RÉPUBLIQUE FRANÇAISE
Liberté
Égalité
Fraternité

Inserm
La science pour la santé
From science to health

Job Offer

Assessment of weak electric field effects on brain activity from processing of electrophysiological signals (ref: INSERM-SIGPROC2)

Job Profile

CSS 7

Offer description

Researcher profiles	☐ First-Stage Researcher *(PhD candidate)* X Recognised Researcher (*with less than 4 years research experience after PhD)* ☐ Established Researcher *(with more than 4 years research experience)* ☐ Leading Researcher
Research Fields (2 max.)	☐ Biological Sciences ☐ Medical Sciences ☐ Chemistry X Neurosciences ☐ Computer Science ☐ Pharmacological Sciences X Engineering ☐ Physics ☐ Environmental Science ☐ Technology ☐ Ethics in Health Sciences X Other (specify): Biosignal Processing
Main Activities	*Context.* Epilepsy refers to a neurological disorder that affects about 1% of the general population. Recent findings indicate that non-invasive brain transcranial current stimulation (tCS) is safe and of therapeutic promise in epilepsy. However, it is not yet indicated as a standard treatment due to major scientific limitations: unknown mechanisms of action, insufficient account for patient-specific factors, poor understanding of short- and long-term effects. The ambition of the **GALVANI Project (ERC-SyG 2019; 2020-26)** is to transform the care of a large fraction of patients living with drug-resistant epilepsies by solving a fundamental problem: to efficiently target and control large-scale epileptic brain networks with tCS-induced neuromodulatory weak electric fields (https://www.galvani-lab.eu/). *Objective and Methods.* The objective of the proposed research position is to design methods to assess the impact of tCS-induced electric fields on brain activity from electrophysiological data. Signal processing methods will be developed to detect and quantify epileptic activity (interictal, pre-ictal and ictal) recorded in human (EEG, SEEG). A user-friendly environment will be developed to integrate these approaches and to allow for use by non-experimented personals. Developments will include methods aimed at computing functional brain connectivity from EEG signals. Signal processing methods will be complemented by statistical methods to assess pre-/post-tCS effects. Signals to be processed will include simulated data from neuro-inspired models, human SEEG/EEG and human simultaneous SEEG/EEG/tCS. Signal processing/statistical methods will be developed in Python. A number of approaches are already available in the team.
Associated Activities	• Preprocessing of electrophysiological signals (denoising) • Filtering • Independent Component Analysis • Detection of transient events & abrupt changes

- Spectral analysis (incl. timescale and time-frequency analysis)
- Connectivity analysis (interdependences between signals)
- Statistical analysis (comparative tests)
- Clustering methods

Specific Requirements or Constraints	• None
Skills/Qualifications	The Post-doc fellow (PhD level) will preferably have a strong background in signal processing or in electrical engineering with experience in bio-signal processing. Competences in programming are required. Previous experience in electrophysiology and/or EEG analysis would be an asset.
Required Experience	☐ 0 to 2 years **X 2 to 4 years** ☐ 4 to 10 years ☐ >10 years **Fields:** The post-doc fellow will join a multidisciplinary team including research scientists in biomedical engineering, neurophysiological modeling, bio-physics, signal processing, electrophysiology, neurology.
Required Education Level or Diploma	• PhD in Biomedical Engineering or Electrical Engineering in the field of biosignal analysis
Required Languages	• English or French

Hosting Unit	
Code	UMR Inserm 1099
Name:	LTSI. Laboratory of Signal and Image Processing
Res. team Director	Fabrice Wendling (DR Inserm, LTSI, France) Email: fabrice.wendling@inserm.fr
Composition	About 90 personals with permanent positions. 150 total (incl. Masters, PhDs and P.Docs)
Address	Université de Rennes 1 - Campus de Beaulieu. Bât 22 - 35042 Cedex - Rennes - FRANCE.
Website	http://www.ltsi.univ-rennes1.fr/ https://perso.univ-rennes1.fr/fabrice.wendling/

Contract	
Type	Post-doctoral researcher or Research Engineer. Employer: Inserm
Duration	2 years, with possible extension
Salary	The competitive salary will be according to experience (about 2300 Euros net). The candidate will also have access to the French system benefits.
Envisaged Start Date	March 2023 (flexible)

Application

Applicants must send a CV, cover letter and recommendation to:

Fabrice Wendling

Contact for further information (name, telephone/mail):

Fabrice WENDLING
LTSI - UMR Inserm - Université de Rennes
Campus de Beaulieu - Bât. 22 - 35042 Rennes Cedex - France -
Tel: +33 2 23 23 56 05 / 62 20
Email: fabrice.wendling@inserm.fr
https://perso.univ-rennes1.fr/fabrice.wendling
https://www.galvani-lab.eu/

Deadline for application: Beginning of January 2023 (flexible)