UNIVERSITY OF CAMBRIDGE
Faculty of Computer Science & Technology

Annual Report of the Faculty 2013-14

Personnel

As at 31 October 2014 the Computer Laboratory consisted of 169 members of staff:

Academic staff	41
Academic-related & Assistant staff	25
Research Fellows	3
Post-doctoral Researchers	100

Two members of staff enjoyed personal promotions from October 2014: Dr Simon Moore to a Professorship in Computer Engineering and Dr Cecilia Mascolo to a Professorship in Mobile Systems.

Two new Lecturers were appointed to start in 2014/15: Dr Anil Madhavapeddy, previously a Senior Research Associate at Cambridge and Dr Richard Mortier, previously Horizon Transitional Fellow in Computer Science at the University of Nottingham.

Honours, Awards and Competitions

- Alastair Beresford and Andy Rice received the Pilkington Prize to honour their excellence in teaching.
- The team from the Alta Institute based at the Computer Lab won this year's shared task competition at the International Conference on Computational Natural Language Learning (CoNLL 2014, Baltimore) on automatic grammatical error correction in non-native English text. This was the fourth such competition in the last five years but the first in which errors of all types were tackled.
- Chloe Brown, supervised by Cecilia Mascolo, received the Best Paper Award at the 2014 ACM International Joint Conference on Pervasive and Ubiquitous Computing (Ubicomp 2014). The paper "The architecture of innovation: Tracking face-to-face interactions with ubicomp technologies" was joint work with Christos Efstratiou, Ilias Leontiadis, Daniele Quercia, Cecilia Mascolo, James Scott and Peter Key.
- Jon Crowcroft and Anil Madhavapeddy won the "HiPEAC Paper Award" for their paper "Unikernels: Library Operating Systems for the Cloud" which was presented at the ASPLOS 2013 Conference.
- John Daugman received the "Large Data Analysis (LDA) Award" from the International Society for Optical Engineering, and he became permanently inducted into the US National Inventors Hall of Fame.
- Ionel Gog, supervised by Robert Watson, was awarded a Google Europe Fellowship in Distributed Systems.
- Andy Hopper was named in the Science Council's list as one of the country's 100 leading practising scientists.
- Flora Pnjou Tasse, supervised by Neil Dodgson, was awarded a Google Europe Fellowship in Computer Graphics.
- Three Cambridge teams excelled at the Northwestern European Regional Contest 2013 (NWERC). The teams, which included a number of Computer Laboratory undergraduate students (Boris Grubic, Vlad Alexandru Gavrilă, Bogdan-Cristian Tataroiu, Eduard Kalinicenko and Oleg Oshmyan), came 2nd, 4th and 5th, which meant that Cambridge qualified for the ACM-ICPC world finals.

Activities

The Computer Laboratory celebrated the 10th anniversary of women@CL on 14th May, 2014. women@CL started off as a national network that supports women in computing research. Its model has been replicated in many departments across the UK and national organisations like the BCS. The 10th anniversary celebrations included 41 Minute Madness presentations featuring cutting edge research undertaken by women in the Computer Laboratory and beyond. This was a very informative, entertaining and inspiring session. The day concluded with the annual distinguished Wheeler Lecture given by Jeannette Wing, the Corporate Vice President of Microsoft Research. 11 years ago, we were pioneering with women@CL by offering such a support network to women in computing. Today, we are proud of the several thousand people who took part in activities during this time, and of our extremely active student and post-doc community of women who clearly feel the benefits of and want the support from such a programme.

The annual dinner of Cambridge Computer Lab Ring, the Lab's graduate association, featured the 10th Hall of Fame Awards. The awards celebrate the success of over 220 companies founded by Computer Lab graduates and staff.

> The winners were:
> *Product of the Year* - Masabi for JustRide
> *Publication of the Year* - Jaroslav Sevcík, Viktor Vafeiadis, Francesco Zappa Nardelli, Suresh Jagannathan, and Peter Sewell for "CompCertTSO: A Verified Compiler for Relaxed-Memory Concurrency'"

The Supporters' Club enjoyed another successful year: 55 companies attended the annual recruitment fair; members acted as clients for the Part IB group design projects; sponsorship was secured for the student prizes; there were a large number of tech talks for students; and members offered a wide variety of internship and graduate opportunities.

Responding to a call by EPSRC and the British Embassy in Tokyo, Dr Frank Stajano, head of Cambridge's Academic Centre of Excellence in Cyber Security Research (ACE-CSR), has taken an active role in promoting research links in cybersecurity between the UK and Japan. He has co-organised a workshop in Tokyo, attended by representatives of other ACE-CSRs, to attract Japanese researchers to the UK as visiting scientists, and a workshop in Cambridge, again with the British Embassy, to host a group of Japanese scientists from NICT.

The 2014 GNU Tools Cauldron was held at the Computer Laboratory in July 2014. The event brought together researchers and developers working on the GNU Tool Chain (the GNU Compiler Collection (GCC), the GNU Debugger (GDB) and the GNU binary utilities) and was the largest ever such meeting, with approximately 150 attendees from universities and companies around the world.

Community Engagement

The Department has continued to enjoy the galactic success of the Raspberry Pi initiative. There are currently millions of Raspberry Pi owners worldwide and it has spawned many community projects: magazines, newsletters, blogs, YouTube channels and tutorial sites and family events centred around learning with the Raspberry Pi.

The Sonic Pi project explores the computer's use in education, particularly the creative potential of live coding to provide new routes into digital music for young people. The project encompassed this summer's Sonic Pi: Live & Coding summer school which gave 60 children (aged 10-14) a unique opportunity to develop digital music. (The project is in partnership with others but Sonic Pi was created in the Computer Laboratory so plays a big part in the project).

The Cambridge Coding Academy (CCA) was started by two of the Computer Laboratory's post graduate students. The CCA seeks to empower school children, and University students of the Arts and Humanities, to turn their creative ideas into reality through coding. This is done through hands–on one–day coding workshops where attendees learn how to create a web game using industry relevant technologies and practices. The workshops are taught by our students.

Rob Harle gave the computer science lecture at the University's Subject Masterclass series. Rob Harle and Bodgan Roman represented the Department at the Oxbridge Conferences.

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.

Research grant income in the last financial year was £7.8M, an increase of £1.5M on the previous year. Just over half of this (51%) came from the UK Research Councils, with industry (UK and overseas) accounting for a further 24%. We continue to diversify our funding sources; of the 149 active grants during this period, 44% (65) were funded by EPSRC.

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

- Ross Anderson won a large EPSRC grant for work on the deterrence of deception in socio-technical systems, which involves cross-disciplinary research with computer scientists and psychologists in Cambridge, Newcastle, UCL and Portsmouth.
- Timothy Jones started his 5 year EPSRC Early Career Fellowship in collaboration with ARM that will develop schemes for performance, energy efficiency and reliability in future many-core systems.
- The Mirage OS (originally developed at the Computer Laboratory, lead by Anil Madhavapeddy) officially became a Linux Foundation Incubation Project.
- The OCaml Labs initiative within the SRG and PLS (Madhavapeddy, with Crowcroft, Mycroft, Leslie) expanded in size via several new research awards (EU FP7, EPSRC and British Telecom) to deploy safe programming techniques towards the construction of secure, privacy-aware networked infrastructure.
- Simon Moore continues to collaborate with the Security and Systems groups on two DARPA funded projects developing more secure systems from a new processor (CHERI) through language, compilation and operating systems to deliver more robust applications.
- Andrew Moore (PI), Jon Crowcroft and Anil Madhavapeddy won an EPSRC grant, NaaS (Network as a Service), that studies how to provide safe efficient and easy control of network operations to datacenter tenants.
- Andrew Moore (PI) was awarded an NSF grant, jointly with colleagues at Stanford University, supporting development and operations of the NetFPGA research platform. This award supports the ongoing and future developments of a critical platform in worldwide network research. The grant will support the work of local researchers and assistant staff based in Cambridge.
- Robert Mullins has started a new project, LowRISC, developing an open source ASIC platform. He also continues his work on the Loki processor.
- Dr Frank Stajano is Principal Investigator for the ERC-funded Pico project on the elimination of passwords. So far, the project has employed 5 RAs and has been the project topic of 7 undergraduate and master students, two of whom received a Distinction. An additional PhD CASE studentship on Pico has been awarded by BT in 2014. Introductory video and publications at http://mypico.org.

Teaching

Undergraduate numbers continue to steadily increase. Over the last two years, student examination results in the various classes have become more in line with other Triposes across the University. In 2014, 80% of students achieved a First or II.1.

2013 Part II results		*2014 Part II results*	
I	32%	I	31%
II.1	40%	II.1	49%
II.2	24%	II.2	16%
III	4 %	III	4%

The external examiners have confirmed that the lower number of II.2 degrees compared to earlier years is fully appropriate on the basis of comparison with standards in other UK institutions.

There have been some changes to the MPhil in ACS. Premium fees were introduced for 2014-15, which has brought the fees for Part III and the ACS closer to comparability. We have not noticed any changes in application numbers. Departmental bursaries are now available for students taking the MPhil in ACS, with preference being given to students from the UK, who have limited other options for funding.

From 2015-16. the little-used essay option on the ACS will be dropped and Research Skills will be run throughout the year, on a Pass/Fail basis, instead of being treated as another module. This revision makes it clearer that the ACS is regarded as a research degree, preparing students for a PhD, rather than a taught MPhil.

Building and Facilities

The facilities team worked hard to achieve a Green Impact Bronze Award which was presented by the Energy & Environmental Office. We continue to maintain our reputation as one of the most energy efficient buildings on the West Cambridge Site.

Visitors

We have been pleased to host many academic visitors, including the following:

- Professor Luis Ceze, University of Washington, USA
- Dr Zeynep Engin, Director of the London Centre for Social Studies
- Dr David Eyers, University of Otago, Dunedin, New Zealand
- Dr Tim Harris, Oracle
- Professor Warren Hunt, University of Texas at Austin, USA
- Prof Uday Khedker, Indian Institute of Technology Bombay
- Professor Jeong-Gun Lee, Hallym University, South Korea
- Dr Luc Maranget, INRIA, France
- Professor Joerg Ott, Aalto University, Finland
- Professor Panagiotis Papadimitriou from University of Hannover
- Dr Anna Slobodova, Centaur Technology, USA
- Professor Michael Segal, Ben-Gurion University of the Negev, Israel
- Steve Tanimoto, University of Washington
  Industrial visitors Nirav Dave, Brooks Davies, Peter G Neumann and Stacey Son (SRI), and Ben Laurie (Google) continued their collaboration with the DARPA- and Google-sponsored CTSRD and SOAAP projects.

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