Post-doc Position

TinyBrains project

MULTIMODAL (fNIRS-EEG) ANALYSIS OF BRAIN FUNCTION

University of Picardie Jules Verne
Amiens (North of Paris), France

The Research Group on Multimodal Analysis of Brain Function (GRAMFC, Inserm UMRS 1105) is an internationally renowned research laboratory located at the University Hospital of Amiens and the medical school of Picardy University, with access to a wide range of experimental facilities - including two research-dedicated high resolution EEG systems (equipped for both 64 and 128 channel recordings), four Near Infrared Spectroscopy (NIRS) instruments (frequency domain, and continuous wave systems) for functional imaging of human brain. Our group focuses on functional brain development and the cognitive deficits associated with neurological disorders in children of all age groups, from premature infants to adolescents with an emphasis on early language and attention brain development and the effects of epilepsy on cognitive development. We work in collaboration with other research groups from University of Montreal (Canada), ICFO research institute (Spain), University of Illinois (USA), and Neurospin (France).

Project

Hypoxic-ischemia is a brain dysfunction that occurs when the brain doesn't receive enough oxygen or blood flow for some time. It plays a major role in more than 50% of the cases of neonatal and infant encephalopathy, first in newborns and later in infants. While researchers know of its importance, it is still unclear to what extent and when it can occur. Determining the duration, severity and particular moment of occurrence of hypoxic-ischemia is very important. We will address this by focusing on a condition known as congenital heart defects (CHD), which are the most common birth defects. TinyBrains is a multi-disciplinary and collaborative 4-year project, funded by the European Union, with six institutions in three different countries. TinyBrains (https://tinybrains.eu/) will:

- Build a novel research tool focused on cutting-edge research for preventing brain injury in the newborns and infants.
- Use two photonic technologies to measure the duration, severity, and location of the hypoxic-ischemia in newborns with congenital heart defects.
- Improve the understanding of the cellular origin of these neurodevelopmental problems, by helping to analyze the link between energy demand and oxygen supply, in pre-clinical and clinical studies.

Technology

Brain injury is very difficult to detect with a physical exam alone. In some cases, patients with congenital heart-defects may suffer neurological injuries during the neonatal period. Unfortunately, many of those patients are asymptomatic. To correctly diagnose them, physicians need to perform brain magnetic resonance images (MRI) or electroencephalograms (EEG). The prevention of brain injury requires a better knowledge of the timing when adverse physiological events happen.

Tinybrains project proposes a multi-modal approach towards **a non-invasive and multi-modal tool by combining two advanced photonics systems** (fNIRS, DCS) **with a quantitative electroencephalogram and a head-cap.** It will allow us to obtain useful and multi-modal data for better understanding the origins of neuronal injury in congenital heart defects, by carrying out studies on an animal model and in clinical groups.

Requirements

We are looking for a highly motivated postdoctoral fellow to work in a multi-disciplinary project to study brain functions in infants using functional near-infrared & diffusion correlation (fNIRS & fDCS) spectroscopies coupled with EEG recording. Candidates must hold an internationally recognized Ph.D.-equivalent degree in a relevant field (Computational neuroscience, Electrical or Biomedical Engineering).

Scientific background:

- Demonstrated experience in functional neuroimaging (fNIRS, EEG) methods & algorithms.

- Diffusion correlation spectroscopy (DCS) experience is a plus.

- Candidates with a strong interest in and experience with biological signal processing, are in particular encouraged to apply.

- Experience in using MATLAB, as well as in multiple programming language types including Python are preferable.

- Applicant should be self-motivated and must have a willingness to do inter-disciplinary research and collaborative teamwork. The successful candidate will need to write reports, research papers and presentations.

Candidates are selected exclusively on merit and potential on the basis of submitted application material. No restrictions related to disabilities, citizenship or gender apply to this position. The contract is offered for periods of one year, renewable for a total of up to 3 years.

If interested, please send your CV, letter of motivation, and the names and contact information by e-mail to Prof. Fabrice Wallois (fabrice.wallois@u-picardie.fr) at your earliest convenience. We will consider applications until December, 30 2021 if position is not yet filled.