



# UNIVERSITY OF CAMBRIDGE

Department of Computer  
Science and Technology

## Annual Report of the Faculty 2017-18\*

*\*A small number of items that fall into 2018-19 which are of current relevant interest are also included in this report.*

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### **Richard Gibbens, Reader in Network Modelling, Fellow of Gonville and Caius and Fellow of the Alan Turing Institute. 29 January 1962 – 12 August 2018**

It was with great shock and sadness that we heard of the death of Richard Gibbens on 12 August 2018, following a short illness. Richard was Reader in Network Modelling in the Department, and had been promoted to a Professorship from 1 October 2018. Richard was a very valued member of the department who was recognised internationally for his research. He is survived by his wife Helen and two children.

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The Department welcomed **Ann Copestake**, Professor of Computational Linguistics, as the new Head of Department in May 2018. She took over from Professor Andy Hopper CBE, FIET, FEng, FRS who had been in the post for almost 14 years.

The Department is to appoint a **DeepMind Chair of Machine Learning** thanks to a benefaction from the world-leading AI company DeepMind.

Following the appointment of Professor Ian Leslie as the Director of the University's Information Services, we will be appointing a new **Robert Sansom Professorship of Computer Science**.

We hope that both Chairs will be appointed in time to take up their positions in October 2019 or shortly afterwards.

## PERSONNEL

As at 30 September 2018 the Computer Laboratory consisted of 183 members of staff:

Academic staff	44
Academic-related & Assistant staff	30
Research Fellows	7
Research Staff	102

The following members of staff enjoyed personal promotions from 1 October 2018:

- Professor: **Pietro Lio'**
- Reader: **Robert Harle, Timothy Jones, Richard Mortier, Rafal Mantiuk**
- Senior Lecturer: **Thomas Sauerwald**

New members of academic staff from 1 October 2018:

- **Alice Hutchings**, University Lecturer, previously Senior Research Associate in the Department's Security Group.
- **Andreas Vlachos**, University Senior Lecturer, previously Lecturer in the Natural Language Processing and Machine Learning at the University of Sheffield.
- **Ryan Cotterell**, University Lecturer, previously undertaking a PhD at John Hopkins University, Baltimore.

The following Research Associates were promoted to Senior Research Associate:

- **Andrés Arcia-Moret**, Systems Group
- **Daniel Bates**, Computer Architecture Group
- **Ekaterina Kochmar**, Natural Language Processing Group
- **Matthew Naylor**, Computer Architecture Group

We are pleased to report numerous staff and student honours, awards and achievements over 2017/18 <http://www.cl.cam.ac.uk/news/category/frontpage/> A selection of these include:

- **Alan Blackwell** has received a 20 year Most Influential Paper award from the IEEE symposium on Visual Languages and Human-Centric Computing for his 1996 paper '*Metacognitive theories of visual programming: What do we think we are doing?*'.
- **Jon Crowcroft** has been awarded an honorary doctorate by the Aalto University Schools of Technology.
- Team Me[N]ta[ca] comprising of **Dimitrije Erdeljan**, **Petar Velickovic**, **Marko Stankovic** and **Dušan Živanovic** won a gold medal at the Northwestern Europe Contest (NWERC 2017).
- **Victor Gomes**, **Martin Kleppmann**, **Dominic Mulligan** and **Alastair Beresford** have been awarded a distinguished paper award and a distinguished artifact award for their paper 'Verifying strong eventual consistency in distributed systems.'
- Part II Student **Ran Zmigrod** was invited to present a paper on his Part II project at the International Conference on Interactive Theorem Proving (ITP). Ran's work is tied to that of his supervisors **Tim Griffin** and **Matthew Daggitt**.
- **Andy Hopper** CBE FEng FRS has been appointed Treasurer of the Royal Society. The appointment, which is for five years, started on 30 November 2017. Andy has been a recipient of numerous prestigious awards for his influential work, with the Science Council naming him as one of the UK's 100 leading practising scientists in 2014.
- **Mateja Jamnik** has been appointed as a Specialist Adviser to the House of Lords Select Committee on Artificial Intelligence.
- **Michael Schaarschmidt** has been awarded a 2018 Google PhD Fellowship. Michael is a member of the Systems Research Group under the supervision of **Eiko Yoneki**.
- **Quentin Stafford-Fraser** has won the Lovie Lifetime Achievement Award for his role in inventing the first webcam. The Lovie Awards honour European online excellence.
- The New Science published an article 'Uncrackable computer chips stop malicious bugs attacking your computer' which covers CHERI and other projects relating to security-focused computer architecture. The work on CHERI (Capability Hardware Enhanced RISC Instructions) is led by **Simon Moore**, **Peter Sewell** and **Robert Watson**.
- **Noa Zilberman**, Leverhulme Early Career Fellow and member of the Networks and Systems Group has been named in the fourth list of 'N<sup>2</sup>Women of 10 Rising Stars in Computer Networking and Communications'.

The Department's Wiseman Award is now in its 2<sup>nd</sup> year. It aims to recognise research staff and students who make a commendable contribution to the work of the Department. Their outstanding contributions make a real difference to our work. The 2017-18 recipients were:

Daniel Bates  
Mario Cekic  
Krittika D'Silva  
Matthew Danish  
Botty Dimanov  
Martin Kleppman  
Stephan Kollman  
Robert Kovacsics

Kevin Heffernan  
Amandla Mabona  
Chaitanya Mangla  
Mariana Marasoiu  
Alessandro Montanari  
Ewa Muszynska  
Jean Pichon-Pharabod  
Olesya Razuvayevskaya

Michael Schaarschmidt  
Daniel Thomas  
Diana Vasile  
Alexander Vetterl  
Mark Wassell  
Conrad Watt  
Poonam Yadav

## ACTIVITIES

During 2017-18 the **Supporters' Club** saw further growth with membership reaching 82. The Club hosted a successful recruitment fair and ran a full programme of tech talks. Members acted as clients for the Part IB group design projects and continued to offer a wide variety of internship and graduate opportunities.

The annual dinner of the **Cambridge Computer Lab Ring**, a professional networking group for Cambridge Graduates working in the computing industry, was held at Queens' College on 11 April 2018 and featured the 14<sup>th</sup> Hall of Fame Awards. The awards, which celebrate the success of around 260 companies founded by Computer Lab graduates and staff were presented by guest speaker **Herman Narula, co-founder and CEO of Improbable, a member of the exclusive UK tech 'unicorn' club.**

### *The 2017 winners*

<i>Company of the Year:</i>	Bromium
<i>Product of the Year:</i>	PetaGene for PetaSuite
<i>Better Future Award:</i>	Sandra Servia-Rodríguez, Kiran K. Rachuri, Cecilia Mascolo, Peter J. Rentfrow, Neal Lathia, Gillian M. Sandstrom for "Mobile sensing at the service of mental well-being: a large-scale longitudinal study"
<i>Publication of the Year:</i>	Petko Georgiev, Nicholas Lane, Cecilia Mascolo, David Chu for 'Accelerating Mobile Audio Sensing Algorithms through On-Chip GPU Offloading'

The seventh annual distinguished **Wheeler Lecture** on 30 May 2018 was given by **Professor Stephen Pulman FBA, Emeritus Professor of Computational Linguistics at Somerville College, University of Oxford.** His lecture was titled '**Language, learning, and creativity**'.

The fourth annual **women@CL** Oxbridge Conference was held in the Department in March 2018.

The **annual academic off-site meeting** was held on 2 July 2018 at Wolfson College.

The official launch of the Centre for Mobile, Wearable Systems and Augmented Intelligence, a collaboration between the University and Nokia Bell Labs was held on 11 September 2018. The Centre, which is based at the Department, is directed by **Prof Cecilia Mascolo** and **Dr Alastair Beresford**. The lab also hosted the first UK Mobile Wearable and Ubiquitous Systems Research Symposium on 12-13 September 2018.

The Cambridge Trust and Technology Initiative held its launch event on 20 September 2018 at Robinson College. The Initiative headed by **Prof Simon Moore** and **Dr Jat Singh** brings together and drives forward interdisciplinary research from Cambridge and beyond to explore the dynamic of trust and distrust in relation to internet technologies, society and power; to better inform trustworthy design and governance of next generation tech at the research and development stage; and to promote informed, critical, and engaging voices supporting individuals, communities and institutions in light of technology's increasing pervasiveness in societies

## RESEARCH

The Computer Laboratory's research programme continues to produce world-leading work and research continues to be at the heart of the Laboratory's business <http://www.cl.cam.ac.uk/research/>. Research grant income in the last financial year was £9.4M (an increase of £1.6M on the previous year).

Members of the department are involved in leading two new Strategic Research Initiatives: Trustworthy Technologies <http://www.cam.ac.uk/research/research-at-cambridge/strategic-research-initiatives-networks> and Global Challenges [www.gci.cam.ac.uk/](http://www.gci.cam.ac.uk/). Both started on 1 October 2017 and are funded for three

years in the first instance. The Language Sciences Interdisciplinary Research Centre, co-led by a member of the department, was upgraded from a Strategic Research Initiative on the same date.

In September 2018 the University undertook a Strategic Research Review of the Department's research. This review provided expert external advice to support the development of the University's research environment.

Amongst the Computer Laboratory's portfolio of active research grants, we have a broad spectrum of topics. Grants awarded include:

- **Dr Paula Buttery** was awarded an Alan Turing Institute grant for work on 'Data science approaches to understanding key actors on online hacking forums' from October 2017 to March 2018.
- **Professor Jon Crowcroft** and **Dr Carlos Molina** have been awarded an EPSRC IAA Knowledge Transfer Fellowship from 1 February 2018 to 1 December 2018 for 'Tools for enforcement of Smart Contracts (TESCON)'.
- **Dr Cristina David** was awarded a Royal Society Fellowship for work on 'Advancing inductive program synthesis' from 1 October 2017 to September 2022
- **Dr Mateja Jamnik** has been awarded an EPSRC Human-like Computing feasibility grant together with University of Sussex from 1 April 2018 to 1 October 2019 for How to (re)represent it.
- The Department and Nokia Bell Labs have established a new Centre for Mobile, Wearable Systems and Augmented Intelligence. The centre will be directed by **Professor Cecilia Mascolo** and **Dr Alastair Beresford**.
- **Dr Eva Kalyvianaki** was awarded an EPSRC grant for work on 'Decentralised, large scale resource management in modern data centres' from October 2017 to November 2018.
- **Dr Andrew Moore** and **Dr Noa Zilberman** have been awarded a fully funded 3 year Microsoft Research PhD studentship from 01/10/17 to 30/09/2020 to study power efficiency and bottlenecks in existing rack scale fabric topologies, and to develop new power efficient architectures.
- **Dr Andrew Moore** has been awarded an EPSRC grant (with QMUL) from 1 January 2018 to 31 December 2020 for EARL: sdn EnAbleD measuRement for all.
- **Dr Richard Mortier** and **Dr Andres Arcia-Moret** have been awarded an EPSRC IAA Knowledge Transfer Fellowship from for 'IoT Spectrum Monitoring in Smart Cambridge'.
- **Dr Rafal Mantiuk** has been awarded a 4 year €4M Horizon 2020 ITN award in collaboration with DTU Fotonik (Denmark), Universite de Nantes, Bang and Olufsen AS, MPI Informatik, CNRS, Dxo Labs, University of Oxford, Bangor University and Fraunhofer IIS for research on 'RealVision'.
- **Joanna Ochremiak** was awarded a Marie Skłodowska-Curie Individual Fellowship for work on 'Descriptive complexity of infinite domain constraint satisfaction problems' from July 2018 to June 2020.
- **Dr Jat Singh** has been awarded an EPSRC TIPS (Trust, Identify, Privacy and Security) for 28 months together with Aberdeen and Oxford for Realising Accountable Intelligent Systems (RAInS).
- **Dr Jat Singh** and **Professor Simon Moore** have been awarded an EPSRC GCRF Institutional Grant for 'People vs. bots – detecting social media manipulation in the developing world'.
- **Dr Robert Watson**, **Professor Simon Moore** and **Professor Peter Sewell** have been awarded a DARPA Microelectronics Technology Office (MTO) for 36 months for CHERI-ISA Formal Verification (CIFV).
- **Dr Robert Watson** was awarded an EPSRC grant for 'IOSEC, protection and memory safety for input/output security' for 5 years from November 2017 to October 2022.
- **Dr Eiko Yoneki** has been awarded an RAEng Frontiers of Development from 01/02/18 to 01/02/19 for BUGALERT 'Pest and Disease monitoring in greenhouses with Raspberry-Pi Network.

## TEACHING

Undergraduate numbers slightly increased in 2017-18; our first year intake was 102 students (99 in 2016-17). For 2018-19 the intake has risen to 130. 116 students (~90%) have chosen the Computer Science 75% option which fall in line with our planned withdrawal of the 50% option in 2020.

The proportion of female students in 2018-19 has risen to 24% as opposed to 18% in 2017-18 and 14% in 2016-17. The proportion of students obtaining a First or II.1 in 2018 rose to 92% (89% in 2017).

<b>2018 Part II results</b>		<b>2017 Part II results</b>	
I	41%	I	41%
II.1	51%	II.1	48%
II.2	7%	II.2	7%
III	1%	III	4%

The MPhil in Advanced Computer Science continues to run smoothly with 28 modules spanning the wide range to research interests found in the Department. Application numbers remain strong with 326 applicants applying for entry for 2018-19.

## OUTREACH

The Department is engaged in a wide range of outreach activities with schools, colleges and communities. Our staff participate in public engagement activities to inspire, inform and foster debate. Full details of our outreach and public engagement can be found at: <http://www.cl.cam.ac.uk/outreach/> but a selection of the year's activities include:

**Professor Cecilia Mascolo** participated in the Cambridge Science Festival in March 2018 and gave a talk on 'Small but mighty data: what mobile devices can tell about us'. Pod cast available here: <https://soundcloud.com/university-of-cambridge/cecilia-mascolo-small-but-mighty-data-what-mobile-devices-can-tell-about-us>

The Department participated in the University Open Days in July 2018 opening its doors to students, parents and teachers. Over 370 potential students attended, of which approximately 16% were female.

The Sutton Trust Summer School took place in the Lab from 6-10 August 2018 with 22 attendees. The week-long programme was organised by **Dr Timothy Jones**. Tim also organised an Experience Cambridge Day and two Computer Science Taster Sessions during Summer 2018 in association with the Cambridge Admissions Office.

The CSAT Practice[+] Platform <https://www.cl.cam.ac.uk/admissions/undergraduate/csat/practice/> was launched in July. Bogdan Roman, the Department's CSAT Coordinator, together with a talented team of current undergraduate students, all who sat the CSAT in a previous year, are driving this online learning platform to aid candidates in their preparation for Computer Science and Maths more generally and to give them a feel for the sort of questions they might face in the admissions test.

**Dr Amanda Prorok** was interviewed by The Naked Scientists in August 2018 as part of the show 'Naked on a Punt' <https://www.thenakedscientists.com/podcasts/naked-scientists-podcast/naked-punt> Dr Prorok's research covers robot networks and cyber-physical systems.

In March 2018, **Professor Frank Stajano**, hosted a 2-day Inter-ACE cyber security challenge with more than 130 students taking part representing 18 of the UK's top cybersecurity universities. The competition is supported by GCHQ's National Cyber Security Centre. The victorious team from the University of Edinburgh won the top prize of £6,000 with 2<sup>nd</sup> place going to the University of Southampton and 3<sup>rd</sup> prize to Imperial College London.

Professor Ann Copestake  
Head of Department, October 2018