Fully Funded 4-year Doctoral Studentship

Joint with Amazon Web Services and the EPSRC CDT in Autonomous Intelligent Machines & Systems (AIMS)

Note: This studentship is fully-funded.

Supervisor(s): Oiwi Parker Jones (Oxford Robotics Institute)

Start Date: October 2023

Autonomous systems powered by artificial intelligence will have a transformative impact on economy, industry and society as a whole. Our mission is to train cohorts with both theoretical, practical and systems skills in autonomous systems - comprising machine learning, robotics, sensor systems and verification- and a deep understanding of the cross-disciplinary requirements of these domains. Industrial partnerships have been and will continue to be at the heart of AIMS, shaping its training and ensuring the delivery of Oxford’s world-leading research in autonomous systems to a wide variety of sectors, including smart health, transport, finance, energy and extreme environments. Given the broad importance of autonomous systems, AIMS provides training on the ethical, governance, economic and societal implications of autonomous systems. For more information regarding the AIMS programme, see our web pages at: aims.robots.ox.ac.uk.

Deep learning for electrophysiology

Abstract

The aim of this project is to drive critical progress toward the development of safe and effective neural speech prosthetics – brain-computer interfaces (BCIs) that will restore communication to paralysed patients. To leverage the power of deep learning, my group is actively collecting a uniquely large dataset of neural recordings; we are also developing foundational methods for the use of deep learning with large-scale electrophysiological data. Your role will focus on signal processing and machine learning, with the aim of answering the following question: What is the optimal method to represent electrophysiological data as input to deep neural networks? To answer this question, we will compare multiple approaches empirically, using in-house BCI tasks and their evaluation metrics. To warm up, we will implement existing methods from the literature that transform raw sensor amplitudes into low-dimensional projections, time-frequency representations, and Riemannian geometry features. We will then execute a rigorous comparison of these input representations for a variety of neural decoding tasks. By interpreting which parts of the feature representations produce the best empirical results, our ultimate aim will be to reverse-engineer novel and even more efficient input representations (cf. MFCCs in the acoustic domain). Time permitting, we will explore input-specific methods for data-augmentation.

Award Value

The studentship covers the full course fees (Home) plus a stipend (tax-free maintenance grant).

Eligibility

This studentship is available to all applicants.
Prospective candidates will be judged according to how well they meet the following criteria:

- Applicants are normally expected to be predicted or have achieved a first-class or strong upper second-class undergraduate degree with honours (or equivalent international qualifications), as a minimum, in computer science, engineering, physics, mathematics, statistics or other related disciplines. A previous master's qualification is not required.
- Excellent English written and spoken communication skills

Candidates will also need to demonstrate a broad interest in some or all of the four AIMS themes:

- machine learning, as a unifying core
- robotics & vision
- cyber-physical systems (e.g. sensor networks)
- control & verification

The deadline for applying is Friday 20th January 2023. Candidates are therefore recommended to apply as soon as possible to and to inform wendy.adams@eng.ox.ac.uk when they have done so.

If you have any technical questions about the DPhil Studentship, please email wendy.adams@eng.ox.ac.uk

Please quote AIMS-AWS-2023 in the studentship reference box.

There are other sources of funding through the CDT associated with Industry, and all applicants will be considered for these.

aims.robots.ox.ac.uk