



# Trustworthy AI for Medical and Health Research Workshop

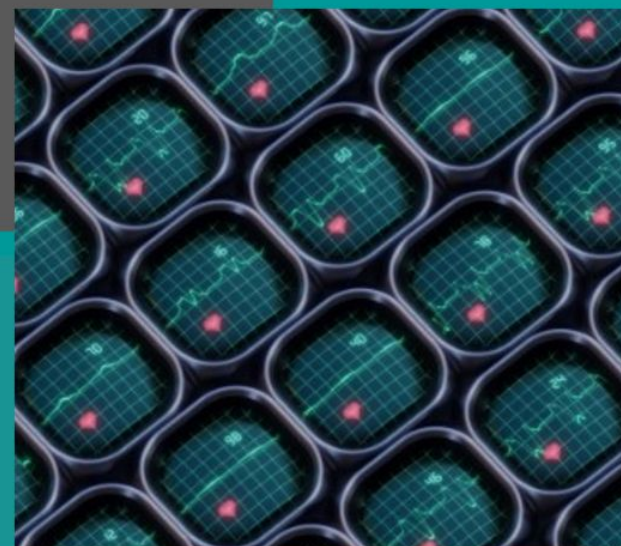
Sponsor



Wednesday 23<sup>rd</sup> November 2022 | 14:00 – 18:00 (with a drinks reception)

Maxwell Centre, Cavendish Laboratory

Organiser: Dr Pingfan Song, Department of Engineering



# Cambridge Centre for Data-Driven Discovery (C2D3)

C2D3 – Interdisciplinary Research Centre at the University of Cambridge.

- Supports and connects the growing **data science and AI** research community
- Builds research capacity in data science and AI to **tackle complex issues**
- Drives new research challenges through **collaborative research projects**
- Promotes and provides opportunities for **knowledge transfer**
- Identifies and provides **training courses** for students, academics, industry and the third sector
- Acts as a **gateway** for external organisations

Five cross-cutting themes.

- Data Management and Processing
- Ethics, Law and Policy
- Imaging
- Making Big Data Work
- Theoretical Foundations

# Programme

13:30 - 13:50 Arrival and registration

13:50 - 14:15 Welcome and Opening remarks, Introduction to C2D3,  
Themed speech from the organisers (Dr Pingfan Song)

Session 1: Chair - Dr Lefan Wang (Engineering)

14:15 - 15:00 Keynote Speaker: Dr Li Su (Psychiatry)

15:00 - 15:30 Short Talks: Prof Matthew Juniper (Engineering); Dr  
Michael Burkhart (Psychology)

15:30 - 16:00 Refreshment Break and Poster session

Session 2: Chair - Dr Vihari Piratla (Engineering)

16:00 - 17:00 Keynote Speaker: Dr Alexander Gimson (Cambridge  
Centre for Artificial Intelligence in Medicine)

17:00 - 17:30 Short Talks: Dr Yuanxi Li (Psychology); Dr Michael Roberts  
(DAMTP)

17:30 - 18:00 Networking and drinks reception

# Speakers and Chairs

## Session 1



Prof. Li Su  
(Psychiatry)



Prof Matthew Juniper  
(Engineering)



Dr Michael Burkhart  
(Psychology)



Chair - Dr Lefan  
Wang (Engineering)

## Session 2



Dr Alexander Gimson  
(CCAIM, Cambridge  
University Hospital)



Dr Yuanxi Li  
(Psychology)



Dr Michael Roberts  
(DAMTP)



Chair - Dr Vihari Piratla  
(Engineering)

# Speakers



Prof. Li Su  
(Psychiatry)

Title: Integrating AI and neuroimaging with neurobiologically plausible cognitive models

Bio: Professor Li Su is the head of the Artificial Intelligence and Computational Neuroscience Group and has a joint appointment as Principal Research Fellow in the Department of Psychiatry at the University of Cambridge and Professor of Neuroimaging in the Department of Neuroscience in University of Sheffield. His research aims to combine innovative and original computational methods with the state-of-the-art brain imaging techniques (MEG/EEG, 7T MRI and PET) in understanding, detecting and developing treatments for neurological and psychiatric conditions. He has been awarded a prestigious Senior Fellowship from Alzheimer's Research UK in 2017 and fellow of Clare Hall in 2018.

# Speakers



Prof Matthew Juniper  
(Engineering)

## Title:

From wings to hearts: physics-based machine learning for flow-MRI

## Bio:

Matthew Juniper is Professor of Thermofluid Mechanics at the Engineering Department and is the Principal Investigator of the UK Fluids Network ([www.fluids.ac.uk](http://www.fluids.ac.uk)). He completed his PhD from Ecole Central Paris in 2001 and was appointed Lecturer in Combustion at the University of Cambridge in 2003. His research interests are in the broad area of flow instability, adjoint methods, shape optimization, and physics-based Bayesian inference. He is an Associate Editor of the Journal of Fluid Mechanics and has held visiting fellowships/professorships at Ecole Central Lyon, the Institute for Advanced Studies at TU Munich, KTH/Nordita Stockholm, IIT Madras, and the Center for Turbulence Research Summer Program at Stanford University.



# Speakers



Dr Michael Burkhart  
(Psychology)

Title: Clustering trajectories of neurodegenerative disease with mixtures of state space models

Bio:

Michael Burkhart earned his Ph.D. in 2019 from Brown University's Division of Applied Mathematics. He and his advisor, Matthew Harrison, collaborated with the BrainGate clinical trial that develops intracortical brain–computer interfaces to enable persons with quadriplegia to communicate and interact with their environments using mental imagery alone. Together with Leigh Hochberg and David Brandman, they derived and implemented a novel Bayesian filtering framework for neural decoding. In 2021, he joined the Adaptive Brain Lab at Cambridge University as a research associate to develop machine learning-based approaches for the early diagnosis of neurodegenerative disease. He's excited to continue working at the interface of artificial intelligence and neuroscience.

# Speakers



Dr Alexander Gimson  
(CCAIM, Cambridge  
University Hospital)

Title: Developing trustworthy machine learning for organ transplantation

Bio: Dr Alexander Gimson was a Consultant Transplant Hepatologist at Cambridge University Hospital NHS Foundation Trust, where he was previously Director of Medicine. He led the national team which developed new liver transplantation recipient selection criteria for the UK and introduced a novel national organ allocation offering scheme whereby organs are offered to the individual on a national waiting list who has the greatest calculated net life years gained from the particular donor organ. With professor van der Schaar, he has developed two new AI machine learning models which can improve on present Cox models with interpretable allocation policies. Developing clinically relevant and trustworthy ML models for both clinicians and patients within organ transplantation highlights a number of crucial areas that require more stringent examination.



# Speakers



Dr Yuanxi Li  
(Psychology)

## Title:

Modelling prognostic trajectories of cognitive decline due to Alzheimer's disease

## Bio:

Yuanxi Li (Liz) gained a BEng and MEng in Electrical Engineering at Tsinghua University and a DPhil in Cognitive Psychology at Beijing Normal University. She joined Dr Zoe Kourtzi's lab in 2022 as a Postdoctoral Research Associate, using machine learning-based approaches for the early diagnosis of neurodegenerative disease on the EDoN project. Her research interests focus on early detection of dementia, adaptive brain and healthy ageing intervention.

# Speakers



Dr Michael Roberts  
(DAMTP)

Title: Common pitfalls and recommendations for using machine learning to detect and prognosticate for COVID-19 using chest radiographs and CT scans

Bio:

Dr Roberts is Senior Research Associate of Applied Mathematics at DAMTP and member of the Cambridge Image Analysis group (CIA) and leads the algorithm development team for the global COVID-19 AIX-COVNET collaboration, see

<https://covid19ai.maths.cam.ac.uk/>.

Dr Roberts' research interests focus on variational methods for image processing (in particular image segmentation and registration), machine learning for image and data analysis, image processing and data analysis. He has active interdisciplinary collaborations with other applied mathematicians, computer scientists and clinicians focussing on medical imaging problems. He has vast experience in studying medical imaging problems for lung diseases including (but not limited to) lung cancer, idiopathic lung fibrosis, mesothelioma and drug induced interstitial lung disease.



**Slido Q&A**