



UNIVERSITY OF CAMBRIDGE

Faculty of Computer Science
& Technology

REVIEW OF THE YEAR 2010-11

Personnel

Sir Maurice Wilkes DFBCS FREng FRS, died on 29 November 2010 at the grand age of 97. Sir Maurice, one of the pioneers of British Computing, was Head of Department from 1946 until 1980. A memorial event was held on 27 June 2011, when over 250 people participated in a lunch hosted by St John's College, followed by a programme of talks in the Computer Laboratory.

Four members of staff enjoyed personal promotions from October 2011: Ann Copestake to a Professorship of Computational Linguistics, Marcelo Fiore to a Professorship in Mathematical Foundations of Computer Science, Richard Gibbens to a Readership in Network Modelling and Mateja Jamnik a University Senior Lectureship.

In 2010-11 the Computer Laboratory consisted of 110 members of staff:

Established posts	Academic staff	34
	Academic-related	8
	Assistant staff	15
Un-established posts	Academic staff	2
	Academic-related	2
	Research Fellows	7
	Researchers	42

Honours, Awards and Competitions

- Professors John Daugman and Neil Dodgson were elected Fellows of the Institute of Mathematics and its Applications in recognition of their 'personal contribution to the advancement of mathematics as a discipline and as a profession'.
- Andy Harter, Visiting Fellow at the Computer Laboratory, was elected a Fellow of the Royal Academy of Engineering.
- Stephen Clark was elected to the position of Chair-Elect of the European Chapter of the Association for Computational Linguistics (ACL), for 2011-2013. From 2013-1015 he will be the Chair and a member of the ACL Executive Committee.
- Professor Peter Robinson was awarded best in-category at Pervasive 2011 for the video "*The emotional computer*". The conference is the premier forum for researchers to present their latest results in all areas related to architecture, design, implementation, application and evaluation of pervasive computing.
- Robert Watson and Jonathan Anderson won the Publication of the Year Award 2011, at the Cambridge Ring's Hall of Fame Awards for "*Capsicum: Practical Capabilities for UNIX*".
- Dan Greenfield won the BCS Distinguished Dissertation prize with his dissertation "*Communication Locality in Computation: Software, Chip Multiprocessors and Brains*". Dan received his award at the prestigious Roger Needham Lecture at the Royal Society.
- Eurographics, the European Association for Computer Graphics, chose Tom Cashman's 2010 dissertation "*NURBS-compatible subdivision surfaces*" as one of the year's three award winners.

- Dr Alexey Gotsman was the winner of the European Association for Programming Languages and Systems's Best Dissertation Award 2010 for his dissertation on logics and analyses for concurrent heap-manipulating programs.
- Andreas Koltes won the IET Postgraduate Scholarship, one of two awarded in 2011. His research focused on the design of flexible low-power memory systems for manycore processors, part of the Loki project.
- Peter Calvert won first place in the undergraduate category of the ACM Student Research Competition, for his final year project on offloading Java to graphics processors. He collected his award at the ACM Awards Banquet in San Jose, CA.
- Mohan Ganesalingam who has been (jointly) awarded the Beth Prize for his PhD thesis "*The Language of Mathematics*". The E.W. Beth Dissertation Prize is awarded annually to outstanding dissertations in the fields of Logic, Language, and Information.
- Lech Świrski and Christian Richardt won the ACM Student Research Competition at SIGGRAPH 2011 with their poster "*Layered Photo Pop-Up*", based on Lech's 2011 MPhil project.
- Sherif Akoush won the best student paper award at the 18th Annual Meeting of the IEEE International Symposium on Modeling, Analysis and Simulation of Computer and Telecommunications Systems.

Activities

In June, members of staff attended an Away Day at Homerton College to discuss the Computer Laboratory's operational strategy and tactics for the future. Presentations by Andy Hopper, Neil Dodgson and Anuj Dawar 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 three members of staff – Stephen Clark Cecilia Mascolo and Sam Staton – gave short presentations about their research.

Membership of the Cambridge Ring increased to over 700, while the number of companies founded by Computer Lab graduates grew to 182. The mentoring scheme continued to prove popular, particularly amongst younger graduates starting their own businesses.

It was gratifying to see that, despite the poor economic environment and the consequent loss of some longstanding members, the arrival of new members allowed overall membership of the Supporters Club to remain unchanged. The 2010 recruitment fair was again fully subscribed. The exhibitors deemed it a great success, their only complaint being the insufficient supply of students to meet their demand. A number of members again acted as clients for the Part IB group projects, while more voiced their interest in future participation.

The Computer Laboratory continued to participate in the Oxbridge Conferences. Alastair Beresford and Rob Harle attended the various UK-wide locations to talk to students about reading computer science, and to be on hand to answer their questions.

Andrew Rice and Alastair Beresford continued to run their summer programme for undergraduates covering a ten week period in the summer vacation. Six students were selected for this year's programme which was generously supported by Redgate.

The Computer Laboratory continued to participate in the Cambridgeshire schools' work experience programme for pupils in years 10 and 11. In May we hosted Azarias Harding from Parkside Community College for a one-week placement during which time he worked with the administration team and participated in a number of projects with the MPhil students.

In September, the Computer Laboratory celebrated ten years in the William Gates Building with a party in the Atrium. The event also marked the retirement of Christine Northeast after nearly 24 years as a Computer Officer in the Department.

Research

In the financial year ending 31 July 2011 research income amounted to £4.2M.

The Computer Laboratory's portfolio of research grants covered a broad spectrum of topics including the following:

- Glynn Winskel was awarded one of the prestigious European Research Council Advanced grants. The award of 2.4 million euro is for five years and is for research on Events, Causality and Symmetry – the next generation semantics.
- Simon Moore was awarded £1.9m by the US Government (DARPA) for research into secure and resilient cloud computing. The (MRC)² project takes a clean-slate approach to designing robust server systems and data centre switches including hardware (networks, processors and memory subsystems) and operating systems.
- Peter Sewell was awarded a £1.2m EPSRC Leadership Fellowship on Semantic Foundations for Real-World Systems, supporting his research and that of his group to build mathematically rigorous tools for handling the subtle concurrency semantics of multiprocessors (such as x86, IBM Power, and ARM) and programming languages (such as C and C++). The project partners are ARM Ltd, IBM, Microsoft Research Ltd, Oswego State University of New York and Sun Microsystems Inc.
- The Computer Laboratory's research initiatives in sustainability were boosted by an EPSRC project, *Enabling Consumer Awareness of Carbon Footprint through Mobile Service Innovation (C-AWARE)*, shared by the Universities of Cambridge, Nottingham and Exeter.
- The Foresight and Understanding from Scientific Exposition (FUSE) initiative, led by Simone Teufel and funded by IARPA, seeks to develop automated methods that aid in the systematic, continuous, and comprehensive assessment of *technical emergence* from the scientific literature. Technical emergence refers to the process whereby innovative ideas, capabilities, applications, and even entirely new fields of study arise, are tested, mature, and, if conditions are favorable, make a significant impact. Work will continue over the next five years.
- Anil Madhavapeddy received a Verisign grant of US\$75,000 to pursue projects aimed at strengthening Internet infrastructure. The winners were chosen in four categories with Anil the winner in the DNS Security category for "Constructing a Functional Name System". The purpose of this project, Mirage, is to develop a clean-slate operating system designed to run reliably, securely and speedily on the Internet, and is much simpler than systems currently in use due to the use of modern programming language techniques.
- Larry Paulson led an EPSRC project worth more than £1 million over four years, to be shared by the Universities of Cambridge and Edinburgh. Entitled "*Automatic Proof Procedures for Polynomials and Special Functions*". Its objectives were to develop advanced mathematical software and to apply it to engineering problems, specifically to control engineering and electronic engineering.
- In May 2011, the FluPhone project led by Jon Crowcroft and Eiko Yoneki was reported in the University's magazine *Horizon* followed by a series of media coverage including the BBC's website <http://www.bbc.co.uk/news/uk-england-cambridgeshire-13281131> which got highest access on the web on that day in a BBC site. FluPhone provides a phone application that could help monitor the way infectious diseases such as influenza are spread.
- Andrew Rice was awarded a £50K starter grant from the university to support the development of his OpenRoomMap project. The starter grant programme is available to new University Teaching Officers and funds a Research Associate for up to one year.
- Cecilia Mascolo was awarded an EPSRC grant in the Cross-Disciplinary Interface *UBhave: ubiquitous and social computing for positive behaviour change*. Collaboration between Psychology in Southampton and the Computer Laboratory at Cambridge investigated how mobile technologies may help in the provision of behaviour intervention.

Teaching

MPhil in Advanced Computer Science

The MPhil in Advanced Computer Science continues to be a popular course, with well over 200 applications for entry in October 2011. The quality of candidates was very high, and we made offers to approximately 90 students, of which 45 were able to take up their offer, six taking Option A (with an extended essay), the remainder taking Option B (with the project).

Andrew Moore continued to obtain financial support for his MPhil ACS module, "Building an Internet Router", from lab supporters Redgate Software, Ensoft, and Zeus (now Riverbed) 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.

Computer Science Tripos

2011-12 will see the introduction of Part III of the Computer Science Tripos; 20 applications were received for entry in October 2011. Initial admissions are expected to be low, providing a gentle introduction for the new course, which will help with ironing out any wrinkles. However we would ideally hope to have 5-8 students continuing to Part III in future years.

The Computer Science Tripos has been relatively stable since the addition of 'subject streams' in Part IB. Minor changes during 2010-11 included: revision of the syllabus of Computer Fundamentals, expansion of Algorithms I and Algorithms II to permit mention of parallel algorithms, and Regular Languages and Finite Automata to allow context-free grammars to be introduced. Scheduled twice-weekly 11:00 slots and associated meeting rooms for Part IB facilitated group interaction during group projects. The expansion of practical work in the Tripos continued allowing Programming in Java (Part IA), and Further Java (Part IB) courses to be taught entirely in a practical setting. The Tripos Management Committee is considering possibilities for extending this approach to the remaining courses on programming.

Building and Facilities

The Computer Laboratory continued to make efforts in reducing energy consumption and once again exceeded its annual energy saving target by a considerable margin. The Laboratory began to deploy a comprehensive energy monitoring infrastructure within the William Gates Building both to support research programmes and to inform further energy reduction measures. A new power distribution network for lighting and investigating lower energy lighting options is planned.

In April, a full recycling system was introduced in the Computer Laboratory. All waste is taken to a central recycling site for sorting then recycling or composting.

Visitors

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

- Professor Paul Barford, University of Wisconsin
- Professor Don Towsley, University of Massachusetts Amherst
- Professor Geoffrey Xie, Naval Postgraduate School, Monterey, California
- Dr Iain Phillips, Loughborough University
- Professor Vito Latora, University of Catania
- Professor Suresh Jagannathan, Purdue University, West Lafayette, Indiana
- Professor Stephanie Weirich, University of Pennsylvania
- Professor Steven Zdancewic, University of Pennsylvania
- Professor Warren Hunt, University of Texas at Austin
- Dr Anna Slobodova, Centaur Technology, Austin, Texas

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November 2011