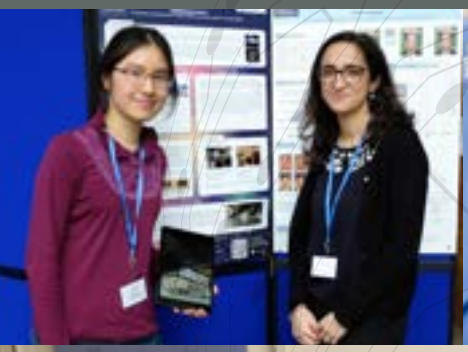
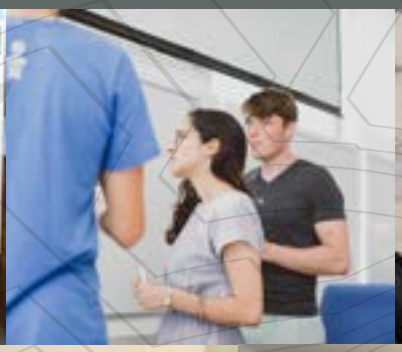
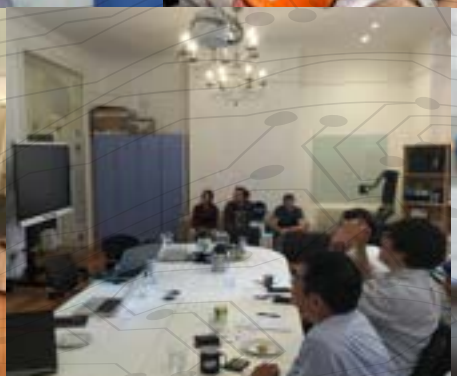
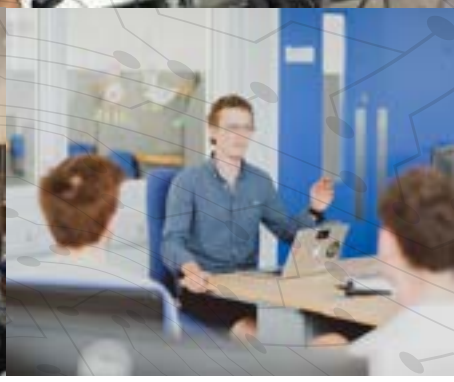
AIMS

EPSRC Centre for Doctoral Training in Autonomous Intelligent Machines & Systems

Annual Review 2017/18

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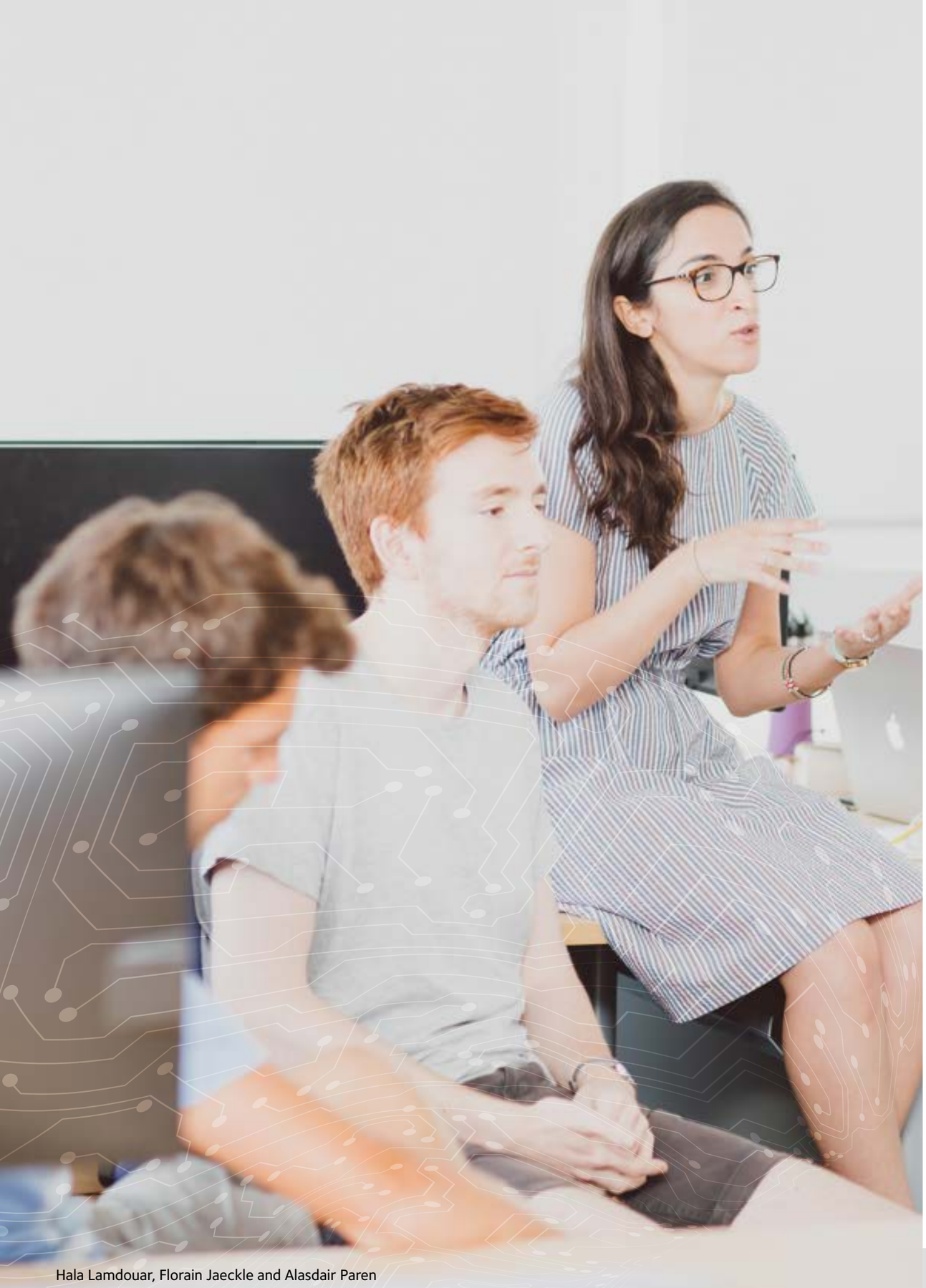


Hala Lamdouar, Florain Jaeckle and Alasdair Paren

AIMS

EPSRC Centre for Doctoral Training in Autonomous Intelligent Machines & Systems

Foreword

Welcome to the fourth annual review highlighting key aspects and activities of staff and students in AIMS during 2017/2018. This has been the fourth full year of the EPSRC Centre for Doctoral Training in Autonomous Intelligent Machines & Systems. Following intakes in 2014, 2015, 2016, 2017 and now 2018, the Centre now has 62 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 2018 we received over 190 applications for the CDT programme. We have recruited 17 students, eleven of whom are fully or half funded by EPSRC, six who are either fully or partially funded through Industry or University scholarships. This year has seen our third 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.This summer we put together the renewal bid for the CDT, we thank our potential new partners, and also our existing ones for their continued support with this bid, and we expect to know the outcome sometime in December 2018.Two new CDTs within AI have also been submitted, one in Foundations of AI with the Computer Science Department and also AI for Planetary and Environmental Sciences with Computer Science, Physics and Zoology. They will also know the outcome of their bid sometime in December.

Mike Osborne
Acting Director

Alex Rogers
Acting Co-Director

Wendy Poole
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, with two new courses added to the teaching in 2018; Reinforcement Learning and Dynamic Robot Locomotion and Motion.

- 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
- Reinforcement Learning
- Dynamic Robot Locomotion and Motion
- Sensor & Actuator Networks
- Mobile Robotics

Events, highlights & outreach

AIMS students have taken part in a wide range of research and outreach events this year.

- A paper addressing multi-agent AI problems won top accolade prize at AAAI-18 - The winning paper 'Counterfactual Multi-Agent Policy Gradients' (COMA) presents a method which could soon make it possible to deploy learning multi-agent systems in the real world.
- In November 2017 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. We will be holding another Taster Day again this year in November 2018 with the Department of Computer Science.
- Students attended a number of workshops which were run by external companies. These were courses on MATLAB on Simulink run by Mathworks. The students also attended a one day workshop at Nvidia, and several partners came in to talk to students about possible project ideas.

Nvidia event

- Students have taken part in OXFEST (Oxford Females in Engineering Science and Technology), AI@Oxford, World Summit in Dubai which brought together government decision makers, Teaching Maths & Physics in Ghana, and also gave talks at the Big-Data Institute in Oxford and Google.
- In June this year we held our second joint CDT conference with Edinburgh and Bristol CDTs. This took place in Bristol, and was attended by over 100 people - including students, industry partners and academic members of the CDTs. Again this was a huge success, and was great to hear what new research is going on in the other two CDTs.
- During the summer several students took up internships, these were at DeepMind, Mind Foundry Ltd and NASAs Frontier Development Lab (FDL).
- We welcome CRUK and the Ludwig Institute this year as new CDT partners, and look forward to working with them in the coming years.
- Yuki from the CDT 2017 cohort, who is an NVIDIA Deep Learning Institute university ambassador gave a workshop at the Big-Data Institute at the University of Oxford.

Yuki Asano (Big Data Institute, University of Oxford)

20 biostatisticians were introduced into the field of deep learning and were able to train their first neural networks and learn about the opportunities and caveats of using these powerful models.

- Google's Computer Vision Summit is designed to create an interactive environment to facilitate an exchange of ideas amongst PhD students, postdocs and Google researchers and engineers. This year, three CDT AIMS students were selected to participate in this event: Chia-Man Hung, Yuki Asano and Hala Lamdouar.

The event took place at the Google office in Zurich, Switzerland and provided the opportunity to deeply explore cutting edge computer vision technologies with the researchers and engineers working on these topics in the industry. Chia-Man presented a poster on her work on Skybox Creation by Photo Merging. Her tablet demonstration made quite an impression on Google Street View makers!

Publications & Output

AIMS students have had another 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.

Below is an updated list of all Publications and Output.

- **Gupta, Ankush,** and Vedaldi, Andrea and Zisserman, Andrew. *Synthetic Data for Text Localisation in Natural Images.* The IEEE Conference on Computer Vision and Pattern Recognition (CVPR 2016).
- **Ghoshal, Siddhartha,** and Roberts, Stephen. *Extracting Predictive Information from Heterogeneous Data Streams using Gaussian Processes.* Algorithmic Finance, vol. 5, no. 1-2, pp. 21-30, 2016.
- Hasenclever, Leonard, **Webb, Stefan,** Lienart, Thibaut, Vollmer, Sebastian, Lakshminarayanan, Balaji, Blundell, Charles, and Tey, Yee Whye. *Distributed Bayesian Learning with Stochastic Natural-gradient Expectation Propagation and the Posterior Server.* Journal of Machine Learning Research 18 (2017) 1-37.
- **Albanie, Samuel,** and Vedaldi, Andrea. *Learning Grimaces by Watching TV.* British Machine Vision Conference (BMVC 2016).
- **Thewlis, James,** Zheng, Shuai, Torr, Philip, and Vedaldi, Andrea. *Fully-Trainable Deep Matching.* British Machine Vision Conference (BMVC 2016).
- **Bartlett, Oliver,** Gurau, Corina, Marchegiani, Letizia, and Posner, Ingmar. *Enabling Intelligent Energy Management for Robots using Publicly Available Maps.* IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS), Daejeon, South Korea, 2016.
- **Berrada, Leo.** *Trusting SVM for Piecewise Linear CNNs.* International Conference on Learning Representations (ICLR 2017).
- **Ghoshal, Siddartha** and Roberts, Stephen. *Reading the Tea Leaves: A Neural Network Perspective on Technical Trading.* Knowledge Discovery and Data Mining (KDD 2017).
- **Cobb, Andrew** and Markham, Andrew and Roberts, Stephen. *Learning from lions: inferring the utility of agents from their trajectories.*
- Foerster, Jakob, Nardelli, Nantas, **Farquhar, Gregory, Afouras, Triantafyllos,** Torr, Philip, Kohli, Pushmeet, and Whiteson, Shimon. *Stabilising Experience Replay for Deep Multi-Agent Reinforcement Learning.* International Conference on Machine Learning (ICML 2017).
- **Thewlis, James,** Bilen, Hakan, and Vedaldi, Andrea. *Unsupervised object learning from dense invariant image labelling.* Proceedings of Advances in Neural Information Processing Systems (NIPS 2017), (oral presentation).
- **Thewlis, James,** Bilen, Hakan and Vedaldi, Andrea. *Unsupervised learning of object landmarks by factorized spatial embeddings.* Proceedings of the International Conference on Computer Vision (ICCV 2017) (oral presentation).

- **Zand, Jaleh** and Roberts, Stephen. *MiDGaP: Mixture Density Gaussian Processes.* NIPS time series workshop 2017.
- Paoletti, Nicola, **Patane, Andrea,** and Kwiatkowska, Marta. *Closed-loop quantitative verification of rate-adaptive pacemakers.* ACM Transactions on Cyber-Physical Systems, to appear, 2018.
- **Webb, Stefan** and Teh, Yee Whye. *A Tighter Monte Carlo Objective with Renyi divergence Measures.* (NIPS 2016 Workshop in Bayesian Deep Learning).
- **Webb, Stefan, Golinski, Adam,** Zinkov, Robert and Wood, Frank. *Faithful Model Inversion Substantially Improves Auto-encoding Variational Inference.* (NIPS 2017 Workshop in Bayesian Deep Learning).
- Foerster, Jakob., **Farquhar, Greg., Afouras, Triantafyllos,** Nardelli, Nantas, and Whiteson, Shimon. *Counterfactual multi-agent policy gradients.* 32nd AAAI Conference on Artificial Intelligence (AAAI'18).
- **Farquhar, Gregory,** Rocktäschel, Tim, Igl, Maximilian, and Whiteson, Shimon. *TreeQN and ATreeC: Differentiable Tree Planning for Deep Reinforcement Learning.* International Conference on Learning Representations (ICLR 2018).
- **Border, Rowan,** Gammell, Jonathan, and Newman, Paul. *Surface Edge Explorer (SEE): Planning Next Best Views Directly from 3D Observations.* International Conference on Robotics and Automation (ICRA 2018).
- Le, Tuan Anh, **Igl, Maximilian,** Jin, Tom, Rainforth, Tom, and Wood, Frank. *Auto-encoding sequential Monte Carlo.* International Conference on Learning Representations (ICLR 2018).
- Novotny, David*, **Albanie, Samuel*,** Larlus, Diane, and Vedaldi, Andrea. *Self-supervised Learning of Geometrically Stable Features Through Probabilistic Introspection.* Conference on Computer Vision and Pattern Recognition (CVPR 2018). (* denotes equal contribution).
- Nagrani, Arsha, **Albanie, Samuel,** and Zisserman, Andrew. *Seeing Voices and Hearing Faces: Cross-modal biometric matching.* Conference on Computer Vision and Pattern Recognition (CVPR 2018). (* denotes equal contribution).
- **Albanie, Samuel, Shakespeare, Hillary,** and Gunter, Tom. *Unknowable Manipulators: Social Network Curator Algorithms.* (NIPS 2016 Symposium: Machine Learning and the Law).
- **Cornish, Rob,** Wood, Frank, and Yang, Hongseok. *Towards a testable notion of generalisation for generative adversarial networks.* Conference on Neural Information Processing Systems (NIPS 2017).
- Baydin, Atilim, **Cornish, Rob,** Martínez Rubio, David, Schmidt, Mark, and Wood, Frank. *Online Learning Rate Adaptation with Hypergradient Descent*. In Sixth International Conference on Learning Representations (ICLR 2018).
- **Cobb, Adam,** Everett, Richard, Markham, Andrew, and Roberts, Stephen. (2018). *Identifying Sources and Sinks in the Presence of Multiple Gaents with Gaussian Process Vector Calculus.* https://arxiv.org/abs/1802.10446
- Eberz, Simon, Lovisotto, Giulio, **Patané, Andrea,** Kwiatkowska, Marta, Lenders, Vincent, and Martinovic, Ivan. *When Your Fitness Tracker Betrays You: Quantifying the Predictability of Biometric Features Across Contexts.* IEEE Symposium on Security and Privacy (S&P), San Francisco, CA, USA, May 2018.
- Rosa, Stefano, **Patanè, Andrea,** Lu, Xiaoxuan, and Trigoni, Niki. *CommonSense: Collaborative learning of scene semantics by robots and humans.* In Proceedings of the 1st International Workshop on Internet of People, Assistive Robots and Things (pp. 1-6). ACM. 2018, June.
- **Cobb, Adam,** Roberts, Stephen, and Gal, Yarin. *Loss-Calibrated Approximate Inference in Bayesian Neural Betworks.* https://arxiv.org/abs/1805.03901
- Afouras, Triantafyllos, Chung, Joon Son and Zisserman, Andrew. *Deep Lip Reading: a comparison of models and an online application.* INTERSPEECH 2018
- **Afouras, Triantafyllos,** Chung, Joon Son, and Zisserman, Andrew. *The Conversation: Deep Audio-Visual Speech Enhancement* INTERSPEECH 2018
- **Berrada, Leo,** Zisserman, Andrew, and Kumar, Mudigonda Pawan. *Smooth Loss Functions for Deep Top-k Classification.* International Conference on Learning Representations (ICLR, 2018).
- Nagrani, Arsha*, **Albanie, Samuel*,** and Zisserman, Andrew. *Learnable PINs: Cross-Modal Embeddings for Person Identity.* European Conference on Computer Vision (ECCV 2018). (* indicates equal contribution).
- Novotny, David*, **Albanie, Samuel*,** Larlus, Diane, and Vedaldi, Andrea. *Semi-convolutional operators for instance segmentation.* European Conference on Computer Vision (ECCV 2018).
- Rainforth, Tom, **Cornish, Rob,** Yang, Hongseok, Warrington, Andrew, and Wood, Frank. *On Nesting Monte Carlo Estimators.* International Conference on Machine Learning (ICML 2018).
- **Rudner, Tim** and Sejdinovic, Dino. *Inter-domain Deep Gaussian Processes.* Bayesian Deep Learning NIPS Workshop, 2017.
- **Ghoshal, Siddartha,** and Roberts, Stephen. *Thresholded ConvNet Ensembles: Neural Networks for Technical Forecasting.* Data Science in Fintech, (KDD 2018).
- **Smith, Lewis** and Gal, Yarin. *Understanding Measures of Uncertainty for Adversarial Example Detection.* Conference on Uncertainty in Artificial Intelligence (UAI 2018).
- **Gupta, Ankush,** Vedaldi, Andrea, and Zisserman, Andrew. *Inductive Visual Localisation: Factorised Training for Superior Generalisation.* Proceedings of the British Machine Vision Conference (BMVC, 2018).
- **Golinski, Adam,** Teh, Yee Whye, Wood Frank and Rainforth, Tom, *Amortized Monte Carlo Integration.* Conference on Uncertainty in Artificial Intelligence (UAI 2018).
- **Kiskin, Ivan,** Zilli, Davide, Li, Yunpeng, Sinka, Marianne, Willis, Kathy, and Roberts, Stephen, *Bioacoustic detection with wavelet-conditioned convolutional neural networks*. Springer, Neural Computing and Applications 2018.
- Groth, Oliver, **Fuchs, Fabian,** Posner, Ingmar, and Vedaldi, Andrea. *ShapeStacks: Learning Vision-Based Physical Intuition for Generalised Object Stacking.* European Conference on Computer Vision (ECCV 2018).
- **Moseley, Benjamin,** Markham, Andrew, and Nissen-Meyer, Tarje. *Fast approximate simulation of seismic waves with deep learning.* 2018.
- **Igl, Maximilian,** Zintgraf, Luisa, Le, Tuan Anh, Wood, Frank, and Whiteson, Shimon. *Deep variational reinforcement learning for POMDPs.* International Conference on Machine Learning (ICML 2018).

- Rainforth, Tom, Kosiorek, Adam, Le, Tuan Anh, Maddision, Chris J, **Igl, Maximilian,** Wood, Frank and Teh, Yee Whye. *Tighter variational bounds are not necessarily better.* International Conference on Machine Learning (ICML 2018).
- Jakab, Tomas *, **Gupta, Ankush *,** Bilen, Hakan, Vedaldi, Andrea. *Conditional Image Generation for Learning the Structure of Visual.* Conference on Neural Information Processing Systems (NIPS2018) (* indicates equal contribution)
- **Thewlis, James,** Bilen, Hakan, and Vedaldi, Andrea. *Modelling and unsupervised of symmetric deformable object categories.* Conference on Neural Information Processing Systems (NIPS 2018) .
- **Webb, Stefan, Golinski, Adam,** Zinkov, Robert, Siddharth, N, Rainforth, Tom, Teh, Yee Whye and Wood, Frank. *Faithdul Inversion of Generative Models for Effective Amortized Inference.* Conference on Neural Information Processing Systems (NIPS2018).
- Mahendran, Aravindh, **Thewlis, James,** and Vedaldi, Andrea. *Cross Pixel Optical Flow Similarity for Self-Supervised Learning.* Asian Conference on Computer Vision (ACCV 2018).
- Mahendran, Aravindh, **Thewlis, James,** and Vedaldi, Andrea. *Self-Supervised Segmentation by Grouping Optical-Flow.* POCV Workshop on Action, Perception and Organization. European Conference on Computer Vision (ECCV 2018 Workshops).
- **Gupta, Ankush,** Vedaldi, Andrea, and Zisserman, Andrew. *Learning to Read by Spelling: Towards Unsupervised Text Recognition* arXiv preprint arXiv:1809.08675
- Cardelli, Luca, Kwiatkowska, Marta, Laurenti, Luca, and **Patane, Andrea.** *Robustness Guarantees for Bayesian Inference with Gaussian Processes.* , arXiv preprint arXiv:1809.06452 Link: https://arxiv.org/pdf/1809.06452.pdf
- **Patane, Andrea,** and Kwiatkowska, Marta. *Calibrating the Classifier: Siamese Neural Network Architecture for End-to-End Arousal Recognition from ECG.* The Fourth International Conference on Machine Learning, Optimization, and Data Science. 2018 Link: http://qav.comlab.ox.ac.uk/papers/pk18.pdf
- **Patane, Andrea,** Ghiasi, Shadi, Scilingo, Enzo Pasquale, and Kwiatkowska, Marta. *Automated Recognition of Sleep Arousal using Multimodal and Personalized Deep Ensembles of Neural Networks.* Computing in Cardiology 2018 .
- **Hunt, Jack,** Prisacariu, Victor, Golodetz, Stuart, Cavallari, Tommaso, Lord, Nicholas and Torr, Philip. *Probabilistic Object Reconstruction with Online Global Model Correction.* Proceedings of the 5th International Conference on 3D Vision (3DV 2017).
- **Fuchs, Fabian,** Groth, Oliver, Kosiorek, Adam, Bewley, Alex, Wulfmeier, Markus, Vedaldi, Andrea, and, Posner, Ingmar. *Neural Stethoscopes: Unifying Analytic, Auxiliary and Adversarial Network Probing.* https://arxiv.org/abs/1806.05502
- Shiarlis, Kyriacos, Wulfmeier, Markus, **Salter, Sasha,** Whiteson, Shimon, and Posner, Ingmar. *TACO: Learning Task Decomposition via Temporal Alignment for Control.* https://arxiv.org/abs/1803.01840
- **Bent, Oliver,** Remy, Sekou, Bore, Nelson. *A machine learning environment to determine novel malaria policies.* NIPS Demonstration 2018.

Mini-projects

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

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

- Localisation and Policy Synthesis for Underwater Swarming Autonomous Vehicles with Probabilistic Guarantees about Safe Exploration and reachability Requirements
- Missingness-informed Conditional CNN for Medical Time series Classification
- Towards One-Shot Learning from Demonstration via Reinforcement Learning
- Generative Adversarial Imitation Learning for Quadrupedal Locomotion using Unstructured Expert Demonstrations
- Structured Coordination and Smart Exploration for Multi-Agent Reinforcement Learning
- Learning Binary SVMs using the Sherali Adams Hierarchy
- Differentiable Model-based Reinforcement Learning
- Auxiliary Tasks for Reinforcement Learning
- Unsupervised Learning of Vehicle Motion using Image Sequences
- Fast Approximate Simulation of Seismic Waves with Deep Learning
- Machine Learning for Radio Source Association
- Analysis and design of Biological Systems using Finite State Abstractions
- Deep-Image Prior for Segmentation
- Motion Planning to Smoothly Intercept Moving Objects
- Deep Hierarchical Reinforcement Learning Based Solution for Heterogenous Swarm Optimization
- Robot Learning for Autonomous Assembly
- Rough Terrain Footsteps Planning
- Geometric Deep Learning for Business Classification
- Alignment Network for Change Detection
- Learning to Detect Humans for Quadruped Motion Planning
- Bayesian Optimization for Variational Quantum Eigensolvers
- Learning Binary Neural Networks using Relaxations
- Unifying Approximate Inference
- Multi3Net Segmenting Flooded Buildings via Fusion of Multiresolution, Multisensor and Multitemporal Satellite Imagery
- Adaptive Online Learning for Faster Verification of Neural Networks

DPhil Proposals

Cohort 2017 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 2017

"The first year was a great experience for me because it allowed me to not only dive deeper into deep learning but also embrace breadth. This way, I was able to learn more about robotics, control systems, sensor networks, privacy and many other topics. Additionally, the diverse colleagues in the course allowed me to learn from them and have interesting discussions."

"It has been an amazing first year in the AIMS CDT. We have people from diverse backgrounds and with different, but usually related interests, which sparks interesting conversations. I think I have made lifelong friends within my cohort. We have been given so many opportunities to explore different topics. I particularly like the wide range of courses and the possibility of doing mini-projects in different groups. Before coming here, I had a general interest in robotics, but no background in it; I had no idea that I would end up in the Oxford Robotics Institute for the upcoming three years. To sum up, I have learned a lot, explored my research interests and had great fun in the CDT."

"I enjoyed the AIMS CDT first year and its carefully selected modules with balanced theoretical/practical sessions. Working in teams, with other CDT students, brought us together and many, hopefully long-lasting, friendships were born.

During the last term, lab rotation offered a great opportunity to be immersed in research groups and experience working with potential supervisors. Overall, I felt privileged to be offered a working space on the 8thfloor of Thom's building, where the nicest view of Oxford coupled with the daily warm smile of Wendy provided enough energy to kick off the day. I even felt nostalgic to clear my desk for the next students :'(, may they have an equally thrilling experience."

"The AIMS CDT gave me the opportunity to study a variety of subtopics relating to autonomous and intelligent machines and systems allowing me to build an essential foundation for further study. Along the way, professors connected ideas and inspired me to think about cutting-edge research questions, providing me with the mindset needed for original research. Mini-projects lend the perfect opportunity to trial research groups, supervisors and research questions before committing to a DPhil topic. I would highly recommend the AIMS CDT to those who are confident they wish to do a DPhil in an area related to autonomous and intelligent machines and systems but are not entirely sure which specific area they wish to do research in. "

"My experience with the AIMS first year was mostly really positive. The courses weren't that much in depth, but I think that is actually a good thing, as they succeeded in giving a high level overview of the field as a whole, which I think has been very beneficial. I found the mini projects fun, though the time constraints are challenging, and I think that having a well defined project description beforehand should be a strong prerequisite for academics offering them. Overall though I wouldn't change much."

"I thoroughly enjoyed the first year of AIMS. The courses were all very interesting; I particularly enjoyed the optimisation and mobile robotics ones. Most importantly, I believe that AIMS provides you with the perfect opportunity to choose a DPhil supervisor who you're able to work well with for the duration of the PhD. Getting to know students from the different cohorts at the AIMS lunches and dinners was great, too!"

"The first year of AIMS was really interesting and challenging. We had the chance to be exposed to several scientific directions, many of which were completely new to me. Even though it is impossible to cover everything happening in a scientific field in one or two weeks time, I believe the taught courses during the first two terms provided us with enough intuition and basic skills. Personally, I found these of great assistance when we started our mini-projects, since they gave us the time to adapt to the Oxford academic environment, together with multidisciplinary knowledge. As far as the mini-projects are concerned, I had the chance to work in three different labs and get to know valuable different approaches to research from each of my supervisors. That, I feel, has really expanded my way of thinking and approaching research questions. Finally, I should make a special note to the collaborative - and not competitive, as it can often be the case in academia - spirit between the students of all AIMS cohorts: this really helped boost both my confidence and performance. Overall, a very unique and engaging year!"

Bradley Gram-Hansen, Alasdair Paren and Robert McCraith

Feedback from Courses – Cohort 2017

The lectures were exactly what I was hoping all week-long lectures would be like: roughly half of the material of an 8-week Oxford course compressed into one week.

Amazing lectures, very interesting and well explained.

I enjoyed the emphasis on similarities between more classical vision techniques and newer convnet based systems

I got a better high-level understanding of computer vision techniques.

Good intro into machine vision, had seen a lot of the material before and this class acted as a nice refresher.

In general a great course, very clear and the practicals were clear, insightful and taught me multiple useful CV workflows I feel I could easily pick up and use in the future. Great balance between theory/practical implementation of CV and slides were very good quality from all the lecturers.

Questions/quizzes in lectures were good at maintaining concentration.

Excellent teacher, motivating the mathematics we were being taught and effectively connected ideas.

Very interesting overview of how code is executed on your computer.

I particularly enjoyed the state-space view, since this allowed me to draw a lot of links with my previous experience in physics

The course lab exercises were very clearly related to the lecture material and helped me more clearly understand the lectures. The lecture slides were mostly very clear.

Good demonstrations of real life big data systems I thought the topics covered were interesting.

I enjoyed the guest lectures, and the receptiveness of the lecturers to class suggestions.

Really enjoyed that it was so hands on. It made me understand the concepts much better by having to implement them e.g. SLAM. Working as a team was also very fun and promoted other skills such as source control.

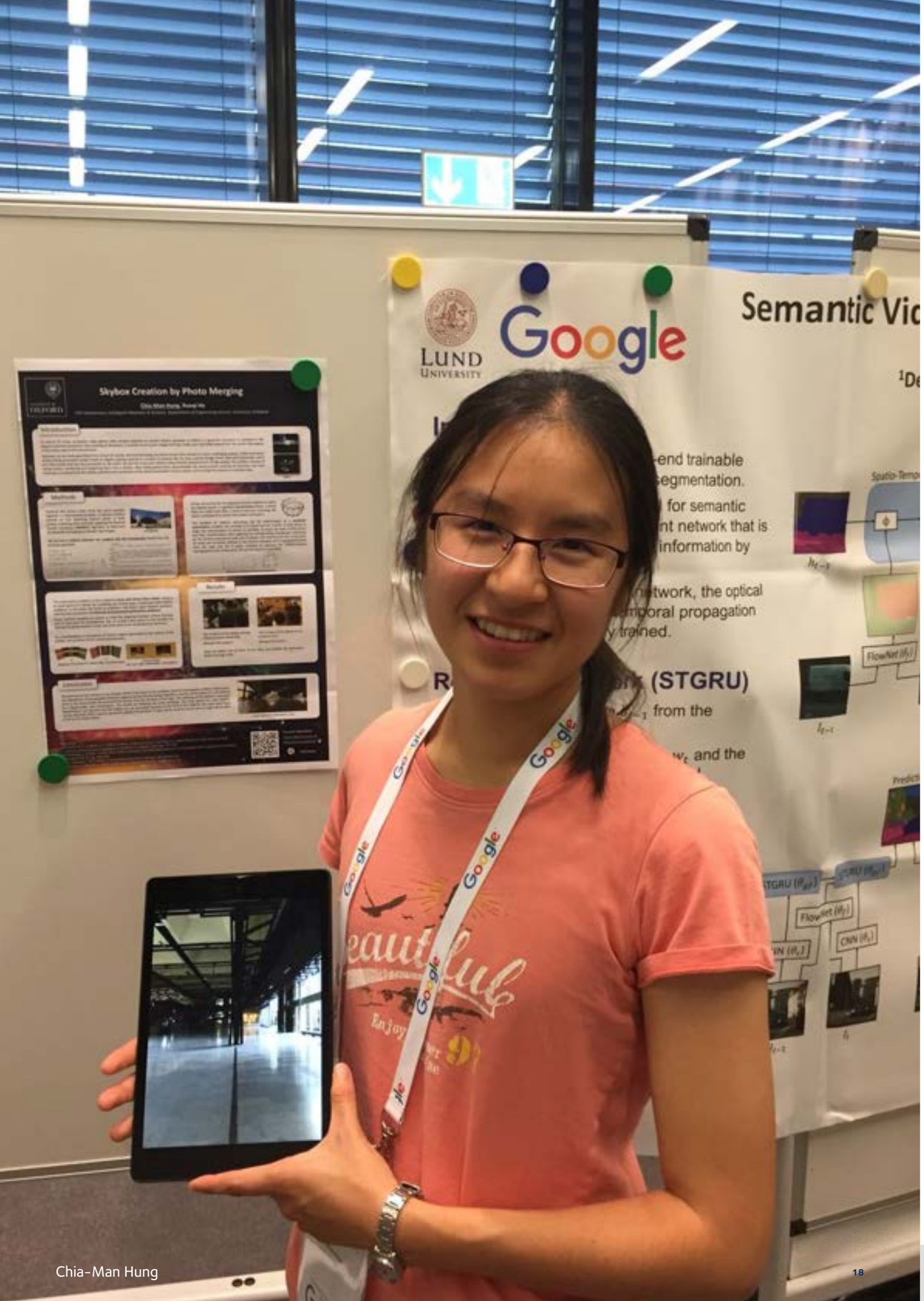
Supervisors were very helpful and friendly. Overall, great.

Great lecturer, very engaging and knowledgeable. Made the material accessible.

The lecturer engaged with the students and made the experience enjoyable.

In general an insightful course which made me properly consider verification and its importance for the first time. I feel I have a good understanding of practical verification methods and the formal models verification uses. The lecture slides were clear and of good quality. I particularly liked the last lecture on smart energy, which felt very practically relevant.

Fabian Fuchs, Hala Lamdouar and Oliver Bent



Chia-Man Hung

Student Biographies – Cohort 2018

Alessandro De Palma

I'm from Apulia, southern Italy, but in the last few years I spent time closer to the Alps than the Mediterranean. I got my Bachelor in Computer Engineering from Politecnico di Torino and a Master's in Computer Science from ETH Zurich. There, I first focused on distributed computing and later converged to machine learning. Willing to combine these two interests, I spent 6 months at MIT for my Master's thesis on distributed approximate Similarity Search and, after graduation, I worked on parallel Bayesian Optimization at IBM Research Zurich. My current interests lie at the intersection between optimization and machine learning and I am therefore very excited to join the AIMS CDT, where I will strengthen and extend my theoretical background in these areas. During my free time, I'll be printing analog photography, shooting many more photographs than I can print, and pretending I can play guitar.

Shaan Desai

I am from Lusaka, Zambia and graduated from Harvard College with a Bachelor's in Physics and a Master's in Computational Science. During college, I worked in the Kaxiras Group where I developed a deep interest in using machine learning techniques to solve physics problems, especially those relating to the discovery of novel materials for renewable technology. I am therefore excited to pursue this interest further through the AIMS DPhil and the generous support of the Rhodes Scholarship.

Bryn Elesedy

I grew up in North West England and graduated from Jesus College, Cambridge in 2015 with a master's in mathematics with astrophysics. Before coming to Oxford I worked as a quant in a hedge fund, where I was in a team designing and building systematic trading strategies. My work exposed me to ideas from programming, data science and statistics and following this I became interested in machine learning and later in AI more broadly. I am excited to start the AIMS programme and I hope that the experience will equip me to contribute to these fields.

Anna Gautier

Originally from Philadelphia, USA, I completed my BSc in Computer Science and my BA in Pure Mathematics at Washington University in Saint Louis. In 2017 I moved to the UK to work towards my MSc in Applicable Mathematics at The London School of Economics. My research interests include Artificial Intelligence and Multi-Agent Systems, particularly the fields of mechanism design and algorithmic game theory.

Saad Hamid

I was born in Rawalpindi, Pakistan, but grew up in London. I graduated from Balliol College, University of Oxford with a Master of Engineering (MEng) in 2018. It was the pursuit of this degree that led me to develop an interest in autonomous systems. My final year project focussed on Bayesian Quadrature, and I'm excited to continue working on probabilistic numerical methods and their application to machine learning during the AIMS CDT. Outside of engineering, I enjoy rowing, running, and travelling.

Prannay Kaul

I am from Sheffield, South Yorkshire and graduated in 2018 with an MEng in Engineering Science from Somerville College, Oxford. I spent my 4th year at Princeton University where my thesis focused on the experimental analysis of an integrated photonics circuit for wireless communications. At Princeton, my interest in machine learning began and I am excited to learn more about autonomous systems during my AIMS studies. I am an avid traveller and in my spare time I enjoy playing cricket and listening to political debates.

Andreas Kirsch

Originally from Romania, I grew up in Southern Germany. After studying Computer Science and Mathematics at the Technical University in Munich, I spent a couple of years in Zurich as a software engineer at Google/YouTube. I moved to London and worked as a performance research engineer at DeepMind for a year. I'm interested in Bayesian Deep Learning and ethics and safety in AI.

Vitaly Kurin

I'm from Russia where I studied economics (BA) in Moscow State Institute of International Relations, and applied mathematics and computer science (BSc) in Moscow State University. Then I got my Media Informatics master's degree from RWTH Aachen University in Germany writing my thesis on Learning from Demonstration. I'm particularly interested in how machine learning models (especially in reinforcement learning) can use any prior information we can provide: human demonstrations, knowledge databases, other models predictions. For more detail, please, visit https://yobibyte.github.io

Alexander Mitchell

I graduated with a Masters in Engineering Science from the University of Oxford in 2018. My Master's project was in the field of Model Predictive Control subject to probabilistic constraints. The consequent controllers rejected unknown disturbances and could adapt to system parameters which vary slowly over time. Both controllers used a scenario approach to approximate the probabilistic constraints with linear ones. My areas of interest are in control for legged robots, path planning and computer vision. Before university, I spent a gap year in industry in Cambridge, UK working for an engineering company in medical technologies. I am also a keen pilot.

Matthew Newton

I grew up in South West England and completed my MEng undergraduate degree at St. Catherine's College, Oxford in Engineering Science. My main academic interests lie in Machine Learning, Network Systems and Control Systems. These were first realised during a summer internship at the Oxford MAN Institute, where I investigated the relationships between unstructured financial data sets. I then went on to specialise in Information Engineering and Mathematics in my final year of university and for my Master's Project I investigated the stability of pipe flow by using a novel control theory perspective. Outside of academia I am heavily involved in athletics as a 400m runner, but also enjoy surfing, various outdoor pursuits and (trying) to keep up with technology.

Mandela Patrick

I am originally from Trinidad and Tobago, the twin-island republic in the Caribbean. Upon completing my high school studies in Trinidad, I enrolled as an undergraduate student at Harvard University where I received a Bachelor of Arts degree in Computer Science. At Harvard, I had the opportunity to pursue software engineering internships at Facebook, Goldman Sachs, Instagram and B12. Upon taking classes in both machine learning and artificial intelligence at Harvard, my interest in machine learning got piqued when I interned on the Instagram Machine Learning team, where I built out the core infrastructure to add support to multi-task multi-label neural network models to personalize experiences on Instagram Feed and Explore. I am excited to pursue this interest further through the AIMS program and the generous support of the Rhodes Scholarship.

Stefen Ridderbusch

After getting two undergraduate degrees, first in engineering and then in mathematics, and taking some parallel graduate-level classes at the university in my hometown, Paderborn, I had the opportunity to pursue an internship at an aerospace research center in the United States. Following this experience, I did my master's in Mathematical Modelling and Scientific Computing at Oxford, where I focused on statistical mechanics and swarm robotics. I took a year out between my master's and PhD to learn some Spanish in Salamanca, intern at a company working on autonomous driving in Munich, and co-lead the Tech and HR teams of the pan-European movement. In the AIMS CDT, I will be focusing on multi-objective optimal control and how it can interface with other AI-relevant topics, like machine learning and formal verification.

Kaur Aare Saur

I am originally from Estonia where I also grew up before reading for the Engineering Tripos at the University of Cambridge. During the later years of my course I specialised in Information Engineering. My final project was about applying machine learning methods to self-optimise the performance of real life robots. AIMS CDT provides an excellent opportunity to combine my different areas of interest, including machine learning and robotics. I spend most of my free time on travelling and I enjoy recording and systematically analysing my travel patterns.

Thomas Steeples

I grew up in Leighton Buzzard, in Bedfordshire, and I first attended UCL where I attained my MSci in Mathematics. Following this, I completed my MSc in Computer Science at the University of Oxford, where I explored the notion of local equilibria in Boolean Games. I then worked at IBM as part of the Automation team before returning to Oxford for the AIMS CDT. My primary research interests lie in computational game theory, the foundations of artificial intelligence, and machine learning. In my spare time, I enjoy the work of David Lynch, I like playing chess and I have recently developed an interest in photography.

Filip Svoboda

I work on Deep Learning Efficiency under the supervision of Dr. Nicholas Lane and Dr. Niki Trigoni. The early applications of my work are in the resource constrained interference for embedded and wearable devices. My long-term aim is to develop and popularize my concept of Rational Automated Machine Learner – a learning paradigm whereby a wider set of resource costs and preference considerations can be consulted along with the model accuracy in the AutoML process. I have background in Statistics and Computer Science (MSc UCL), Econometrics (MPhil Oxford), and Economics (BSc Amsterdam). In my very early career, I was a research assistant at the Experimental Oncology Institute of the Slovak Academy of Sciences. For more detail, please, visit www.filip.svoboda.sk.

Panagiotis Tigkas

I received my B.Sc. from the University of Ioannina, Greece and my M.Sc. in Machine Learning from the University of Bristol. During my M.Sc., I carried out research on sequence prediction models for interactive music improvisation. Prior to joining Oxford, I spent several years in the IT industry, during which I had the opportunity to work for Microsoft, Autodesk Research (Generative Design team), Brave Research (Privacy Preserving Machine Learning) and a startup I co-founded, Filisia Interfaces (Special Education and Rehabilitation HCI). I spend most of my free time making music and thinking about philosophy, nature and culture. For more information, see http://ptigas.com

Rhydian Windsor

I was born in Atlanta, GA in the US but grew up in the beautiful county of Shropshire in England. However, you can probably tell from my name my dad is a proud Welshman! For my undergraduate degree I studied Physics at the University of Manchester (MPhys), although in the last few years I've become increasingly interested in machine learning and AI as a result of an internship I did and subsequently my Master's project using machine learning for lung cancer imaging at the Christie Hospital in Manchester. I'm particularly interested in the use of intelligent systems in medicine and am thrilled to have my studies at the CDT funded by Cancer Research UK. When I'm not working, I'm usually playing sports (in particular rugby and running) with the occasional foray into baking.

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.

Hala Lamdouar

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.

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.

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.

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.

Past Students

The following students have now submitted their thesis, and await their viva voce examination.

Oliver Bartlett (MSc by Research) – *Teaching Robots where to Drive using Real World Data*

I enjoyed my time as part of the AIMS CDT, the foundation year was useful as an introduction to the different areas where Artificial Intelligence is having an impact. Afterwards I joined Ingmar Posner as part of the Oxford Robotics Institute, investigating off-road driving in novel environments. Having finished, I am staying on as part of Oxford Robotics Institute, organising trials and projects.

James Thewlis – *Objects from Motion*

The AIMS CDT has given me the opportunity to learn a broad range of topics in the first year and then develop my ideas into a solid research project.

My thesis, supervised by Andrea Vedaldi in the Visual Geometry Group, deals with the problem of finding useful representations of objects, such as faces and cats, learning automatically from motion rather than using expensive manual annotations. I am very grateful for the support the AIMS CDT has given me throughout my studies, including funding that has allowed me to present my work at international conferences.

My future plans include a project working with Facebook AI Research (FAIR), and I am also thinking about some startup ideas.

Ankush Gupta – *Deep Learning with Synthetic, Temporal, and Adversarial Supervision*

AIMS CDT is an excellent PhD program envisioned and funded by the EPSRC, the University of Oxford, and various industrial partners. The CDT brings together students who work in different but related areas, which enriches their experience and broadens their knowledge. It provides a well-structured approach essential for the successful transition of students into graduate researchers. The courses and mini-research projects in the first year help in gaining an insight into the various sub-areas, and making an informed decision about doctoral research area/advisor. The generous financial support enables one to choose from some of the world's best researchers at Oxford as their research advisor, without any prior commitment. Further, it provides for various expenses, like equipment and travel over the course of the program. The various seminars, outreach activities, and training sessions support in rounded development. It is a unique program which relieves the students of financial pressures and creates an ideal environment to enable valuable research. The CDT has gifted me the financial and intellectual freedom to pursue the research which I could not have done anywhere other than Oxford. Studying here also enabled me to further enhance my research skills as an intern at DeepMind London, which is also where I will work after completion. I am very grateful to the program for supporting my doctoral study.

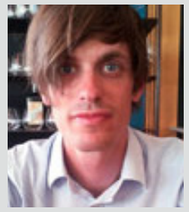
Jack Hunt – *Dynamic SLAM, Object Reconstruction, Shape and Pose Prediction for 3D Scene Understanding*

I joined the AIMS CDT at Oxford in 2014, following my undergraduate degree in computer science. The broad remit of the training year allowed me to reinforce my decision to work in computer vision, whilst affording me an important appreciation for inter-disciplinary work. During my time at Oxford I have worked predominantly on 3D reconstruction and it's various areas. As a result, I now work in Mixed Reality technology, an exciting area that draws directly on my experience at Oxford.

AIMS Contacts

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

Niki Trigoni
Director



Michael Osborne
Co-Director

Wendy Poole
Centre Administrator

Academic Supervisors

A full list of academic supervisors can be found at:
http://aims.robots.ox.ac.uk/academics-and-staff/

Fabian Fuchs and Oliver Bent

AIMS

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
Niki Trigoni
Email: aims-cdt@robots.ox.ac.uk
Tel: 01865 273152

CDT Co-Director
Mike Osborne
Email: aims-cdt@robots.ox.ac.uk
Tel: 01865 616622

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

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

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