University of Newcastle upon Tyne

Developing novel tools from wearable sensor data for neurodegenerative disease management using deep learning techniques.

Newcastle University is a member of the Russell Group of research-intensive institutions and undertakes multi-disciplinary research in many areas with high scientific, economic and social impact. Newcastle University is committed to 'Excellence with a purpose' and believes our teaching and research should make a difference to people's lives locally, nationally and internationally. In the Research Excellence Framework 2014 Newcastle was ranked 16th in the UK for research power and 26th for quality research, joint 1st for student support in the UK in the Times Higher Education Student Experience Survey 2016 and joint 7th overall. The core mission of the Institute of Neuroscience is to undertake the highest quality research that translates into patient benefit, real world application and commercial opportunity. We have a diverse research portfolio from the basic biology of neurons through to complex processes of perception and decision-making behaviour, we address how the mind, brain, and body work together. Committed to equality and diversity the Institute holds an Athena SWAN silver award.

As part of this European Training Network, applications are now invited for an Early Stage Researcher in Professor Rochester's Brain and Movement research group at the Institute of Neuroscience, Newcastle University, United Kingdom. The Brain and Movement (BAM) Research Group at Newcastle University have extensive experience in gait and its role as a discrete biomarker for diagnostic algorithms, progression modelling and risk prediction (cognitive decline and falls). As part of a translational programme to develop tools for widespread application in clinical and home environments, extensive expertise has been developed in validation and implementation of algorithms and signal processing techniques to derive clinically meaningful micro and macro gait outcomes from wearable sensor data in various cohorts (neurodegenerative diseases, ageing, etc.). Large data sets are available in well characterised patient cohorts (e.g. Parkinson's disease, dementia subtypes and Alzheimer's disease and age-matched healthy controls. They comprise data collected with wearable sensors in controlled (e.g. laboratory) and free-living conditions (7 day data) allowing detailed quantification of gait and postural control outcomes. A particular interest of the group is to extend methodological approaches using novel supervised and un-supervised deep-learning computational methodologies to enhance tools for management of for neurodegenerative disease using gait data collected from a wearable sensor system, with the ultimate goal of using wearable technology as an early diagnostic/management tool for neurodegenerative diseases. To this wend we collaborate with colleagues in Mathematics and Statistics and Computer Science to deliver on this multidisciplinary research agenda. The successful applicant will be employed at Newcastle University, and will also be enrolled onto a PhD.

Project outline

The PhD candidate will be (i) developing novel algorithms for extraction frequency-based features and other features representing intensity, periodicity and coordination of movement, (ii) evaluating of spatial-temporal features stemming from a conceptual model of gait already validated by the BAM group, (iii) determining tools for classification/progression (including medication responsiveness) using advanced deep learning techniques.

Requirements

- MSc in Biomedical Engineering, Computer Science or related field
- Good information technology and computing skills
- Good skills in signal processing and use of machine learning techniques
- Experience/ knowledge of Matlab or equivalent programming languages (e.g. Octave, Python, etc.)
- Good communication skills and ability to work in a multidisciplinary team

Desirable

- Knowledge of gait analysis
- Experience of working with accelerometer data

For additional information please contact:
Professor Lynn Rochester
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General eligibility criteria

- Researchers may be of any nationality.
- Researchers must not have resided or carried out their main activity (work, studies, etc.) in the country of the host for more than 12 months in the 3 years immediately prior to their recruitment.
- Applicants should have less than 4 years of postgraduate research experience

Applications

For more information and to upload your application (CV, letter of interest and contact information for potential references) visit www.keep-control.eu.

Deadline for application: June 30, 2017