PhD studentship in Brain-Computer Interfaces:

Feasibility and development of a brain-computer interface to support clinical and self-management of spasticity

Duration of studentship: 3 years

Stipend: A stipend of £18,700 per annum (tax free) subject to nationality and residence status.

Vacancy Information:

We are advertising a 3-year PhD studentship with stipend and fees, funded by the Leslie Fund Trust. This is part of an ongoing research project called RESPONSE: Rehabilitation Technologies Supporting Clinical and Self-management of Spasticity. The student will be registered with UCL and join a team of researchers at the Centre for Rehabilitation Engineering and Assistive Technology (CREATE) and London Spinal Cord Injury Centre (LSCIC), Royal National Orthopaedic Hospital (RNOH). The studentship will be based at the UCL/RNOH Stanmore campus.

Studentship Description:

Spasticity is a disorder that affects people with various types of neurological pathology including spinal cord injury, stroke and multiple sclerosis. It is caused by an imbalance of signals from the central nervous system (brain and spinal cord) to the muscles, which results in tight or stiff muscles and reduced muscle control. If left untreated, spasticity can have devastating effects on the individual, giving rise to several issues such as pain, spasms, deformity, and limb contracture. This considerably decreases their quality of life, affecting mobility, function, dexterity, and care needs.

The usual care pathway for spasticity includes medication and corrective devices such as orthoses. However many patients are unable to tolerate these treatments for long periods. Other workpackages in the RESPONSE project will investigate alternative techniques, such as neuromodulation and robot-assisted sensorimotor interventions. However, determining how and when to initiate these alternative interventions is not a trivial problem.

Therefore, this PhD study will explore the relationship between the brain and muscle activity for volitional and non-volitional movements. Using this information the study will go on to develop a hybrid brain-computer interface (hBCI) that will continuously measure the user’s brain and muscle activity to determine when one of these alternative interventions should be triggered (started/stopped). The student will make use of our existing electrophysiological recording equipment (g.Tec and/or TMSI) and will focus on the software, signal-processing and classifier development. The PhD will involve experiments with human participants throughout and will culminate in a series of case studies with spinal cord injured patients to evaluate the feasibility of using such a system in clinical practice.

We are looking for a student who can undertake not only the technical aspects of the brain-computer interface development, but who also has an interest in the translation of technology to the patient group. The student will work closely with a clinical scientist or physiotherapist whilst with patients, but must have good interpersonal and communication skills, with a desire to work in a clinical setting. Previous experience of brain-computer interfaces is not essential but evidence of previous work with human participants would be desirable.
Person Specification:

Essentials:
- Bachelor degree in Engineering or Physics discipline, or equivalent professional experience
- Interest in brain-computer interfaces, electrophysiological signal processing and machine learning.
- Programming experience (any language)
- Analytical skills: ability to interpret data, knowledge of statistics and ability to think independently
- Strong verbal and written communication skills, both in plain English for dialogue with patients (see http://www.plainenglish.co.uk/), and scientific language for communication with medical and academic staff, publication in relevant journals and presentation at conferences.

Desirable:
- Experience of clinical research and/or experiments with human participants
- Experience of brain-computer interface design, implementation and/or experimentation
- Experience of electrophysiological signal acquisition and/or processing
- Experience of machine learning techniques
- Proficiency in MATLAB, C++ and/or Python.
- Basic electronics skills (e.g. soldering, simple circuit design/build/test, microcontroller programming etc.)
- Knowledge of Neuroscience
- Flexible, able to work collaboratively
- A strong team player with good interpersonal skills able to build and sustain effective working relationships with both the CREATE team and the LSCIC team
- Self-motivated researcher, with a hands-on approach, willing to develop their technical and analytical skills and contribute to the overall aims of the research project in innovative ways
- Proven organisational skills

Eligibility: The studentship covers the fees for UK/EU students only. Additional fees may be required for students applying who do not fulfill UCL’s criteria to be considered a home student. Please check the UCL website for full criteria at http://www.ucl.ac.uk/current-students/money/fees-support/fee_status_proc.

Application: To make an application please submit a 2-page CV with a cover letter, explaining your interests, engineering and research experience (including examples of previous project work) to Dr Tom Carlson t.carlson@ucl.ac.uk. Please use the subject: “RESPONSS BCI PhD Studentship”

Contact names: Dr Tom Carlson t.carlson@ucl.ac.uk
- Dr Anne Vanhoestenberghe a.vanhoest@ucl.ac.uk
- Dr Lynsey Duffell l.duffell@ucl.ac.uk

Application Closing Date: Sunday 2nd July 2017

Interview Date: Tuesday 25th July 2017. Interviews will be conducted either in person at the RNOH (UCL Stanmore campus), or via Skype.

Studentship Start Date: Monday 2nd October 2017

Please note that we can only guarantee to contact the shortlisted candidates.