



Cardiff University
School of Psychology

Studentship Title:	PhD in Psychology
Research Area/ Project Title:	Computational modelling and prediction of brain shift to improve surgical navigation
Location:	CUBRIC
Expected Start Date:	1 st October 2018
Duration:	3 years
Deadline for Application:	Friday, 30 th March 2018

The PhD is funded via an industrial/EPSRC sponsored (iCase) scholarship.

Description of Research Opportunity:

CUBRIC (Cardiff University Brain Research Imaging Centre) School of Psychology and the Schools of Computer Science, and Engineering, in collaboration with Renishaw PLC seek a PhD student to join a research team developing computational modelling and MRI for surgical planning. They will work with world-renowned experts in brain imaging, computer vision and tissue modelling. We seek a high calibre graduate with a good degree (First or strong Upper Second Class) in Computer Science, Physics, Engineering or Mathematics with a high degree of computer programming proficiency and strong mathematical skills.

The scholarship will conduct research on the brain image analysis aspects of the research and will work alongside two currently funded School of Engineering scholarships in brain tissue modeling and another PhD looking at measuring and modelling Brain deformation from MRI imaging. Experience in image registration, especially non-linear deformation would be desirable but not essential.

Neurosurgical procedures for treatment of brain tumours and diseases such as Parkinson's disease often require the insertion of catheters to deliver drugs to particular parts of the brain, or electrodes to enable precisely targeted stimulation. It is important to be able to place these accurately and to avoid critical parts of the brain. Surgical trajectories are planned using preoperative MRI images and a robot system is used to set the correct direction relative to the skull. However, the brain is soft and moves around when the skull is opened for surgical access, affecting the accuracy with which particular features can be targeted.

There are several situations in which brain shift occurs:

- It is often necessary to move the patient into different orientations to allow access from different directions. This causes repeated brain movements;
- Pushing catheters or other devices into the brain may cause shift and deformations, depending on the resistance of different tissues;
- Multiple catheters /electrodes may anchor the brain tissue and alter its subsequent deformation.
- Fluid flow within the brain arising from brain rotation can impact the degree of deformation;

This project aims to predict brain shift from pre-operative MRI scans and hence improve the accuracy of neurosurgical navigation. We will investigate the effects of incremental shifts and produce models, simulation tools and algorithms to minimise targeting errors and facilitate surgical planning. The long-term aim is to incorporate these predictions into Renishaw's neurosurgery systems and deliver better treatment to patients.

Supervisors: Professor Derek K Jones (JonesD27@cardiff.ac.uk), Prof David Marshall (MarshallAD@cardiff.ac.uk), & Professor Sam L. Evans (EvansSL6@cardiff.ac.uk)

Interested parties are strongly encouraged to contact the supervisors for an informal chat prior to submission of a formal application

Award:

The studentships will commence in October 2018 and will cover your tuition fees (at UK/EU level) as well as a maintenance grant. In 2017-18 the maintenance grant for full-time students was £14,553 per annum. As well as tuition fees and a maintenance grant, all School of Psychology students receive conference and participant money (approx. £2250 for the duration of the studentship). They also receive a computer and office space, additional funding for their research, and access to courses offered by the University's Doctoral Academy and become members of the University Doctoral Academy.

Eligibility:

Full awards (fees plus maintenance stipend) are open to UK Nationals, and EU students who can satisfy UK residency requirements. To be eligible for the full award, EU Nationals must have been in the UK for at least 3 years prior to the start of the course for which they are seeking funding, including for the purposes of full-time education.

As only one studentship is available and a very high standard of applications is typically received, the successful applicant is likely to have a very good first degree (a First or Upper Second class BSc Honours or equivalent) and/or be distinguished by having relevant research experience.

How to apply:

You can apply online - consideration is automatic on applying for a PhD in Psychology, with an October 2018 start date (programme code RFPDPSYA).

Please use our online application service at <http://www.cardiff.ac.uk/study/postgraduate/applying>

and specify in the funding section that you wish to be considered for School funding.

Please specify that you are applying for this particular project.

Application deadline: 30th March 2018 with interviews (either in person or by Skype) being held on or around start of April and decisions being made by end of April.

General Information:

The School of Psychology is one of the largest and most successful in the UK (<http://www.cf.ac.uk/psych/>). The School's excellent standard of research and teaching has been recognised in every Research Assessment Exercise. It has its own brain-imaging centre (<http://www.cf.ac.uk/psych/cubric/>), enhancing the international-leading research in behavioural neuroscience, cognitive ergonomics, forensic, social and developmental psychology.

Cardiff is the youngest capital city in Europe and the fastest growing in the UK. It plays host to many national and international sporting events at the Millennium Stadium (<http://www.millenniumstadium.com/>). Culturally, the city is thriving, with the Wales Millennium Centre (<http://www.wmc.org.uk/>) in Cardiff Bay. Cardiff is in very close proximity to the beautiful Welsh countryside (<http://www.breconbeacons.org/>), has a two hour rail link to London and a (cheap) one hour air link to Paris and Amsterdam (<http://www.cardiffairportonline.com/>)

Please address any informal enquiries to:	
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