Fully funded studentship opportunities in Information Engineering

The following studentships will be available to start in October 2017. Full funding for fees and maintenance is available via EPSRC funds for UK and some EU students (see eligibility criteria here https://www.epsrc.ac.uk/skills/students/help/eligibility/).

Industrial top-up funding is available for some of the projects.

Supervisor	Project
Dr Guillaume Hennequin, Computational and Biological Learning Group gjeh2@cam.ac.uk Please contact Dr Hennequin for more information	**Reverse engineering robustness in neural circuits** Neural activity is surprisingly robust to perturbations. The aim of this project is to reverse-engineer neuronal robustness, by building resilient network models based on experimental data and identifying the control strategies used by those networks to recover from perturbations. There will be opportunities to collaborate with the lab of Karel Svoboda (HHMI Janelia; optical imaging/stimulation in awake behaving mice). Data will constrain models, and models will make novel predictions to be tested experimentally. **Closing date: 31 January 2017**
Dr Miguel Hernandez Lobato, Machine Learning Group jmh233@cam.ac.uk	**Deep learning and Bayesian optimization** The vast size of chemical space makes very challenging to search for new relevant molecules (OLEDS, photovoltaics, pharmaceuticals, etc.). We aim to produce new intelligent systems that will accelerate this type of discovery processes by using deep learning and Bayesian optimization methods. Our contributions will be in the areas of generative modelling of data, Bayesian neural networks and approximate inference. http://www.jobs.cam.ac.uk/job/11988/ **Closing date: 4 January 2017**
Dr Fumiya Iida, Biologically Inspired Robotics Laboratory fi224@cam.ac.uk Please contact Dr Iida for more information	**Data-driven adaptation of physics simulation for control of soft-body robots** There has been an increasing interest in the use of soft deformable materials in robotic systems, though modelling, simulation and precise control of them are not trivial. This project explores the state-of-the-art simulation and machine learning techniques to handle mechanical dynamics of soft robots for better motion control. Top-up maintenance funding will be available from the industrial sponsor, The Mathworks **Closing date: 31 January 2017**

Dr Mate Lengyel, Computational and Biological Learning Group ml468@cam.ac.uk	**Episodic memory for control** The aim of the project is to explore and quantify, by both analytical and numerical techniques, the advantage of episodic memories in AI, and then use this analysis to understand the organisation of human memory into different systems, including episodic, semantic, and procedural memories. http://www.jobs.cam.ac.uk/job/12005/ **Closing date: 7 December 2016**
Dr Timothy O'Leary, Control Group tso24@cam.ac.uk	**Reverse-engineering invertebrate neural circuits** In collaboration with a leading experimental invertebrate neurobiologists (Zlatic Group, HHMI Janelia & Department of Zoology at Cambridge) this project will develop real-time tracking and analysis methods for studying Drosophila larva nervous system function using an automated fluorescent microscope. We will use cutting-edge optogenetic tools to stimulate neural circuits and monitor neural activity and behaviour, then analyse and interpret experimental data using computational models of neural circuits. http://www.jobs.cam.ac.uk/job/12211/ **Closing date: 31 January 2017**
Prof Carl Rasmussen, Machine Learning Group Contact Prof Rasmussen, cer54@cam.ac.uk	**Probabilistic methods in time-series analysis and control** Probabilistic methods in time series analysis and control To improve approximate Bayesian inference in non-linear dynamical systems, allowing for learning and control in the face of data scarcity, noise and uncertainty. Simultaneous solution to dynamics learning and control through experimental design. http://www.jobs.cam.ac.uk/job/11982/ **Closing date: 4 January 2017**
Dr Sumeetpal Singh, Signal Processing and Communications Laboratory	**Bayesian Data Assimilation in Very High-Dimensions** Assimilating data into very high-dimensional probabilistic dynamical models and then simulating the assimilated model forward to make forecasts is a major computational challenge. This project aims to address this problem by drawing on recent advances in Monte Carlo based Bayesian inference, e.g. Particle Markov Chain Monte Carlo http://www.jobs.cam.ac.uk/job/11993/ **Closing date: 28 February 2017**

Professor Malcolm C. Smith, Control Group Industrial supervisor: Dr Will Hoult (McLaren Automotive) mcs@eng.cam.ac.uk	**Vehicle dynamics, estimation and control for high-performance automobiles** The aim of the research is to examine the performance limits and trade-offs in autonomous vehicle estimation and control from a fundamental and applied perspective including the development of new algorithms to address key challenges. One particular focus of the work is on the estimation of key quantities that are important in vehicle control, e.g. the tyre forces that are being generated or are available, and that need to be estimated in highly dynamic situations. Track testing of promising approaches and algorithms on a high performance sports car is expected. Top-up maintenance funding will be available from the industrial sponsor, McLaren Automotive **Closing date: 31 January 2017**
Professor Malcolm C. Smith, Control Group Industrial supervisor: Dr Joachim Sihler (Schlumberger Cambridge Research Ltd) mcs@eng.cam.ac.uk	**Dynamics and Control of Large Mechanical Structures** The inerter is a new passive mechanical device whose use has been pioneered for suspension systems in the Formula One industry. There is interest to apply such methods to large systems, e.g. earthquake damage mitigation in tall buildings, space tethers, railway suspensions. The motivation for this project is the control of vibrations in very long high aspect ratio drillstrings, which cause costly damage to mechanical and electronic components of the drillstring. The research seeks both a general framework to apply advanced mechanical control methods to such problems and specific solutions for the motivating example. Opportunities exist for close collaboration with the industrial partner, access to advanced facilities, and experimental testing of promising methods resulting from the research. The project falls under the control engineering EPSRC research area, and has many common elements with other areas: complex dynamics, modelling of nonlinear effects, implementation constraints for control solutions. Top-up maintenance funding will be available from the industrial sponsor, Schlumberger Cambridge Research **Closing date: 31 March 2017**
Dr Richard E. Turner, Machine Learning Group Please contact Dr Turner, ret26@cam.ac.uk, for more information	**New methods for one-shot learning using Bayesian deep learning** The position will involve research with Dr. Richard E. Turner developing new methods for one-shot learning using Bayesian deep learning. One-shot learning involves making dramatic inductive leaps from just a single datapoint. The project will involve developing state-of-the-art technology based upon

	Bayesian neural networks, Gaussian Processes and new approximate inference techniques. http://www.jobs.cam.ac.uk/job/11978/ **Closing date: 4 January 2017**
Dr Ramji Venkataramanan, Signal Processing and Communications Laboratory	**Message-Passing Algorithms and Data Compression** This project will explore the use of message-passing algorithms for finding good sparse approximations of high-dimensional signals. In the simplest setting, the goal is to represent a vector by efficiently finding the best sparse linear combination of vectors from a given dictionary. The project will also investigate the application of these algorithms for lossy data compression. More details can be found at: http://www2.eng.cam.ac.uk/~rv285/phdopening2017.html http://www.jobs.cam.ac.uk/job/11975/ **Closing date: 31 January 2017**
Prof Daniel Wolpert, Computational and Biological Learning Group wolpert@eng.cam.ac.uk	**Deciding and revising: a unifying framework for decision making and motor control**