



UNIVERSITY OF CAMBRIDGE

Department of Computer
Science and Technology

Annual Report of the Faculty 2016-17*

*A small number of items that fall into 2017-18 which are of current relevant interest are also included in this report.

As of 1 October 2017, the Department's official name changed to the Department of Computer Science and Technology. However, we still wish to use *The Computer Laboratory* in an informal sense and it will be maintained when identifying the physical place we work in.

Michael JC Gordon FRS, Professor of Computer Assisted Reasoning 28 February 1948 – 22 August 2017

It was with great sadness we reported the death of Professor Mike Gordon in August 2017. Mike Gordon joined the Computer Laboratory in 1981 and he made magnificent contributions to the Department in many different ways. Mike Gordon's colleagues and students will remember him as an attentive and supportive listener, of unflinching kindness and generosity. He is survived by his wife, Avra Cohn, and by their two children Katriel and Reuben Cohn-Gordon. He will be sadly missed.

Obituary: <https://www.cl.cam.ac.uk/misc/obituaries/gordon/>

PERSONNEL

As at 30 September 2017 the Computer Laboratory consisted of 194 members of staff:

Academic staff	46
Academic-related & Assistant staff	32
Research Fellows	1
Research Staff	115

Six members of staff enjoyed personal promotions from 1 October 2017:

- Professorships: **Frank Stajano, Simone Teufel**
- Readerships: **Alastair Beresford, Paula Buttery, Mateja Jamnik, Andy Rice**

New members of academic staff:

- **Dr Nada Amin**, University Lecturer, previously Research Assistant in the Programming Methods Laboratory at EPFL. Her appointment began on 1 September 2017
- **Dr Paula Buttery**, Reader in Computing and Language, previously University Senior Lecturer in the Department of Theoretical and Applied Linguistics, transferred to the Department in October 2016.
- **Dr Evangelia Kalyvianaki**, University Senior Lecturer, previously University Senior Lecturer at City, University of London. Her appointment began on 1 October 2017.
- **Dr Amanda Prorok**, University Lecturer, previously a Postdoctoral Researcher in the General Robotics, Automation, Sensing and Perception at University of Pennsylvania. Her appointment began on 1 September 2017
- **Dr Damon Wischik**, University Lecturer, previously Chief Data Scientist at Urban Engines (a start-up based in Los Altos, CA). His appointment began on 1 January 2017

The following Research Associate was promoted to Senior Research Associate:

- **Dr Graeme Jenkinson**, Security Group

The Laboratory continues to strengthen its links with the Colleges and three more members of staff have taken up a College Fellowship:

- **Dr Timothy Jones**, Gonville and Caius
- **Dr Pietro Lio'**, Clare Hall
- **Dr Thomas Sauerwald**, Emmanuel

We are pleased to report numerous staff and student honours, awards and achievements over 2016/17 <http://www.cl.cam.ac.uk/news/category/frontpage/> A selection of these include:

- **Gianni Antichi, Marcin Wójcik** and **Andrew W. Moore** along with co-authors, won the best paper award at ACM SIGCOMM 2017. The paper '*Re-architecting datacenter networks and stacks for low latency and high performance*' is joint work between members of the Systems Research Group, University College London and University Politecnica of Bucharest
- **Thomas Brouwer** won the Homerton Santander award for outstanding achievement in PhD research. Thomas was awarded the prize for his work under Pietro Lio' investigating the use of Bayesian models for analysing biological datasets. The award is given annually for outstanding research in STEM subjects
- **Catalina Cangea** (MPhil), **Laurynas Karazija**, **Edgar Liberis** (Part III) and **Petar Veličković** (PhD) were awarded a bronze medal at Cambridge Hack Recurse in January 2017
- **Stephen Dolan** was the winner of the 2017 CPHC/BCS Distinguished Dissertation Award for his dissertation '*Algebraic subtyping*'
- **Zafar Gilani** presented his research on Twitter bots at the International Conference on Advances in Social Networks Analysis and Mining in Australia. The paper '*Classification of Twitter Accounts into Automated Agents and Human Users*' is joint work with **Ekaterina Kochmar** and **Jon Crowcroft**
- **Professor Sir Tony Hoare** has been elected a foreign associate of the National Academy of Sciences
- **Mateja Jamnik** received a Royal Society 2016 Athena award for founding women@CL
- **Ramana Kumar** won the ACM SIGPLAN John C. Reynolds Doctoral Dissertation Award for 2017
- **Marwa Mahmoud** presented the results of research on a new AI system designed to detect pain levels in sheep, at the 12th IEEE International Conference on Automatic Face and Gesture Recognition in Washington, DC in June 2017
- **Cecilia Mascolo** reached the finals of the 2016 Women in Networking/Communications (N₂ Women) list of '10 Women in Networking/Communications That You Should Know'
- **Lawrence Paulson** was elected a Fellow of the Royal Society
- **Diana Popescu** was named Google Women Techmakers Scholar 2017 (formerly Google Anita Borg Memorial Scholarship Program)
- **Raspberry Pi** won the Royal Academy of Engineering MacRobert Award in June 2017
- **Advait Sarkar** received CSAR (Cambridge Society for the Application of Research) Student Award for 2017
- **Peter Sewell** and his team of researchers won the SIGPLAN Most Influential ICFP Paper Award 2017. The paper '*Ott: Effective Tool Support for the Working Semanticist*' is joint work with the PLS group and Francesco Zappa Nardelli of INRIA Paris
- In April 2017, **Petar Veličković** (PhD), **Marko Stanković** and **Dimitrije Erdeljan** (Part II), from team METAIICA came fifth in the final of Google's Hash Code 2017. In November 2016, they were awarded a silver medal at Northwestern Europe Regional Contest (NWERC 2016)

The Department's Wiseman Award was launched this 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. 2016-17 recipients were:

Ewa Muszyńska
Kevin Hefferman
Alex Kuhnle
Guy Emerson
Petar Veličković
Christian O'Connell
Marwa Mahmoud
Gyuri Denes

Daniel Thomas
Theo Markettos
Graeme Jenkinson
Lucian Carata
Matthew Daggitt
Philip Saville
Raphael Proust

ACTIVITIES

During 2016-17 the **Supporters' Club** saw further growth with membership reaching 77. 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 5 April 2017 and featured the 13th 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 **Dame Stephanie Shirley**.

The 2017 winners

<i>Company of the Year:</i>	Improbable*
<i>Product of the Year:</i>	Grakn Labs for GRAKN.AI
<i>Publication of the Year:</i>	Jatinder Singh, Thomas F. J.-M. Pasquier, Jean Bacon, Julia Powles, Raluca Diaconu, & David Eysers for "Big Ideas paper: Policy-driven middleware for a legally-compliant Internet of Things"

*Cambridge Computer Lab Ring Company of the Year, Improbable, has raised \$502m from Japan's SoftBank corporation. Founded in 2012 by Computer Lab graduates Herman Narula and Rob Whitehead, Improbable's software simulates systems on a massive scale with a level of detail not previously possible. Improbable will remain independent with Softbank having only a minority stake in the business.

The sixth annual distinguished **Wheeler Lecture** was held on 24 May 2017 and given by **Professor Angela Sasse FEng**, Professor of Human-Centred Technology in the Department of Computer Science at University College London. Her lecture was titled '*Can we make people value IT security?*'

The third annual **women@CL** Oxbridge Conference was held in March 2017 at Oxford with approximately 80 participants, ranging from sixth form students, senior professors, computer scientists and engineers from different companies, universities and related organisations.

The **annual academic off-site meeting** was held on Wednesday 5 July 2017 at the Stephen Hawking Building, Gonville and Caius College, with talks given by Professor Ann Copestake and Professor Jon Crowcroft.

In July 2017, **Frank Stajano**, **Graham Rymer** and **Michelle Houghton** organised a 3-day Cambridge 2017 cyber security competition in collaboration with MIT CSAIL. 110 students took part from US and UK. The teams winning Gold and Silver included **Lucian Paul-Trifu** (MPhil) and **Dimitrije Erdeljan** (Part IB).

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 £7.7M, an increase of £3M on the previous year.

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

- **Ross Anderson** and **David Modic** have been awarded an 18 month grant from Orange for research on '*Intrusion deception*'. Using insights from psychology and computer science to provide more attractive honeypots, in order to identify individuals trying to hack into networks and their incentives for doing so

- **Ted Briscoe** has been awarded a grant from Innovate UK on ‘*Virtual Investment Researcher*’ (in collaboration with All Street Research Ltd) to develop the NLP technology to underpin an autonomous investment research system
- **Franck Courbon** has been awarded a 3-year Leverhulme Early Career Fellowship, starting in September 2017 to August 2020 for research on *Extending and Characterising the Capability of Hardware Data-Extraction Techniques*.
- **Timothy Jones** has been awarded a 3.5 year EPSRC programme grant partnered with ARM and Cancer Research UK on ‘*Automatic Binary Parallelisation*’. This work will continue the work started by his PhD student in automatically parallelising application binaries
- **Rafal Mantiuk** has been awarded a 5 year ERC Consolidator Grant on ‘*Perceptual encoding of high fidelity light fields*’ which will aim to characterise and model the performance and limitations of the human visual system when observing complex dynamic 3D scenes
- **Larry Paulson** has been awarded a 5 year ERC Advanced Fellowship of €2.4M for ‘*ALEXANDRIA: Large-Scale Formal Proof for the Working Mathematician*’. Alexandria will create a proof development environment attractive to working mathematicians, utilising the best technology available across computer science
- **Jat Singh** has been awarded a 3 year EPSRC Fellowship titled ‘*Towards a legally-compliant Internet of Things*’. Dr Singh will take an interdisciplinary approach to develop conceptual frameworks and technical means to enable systems (and those responsible) to comply with legal and regulatory obligations, by improving control and visibility of data as it moves throughout IoT
- **Frank Stajano** has had his EPSRC Academic Centre of Excellence in Cyber Security Research award renewed to the value of £93,518 to support activities of the ACE over the next 5 years
- **Robert Watson** was awarded a £145K DARPA-funded project in collaboration with SRI International for work on CTSRD (Clean Slate Trustworthy Secure Research and Development) from August 2016 to August 2018
- **Robert Watson** was awarded a Google Chrome for CHERI: Memory Protection for Operating-System Kernels from October 2016 to September 2017

TEACHING

Undergraduate numbers slightly increased in 2016; our first year intake was 99 students (96 in 2015). For 2017 the intake has risen to 104 students including 2 Caltech students. Around 79% have chosen the Computer Science 75% option. The proportion of female students in 2017 has risen to 18%, as opposed to 14% in 2016 and 19% in 2015. The proportion of students obtaining a First or II.1 in 2017 rose to 89%.

2017 Part II results		2016 Part II results	
I	41%	I	34%
II.1	48%	II.1	51%
II.2	7%	II.2	7%
III	4%	III	8%

The M.Phil in Advanced Computer Science continues to run smoothly with 32 modules (including three offered at the Department of Engineering) spanning the wide range of research interests found in the Department. Application numbers remain strong, with 329 applicants applying for entry in 2017-18.

OUTREACH

The Computer Laboratory 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 the Laboratory’s outreach and public engagement can be found at: <http://www.cl.cam.ac.uk/outreach/> but a selection of the year’s activities include:

The Sutton Trust Summer School took place in the Lab from 14-18 August 2017 with 30 attendees, both male and female. The week long programme was organised by **Dr Robert Harle**, **Dr Timothy Jones** and

Dr Bogdan Roman and included an Introduction to Programming (simple Python in a day) and Machine Learning using a Raspberry Pi.

The Computer Laboratory was represented at the Oxbridge Conferences in March 2017 by **Tim Griffin, Lawrence Paulson, Graham Titmus** and **Gabriela Sklencarova** (MPhil).

The Department participated in the University Open Days in July 2017 opening its doors to students, parents and teachers. Over 450 potential students attended, of which approximately 18% were female. This is an increase of visitors of almost 50% from previous years.

Professor Andy Hopper
Head of Department