CLINICAL NEURAL ENGINEERING GROUP
TRINITY CENTRE FOR BIOMEDICAL ENGINEERING
TRINITY COLLEGE, THE UNIVERSITY OF DUBLIN

POST-DOCTORAL RESEARCHER OR RESEARCH ASSISTANT

FOR THE STUDY OF

THE ELECTROPHYSIOLOGY OF NATURAL SPEECH PROCESSING

The Clinical Neural Engineering - Reillylab (https://reillylab.net/) at Trinity College focuses on signal processing of neuroimaging and physiological data for specific clinical problems. Our research is in collaboration with clinical colleagues in neurology, neurophysiology, psychiatry, otolaryngology, gerontology and respiratory medicine.

Based on our research into neural audio processing following cochlear prosthesis implantation, we have developed objective measures of auditory perception and auditory cognition. This is based on EEG recordings and neural signal analysis. A significant challenge is the separation of neural responses from the electrical artefacts generated by the cochlear implant. Nevertheless, we have made progress and have published on this area [1-4].

We wish to develop new paradigms to test the applicability of such measurements for monitoring cognition in cochlear implant users using natural speech.

One central element of this project is methodological and will involve the use of simulated electroencephalography data. The goal of this study will be the identification of experimental requirements for isolating neural indices of speech comprehension in cochlear implant patients, such as the minimum number of EEG sensors and passive listening task duration, as well as determining the effectiveness of novel data analysis procedures.

We wish then follow up with a study applying these EEG based paradigms with a cohort of Cochlear Implant users.

We are seeking candidates with:

- Strong computational and signal processing skills
- Strong interest in studying cognition and the human brain
- (Ideally) Prior experience with speech sound processing
- Excellent writing skills to lead on publications and technical reports related to the project.

Interested candidates should submit a CV and a brief cover letter, explaining in about 100-200 words their motivation in applying for this position. Please contact Prof Reilly (reillyri [at] tcd.ie) or Dr Di Liberto (diliberg [at] tcd.ie). The position is available immediately. Note that this is a short-term position that will end in Feb 2022.

References

1. Lopez Valdes A, Mc Laughlin M, Viani L, Walshe P, Smith J, Zeng FG, Reilly RB. Objective assessment of spectral ripple discrimination in cochlear implant listeners using cortical evoked responses to an oddball paradigm. PLoS One. 2014 Mar 5;9(3):e90044. doi: 10.1371/journal.pone.0090044. PMID: 24599314; PMCID: PMC3943794.
2. Mc Laughlin M, Lopez Valdes A, Reilly RB, Zeng FG. Cochlear implant artifact attenuation in late auditory evoked potentials: a single channel approach. Hear Res. 2013 Aug;302:84-95. doi: 10.1016/j.heares.2013.05.006. Epub 2013 May 28. PMID: 23727626.
3. Waechter SM, Lopez Valdes A, Simoes-Franklin C, Viani L, Reilly RB. Depth matters - Towards finding an objective neurophysiological measure of behavioral amplitude modulation detection based on neural threshold determination. Hear Res. 2018 Mar;359:13-22. doi: 10.1016/j.heares.2017.12.005. Epub 2017 Dec 14. PMID: 29291949.
4. Lopez-Valdes A, Mc Laughlin M, Viani L, Walshe P, Smith J, Zeng FG, Reilly RB. Auditory mismatch negativity in cochlear implant users: a window to spectral discrimination. Annu Int Conf IEEE Eng Med Biol Soc. 2013;2013:3555-8. doi: 10.1109/EMBC.2013.6610310. PMID: 24110497.
5. Di Liberto GM, Nie J, Yeaton J, Khalighinejad B, Shamma SA, Mesgarani N. Neural representation of linguistic feature hierarchy reflects second-language proficiency. NeuroImage, Volume 227, 2021, 117586, ISSN 1053-8119, https://doi.org/10.1016/j.neuroimage.2020.117586.