



Cardiff University
School of Psychology

Studentship Title:	ERC studentship
Research Area/ Project Title:	Machine learning and sleep: Detecting neural replay in sleep with EEG classifiers
Location:	CUBRIC
Expected Start Date:	1 October 2018
Duration:	3 years
Deadline for Application:	23 rd February 2018

Description of Research Opportunity:

Memories are spontaneously replayed in sleep, and this replay is critical for their consolidation (strengthening and integration with pre-existing knowledge). Until recently, it has been impossible to detect these replays in humans, but work from our laboratory has devised a method to achieve this using machine learning to analyse EEG data. In this PhD, we will seek to extend this work by improving the detection method and using it to examine many additional aspects of memory replay such as how long it lasts, which phases of sleep it occurs in, and how it impacts on neuroplasticity.

We will first use common machine learning algorithms such as SVM, Logistic Regression, KNN with emphasis in feature extraction and selection. As this is a challenging problem we aim to explore and combine techniques from areas such as time series analysis (dynamic time warping), neuroimaging (representation similarity analysis) and deep learning (LSTM, convolutional NN). We seek a computer science or engineering student with a good background in machine learning and signal processing to take this work forward. An initial paper we've written on this is here: [BioRxiv link](#)

The Neuroscience and Psychology of Sleep (Naps) lab is a thriving community of computer scientists and sleep researchers studying all aspects of how sleep impacts on cognition (see our nascent web pages: <http://sites.cardiff.ac.uk/cubric/research-2-2/neuroscience-and-psychology-lab-naps/>)

Cardiff University's Brain Research Imaging Centre (CUBRIC) opened in Spring 2016, housing a unique combination of facilities and expertise that will further its world-leading research in Neuroimaging, Cognitive Neuroscience and Biological Psychiatry. Further details of CUBRIC can be found on our web-page: <http://sites.cardiff.ac.uk/cubric/> .

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 www.cf.ac.uk/regis/general/applyonline/index.html

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: 23rd February 2018 with interviews (either in person or by Skype) being held on or around March and decisions being made by 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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