, and tetraplegic individuals using EEG-based and implanted brain-machine interfaces coupled with electrical muscular stimulation to regain control of their upper limb. The project is scheduled to start in February 2025 and last for four years. Dr. Bertoni will provide direct guidance, and Prof. Silvestro Micera, head of the TNE lab, will be the mentor and official supervisor of the PhD student.

Candidate: the ideal candidate should hold a master's degree in biomedical engineering, physics, neuroscience, biology or similar disciplines. Expertise in signal processing, electrophysiology and sensorimotor processing would be a big added value. Due to the multidisciplinary nature of the project, the candidate should be curious and motivated to develop a broad set of skills spanning from advanced data analysis to cognitive neuroscience. She/he will have to be able to work autonomously as well as in synergy with the PI, openly exchanging ideas and participating in all aspects of the research project from experimental design to data collection, analysis and scientific writing.

Contact: if you find the project exciting and think you are the right person, you are invited to apply through the EPFL PhD program in Neuroscience (deadline on November 1st, 2024, see https://www.epfl.ch/education/phd/edne-neuroscience/edne-how-to-apply/). Before applying, you are warmly encouraged to contact Dr. Bertoni (tommaso.bertoni90 [at] gmail.com) with a CV and a short self-presentation to establish a first contact and exchange more about the project.

[1] Raspopovic S *et al.* Restoring natural sensory feedback in real-time bidirectional hand prostheses. Sci Transl Med. 2014 Feb 5;6(222):222ra19. doi: 10.1126/scitranslmed.3006820. PMID: 24500407.