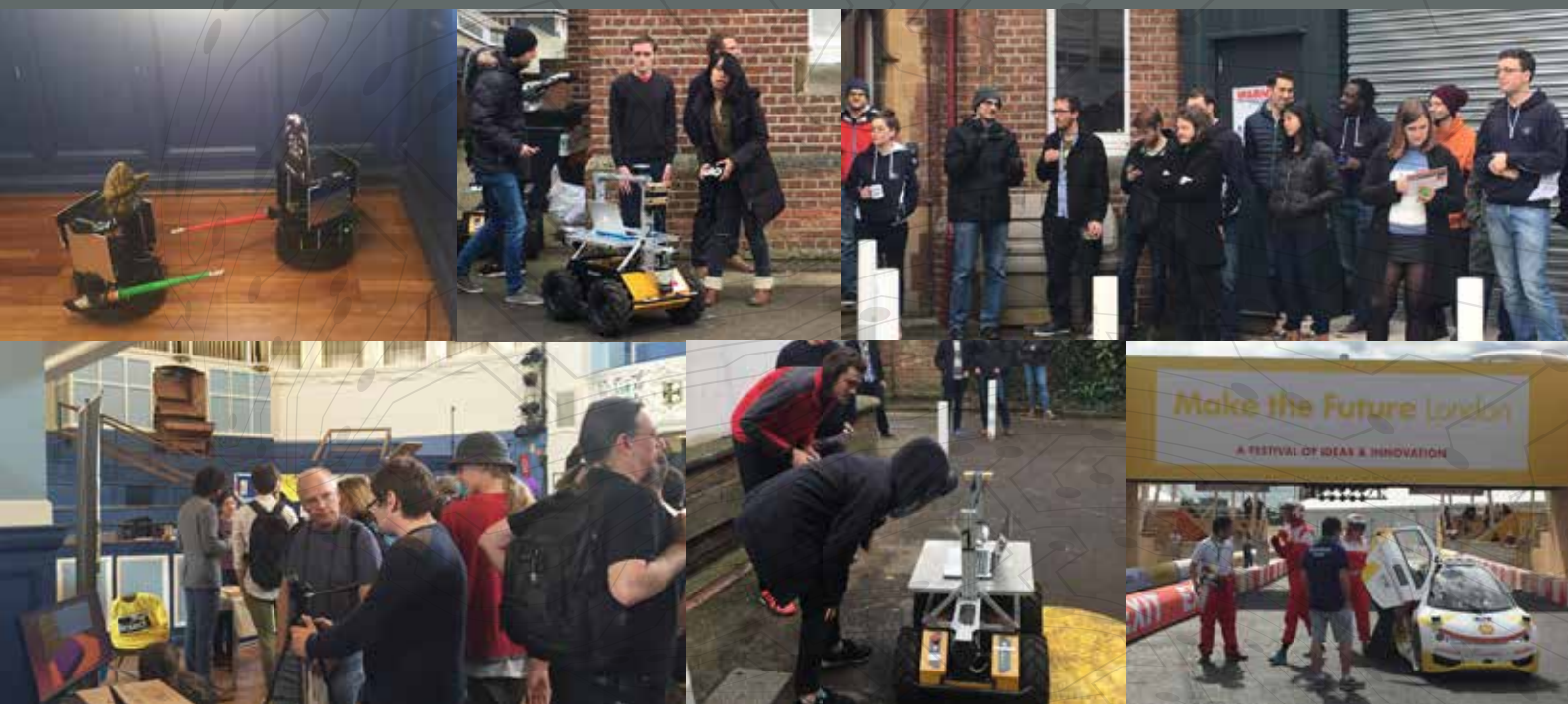
AIMS

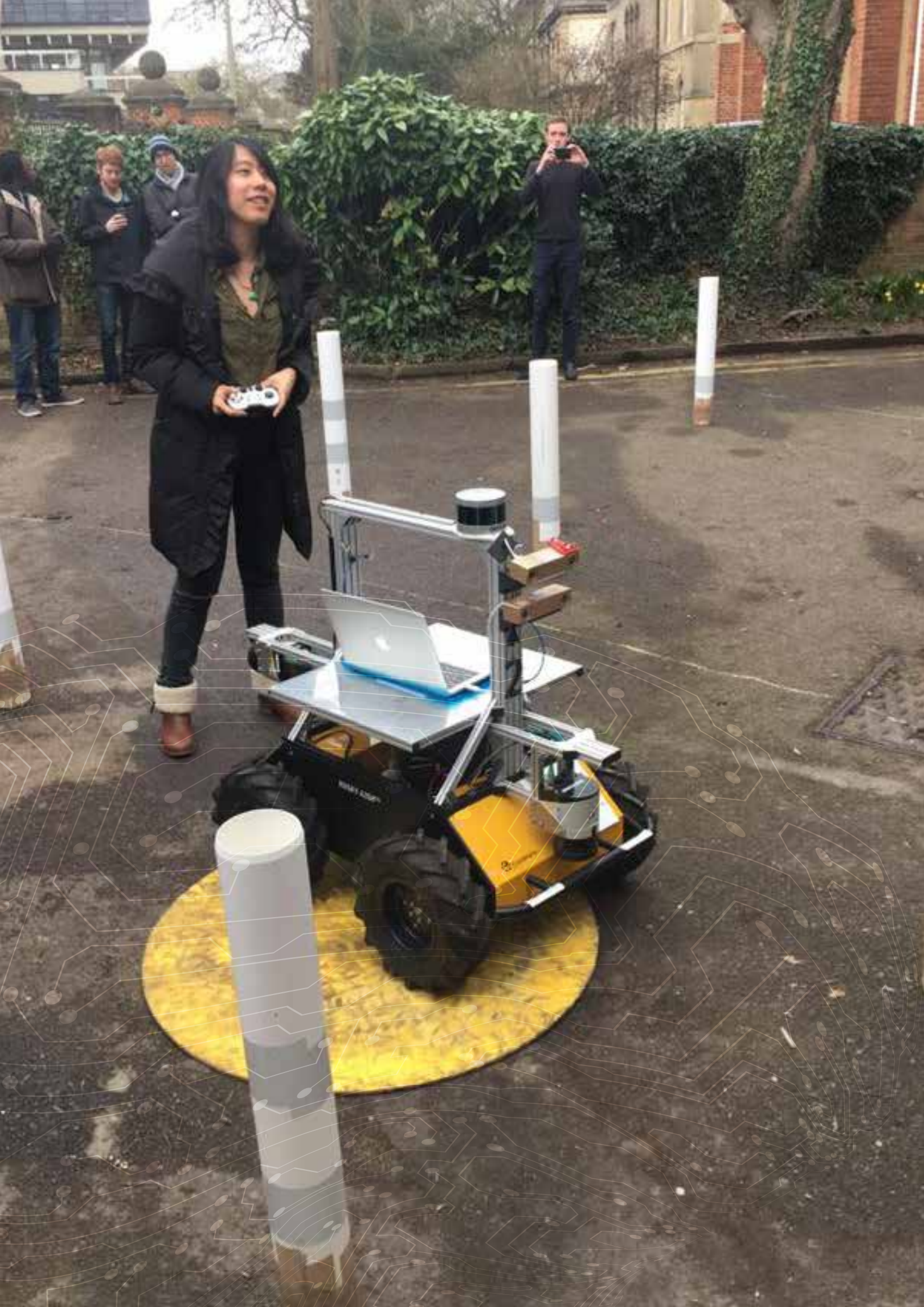
EPSRC Centre for Doctoral Training in Autonomous Intelligent Machines & Systems

Annual Review 2016/17



EPSRC
Pioneering research and skills

UNIVERSITY OF OXFORD



EPSRC Centre for Doctoral Training in Autonomous Intelligent Machines & Systems

Foreword

Welcome to the third annual review highlighting key aspects and activities of staff and students in AIMS during 2016/2017. This has been the third full year of the EPSRC Centre for Doctoral Training in Autonomous Intelligent Machines & Systems. Following intakes in 2014, 2015, 2016 and now 2017, the Centre now has 45 full time Ph.D. students engaged in the four year Ph.D. programme. It's been another busy year, but again an enormously rewarding one. The CDT is thriving with applications escalating at a pace, along with more Industry partners joining the CDT.

In 2017 we received over 140 applications for the CDT programme. We have recruited 14 students, nine of whom are fully or half funded by EPSRC, four who are either fully or partially funded through Industry or University scholarships, and one who is self-funded.

This year has seen our second cohort transfer from PRS (Probationary Research Student) to full DPhil Status and move in to their third year, with several of them producing some outstanding papers submitted to conferences and journals.

The first year students have now completed their training year and now move in to the substantive research phase of their PhDs.

All students have acted as ambassadors for the CDT at events joint with other CDTs and outreach events and have set a bar of excellence. It is truly an exciting time to be involved in autonomous and intelligent systems in the UK.

We would like to warmly acknowledge EPSRC and our industry partners for their continued support of studentships and internships.

Niki Trigoni
Director

Mike Osborne
Co-Director

Wendy Adams
Centre Administrator

Why AIMS?

In the next decade our economy and society will be revolutionised by ubiquitous *Autonomous, Intelligent Machines and Systems*, which can learn, adapt, take decisions and act independently of human control. They will work for us and beside us, assist us and interact and communicate with us. The UK has the opportunity to become a world-leader in developing these technologies for sectors as diverse as manufacturing, energy, security, healthcare, assisted living, transport, environment, entertainment and education. AIMS looks to address the present need for smarter, more useful, machines and systems capable of handling intertwined heterogeneous data. We meet this requirement by training student cohorts in the underpinning sciences of robotics, embedded systems, machine learning, wireless networks, control, computer vision, parallel & distributed computing, statistics & data analysis, design and verification. Our students are able to program, embed and design software, to implement established and novel algorithms efficiently and correctly, to develop and apply models and decompositions which allow for them to control, access, leverage, learn from, interpret and distil large volumes of data.

Our research themes

The CDT is underpinned by key skills areas in four interconnected themes, in which Oxford has particular research strengths, led by members of the CDT team and strengthened by industrial contacts.

Robotics, Vision and Perception: The first key skills area is in enabling autonomous systems to identify and interpret complex scenes, from moving vehicles to human activity and form robust situation assessments to enable appropriate action and decision making. For example, robotic systems require such capabilities so that they can navigate in unknown environments; augmented reality systems require methods for scene perception and object identification. Our vision is to train a new generation of researchers that will be able to understand and embed such intelligent machines across sectors, from home health care to driver-less cars. Such applications are particularly challenging because they require autonomous systems to operate in environments that are inherently unpredictable, continually changing, and impossible to directly model. We infuse expertise in Robotics, Vision and Perception in a unique educational curriculum that cuts across theoretical developments in vision and robotics, scene understanding and perception and state-of-the-art systems research in mobile robot autonomy, navigation and mapping.

Machine Intelligence & Multi-Agent Systems: The second key skills area is in making machine autonomy and intelligence ubiquitous; allowing machines to discreetly pervade the world around us and assist us. Our students are equipped to answer questions like "how can we make machines part of our daily lives without having to continually give them instructions, maintain, repair and look after them?" and "how can machines increasingly learn our objectives, sense our frustration, and help us achieve our goals with minimum interference?" With strong multi-disciplinary expertise in the areas of artificial intelligence, machine learning, crowd-sourcing, participatory systems, language understanding, scalable inference, decentralised information systems, agent-based computing and game theory, the CDT promotes a training foundation for students to inject machine intelligence into real-world applications, such as the critical domains of healthcare, smart grids and energy resources, big data analytics, disaster response, citizen science, human-in-the-loop systems and the environment..

Control & Verification: Our third skills areas lies in developing effective techniques to monitor and control intelligent machines, such as those used in manufacturing, transportation and biosensing/healthcare systems, and to ensure their safety and dependability. For example, how do we ensure that the embedded software controller of the self-driving car does not crash, or that the implantable blood glucose monitor correctly identifies an abnormal range and raises an alarm? Verification via model checking provides automated methods to establish that given requirements are satisfied, but is challenged by the need to consider the complex interplay of discrete, continuous and probabilistic dynamics. This problem is exacerbated in the context of multi-agent systems interacting in uncertain environments. Although there are many new results in the emerging area of hybrid and probabilistic systems, there is a clear gap in developing computational tools that make use of solid theoretical foundations to solve practical problems. Our CDT combines robust control methods with approximate computation methods in stochastic hybrid systems and symbolic model checking & synthesis of embedded software.

Machine-to-Machine (M2M), Secure Sensing & Actuation: The fourth skills area underpins the vision of connecting intelligent devices seamlessly, allowing them to share their sensing, monitoring and actuating capabilities. This is often referred to as "M2M" or the "Internet of Things". Although this vision is not new, there are key technical barriers in the widespread adoption of "intelligent networked" devices. First, machine interaction typically relies on context-awareness (e.g. location) which is problematic in indoor environments. Second, sensors and actuators are inherently unreliable, often lacking calibration, quality estimation, energy management and fault detection capabilities. This compromises their practical use. Third, most M2M solutions have been

designed to meet functional requirements, ignoring security and privacy concerns, both in peer-to-peer ad-hoc networks and cellular networks. By combining expertise in communication and positioning protocols, fault-detection and quality estimation and privacy and security for wireless networks and cloud platforms, the CDT offers a training in M2M systems and the problems they currently face.

To deliver training in these core research themes, we deliver a series of modules in the following areas:

- Data Estimation & Inference
- Machine Learning
- Signal Processing
- Optimization
- Embedded Systems Programming
- Introduction to Modern Control
- Learning from Big Data
- Computer Vision
- Systems Verification
- Security in Wireless and Mobile Networks
- Computational Game Theory
- Sensor & Actuator Networks
- Mobile Robotics

Events, highlights & outreach

- In November 2016 we held another Taster Day with the CDT in Cyber Security for prospective students. This was a very successful event again, with over 100 prospective students attending. Current students spoke about their research, and also produced some great demonstrations with the use of our turtle bots and parrot drones. We will be holding another Taster Day again this year.
- Students attended a number of workshops which were run by external companies. These were courses on MATLAB on Simulink run by Mathworks, BP again offered a course on Project Management training. The students also attended a one day workshop at BP and YouGov, and National Instruments and Samsung gave workshops in the Department talking about real-world problems.

- Students have given talks on drones at the Radcliffe Science Library, to a group of students from Chengdou University and have also given demonstrations at the Romanian summer School in August.
- In June this year we held our first joint CDT conference with Edinburgh and Bristol CDTs. This took place at Lady Margaret Hall, Oxford, and was attended by over 130 people - including students, industry partners and academic members of the CDT. This was a huge success, and the next conference will be held in Bristol in 2018.
- During the summer several students took up internships, these were at Google, California, NASAs Frontier Development Lab (FDL) in Mountain view, California, and another is currently at Google DeepMind, London
- We welcome Toshiba this year as a new CDT partner, and look forward to working with them in the coming years.
- We are also delighted that the CDT was also awarded a second equipment grant (£317,836) in October 2016, as part of the Robotics and Autonomous Systems (RAS) network. The equipment will be used to build robust emergency response systems which can be exploited in challenging environments, such as in mines and, importantly, to help in the aftermath of natural disasters or terrorist attacks. Page Break
- The CDT continues to use the equipment for teaching purposes (e.g., in the context of lab sessions in Mobile Robotics and Sensor Actuator Network courses). In the Actuator and Sensor Networks course we have used Parrot UAVs and smartphones for the practicals. In the Mobile Robotics course we have used the Huskies and Jetson Kits to enable students to rapidly develop and run real-time autonomous navigation systems in challenging environments. The practical problems associated with live implementation require innovative solutions which challenge the students in a way simulations simply can't.
- Equipment has also been extensively used in a number of research projects: For example, the phones / smart glasses and turtlebots have also been used for human-robot navigation in buildings and construction sites; smartphones and sensors for acoustic monitoring; the Astec firefly and Zotac Jetson Kit for semi-supervised autonomous operation and reconstruction; the GoPros and 3D printer and turtlebot in projects on stereo vision, indoor mapping and localisation from landmarks. The equipment is also being used for outreach events, open days and taster days. The high-performance server systems are used very extensively for teaching (particularly modules in computer vision, learning from big data and machine learning), mini-projects, general analysis and research.

Publications & paper submission

AIMS students have had a successful year so far in both submitting and having papers accepted for this year's big machine learning, computer vision and programming conferences, such as: NIPS, ICML, ICLR, ECML, KDD, POPL and ICCV.

Adam Cobb (3rd year student), who submitted the following to NIPS: *Learning from lions: inferring the utility of agents from their trajectories.*

Nikitas Rontsis (3rd year) also submitted to NIPS 2017 this year, with a paper: *Distributionally Robust Optimization Techniques in Batch Bayesian Optimization.*

Robert Cornish (3rd year) submitted two papers to NIPS 2017 *Online Learning Rate Adaptation with Hypergradient Descent and On the Opportunities and Pitfalls of Nesting Monte Carlo Estimators.*

Ivan Kiskin (3rd year) submitted to ECML 2017 *Mosquito Detection with Neural Networks The Buzz of Deep Learning.*

James Thewlis (4th year) submitted to NIPS 2017 accepted. *Unsupervised object learning from dense equivariant image labelling.*

James Thewlis (4th year) submitted to ICCV 2017 accepted. *Unsupervised learning of object landmarks by factorized spatial embeddings.*

Leonard Berrada (3rd year) submitted to ICLR 2017 accepted. *Trusting SVM for Piecewise Linear CNNs.*

Greg Farquhar (3rd year) and Triantafyllos Afouras (2nd year) submitted to ICML 2017 accepted. *Stabilising Experience Replay for Deep Multi-Agent Reinforcement Learning.*

Robert Cornish (3rd year) submitted to POPL 2017 accepted. *Efficient exact inference in discrete Anglican programs.*

Greg Farquhar (3rd year) and Triantafyllos Afouras (2nd year), submitted to NIPS 2017 accepted. *Multi-agent reinforcement learning: Counterfactual Multi-Agent Policy Gradients.*

Sid Ghoshal (4th year) submitted to KDD 2017 accepted. *Reading the Tea Leaves: A Neural Network Perspective on Technical Trading.*

Mini-projects

All students completed two mini-projects during their first year. A list of titles can be found below, and all these mini-projects can be found at the following url:

http://aims.robots.ox.ac.uk/mini-projects/

- Counterfactual Multi-agent Policy Gradients
- Improving Exploration in Deep Reinforcement Learning
- Forecasting Financial Time Series with CNNs
- Neural Networks for 2D to 3D Human Pose Estimation
- Multi-layer Stacked Gaussian Processes
- Seeing is Believing: Contrastive Hebbian Clustering for Unsupervised One-shot Gameplay Learning in a Recurrent Neural Network
- Inference of Spatial Distribution from Multi-Sensor Measurements along Trajectories with Inaccurate Information
- Closed-loop Quantitative Verification of Rate-adaptive Pacemakers
- Learning from Limited Demonstrations in High Dimensional Feature Spaces
- Probabilistically Extrapolated Bayesian Quadrature
- Lip Reading
- Deploying Novel Exploration Techniques (NETs) FOR Malaria Policy Interventions
- Addressing Drift and Overfitting in Deep Visual Odometry
- Towards Real-time Inference for BUGS Models: BUGS to Anglican Compilation
- Hamiltonian Monte Caro Inference for a First Order Probabilistic Programming Language
- DistinctiveNet: Self-supervised Objectness Losses for Detection
- GP-based Inference for Environmental Property Surveying with Noisy Locations
- User Activity Recognition and Room-level Localisation from Smart-watch IMU Data
- xDQN – Differentiable Planning in Deep Reinforcement Learning
- Reinforcement Learning for Robotic Arm Control

DPhil Proposals

Cohort 2016 will now work on their PhDs. A list of their research proposals can be found at: **http://aims.robots.ox.ac.uk/dphil-research-proposals/**

Feedback from Students – Cohort 2016

"I've really enjoyed the first year. I think it was a good balance between breadth (diverse range of useful courses in the first two terms) and depth (the mini-projects). I've learned so much and solidified what I want to work on in the next 3 years. My favourite parts of the year were the robotics challenge week and getting to know the people in the group I'm planning to join. "

"Honestly, I have really enjoyed it. I cannot find anything I would change about the courses and the tutorials, which I have found well structured. I really enjoyed all the events (as for lunches, dinners, and conferences) that were organised. Industry week was amazing too. "

"The only things that come into my mind are the timings of the talks about infrastructure and serves. I think later would be better. As we did not need to use these during the courses, but most of us needed them during the mini-project. Personally, by the time the mini-project started, I had already forgot everything. "

"Also it would be nice to have the mini-project presentations a bit earlier on time. By the time these were given, I had already my mind almost set. "

"For everything else, again everything seemed perfect to me. Thanks for giving us this amazing one-year experience."

"I would say that it has been a really fun and interesting course. I would have personally wanted to have more labs on implementing neural networks from scratch. It is very easy to google for tutorials, but given the expertise here it would have been nice to have done at least one. As there are a lot of cravats to implementing them properly, I suppose, unless you use a wrapper. I would also say that I wish that the second half of the course, from Jan-March, had been a little more intensive. I also wish that we'd been able to do some actually embedded systems programming, maybe using the chip boards in the toy cupboard, during the embedded systems programming week."

"I wish that we had to do more presentations, for example, we could have all done one each on the signal processing methods that we tried and the results that we were able to get. Just to increase confidence and to get us used to presenting our work."

"I think that a week on reinforcement learning, given its current high status, would also be very valuable."

"My favourite weeks were Data estimation and inference, Signal processing, Machine learning, Security in wireless networks and Robotics."

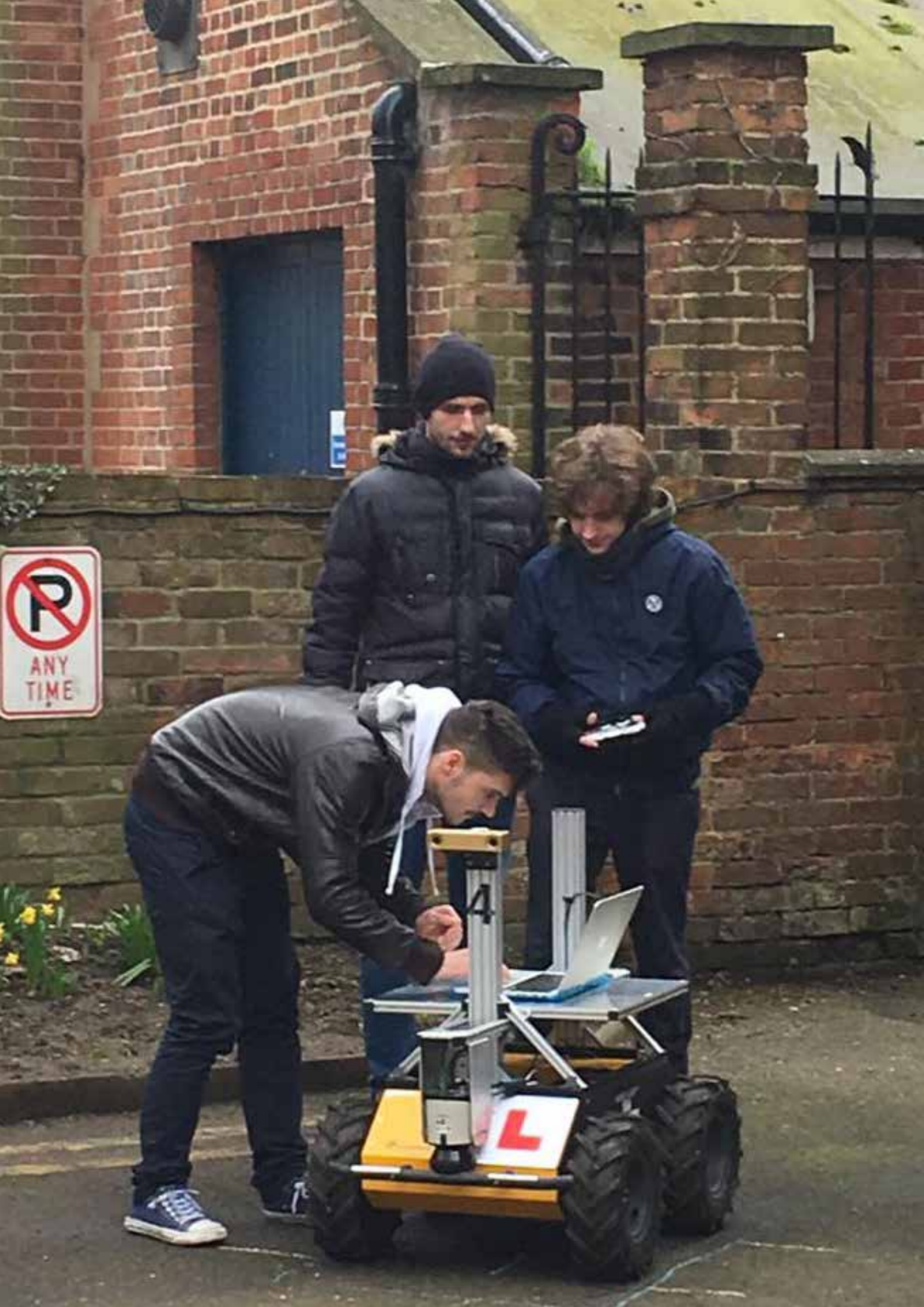
"The first year definitely went well. "

"Given the breadth of the CDT the choice of courses and their depth were appropriate. However, for my personal taste I wish there would be more machine learning focus (not too many people in the cohort support my view on this), and that we were better introduced to reinforcement learning (which is growing as a major research interest, especially at Oxford). Personally I think it would be great to have a long course which would cover one of the classic machine learning textbook such as Bishop, Murphy or MacKay, but I understand it does not entirely fit into the idea of a CDT."

"The course I've enjoyed most was Mobile Robotics group week, which was a group project and I think it could be longer or we could have more of the curriculum covered in that way if possible and reasonable."

"I would also say that we had slightly too much time off. I know some other CDTs have longer terms and projects (e.g. 11 weeks) and I think that could be the case for AIMS as well. Projects should definitely be slightly longer unless the implicit assumption is that people will always run late so it's better if they run late with 8 weeks project than 11 weeks project."

"The first year training courses at AIMS are very helpful! It covers the major aspects of machine learning, robotics and intelligent systems. At times, I doubted the relevance of a particular module to my future research, but the further I have progressed with my project, the more convinced I am that everything I learnt is useful. It helped me to understand papers, talks and led to ideas to solving problems."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Feedback from Courses – Cohort 2016

The lectures were engaging and gave basic introduction to Game Theory.

The amount of coverage, impressive breadth of materials. Cool demos in the lectures, the exercise is well designed to. I enjoyed the visual demonstrations and the in-depth discussions regarding the techniques used for Computer Vision.

Seeing the applications of the machinery that we are learning was very fascinating.

The techniques taught in the Data Estimation course is very relevant to many applications.

Best part of the Embedded Systems course was having an open project and I found during this exercise personally I learnt more than through the lectures or lab exercises.

The lectures for Introduction to Modern Control covered a great variety with the right amount of depth and the lab sessions reinforced this with very helpful TAs.

Very high quality lab assignments, just like for Optimization course, great tutors, great lectures.

Just seeing how the CNNs work was pretty awesome.

The Machine Learning lectures were very engaging. The TAs were very helpful.

The quality of the material and lectures provided was of a great standard while the set-up of the labs and the work was a great example of how to create a contained 5 day course on these topics.

The course provided exactly the right level of content and interaction with the theme of AIMS.

Great lecturing style, very discursive and always open to discuss and work things through with the group.

The lecturers were all very engaging and the lab assistant was excellent.

The wide coverage of materials and techniques in the lecturers.

Student Biographies – Cohort 2017

Antigoni Alevizaki

I was born and raised in Athens, Greece, where I also studied Electrical and Computer Engineering in the National Technical University of Athens. During my undergraduate studies, I developed an interest in Machine Intelligence and its correlation with Biomedical Engineering, especially the areas of neural networks, computer vision and pattern recognition and how they could work towards imitating human behaviour. I am very excited to join the CDT in AIMS, study these interconnected areas and gain knowledge and interest in new scientific fields. Outside of studies, I enjoy travelling, dancing the lindy hop and other swing dances and listening to music!

Yuki Asano

I am a Japanese German and studied physics at the LMU Munich (with an exchange semester at the University of Tokyo). During that time, I also started a second BSc in economics which I recently finished with my thesis at the Potsdam Institute for Climate Impact studies. After my physics degree, I spent a year founding a non-profit student consultancy in Munich and gaining some practical experiences. This was followed by the MSc in Mathematical Modelling Scientific Computing at the University of Oxford where I focussed on complex networks, machine learning, mathematical analytics and complexity economics. This naturally lead me to a machine learning internship at TransferWise and also to this CDT where I am excited to work on impactful challenges.

Mark Finean

I was born and raised in South West England and graduated in 2016 with a Master of Physics (MPhys) from Oriel College, Oxford. I spent the following year working as an Investment Analyst and Trader in London. During my studies, I worked in an interdisciplinary research group where I developed and compared computational models of photon and proton therapy treatment plans for Glioblastoma Multiforme patients. I also worked in a Condensed Matter group investigating, and building apparatus for, the manipulation of microscopic particles in electrodynamic traps. The interdisciplinary nature of the AIMS CDT greatly appeals to me and I am very excited to be starting in October 2017.

Siddhant Gangapurwala

I was born and raised in Aurangabad, India, a city well known as the gateway to the famous Ajanta and Ellora Caves. In the past few decades, it flourished as an industrial town, elements of which contributed towards my passion for industrial research. I obtained my Bachelor's in Electronics Engineering from the University of Mumbai where my primary focus was on Embedded Systems for Mobile Robotics applications. At Oxford, I intend to work on Machine Learning techniques to Optimize Non-Linear Control in Under-actuated Robotic Systems. If not studying, I'll mostly be found either completing an abstract painting, at the gym, indie traveling to a place not much heard of, or working on building a Robotics Venture.

Chia-Man Hung

Originally from Taiwan, I have spent most of my time in Paris over the past six years. Two years of theoretical mathematics and physics at Lycée Louis Le Grand have prepared me to enter Ecole Polytechnique, where I have studied a broad range of scientific subjects, with an emphasis on Computer Science. I also completed an MSc in Data Science in the Department of Applied Mathematics at the University of Paris-Saclay. During my studies, I have developed interests in reinforcement learning and robotics. I am thrilled to explore different topics in the field of AIMS. Outside of work, I enjoy high energy activities, such as hiking, running and swimming, and also extreme sports, gliding and scuba diving.

Florian Jaeckle

I'm from Hamburg, Northern Germany. I graduated this year with a Master in Maths and Computer Science (MMathCompSci) from Worcester College, Oxford. My master thesis included complexity results in the area of computational choice theory. Having focused on various fields of AI such as machine learning and game theory in my final year, I'm looking forward to applying these skills to robotics as part of the CDT for Autonomous Intelligent Machines and Systems. My hobbies include piano, football, tennis and hockey, as well as windsurfing and skiing.

Henry Kenlay

I'm from Northampton in the East Midlands of England. I did my undergraduate degree at the University of Warwick where I studied Discrete Mathematics, a combination of computer science, mathematics and statistics. I then ventured into applying mathematics to biology at the University of Cambridge where I completed an MPhil in Computational Biology. My thesis focused on the utility of deep learning to computational biology. Inspired by my research into deep learning I went on to spend a year working for the university as a research assistant applying deep learning to unsolved problems in epigenetics at the MRC Biostatistics Unit and species classification from images at the Department of Applied Mathematics and Theoretical Physics. I am interested in Machine Learning and Deep Learning.

Hala Lamdouar

I am from Rabat, Morocco, where I studied advanced Mathematics and Physics at Lycée Moulay Youssef Preparatory Classes. I completed my Engineering degree in signal and image processing at ENSEIRB-MATMECA in Bordeaux, France, followed by a MSc in applied mathematics with a focus on machine learning and computer vision at Ecole Normale Superieure of Cachan (Paris area). After a three-year experience in the autonomous driving field, working on perception solutions, I am thrilled to deepen my academic knowledge in Artificial Intelligence as a part of the CDT in AIMS. Apart from that, my hobbies include learning foreign languages (lately Japanese) and playing the harp.

Robet McCraith

Graduated from Maynooth University with a degree in Computational Thinking. During this time I was an exchange student in University of Toronto where my interest in Computer Vision and Machine Learning began. During my final year project I worked on machine perception, object recognition and tracking which I hope to explore further as part of the AIMS program. Outside of this I enjoy cycling, technology, traveling and solving problems.

Benjamin Moseley

I am from Essex, UK and lived in Durham for my Masters degree in physics. I was a geophysicist for BP for five years, living in London. During this time I wrote a patent about seismic imaging, helped to explore for oil and gas fields in Egypt and co-founded a data science community in BP which connected over four hundred people worldwide. Before BP I developed a novel navigational warfare system with the Ministry of Defence and worked as a financial analyst during the London 2012 Olympic Games. For my Masters project I researched next-generation spectrometers for their use in astronomy. I have a strong interest in the field of AI, its ethics, its widespread applications in industry and the integration of learning and reasoning systems. In my spare time I am learning to play the piano, volunteer for a homeless charity and love a good bouldering problem.

Alasdair Paren

I'm from Cambridge where I grew up and attended school. In 2014 I graduated from Imperial College London with an MEng in Mechanical Engineering. After working for an engineering consultancy firm for roughly a year in 2016 I decided to return to academia and pursue my interest in machine learning by studying an MSc in Computational Statistics and Machine Learning at UCL. I have a particular interest in machine vision and its application to self driving cars. This topic will be the focus of my DPhil which I will complete with help from my sponsors Toshiba & EPSRC.

Tom Pretty

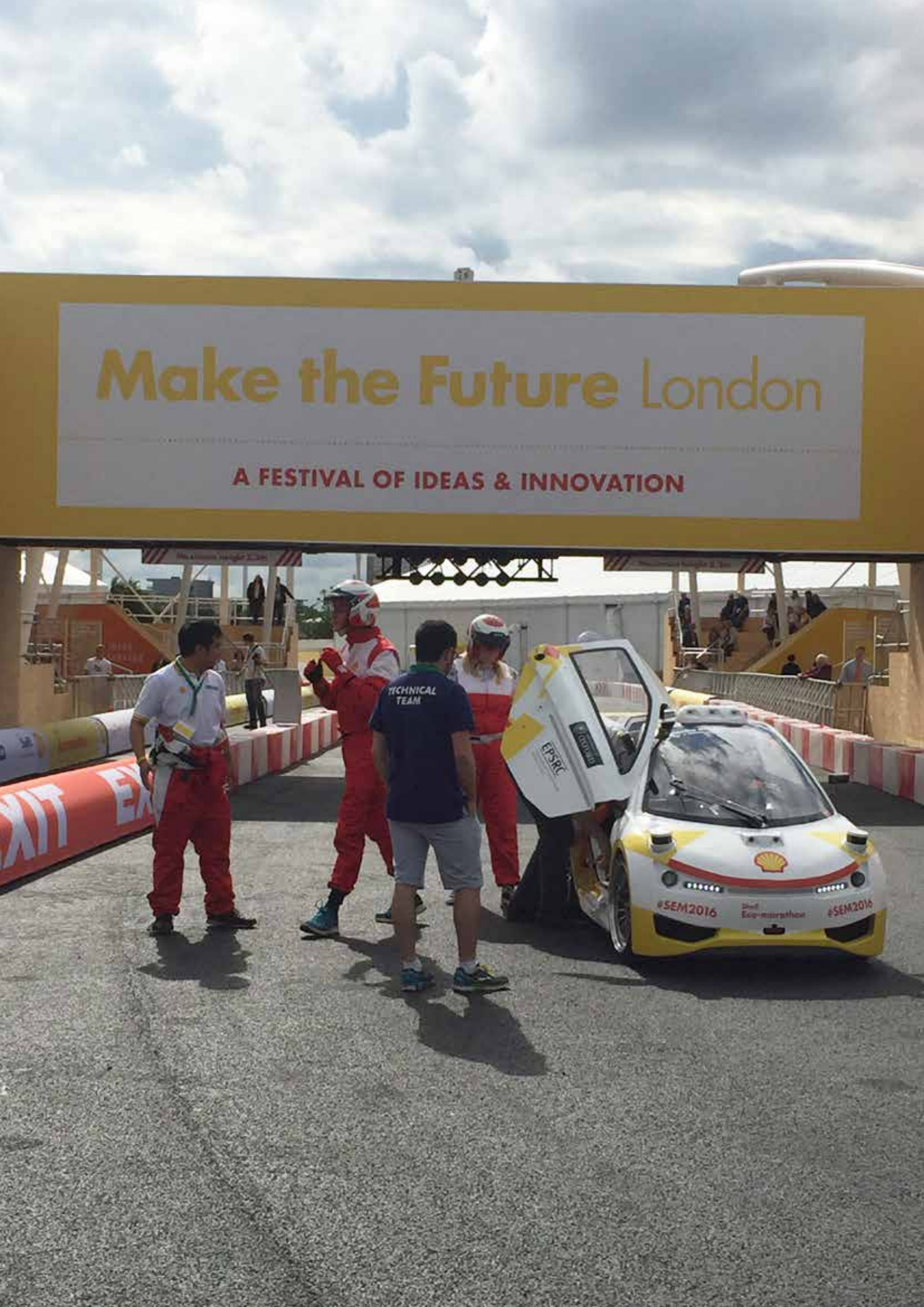
I graduated with a MEng in Engineering Science from Oxford in 2017. My masters project involved creating a framework for running convolutional neural networks on mobile GPUs. I look forward to getting more experience with CNNs and other areas of vison/ learning during my AIMS studies. I've always loved technology and I'm excited by the fact that AIMS will allow me to pursue a career helping to build some of the most innovative new technologies.

Tim Rudner

I am from Cologne, Germany. I received a B.S. in Applied Mathematics and Economics from Yale University and an M.Sc. in Applied Statistics from the University of Oxford, where I've been fortunate enough to be supported by the Rhodes Scholarship. During my time at Yale, I also studied theoretical computer science, quantum physics, analytic philosophy, and history while conducting research on game theory, financial economics, and international trade theory. My interest in computational learning theory and my work in game theory ultimately led to my transition to statistics and machine learning. Prior to studying statistics at Oxford, I was as a consultant for the European Central Bank, worked as a research assistant in economics, and interned in bond trading. My current research interests span the theory and applications of Bayesian statistics, deep learning, and reinforcement learning. In my spare time, I enjoy reading philosophy, learning Mandarin, and playing recreational sports.

Lewis Smith

I'm from Chesterfield in north Derbyshire. I did an MPhys at the University of Manchester, and during my degree I became interested in programming, statistics and machine learning. During my time at Manchester, I spent a summer on an undergraduate science program in South Korea, experimented with ways to improve the vision system in a robot arm with a company in Cambridge, and did my final year project on learning algorithms for detecting pulsars and transients in radio astronomy. I'm really excited to do more work on machine intelligence and related fields with the CDT.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Student Biographies – Cohort 2016

Triantafyllos Afouras

I was born and raised in Thessaloniki, Greece, where I obtained a diploma in Electrical and Computer Engineering from the Aristotle University. During my studies there, I participated in the Pandora robotics team as a software architect. I have also worked and studied in Zürich and Madrid. I am interested in machine learning, particularly the use of deep and reinforcement learning for the development of autonomous agents. I am enthusiastic about traveling and enjoy swimming, football and cinema.

Oliver Bent

Graduated MEng Engineering Science from the University of Oxford 2013. The last 3 years I have been working with IBM Research Africa in Nairobi, Kenya. Developing applied technology solutions in the domains of Education and Healthcare.

I look forward to furthering my academic interest in machine intelligence, towards tackling new challenges with technology.

Fabian Fuchs

I am from Erlangen, Germany (close to Nuremberg and two hours north of Munich). I studied physics at the Universities of Erlangen, Heidelberg, and Imperial College London. Alongside my studies, I gained experience in consulting, co-founded a startup and did some awesome sports climbing. In physics, I have enjoyed computational work the most, specifically developing and implementing complex algorithms. In my twelve-month M.Sc. project (in Germany the M.Sc. lasts for two years), I simulated virus self-assembly in hydrodynamic flow. Fascinated by recent developments in artificial intelligence and by the possibilities which have opened up, I am thrilled to join the AIMS CDT in October 2016.

Adam Golinski

Graduated in Computational Physics from The University of Edinburgh. Meanwhile studying I spent a year abroad at University of California, Berkeley where my interest in machine learning started.

I am interested in high-tech and software industries, automation (especially using cutting-edge machine learning solutions), IoT, sensor networks, big data trends and data science. Apart from that I'm a fan of plain text emails, amateur gym-goer and an avid FIFA player.

Bradley Gram-Hansen

I gained my MMath from the University of Nottingham in 2015 and had the pleasure of completing a summer research internship during my time there, within the relativistic quantum information group. I am thrilled to be joining the AIMS program and I cannot wait to explore all that it offers. My personal interests are in developing new learning processes that use information in interesting ways, whether that be in the classical sense or the non-classical sense. Although, with all that the AIMS program offers I am bound to develop many other personal interests. Outside of academia I enjoy fell running, rock climbing, all types of cycling, the Discworld series, Arduino sets and observing the interplay of electronic, natural and human systems.

Xu Ji

I'm from London. I studied Computing as an undergrad at Imperial, where I co-wrote a bare metal chess game in pure assembly, interned at Google a few times, built some machine learning into their products, and for my final year project invented a new image matching algorithm. I look forward to exploring these interconnected areas and more in the CDT. My hobbies include listening to a lot of music, animals, and taking random walks.

Shuyu Lin

I am from Beijing, China and have been studying in the UK for the last 6 years. I have gained huge interest from my undergrad and master degree of Engineering at Oxford in the areas of machine learning, networks, signal processing and robotics, and wish to gain further knowledge of them during my postgraduate study. I like technology, travel and food, and love to meet people sharing the same interests!

Andrea Patane

I am from Catania, Italy. I have received the BSc degree in Mathematics from the University of Catania, with a thesis on evolutionary algorithms for solar cell design. Pareto-oriented analysis for synthetic biology design problems was the main theme discussed in my Master thesis. I also had the chance to work on pacemaker modeling and analysis during two summer internships in the VERIWARE project. I enjoy swimming, playing the blues harp and I really like opera.

Sasha Salter

I graduated in summer 2015 with a MEng in Engineering Science at Keble College, Oxford. During my final year I investigated the use of Gaussian Processes for sequential changepoint detection in financial time series. In the past year I worked for an energy consultancy as an analyst and a location management company as a publisher specialist. I am excited to return to Oxford and pursue my passion for artificial intelligence and machine learning. My hobbies include piano, guitar, sketching, gym, running and cooking.

Edward Wagstaff

I grew up in Milton Keynes and did my undergrad in maths at Cambridge, followed by a maths and computer science masters at Oxford. I've been working in the software industry in London since 2012, but I've decided that researching autonomous systems sounds more fun than building websites so I'm very excited to be starting on AIMS.

Student Biographies – Cohort 2015

Leonard Berrada

I was born and raised in Paris, France, where I have benefitted from a multidisciplinary education: after two years of theoretical mathematics and physics at Lycée Sainte Genevieve, I have studied a broad range of engineering subjects at Ecole Centrale Paris, with an emphasis on computer science and applied mathematics. While there, I also completed a Bachelor of Science degree in Fundamental Physics at University Paris-Sud. I went last year to University of California, Berkeley, for a Master of Engineering in Industrial Engineering and Operations Research. After an internship at Thales Research & Technology, I am now thrilled to join the Autonomous Intelligent Machines and Systems program to further my passion for artificial intelligence and machine learning.

Rowan Border

I'm from the island of Bermuda but have spent the past four years in Scotland where I attended the University of Edinburgh and studied for a BSc in Artificial Intelligence and Computer Science. In my final year at Edinburgh I was able to pursue my interest in robotics for the first time by working on my robot drawing dissertation project, the 'Robot Picasso', with the SLMC robotics group. I have been elected as the Rhodes Scholar from Bermuda for 2015 and will be attending Lincoln College. I am very excited to be starting the CDT in Autonomous Intelligent Machines and Systems and continuing to explore the world of robotics.

Adam Cobb

I completed my undergraduate degree in Engineering Science at Lady Margaret Hall, Oxford. Having particularly enjoyed working on the detection of exoplanets in large data sets for my final year project, I am excited to explore other areas in the field of AIMS. My hobbies include football, running, swimming and golf.

Rob Cornish

I am originally from Australia, and grew up mostly in Melbourne. I began university as a philosophy major at the University of Melbourne before transferring to study pure mathematics and electrical engineering, and then completed an Honours year in applied mathematics at Monash University with a thesis topic in computer vision. Along the way, I also gained some research experience in program analysis at the University of Melbourne, and in robotics with the CSIRO. I am particularly interested in artificial intelligence topics within a robotics context. I also enjoy cycling, hiking, and playing contemporary and classical guitar.

Maximilian Igl

I am from Germany where I have been studying Physics (MSc) and Economics (BSc) in Munich. Over the last two years I also have been quite active at the Centre for Digital Technology and Management, a University program here in Munich dedicated to entrepreneurship. There, and also during my studies of Physics, I've developed a strong interest in Machine Learning and its applications. In my free time I like to go climbing or hiking. The last time I was in England (I was at the University of Warwick for one year) I also did quite a lot of Tango Argentino.

Gregory Farquhar

I'm German-American but have lived in the UK for over ten years now. I studied at Oxford for a Masters in Physics, but am looking forward to shifting my academic focus for the CDT in AIMS. I'm particularly interested in how humans interact with autonomous systems, and in natural language processing. In my spare time I love to play guitar!

Kevin Judd

My name is Kevin Judd, and I live between Baltimore and Washington D.C. in the U.S. with my parents, younger sister, and my dog and cat I graduated from the University of Maryland College Park with degrees in both Electrical Engineering and Computer Science. Outside of class and work, I enjoy the outdoors and being active. I love running and playing sports, as well as cooking and music. I'm always excited by the opportunity to travel to new places and meet new people.

Ivan Kiskin

Originally from Ukraine, I have attended schools in London, Kiev and Germany. I then went on to study Engineering Science at Wadham College, Oxford. In my fourth year project I worked on signal processing and probabilistic machine learning techniques to aid the detection of pulsars. Outside of studies I take an interest in music and guitar. I am looking forward to further expanding and applying my knowledge at AIMS.

Kyriakos Polymenakos

From Athens, Greece, studied Electrical and Computer Engineering in the NTU of Athens. Took special interest in Power Systems, but soon was more attracted to Control Systems and Machine Intelligence. As part of the CDT in AIMS looks to take part in the research creating a new generation of intelligent systems, propelled by learning from big data and cooperation between multiple agents.

Nikitas Rontsis

I am from Greece, where I studied Electrical & Computer Engineering (5-year Diploma) at Aristotle University of Thessaloniki. During this period, I was an exchange student in EPFL for 2 semesters, where I also made my diploma thesis in controlling kites for energy harvesting. I am excited about modern control methodologies, including, but not limited to, data driven techniques.

Timothy Seabrook

I graduated in MEng Intelligent & Robotic Systems at Lancaster University in 2014 and co-founded a Sharing Economy limited partnership in the same year. I am interested in exploring and developing collaborative AI agents reflecting the social roles of humans, as well as pushing the bleeding edge of autonomous complex systems modelling and prediction.

I am a keen entrepreneur, and hope to discover new applications for Artificial Intelligence to benefit humankind.

Jaleh Zand

I completed my MSc in mathematics at Imperial College London in 2014. Previous to that I was a structured trader, followed by a quant strategist in Fixed Income division at UBS investment bank, where I started to be fascinated and intrigued with machine learning methods. I further have a keen interest in Bayesian statistics, neural networks, and complex systems.

Student Biographies – Cohort 2014

Samuel Albanie

I did my undergrad in mathematics at Oxford, before doing a Masters in computer science Trinity College, Dublin. I'm interested in AI, particularly computer vision and learning.

Oliver Bartlett

After growing up in New Zealand, Syria and London, my family moved near Banbury in 2004. I did my undergraduate Engineering Science at New College, culminating in my 4th Year Project where I investigated trends in the Afghanistan War using Log-Gaussian Cox Processes. Outside of Engineering I enjoy Windsurfing, Aussie Rules Football, Hockey and Skiing. I look forward to continuing my studies at Worcester College.

Siddartha Ghoshal

I'm British-Indian and grew up in Fontainebleau, a lovely small town on the outskirts of Paris. Halfway through my schooling I moved to the UK, and have spent most of the past 2 decades based in London. Following an undergraduate degree in Mathematics at Imperial College, I began work in debt capital markets at Dresdner Kleinwort Wasserstein in 2002. I subsequently took a year out from investment banking to complete an MSc in Finance and Economics at the LSE to expand my personal knowledge. This opened new and vastly more exciting doors in my sector, so I plunged back in as a trader in commodity exotic derivatives at Deutsche Bank, where I spent much of my twenties. I completed the MSc in Computer Science at Oxford in September 2012 and have ever since been keenly interested in the application of machine learning techniques to pattern recognition in complex datasets.

Ankush Gupta

I am from India but was in the US for my undergraduate work in Electrical Engineering and Computer Science at the University of California, Berkeley. I am interested in computer vision, robotics and machine learning methods. Recently, I have worked on learning robotic manipulation from human demonstrations, specifically, learning surgical suturing. I have also worked on 6DOF tracking system for large-scale demonstration collection. My time at Oxford is being funded by the generous Clarendon Fund and Balliol College Eddie Dinshaw Scholarship.

Jack Hunt

I originate from Kent in southeastern England and conducted my BSc in Computer Science at Goldsmiths College, University of London. During my study for my Batchelor's degree I developed an interest in Machine Learning and Adaptive Systems. This interest has lead to my participation in the CDT in Autonomous Intelligent Machines and Systems. In particular, I am interested in applications of Machine Learning, Computer Vision and Agent Systems to Robotics.

Stefan Saftescu

I am from Romania and moved to the UK to start university. I obtained my Bachelor's Degree in Computer Science from the University of Surrey in 2012 and my Master from University of Oxford in 2013. Having spent a year as Software Engineer in a London-based "big data" start-up, I am now eager to move into Engineering Science throw the CDT in Autonomous Intelligent Machines and Systems.

[1] See the VGGMaxBBNet entries at: http://rrc.cvc.uab.es/?ch=2&com=evaluation

Hillary Shakespeare

I'm from London where I studied Physics (MSci) at Imperial College. I then took a year out to make a micro-budget movie (a long standing hobby) before coming to Oxford for an MSc in Computer Science. Within the MSc I was most interested in Intelligent Systems and Machine Learning and am excited to expand on these and related areas in the CDT.

James Thewlis

I was born in Wales but grew up near Alicante in Spain. I studied MEng Computing at Imperial College London. After graduating I spent some time travelling across North America before starting work at Mirriad, collaborating with Oxford on a TSB funded project using deep learning for video analysis. I am interested in Computer Vision and Machine Learning, especially object recognition and scene understanding.

Stefan Webb

Graduated from the Australian National University in 2013 with a Bachelor of Statistics and Economics with First Class Honours in Statistics, topping his cohort. He received the first and second year economic prizes for the highest overall marks, and was also a recipient, during his studies, of the Statistical Society of Australia's Young Statisticians Award. His research interests lie in the fields of machine learning and Bayesian statistics, and at Oxford he intends to work on developing the next generation of intelligent systems that can understand natural language. Alongside his academic work, Stefan has worked as an ANU teaching assistant in maths, economics, and computer science, as well as supporting outreach and school support work coordinated by the university. Outside of study, his interests include drumming, classical music, and photography. On completion of the DPhil he hopes to either continue work in the field of academia or establish himself as a big data entrepreneur.

AIMS Contacts

The AIMS administration team comprises the Director, the co-Director and the Centre Administrator.

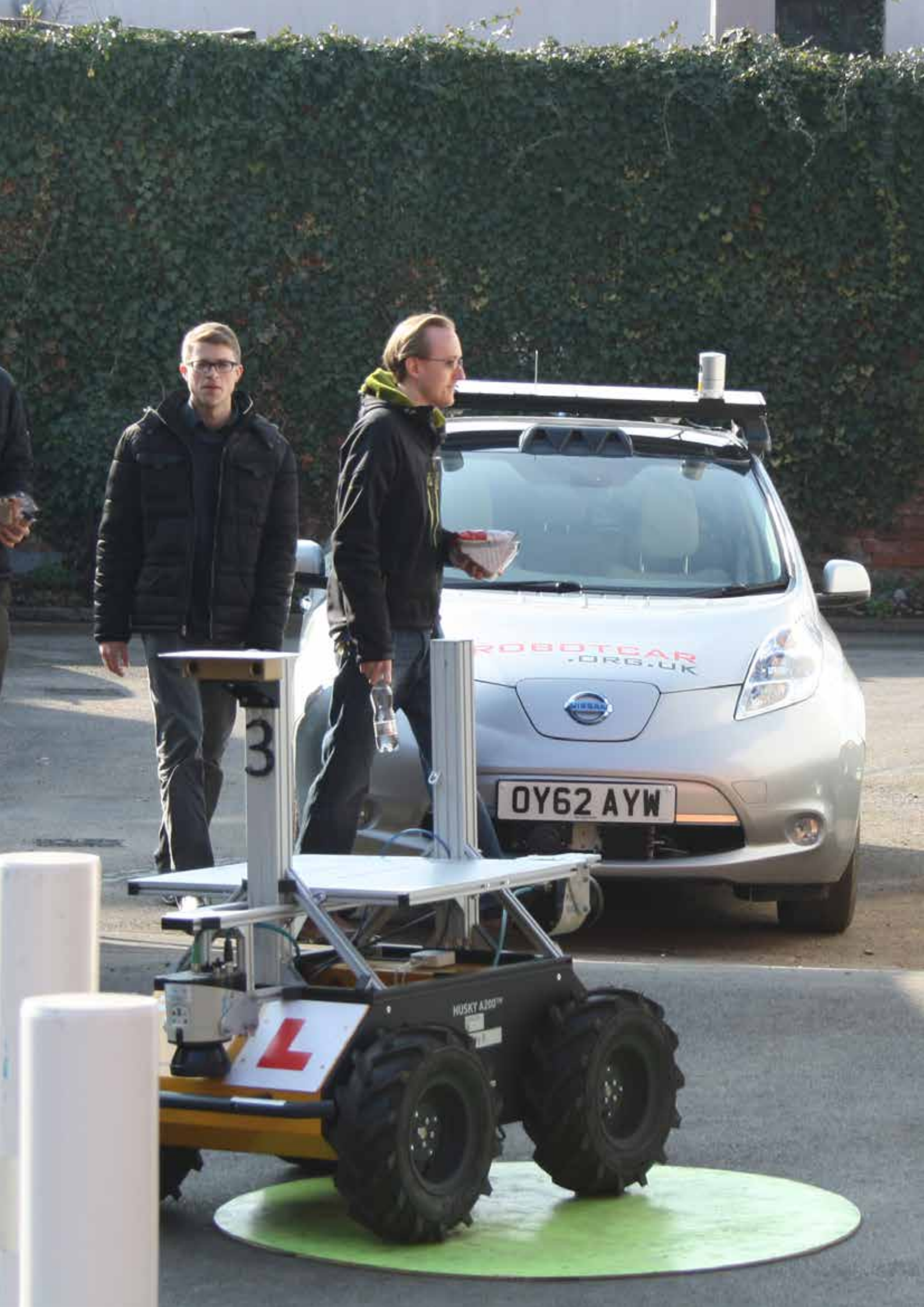
Niki Trigoni
Director

Michael Osborne
Co-Director

Wendy Adams
Centre Administrator

Academic Supervisors

A full list of academic supervisors can be found at:
http://aims.robots.ox.ac.uk/academics-and-staff/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EPSRC Centre for
Doctoral Training in
Autonomous Intelligent
Machines and Systems (AIMS)
Department of Engineering Science
University of Oxford
Parks Road
Oxford OX1 3PJ

CDT Director
Stephen Roberts
Email: aims-cdt@robots.ox.ac.uk
Tel: 01865 273152

CDT Co-Director
Niki Trigoni
Email: aims-cdt@robots.ox.ac.uk
Tel: 01865 610681

CDT Centre Administrator
Wendy Adams
Email: aims-cdt@robots.ox.ac.uk
Tel: 01865 283155

http://aims.robots.ox.ac.uk/

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