ANNUAL REPORT OF THE FACULTY 2022-23

University of Cambridge
Department of Computer Science

Photo: Oxbridge Women in Computer Science Conference, April 2023

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Introduction

The Department of Computer Science and Technology continues to deliver world-class research, combining theory with practical activities, and significantly advancing both the field and computing in the wider world. The Department sustains active research across the breadth of computer science, and we encourage the development of new technologies and applications. Key elements of the Department's ethos are our focus on impact as well as our openness to working closely with both academic and non-academic organisations.

This academic year has been one of change: Professor Ann Copestake ended her five year and four-month period as Head of Department on 30 September 2023, with Professor Alastair Beresford appointed as Head of Department from 1 October 2023. Professor Copestake's time as Head of Department involved a particularly large amount of work. We have all benefited greatly from the results of her effort, often without feeling the pain and graft involved in delivery. She has led us through a myriad of important activities and overseen significant changes. Perhaps most notable was the pandemic, which upended almost everything we did for two years. She also made key improvements in a broad range of areas, including finance, communications, teaching and research.

During the year, we undertook an extensive recruitment round which allowed us to welcome four new Associate Professors in October, with another three to join us between January and August 2024. We also enjoyed another successful year of academic promotions, with three staff promoted to full Professorships and three more to Professor (G11). We also achieved our aim of increasing the number of Professional Services Staff to support the administration of the Department, with a new Finance Analyst, Outreach Coordinator and Receptionist, as well as a number of new support staff working with academic staff on their research projects. We anticipate a pause in growth over the coming year although there are still a number of support staff needs to address.

Staff Overview

As of 30 September 2023, the Department of Computer Science and Technology consisted of 219 members of staff:

Academic staff	54
Professional services staff	47
Research fellows and research staff	118

New Associate Professors:

Dr Tom Gur
Dr Tobias Grosser
Dr Fermin Moscoso del Prado Martin
Dr Jon Sterling

We are also expecting 3 more new academic staff to join us during 2023/24.

Promotions

The following members of staff were successful in the 2022-23 Academic Career Pathway exercise. Their promotions took effect on 1 October 2023.

Professorships (G12)

Professor Hatice Gunes
Professor Rafal Mantiuk
Professor Robert Mullins

Professorships (G11)

Professor Alice Hutchings
Professor Neel Krishnaswami
Professor Cengiz Oztirelli

Senior Research Associates

The following Research Associates were promoted to Senior Research Associate:

Dr Felix Dangel
Dr Abhirup Ghosh
Dr Christopher Pulte
Dr Shiva Taslimipoor

Retirements

Professor Timothy Griffin, Professor Sir Andy Hopper, Professor Alan Mycroft and Professor Andrew Pitts retired on 30 September 2023. Although they have officially retired, they will remain members of the Department as Emeritus Professors and we look forward to our continued collaborations with them.

College Fellowships

The Department continues to strengthen its links with the Colleges. The following University Teaching Officers hold College Fellowships:

Professor Ross Anderson, CHU
Professor Alastair Beresford, Q
Professor Alan Blackwell, DAR
Professor Paula Buttery, CAI
Professor Ann Copestake, W
Professor Jon Crowcroft, W
Professor Anuj Dawar, R
*Dr Carl Henrik Ek, PEM
Professor Marcelo Fiore, CHR
Dr David Greaves, CC
Professor Hatice Gunes, TH
Professor Robert Harle, DOW
Dr Sean Holden, T
Professor Alice Hutchings, K
Professor Timothy Jones, CAI
Professor Srinivasan Keshav, F
Professor Neel Krishnaswami, T
Dr Markus Kuhn, W
Professor Nic Lane, JN
Professor Neil Lawrence, Q
Professor Pietro Lio, CLH
Professor Anil Madhavapeddy, PEM

Professor Cecilia Mascolo, JE
Professor Simon Moore, TH
Professor Richard Mortier, CHR
*Dr Fermin Moscoso del Prado Martin, JE
Professor Robert Mullins, JN
Professor Lawrence Paulson, CL
Professor Amanda Prorok, PEM
Professor Andrew Rice, Q
Professor Thomas Sauerwald, EM
Professor Peter Sewell, W
Professor Emily Shuckburgh, DAR
Professor Frank Stajano, T
Professor Jamie Vicary, K
Professor Andreas Vlachos, F
Dr Ian Wassell, CHU
*Dr Damon Wischik, CHR
Dr Jeremy Yallop, R

* Fellowships taken up during 2022/23

Honours, Awards, Achievements and Appointments

We are pleased to report a selection of highlights from the many staff and student honours, awards, achievements and appointments during 2022-23.

Peter Sewell was elected as a Fellow of the Royal Society. See https://www.cst.cam.ac.uk/news/Professor-elected-royal-society-fellowship.

Conrad Watt was given The Honourable Mention Award as part of the 2022 Association for Computing Machinery Doctoral Dissertation Awards accompanied by a prize of $10,000. Conrad previously won the 2021 Best Dissertation Award from the European Association on Programming Languages and Systems (EAPLS), which is awarded to the PhD student who has made the most original and influential contribution to the area of Programming Languages and Systems, and graduated in 2021 at a European academic institute.

Alastair Beresford and Cecilia Mascolo celebrated the renewal of the Centre for Mobile, Wearable Systems and Augmented Intelligence on 20 September 2023. First established in 2018, thanks to the support of Nokia Bell Labs, the Centre's broad aim is to harness advances in mobile systems, security, and AI to underpin a new generation of mobile devices and wearable sensor technologies.

See https://www.cst.cam.ac.uk/news/celebrating-renewal-our-centre-mobile-wearable-systems-and-augmented-intelligence.

The paper "It's not Fair" – Fairness for a Small Dataset of Multi-Modal Dyadic Mental Well-being Coaching by Jiaee Cheong*, Micol Spitale* and Hatice Gunes received the Best Paper Award in Responsible Affective Computing category at the IEEE Conference on Affective Computing and Intelligent Interaction, 2023. [*Both authors contributed equally to the paper.]

Hatice Gunes' AFAR exhibit was ranked as 2nd Best Exhibitor at the Physics at Work Exhibition 2023. This event is held annually at the Cavendish Laboratory in Cambridge and aims to show 14-16 year olds the variety of careers open to physics graduates as well as the wide range of practical problems physics can solve. See https://cambridge-afar.github.io/awards.html.

Hatice Gunes' research on robotic wellbeing coaches for the workplace appeared at the ACM/IEEE HRI'23 conference, and was covered in >700 international media outlets including The Independent, and Sky News. See https://www.cam.ac.uk/research/news/robots-can-help-improve-mental-wellbeing-at-work-as-long-as-they-look-right and https://www.independent.co.uk/news/science/robots-work-mental-health-improvement-b2301042.html.

The Ukraine Achievement Fund (https://ukraineachievementfund.org/) was originally established in 2022 by Ferenc Huszar to support exceptionally talented high schoolers from Ukraine. The fund welcomed their second cohort of Griffin Scholars, bringing the total to 30 in Cambridge. They now support 8 Ukrainian scholars, most of them maths or programming olympiad medallists. Ferenc now serves as Chair of the project's Advisory Board.

Photo credit: Griffin Catalyst

A team led by Nic Lane were named joint winners of UK-US challenge to detect financial crime. See: https://www.cst.cam.ac.uk/news/researchers-named-joint-winners-uk-us-challenge-detect-financial-crime.

The AISTATS 2023 Test of Time Award went to Andreas Damianou and Neil Lawrence for the paper Deep Gaussian Processes. See: http://aistats.org/aistats2023/awards.html.

Neil Lawrence, DeepMind Professor of Machine Learning, has been appointed to the Competition and Markets Authority (CMA) digital experts' group for the digital markets unit, and has contributed advice to the initial review into AI Foundation Models to help create an early understanding of the current market.

Neil Lawrence continues to be committed to international collaboration and open sharing of scientific research. He has agreed to serve on the Canadian Institute for Advanced Research

Scientific Advisory Committee and also join the Scientific Advisory Council for arXiv, which represents the scientific and research community of arXiv to provide advice and guidance.

Neil Lawrence is putting the finishing touches to his new book, The Atomic Human, which will be available in May 2024. The book explores how our fascination with AI stems from the perceived uniqueness of human intelligence and our belief that intelligence is what differentiates us. Fears of AI not only concern how it invades our digital lives, but also the implied threat of an intelligence that displaces us from our position at the centre of the world. Neil looks at why these fears may be misplaced, and reveals the technical origins, capabilities and limitations of AI systems and how they should be wielded.

Anil Madhavapeddy and colleagues received the ACM 2023 SIGPLAN Award for their work on the functional programming language OCaml. See https://www.sigplan.org/Awards/Software/.

The ERC funded project, Alexandria: Large-Scale Formal Proof for the Working Mathematician, led by Larry Paulson, finished in August 2023. Its outputs include 13 journal articles, 14 refereed conference papers, two book chapters and 39 formal proof developments. The latter are essentially code expressing proofs of advanced mathematical theorems in such areas as additive combinatorics and extremal graph theory. The project also saw significant advances in intelligent information retrieval and the auto-formalisation of mathematical texts through the use of language models. The project aim of bringing computer technology to the assistance of Professoressional mathematicians was met, well beyond expectations. See https://www.cl.cam.ac.uk/~lp15/Grants/Alexandria/.

A team of researchers, including Sarah Morgan and Isaac Sebenius, published a paper in Nature Neuroscience on “Robust Estimation of Cortical Similarity Networks from Brain MRI”. Sarah Morgan is a CST Research Fellow in the Department and supervises Isaac Sebenius, who is a PhD student in Psychiatry. Their work establishes a new computational method for quantifying the brain’s structural network derived from gene expression data. See https://www.cst.cam.ac.uk/news/computational-method-produces-robust-roadmap-how-brain-regions-are-related.

The ACM SIGMOD Test of Time Award 2023 was awarded to Eva Kalyvianaki, co-author of “Integrating scale out and fault tolerance in stream processing using operator state management”. The Award is given annually to recognise a pioneering paper in the field. See https://sigmod.org/sigmod-awards/sigmod-test-of-time-award/.

Andrea Ferlini came second-place in the 2023 ACM SIGMOBILE Dissertation Award. He received the award for his dissertation “For advancing the state of art of sensing in ear-worn devices”. See https://www.cst.cam.ac.uk/news/award-advancing-sensing-capabilities-ear-devices.

The Wiseman Prize

The Wiseman Prize recognizes students and research staff who make an exceptional contribution to the work of the Department which is beyond their expected duties. Their outstanding contributions make a real difference to the Department. The following individuals were awarded the prize for their contributions during 2022-23:

Minja Axelsson	Laurie Gale	Georgi Karadzhov
Jan Blumenkamp	Dobrik Georgiev	Yoàv Montacute
Nicholas Boucher	Param Hanji	Jessica Monteith
Kayla-Jade Butkow	Konstantin Hemker	Anna Pesenti
Hridoy Sankar Dutta	Daniel Hugenroth	Ajay Shankar
Dimitrije Erdeljan	Nida Itrat Abbasi	Micol Spitale

Jack Lang's Contribution to the Department

Jack Lang has now retired from teaching, and the Department wishes to take this opportunity to express our appreciation to him for his sustained contribution to our teaching for so many years. Jack taught the undergraduate Business Studies course, which introduces students to all the things that turn a successful technical project or product into a successful business. The course covers issues that students are likely to encounter in the world of commerce and that need to be considered when setting up a new technology company. Jack also lectured the E-commerce course which provided students with broad coverage of the significant issues involved in setting up an ecommerce business. These courses continue to be a vital part of our undergraduate teaching, and we are very pleased that Stewart McTavish, who has co-taught the courses with Jack for several years, will continue to teach them.

Jack also had a much wider role to play in education. He co-founded the Raspberry Pi Foundation and acted as Chair of the Foundation in the early years and then continued as Vice Chair. Jack contributed a huge amount of business experience, advice and enthusiasm to the project.

Jack also founded the Computer Laboratory's Supporters Club in 1980, which was originally named the Local Industry Fund. For further information see page 139 of the book about the Department: https://www.cl.cam.ac.uk/downloads/books/CambridgeComputing_Ahmed.pdf.

Research

The Department continues to produce world-leading research, and this is at the heart of the Department's activities (https://www.cst.cam.ac.uk/research). Research grant income for the financial year 2022-23 was £14,451,552.

A selection of research grants received between October 2022 and September 2023 include:

- Hatice Gunes, Google, Federated Continual Learning of Socially Appropriate Robot Behaviours
- Srinivasan Keshav, Nokia Solutions and Networks Oy, Support for Research Activities of the Energy & Environment Group
- Roman Kolcun, GEANT VERENIGING, IoT Device Identification at Edge: IoT Device
- Nic Lane, Horizon Europe UKRI Underwrite ERC, Demonstrator of Flower Federated Learning Tool: DEFT
- Nic Lane, Innovate UK, Flower Entry for UK Privacy Challenge Prize

- Nic Lane won an ERC Proof of Concept grant 2022 https://www.cst.cam.ac.uk/news/federated-learning-tool-wins-erc-proof-concept-grant
- Rafal Mantiuk, Meta Platforms Inc, VDP Suite: A Package of Novel Metrics
- Cecilia Mascolo, Principal Investigator on the RELOAD project, won support from UKRI for an AI for Health Project https://www.cst.cam.ac.uk/news/can-ai-diagnose-patients-severe-respiratory-tract-infections
- Cecilia Mascolo won an ERC Proof of Concept grant 2023 https://www.cst.cam.ac.uk/news/mobile-health-monitoring-device-wins-erc-proof-concept-grant
- Cecilia Mascolo, EPSRC, EPSRC Impact Acceleration Account - University of Cambridge - Breathe-In
- Simon Moore, SRI International (FB Darpa), Memory and Safety at Scale (MTSS)
- Richard Mortier, Horizon Europe UKRI Underwrite Innovate, Edge Continuum: Serverless Computing In Heterogeneous, Decentralised Environments: EDGELESS
- Richard Mortier, University of Nottingham (FB EPSRC), TAS Accelerator: UKRI Trustworthy Autonomous Systems Hub - Pump Priming
- Peter Ochieng, Alborada Trust, Improving Quality of Life Within Sub-Saharan Africa Through Natural Language Processing
- Saman Rizvi, ESRC, Inclusiveness in Open Online Computing Education: Geo-Cultural Perspectives
- Peter Sewell was awarded an ERC Advanced Grant for his project 'SAFER' – 'Secure Foundations: Verified Systems Software Above Full-Scale Integrated Semantics' https://www.cst.cam.ac.uk/news/erc-grant-work-making-our-data-and-systems-safer-malicious-attacks
- Jatinder Singh, University of Leeds (FB EPSRC), Inclusive Digital Economy Network+: Include+
- Jonathan Sterling, Air Force Office of Scientific Research (AFOSR), New Spaces for Denotational Semantics
- Jamie Vicary, Isaac Newton Trust, New Categorical Foundations for Compositional Computer Science
- Jamie Vicary, Isaac Newton Trust, Computational Techniques for Directed Globular Higher Categories

Activities, Events and Updates

Postgraduate Studies Open Day

The Postgraduate Education Office participated in the annual Postgraduate Studies Open Day in

November 2022. As in previous years, the event was held online. In addition to sessions provided by the Postgraduate Admissions Office, the Department offered talks from the Director of Postgraduate Education, Professor Mateja Jamnik. The Postgraduate Education Office also hosted a live mini-conference of research students' work on 11 and 12 May 2023 to which prospective PhD students were invited.

Security Research Showcase

From protecting whistleblowers to preventing the abuse of item-tracking technology, and from software compartmentalisation to cybercrime, a Security Research Showcase in January 2023 highlighted some of the security work being carried out in the department.

The event featured a series of lightning talks by PhD students. Topics included 'Argot as a trust signal' - data science techniques for measuring slang, jargon and reputation within underground cybercrime discussion platforms; 'Invisible Hacks' - a novel class of attacks that can target most modern programming languages as well as most deployed text-based machine learning systems; and the CHERI computer processor security project, which was the subject of two talks, one on 'CHERI memory safety'- software stack and ecosystem, and another on 'Library-based software compartmentalisation for CHERI'. More details and videos of the students' presentations can be found here: https://www.cst.cam.ac.uk/news/showcasing-our-security-research.

The Energy and Environment Group (EEG)

The EEG celebrated its second year, and now has four core faculty (Jon Crowcroft, Srinivasan Keshav, Anil Madhavapeddy, Emily Shuckburgh) and affiliate members from Plant Sciences (David Coomes), Institute of Computing for Climate Science (Dominic Orchard), Geography (Emily Lines), and Architecture (Ronita Bardhan and Ramit Debnath). Around 20 PhD and MPhil students attend the regular group meetings at Friday lunchtimes, which consist of roundtable discussions and seminar speakers about biodiversity, climate change and energy management. We have established close working links with the Cambridge Conservation Initiative, and many of the group regularly work out of the David Attenborough Building alongside conservation NGO partners such as the RSPB and BirdLife. Our faculty and students participate in cross-University research initiatives such as the Cambridge Centre for Carbon Credits (4C), the Centre for Landscape Regeneration, and the Cambridge Centre for Earth Observation. We have attracted both significant industrial funding (e.g., Nokia) and philanthropic donations to support PhD students and postdocs, and our research outputs have attracted wide attention across the media, policy and commercial spectrum.

Supporters' Club

Companies enrolled in the Department's Supporters' Club pay a modest annual subscription in exchange for opportunities to interact with students. These organisations, which range from start-ups to multinational enterprises, give Tech Talks, engage in Part 1B projects, advertise opportunities such as graduate roles, internships and events to students, and take part in the Department's Annual Recruitment Fair. Membership has been stable over the last few years at around 95 members.

Subscription to the Supporters' Club is split into three parts: a basic membership, a fee for attendance at the Recruitment Fair, and a donation component for those able to contribute further. We are particularly pleased that many companies chose to provide a donation on top of their membership fee. The income generated is used for a range of purposes including supporting students who are facing hardship, offering additional skills training to early-career researchers, supporting the growing outreach programme and bridge-funding new research ideas.

Supporters' Club activities have included in-person Tech Talks and the annual Supporters' Club dinner. The dinner was held at Pembroke College in March 2023 and was attended by around 30 companies. Following two years of virtual Recruitment Fairs, a successful in-person Recruitment Fair was held in the Department over two days in November 2022. Over 50 companies attended the event.

Cambridge Ring

The Ring is the Department's alumni association. Originally restricted to graduates of the Department, membership has been extended in the last few years to include current and former staff members and longer-term visitors as well as graduates of other departments who were significantly involved with Computer Science while at Cambridge or who now work in computing.

In the past, only a small fraction of those eligible to join actually signed up as members. In 2019, the Ring was brought under the management of the Department's Research Strategy Team, which put a new membership management structure in place and undertook a significant recruitment and data-gathering effort in conjunction with the University's alumni relations department. The team also increased the frequency of communication with alumni and in 2020 set up the Ring Forum, an online discussion venue for peer-to-peer discussions, which now has over 1,000 members. There is also a Cambridge Computer Lab Ring LinkedIn group with over 600 members. Ring membership has more than doubled in the last few years, and continues to rise, supporting over 2,000 members.

The annual Ring Dinner was held in April this year. The occasion was attended by around 50 alumni. The event took place in Queens' College and began with tea and talks from members of the Department and the presentation of the Hall of Fame awards. This was followed by a drinks reception and a three-course dinner, with speeches from the Head of Department Professor Ann Copestake and guest speaker William Tunstall-Pedoe.

In person Ringlets (small gatherings of Ring members) have begun again in London this year with a plan to hold these quarterly.

The Ring has played an important role in entrepreneurial activities this year, with alumni returning to the Department to give talks on start-ups and venture capital, share their experiences of founding companies, and offer advice to current students and postdocs. In June the Research Strategy Team hosted an event entitled, "Become a Cambridge Computer Science Founder" with support from Cambridge Enterprise. At the event, four Ring members gave presentations, were involved in a panel discussion, and took part in a networking session with students and postdocs.

The 'Hall of Fame'

The 2022 awards were presented at the Ring dinner this year. The awards are given in four categories:

Company of the Year 2022: Tenyks

Tenyks is a spin-out from this Department that aims, as its founders say, 'to invent the way humanity interacts with AI'. The company was co-founded by former PhD student Botty Dimanov and current PhD students Dmitry Kazhdan and Maleakhi Wijaya – all of whom were recently named in the Forbes '30 Under 30' Europe Class of 2023 list.

Product of the Year 2022: Flower

Another YCombinator company, Flower Labs, describes Flower as 'a Friendly Federated Learning Framework'. It enables machine learning on distributed data by moving the training to the data, instead of moving the data to the training. The company was co-created by Nic Lane, Professor of Machine Learning Systems, along with his former PhD student and current Visiting Researcher Daniel Beutel, and fellow current Visiting Researcher Taner Topal.

Better Future Award 2022: The Cambridge Centre for Carbon Credits (4C)

The Cambridge Centre for Carbon Credits (4C), co-founded by Anil Madhavapeddy (Professor of Planetary Computing) and Srinivasan Keshav (Robert Sansom Professor of Computer Science), was launched in early November 2021 as an interdisciplinary collaboration between this Department and the Departments of Plant Sciences and Zoology. The Centre's first goal is to scale up the supply of deforestation-avoidance carbon credits in order to halt tropical deforestation as soon as possible. The Centre is currently working on a prototype of a trusted nature-based marketplace.

Publication of the Year 2022

Machine Learning Detects Altered Spatial Navigation Features in Outdoor Behaviour of Alzheimer's Disease Patients (Abhirup Ghosh, Vaisakh Puthusseryppady, Dennis Chan, Cecilia Mascolo, Michael Hornberger). This paper was a collaboration between members of this Department (Research Associate Abhirup Ghosh and Cecilia Mascolo) and colleagues at the Norwich Medical School, University of East Anglia and the Institute of Cognitive Neuroscience, University College London. Impaired navigation is one of the earliest symptoms of Alzheimer's disease, but rather than studying patients' real-life behaviour, the authors pointed out that studies to date have instead involved proxy tests of navigation. They set out to address this by investigating if it is possible to identify Alzheimer's patients by using GPS tracking to see how they navigate their way round their local area.

Annual Alumni Event

The Department's annual alumni event, 'Computer Vision: Seeing the Wood for the Trees,' took place in September 2023 as part of the University's annual Alumni Festival. At the event, three speakers talked to alumni of the Department and some of the research taking place in the Department.

Alastair Beresford discussed how approaches to teaching computing have changed since the introduction of the Diploma in Numerical Analysis and Automatic Computing 70 years ago, and described the development (with the Raspberry Pi Foundation) of our new online teaching and learning platform for schools, AdaComputerScience.org.

Andreas Vlachos talked about his group's work on developing an automated fact-checker that can automatically verify claims made to us online by politicians, by ChatGPT and in Wikipedia pages.

Finally, PhD student Patrick Ferris, part of the Energy and Environment research group, discussed the challenges facing researchers looking for better ways of visualising the huge amounts of environmental data available to us so that we can better understand, analyse and draw conclusions from it.

Introduction to Venture Capital Funding

The Research Strategy Team hosted an event on 26 October 2022 where alumnus Gautham Radhakrishnan came to speak to PhD students about founding companies and venture capital funding. PhD students found the event to be very useful, not only because of what they learned from Gautham but also because it was a useful networking event for them, especially after COVID. Gautham has subsequently been back to the Department to talk to a wider range of postgraduate students as part of the Research Skills Programme.

Pittsposium

On 23 August 2023, the Department hosted a workshop as a celebration of Professor Andrew Pitts' research and successful career in the Department. Until his retirement at the end of September 2023, Professor Pitts was Professor of Theoretical Computer Science at the University of Cambridge, having joined the Computer Laboratory as a Lecturer in 1989. He holds a PhD in Mathematics, also from Cambridge, and is an Emeritus Fellow of Darwin College. His early research interests were in applications of category theory in logic and mathematical foundations and then, from around 1985 onwards, applications in the semantics of programming languages. His work in theoretical computer science has ranged over category theory, constructive logic, type theory, programming language semantics, and the design and implementation of metaprogramming languages. Professor Pitts is an ACM Fellow and a recipient of the Alonzo Church Award for Outstanding Contributions to Logic and Computation.

The event was very well attended by members of the theoretical computer science community, with talks given by many of Professor Pitts' students, colleagues, and collaborators.

The Departmental Annual Garden Party

This year's annual garden party was held on 8 September 2023 at the Møller Institute. It was one of the hottest days of the year and attendees enjoyed a barbeque, Pimms and lawn cricket. The event was an opportunity to thank Professor Ann Copestake for her outstanding service as Head of Department from May 2018 to September 2023.

2023 International Workshop on Primary and Secondary Computing Education Research (WiPSCE)

The WiPSCE International Workshop was held in the Department from 27-29 September 2023. The workshop is the premier international venue for school-level computing education, run in cooperation with ACM's Special Interest Group on Computer Science Education. WiPSCE aims to improve the exchange of research and practice relevant to teaching and learning in primary and secondary computing education, teacher training, and related research, and draws participants from all parts of the world. Its roots are from a long-running workshop of the German computing education community, but it is now hosted in other countries across Europe. Accepted papers will be published in the WiPSCE 2023 proceedings as part of the ACM International Conference Proceedings Series, which will be included in the ACM Digital Library. The event was hosted by Raspberry Pi Education Research Centre (RPCERC), which is a Research Centre within the Department. Thanks to generous support from Google, we offered five all expenses paid places for UK-based computing teachers.

Dr Sue Sentance, the Centre's Director and Co-Chair of the 2023 WiPSCE Conference, says: "Being able to facilitate teachers' attendance at the conference is very much aligned with our approach to research." She also added that "Both at the Foundation and the Raspberry Pi Computing Education Research Centre, we're committed to conducting research that's directly relevant to schools and teachers, and to closely collaborating with teachers."

Wheeler Lecture

We have relocated the timing of the Wheeler Lecture to Michaelmas Term each year. Therefore, the next Wheeler Lecture will take place on 15 November 2023 when Simon Peyton-Jones will speak on the topic of “Beyond functional programming: a taste of Verse”.

Large Language Models

The UK AI Council had provided advice on AI policy and strategy to the government and, in 2022-23, a series of discussions were convened focusing on policy implications of advances in Large Language Models, with the aim of supporting rapid government action to build national capability in Foundation Models.

Among the areas Neil Lawrence was actively involved in was the instigation of a letter to the Science Minister calling for coordinated action across government, industry and academia to develop an action plan to secure advantage in Large Language Models; a briefing paper considering the policy implications of progress in Large Language Models; and a letter to the Secretary of State for Science, Innovation and Technology highlighting ongoing measures dealing with the challenges of AI. The government has disbanded these structures in favour of a *pool of experts* approach.

Neil Lawrence is still involved in international discussions around AI and ML and was recently at the House of Lords Communications and Digital Committee evidence session on Large Language Models to talk about the big questions in understanding and regulating these AI models.

AI Retreat in Nagymaros, Hungary

Ferenc Huszár, Associate Professor in Machine Learning, founded and ran the AI Retreat for the second time in August 2023 for over-achieving teenagers from Hungary.

This 10-day residential event exposed some of the brightest competitive programmers and maths students to machine learning research and covered three main topics: Large Language Models, AI for Science and Mathematics, and AI Safety and Ethics. See: https://www.airetreat.org/

Hopper Studentship

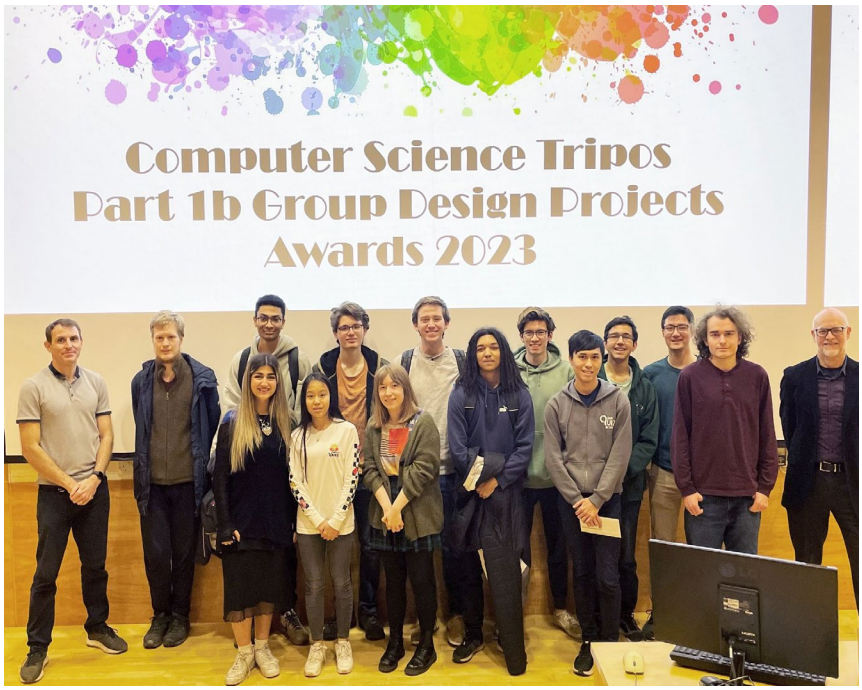
On 25 September 2023, we held an event to launch the Hopper Studentship and to mark Professor Sir Andy Hopper's official retirement. We are extremely grateful to Andy for his support for PhD students in the Department and in establishing the Hopper Studentship Fund, which recognises Andy's many contributions to the Department throughout his career and will allow a new Hopper Student to commence their PhD studies each year indefinitely.

See https://www.cst.cam.ac.uk/news/announcing-hopper-studentship.

Teaching

Undergraduate Teaching

A total of 126 Part IA students were admitted in Michaelmas Term 2023. This is a decrease of 16 students in 2022 but remains above the Department's target of 120. The numbers break down into 66% home students, 8% EU students, and 26% international students. Percentages have followed a similar pattern to last year with a slight increase in home students. The percentage of female students is 20% which is an increase from the figure of 18.3% for 2022. The Part IA and IB 2023 Tripos examinations were held in person under closed book conditions, whereas the Part II 2023 Tripos examinations were online and open book using Moodle. We will return to in-person examinations for all Part IA, IB and Part II students in 2024.



The classing boundaries were set at the percentages shown below. Class distribution reflects the expected boundaries as set out in the Department's Marking and Classing document while allowing for examiner discretion.

Marking and Classing		2021 Part II results		2022 Part II results		2023 Part II results	
Expected distribution		Final Distribution		Final Distribution		Final Distribution	
I	40%	I	41%	I	42%	I	39%
II.1	50%	II.1	50%	II.1	48%	II.1	53%
II.2	7.5%	II.2	7%	II.2	8%	II.2	6%
III	2.5%	III	2%	III	2%	III	2%

Postgraduate Teaching

The MPhil in Advanced Computer Science continues to run smoothly. Students provided positive feedback on the offered modules and One-Minute-Madness sessions and project presentations were popular live events in 2023. The Postgraduate Education Office is very grateful to the PhD students who assisted in running practice sessions and who were session chairs for the presentations. Application numbers for the MPhil commencing October 2023 were marginally lower than 2022. We registered 64 MPhil students and a further 33 Part III students. We also expect between 44-46 PhD admissions in 2023-24. In the academic year to 30 September 2023, the Degree Committee approved 32 Ph.D. degrees and 68 M.Phil degrees, including 48 with Distinction.

Outreach

Cambridge Festival

Talking to robots and making music with code were just two of the activities visitors could try at our day of open events on Saturday 18 March, which took place as part of the 2023 Cambridge Festival.

Hundreds of visitors came through our doors looking to meet some of our robots, try coding music like a DJ with Sonic Pi software, watch a game of virtual football being played by AI footballers, hear how cybercriminals persuade others to trust them, and find out about new software being developed to check the truth of claims made by politicians – or by ChatGPT!

On our day of public events, we showcased some of the research that takes place in areas from security to the environment, encompassing themes from robotics to artificial intelligence through to natural language processing. Researchers working on environmental projects ran a session on "Seeing the woods for the trees," a workshop on how different ways of visualizing and representing environmental data can improve public understanding of it. See https://patricoferris.github.io/the-woods-for-the-trees/.

Visitors were also able to learn about the use and abuse of technology at a session that revealed how item-tracking devices (designed to find lost phones and keys) are used by stalkers to track their targets. They were also able to watch how a swarm of robots interacts with humans.

The day brought over 1,000 visitors into the building and was a great success. The next event will take place in March 2024.

Sutton Trust Summer School

We were very pleased to welcome 46 students into the Department in mid-August for the 2023 Sutton Trust and University of Cambridge Computer Science Summer School. The Summer School runs annually and provides high-achieving Year 12 students from disadvantaged backgrounds an overview of Computer Science and insights into university life. The students who attended took part in practical classes and supervisions in programming, algorithms, graphics and computer architecture. They also attended taster lectures in areas including computer security and natural language processing. In addition, in a residential programme that aimed to give participants the full Cambridge student experience, there were sessions that offered them information and advice - for example, on writing personal statements - to support them during the university application process.

University Open Days

We held two Open Days in the Department on 6-7 July 2023, welcoming prospective undergraduates and their parents. Visitors were able to take tours of the Department, hear an admissions talk and chat to Directors of Studies in Computer Science about what it's like studying here. They could also meet and talk to current students, see some demonstrations of current research work, for example in Graphics. At the Security demo, current students invited visitors to try their hand at lock-picking, a popular demonstration which also showed how techniques in picking locks have parallels with the techniques hackers use to break into our computers and access our data.

Each of the two days included a sample lecture where prospective students could get a flavour of the lectures that undergraduates attend. There was also a series of films showing how this year's Part IB students developed their Group Design Projects, working in teams with a client from among the Department's industrial Supporters' Club to develop a product based on an initial design brief.