



# UNIVERSITY OF CAMBRIDGE

Faculty of Computer Science & Technology

## REVIEW OF THE YEAR 2009-10

### Personnel

Three members of staff enjoyed personal promotions from October 2010: Neil Dodgson to a Professorship in Graphics and Imaging, Simone Teufel to a Readership in Language and Information and Markus Kuhn and Andrew Moore to University Senior Lectureships. Anuj Dawar was appointed as Deputy Head of Department with special responsibility for teaching, from 1 January 2010 until 31 December 2011.

It was with great sadness that we received the news of the deaths of two previous members of staff, Robin Milner (Emeritus Professor) in March and Amanda Hughes (Secretary) in September.

In 2009-10 the Computer Laboratory consisted of 106 members of staff:

Established posts	Academic staff	37
	Academic-related	9
	Assistant staff	14
Un-established posts	Academic-related	2
	Research Fellows	7
	Researchers	37

### Honours and Awards

Ian Leslie, the Robert Sansom Professor of Computer Science, was elected a Fellow of the Royal Academy of Engineering.

John Daugman received the 2010 Wavelet Leadership Award from the International Society for Optical Engineering.

Dr Andy Harter, Director of Studies in Computer Science at St Edmund's College and graduate of the Computer Laboratory, was awarded a Royal Academy of Engineering Silver Medal for his outstanding personal contribution to British engineering.

Professor Andy Hopper received an honorary doctorate, DSc (Eng), from Queen's University, Belfast, for services to information technology and business and commerce.

Dr Simon Moore, Reader in Computer Architecture, was awarded one of the University's prestigious Pilkington Prizes for excellence in teaching.

Three research students achieved the hat-trick in the Distinguished Dissertations Competition: Magnus Myreen was the winner with his thesis entitled "Formal verification of machine-code programs" and the runners up were Alexey Gotsman

"Logics and analyses for concurrent heap-manipulating programs" and Tom Cashman "NURBS-compatible subdivision surfaces".

Andrew Rice and Simon Hay were presented with the best paper award at the Eighth Annual IEEE International Conference on Pervasive Computing and Communications (PerCom2010) for their paper titled "Decomposing power measurements for mobile devices".

Several PhD students won awards for best papers:

Shazia Afzal at the 10th IEEE International Conference on Advanced Learning Technologies, for 'Modelling Affect in Learning - Motivation and Methods';

Sherif Akoush and Ripduman Sohan at the 18th Annual Meeting of the IEEE International Symposium on Modelling, Analysis and Simulation of Computer and Telecommunication Systems (MASCOTS 2010) for "Predicting the Performance of Virtual Machine Migration";

Robert Watson and Jonathan Anderson at USENIX Security '10 for "Capsicum: Practical Capabilities for UNIX".

Undergraduate student Peter Calvert won the BCS Award for the Best Information Technology Student for his Part II project "Parallelisation of Java for Graphics Processors" supervised by Andrew Rice and Dominic Orchard.

## Activities

While UK economic activity remained weak, demand for the Computer Lab's graduates was robust. The Supporters' Club membership remained constant and interest in the annual recruitment fair was undiminished with the November 2009 event fully subscribed. There was an increase in demand from companies to come to Cambridge to provide students with interview clinics, workshops and other networking opportunities. A number of members acted as clients for the Part IB projects, and all those who attended the project presentations found the opportunity to attend instructive.

Membership of the Cambridge Ring continued to grow and the number of companies founded by Computer Lab graduates grew to 177. Members again acted as clients for the Part IB projects and attended the project presentations. New and recent graduates continued to join the mentoring scheme.

In June, members of staff attended an Away Day at Girton College to discuss the Computer Laboratory's operational strategy and tactics for the future. Presentations by Neil Dodgson and Andy Hopper on a range of topics were followed by lively discussion from the floor. Steve Hand gave a review of the first year of the MPhil Course in ACS and four members of staff – Robert Mullins, Pietro Lio, Andy Rice and Glynn Winskel – gave short presentations about their research.

The Computer Laboratory continued to participate in the Cambridgeshire schools' work experience programme for pupils in years 10 and 11. In March we hosted William Hopper from Sawston Village College for a two-week placement, followed by a one-week placement in May for Harry Gwynne from Parkside Community College.

In July, Professor Hopper was delighted to welcome Carlos Slim, Sir Evelyn de Rothschild, Lady Lynn de Rothschild and Lord Martin Rees to discuss the Computer Laboratory's research on computing for the future of the planet.

## Teaching

### The MPhil in Advanced Computer Science

The academic year 2009/10 saw the inaugural intake of students to the MPhil in Advanced Computer Science. In the end, we had a total of 34 students, vastly exceeding our initial expectations of around 10! The students were of a very high quality, and all successfully attained the degree. Several are now PhD students in the lab or elsewhere.

Andrew Moore renewed ongoing financial support for his MPhil ACS module, "Building an Internet Router", from lab supporters Redgate Software, Ensoft, and Zeus as well as Xilinx and Cisco Systems. These companies both directly support the module providing underwriting of additional teaching assistance for this module and by providing judges and prizes for an end of module competition for the best advanced router feature.

### The Computer Science Tripos

During 2009-10, the Teaching Committee completed its rolling review of the Computer Science Tripos with that for Part II following the previous reviews of Parts IA and IB. A number of courses were updated and new offerings added.

A new student feedback system was launched, showing very promising results in terms of soliciting input.

The regulations for Part III of the Computer Science Tripos were approved by the University in March 2010. Students currently reading Part II will now be able to apply for admission to a fourth year of study leading to the award of an MEng degree.

## Research

In the financial year ending 31 July 2010 research income amounted to £3.9M.

The Computer Laboratory's portfolio of research grants covered a broad spectrum of topics. Recent activities included the following:

- Robert Watson, Dr Andrew Moore, Dr Simon Moore and Professor Ross Anderson won a \$5.5m DARPA grant to work on developing better capability mechanisms for use in operating systems. Robert's protection designs have already been adopted by firms such as Google and Apple; this grant will enable them to be developed to use hardware support for fine-grained access control. It follows a Cambridge tradition started in the 1970s with the CAP computer designed by Morris Wilkes and Roger Needham and is the first large DARPA grant to be awarded outside the US in over 7 years.
- The project "Automatic Proof Procedures for Polynomials and Special Functions" is worth just over £1 million, equally divided between Cambridge and Edinburgh. It supports the development of reasoning engines that can prove mathematical formulas involving, for example, ratios of polynomials or transcendental functions. It will also explore applications of this technology within engineering, for example, the verification of hybrid and control systems or analogue circuit designs.
- Stephen Clark was Program Co-Chair of the 48th Annual Meeting of the Association for Computational Linguistics, the flagship conference of the field, held in Uppsala, Sweden in July 2010.

- Jean Bacon was programme co-chair for ACM Middleware, Urbana Champaign, US, December 2009 and general co-chair of ACM Distributed Event-Based Systems, King's College Cambridge in July 2010.
- Professor Pitts appointed a member of the EPSRC Strategic Advisory Team for Information and Communication Technology from February 2010.
- Dr Cecilia Mascolo was involved in project EPSRC WILDSENSING on badgers monitoring with sensor networks, which ended with a full article publication in ACM Sensys 2010 and project EmotionSense, to study how mobile phones can be used to monitor socio-psychological behaviour of people, with a publication in ACM Ubicomp2010 and wide media coverage. In January 2010 project EPSRC FRESNEL started, with focus on sensor network federation: a poster about the work was accepted at ACM Sensys 2010.
- Anuj Dawar was elected vice-president of the European Association for Computer Science Logic at its annual meeting in Coimbra, Portugal in 2009. He also served as programme chair for the annual meeting of the association in 2010 and for the 2010 Workshop on Logic, Language, Information and Computation.
- Jon Crowcroft, Andy Hopper and Andrew Moore of the Computer Laboratory, jointly with David MacKay of Cavendish Laboratory, the Centre for Photonic Systems and Leeds University won an EPSRC programme grant valued at 5.9 million pounds to work INTERNET Intelligent Energy Aware Networks. Within the context of a new generation of Green ICT infrastructure, the Computer Laboratory work will seek to design new protocols and algorithms to enable communications systems to adapt their speed and power consumption according to both the user demand and energy availability.
- Andrew Moore recently won support from Xilinx that continues his role as European advocate of the NetFPGA project. This role has taken on new importance with the impending launch of the foundation for open source networking hardware and enables Cambridge to maintain a central role at the forefront of the networking research community.
- PhD student Dan Greenfield was among the team of computer scientists and neuroscientists that discovered “striking similarities” between human brains, the nervous system of the nematode worm *Caenorhabditis elegans* and computer chips.

## Visitors

We have been pleased to host the following academic visitors:

- Dr Tom Schrijvers, Katholieke Universiteit Leuven
- Prof Rudrapatna Shyamasundar, Tata Institute of Fundamental Research, Mumbai, India
- Dr Cosmin Oancea, Canadian NERC post-doctoral fellow
- Dr James She, funded by a Canadian Scholarship associated with the Horizon EPSRC project
- Dr Helio Guardia, Universidade Federal de São Carlos, Brazil
- Dr Liping Shen, Shanghai Jiao Tong University, PRC
- Dr Roberisy Rodriguez Sanchez, Instituto de Investigaciones en Viandas Tropicales, Cuba

## Conclusion

The University continues to allocate resources in a way which does little to reward success and the Computer Laboratory is faced with a savings target. In order for the Computer Laboratory to maintain its position as an international centre of excellence, it is essential that it receives its fair share of rewards and resources. It has made, and continues to make, a substantive financial contribution to the University, not least through the RAE and the new MPhil in Advanced CS. There is an overwhelming need for a transparent incentive and resource allocation structure to ensure that the Computer Laboratory continues to hold its place among the top few computer science departments worldwide.

AH/MAL  
November 2010