PhD Studentship in Computer Science: Analysing and Visualizing Brain-Heart Interactions in Health and Disease

Contact
Dr Alaa Alahmadi, alaa.alahmadi@newcastle.ac.uk

Research project

Overview

The interaction between the heart and the brain is highly complex, especially in paroxysmal disorders, such epilepsy. Certain epileptic seizures commonly occur in association with changes in heart function; and some patients with cardiac abnormalities (e.g. QT prolongation) can have a primary seizure disorder and intractable focal epilepsy. For example, patients with concealed long QT syndrome (LQTS) can present clinically as syncope, seizures, or sudden cardiac death (SCD), and as such LQTS is often misdiagnosed as epilepsy. This research aims to analyse and visualise brain-heart interactions to predict early signs of ventricular arrhythmia/SCD, and other relevant phenomena in neurological conditions such as epilepsy, using ECG and EEG data. The research aims to build a comprehensive computational framework using AI & data visualisations to have much wider implications for translation and treatment.

Supervisory environment:

We offer a rich interdisciplinary research environment in both clinical and computational labs. Dr Alaa Alahmadi is a Lecturer in Computational Medicine at the Interdisciplinary Computing and Complex BioSystems (ICOS) research group in the School of Computing. She has excellent track record in cardiac monitoring technologies, human-like explainable AI & data visualisations. Prof Yujiang Wang is a UKRI Future Leaders Fellow and leads the Computational Neuroscience, Neurology, and Psychiatry (CNNP) lab in the School of Computing. Wang has extensive experience in both EEG, ECG, and wearable sensor analysis, and has a long track record in epilepsy research using computational and data science approaches with over 70 peer-reviewed papers on the topic. Dr Rhys Thomas is an Epileptologist (Royal Victoria Infirmary), Reader in Epilepsy (Newcastle University) and President of the British branch of the International League Against Epilepsy. He has extensive experience in clinical epilepsy research, including studying preventable causes of sudden death unexpected in epilepsy.

Applicant skills/background

You must have minimum 2:1 Honours degree/and or a merit Masters degree/international equivalent, in a relevant subject. Applicants whose first language is not English require IELTS score of 6.5 overall with a minimum of 5.5 in all sub-skills.