

NTU DOCTORAL SCHOOL

NOTTINGHAM TRENT UNIVERSITY 

*"Creating future innovators and impact for education, industry,
the professions and society"*

**Nottingham Trent University, School of
Architecture, Design and the Built
Environment, and ICON Clinical
Research
PhD Studentship –
2017/18 Entry**

Objective Measurement of Movement Disorder

Symptoms Remotely and within Clinic

A number of medical conditions and their treatments are associated with movement disorders such as reduced movement, tremor and involuntary and uncoordinated movements. Parkinson's Disease (PD), for example, is characterised by slowness of movement, gait freezing and tremor, and treatment is often associated with involuntary movements. This is an important disease, affecting around one million adults, with over 60,000 newly diagnosed annually, in the USA alone. The disease in the USA costs nearly \$25 billion annually in direct and indirect costs, with annual medication costs ranging from \$2,500 to \$10,000.

Treatment for PD is titrated based upon observed side effects and symptoms. However, these outcomes are difficult to measure during routine care visits where symptoms and side effects may vary considerably from day to day. Generally, treatment decisions are based on patient or caregiver recall of symptoms and side effects using standard instruments such as the Unified Parkinson's Disease Rating Scale. More frequent objective measurement of symptoms and side effects is valuable in optimising treatment and also in measuring the effects of treatment in clinical trials. The ability to generate frequent and objective measures of symptoms and side effects extends to the evaluation and treatment of other conditions associated with movement disorders such as Huntington's, Muscular Dystrophy and Stroke.

The average cost of drug development exceeds \$1 billion, and the failure rate of trials assessing Parkinson's treatments is high. Better objective and sensitive measures of changes in PD symptoms over time may improve the success of clinical trials in addition to providing greater richness of data to better understand the effects of treatment. Measuring symptoms and side effects objectively using easy to use technology both in the clinical and remote (home) setting will enable more frequent assessment and enable comprehensive understanding of disease state.

This project will explore the utility of current technology solutions to measure tremor and other symptoms of movement disorders. The research will seek to identify gaps in current approaches and knowledge in measurement in both the clinic and the remote setting. This may include the assessment of instrumented performance tests using wearable devices, clothing-based wearable devices, and smartphone apps leveraging inbuilt sensors (such as tremor tests contained within Apple Research Kit). The scope of the project will be determined based upon appraisal of the current landscape and unmet needs, but will likely focus on disease indications such as Parkinson's. This project aims to extend to the development of potential alternative solutions to the measurement of tremor and/or gait abnormalities that could be used by a patient, with or without the help of a caregiver. This may include novel application and interpretation of data from of existing devices, or development of prototype devices for new measurement approaches.

The output from this research may be valuable in accurately characterising treatment effects in clinical trials, and may add to assist in the care and treatment decisions in routine care of conditions associated with movement disorders and add to the scientific and clinical understanding of the symptom profile of this important disease

The skills required will include the proven ability develop prototype software including apps and applications that interact with sensors, electronics, integration of vision and sensor based systems, wearable product design, strong research and analytical skills and an interest in medicine and life sciences.

Funding: The research is jointly funded by Nottingham Trent University and ICON Clinical Research. The studentship will pay UK/EU fees and provide a maintenance stipend.

Specific qualifications/subject areas required of the applicants for this project:

Applicants are expected to be highly motivated individuals with strong academic research profiles, and in receipt of a UK first-class or 2:1 BSc Hons (or NARIC equivalent) in computer science, clinical/medical sciences, electrical/electronic engineering, or a related discipline, plus research experience and/or a UK MSc or MRes with a minimum of a merit/commendation (or NARIC equivalent) in a relevant subject.

For informal discussion regarding the project, please contact:

Philip.breedon@ntu.ac.uk