



## Personnel

In 2011-12 the Computer Laboratory consisted of 134 members of staff:

Established posts	Academic staff	37
	Academic-related	8
	Assistant staff	15
Un-established posts	Academic staff	2
	Academic-related	2
	Research Fellows	10
	Researchers	60

Three members of staff enjoyed personal promotions from October 2012: Peter Sewell to a Professorship of Computer Science, Stephen Clark to a Readership in Natural Language Processing and Tim Griffin to a Readership in Computer Science.

## Honours, Awards and Competitions

- Professor Glynn Winskel was elected to the *Academica Europaea*, the European Academy of Arts and Sciences.
- Professor John Daugman was made a Fellow of the International Association for Pattern Recognition, and he gave the IAPR Keynote Address in New Delhi.
- Professor Ann Copestake was elected as president of FoLLI - The Association for Logic, Language and Information. FoLLI was founded in 1991 to advance the practicing of research and education on the interfaces between Logic, Linguistics, Computer Science and Cognitive Science and related disciplines.
- Professor Ross Anderson was awarded the Louis Brandeis Privacy Award at the Health Privacy Summit in Washington DC, USA.
- Cecilia Mascolo and Andreas Bulling received Google Research Awards for 2011 for their work in Social Networks and Human computer Interaction respectively. The Google awards program supports academic research aimed at improving information access.
- Alan Blackwell's research on first steps in programming won an award for most influential paper over the past 10 years at the IEEE conference on Visual Languages and Human-Centric Computing.
- The paper 'Track Globally, Deliver Locally: Improving Content Delivery Networks by Tracking Geographic Social Cascades' by Salvatore Scellato, Cecilia Mascolo, Mirco Musolesi and Jon Crowcroft in the Proceedings of 20th International World Wide Web Conference in Hyderabad, India, won the Cambridge Computer Lab Ring's "Most notable publication of the year" award.
- Members of the NLIP group are involved in the Cambridge Language Sciences Initiative, which was launched in May 2012. This aims to bring together researchers from across the university working on language, bridging the divide between the humanities, sciences and technology.
- Computer Science student Jonathan Millican was named the UK's 'Cyber Security Champion' following a competition sponsored by GCHQ and other industrial

heavyweights. Jonathan competed against more than 30 other finalists to claim the title.

- Ubisense, founded by Andy Hopper, won two prestigious UK Queen's Awards, for International Trade and for Innovation.
- Research student Vaiva Imbrasaitė was awarded a Google Anita Borg Scholarship. Vaiva is a member of the Rainbow Graphics & Interaction Group under the supervision of Peter Robinson.
- Research students Tadas Baltrusaitis, Narseo Vallina-Rodriguez and Al-Mustafa Zaidi were awarded Qualcomm Innovation Fellowships. The fellowships focus on recognizing, rewarding and mentoring innovative PhD students across a broad range of technical research areas.
- The EuroSys 2012 Roger Needham PhD Award was given to Derek Murray for 'A Distributed Execution Engine Supporting Data-Dependent Control Flow'.
- Claudio Angione received the best paper award at the Turing Centenary Conference in Manchester. Claudio is a member of the Artificial Intelligence Group under the supervision of Pietro Lio.
- Jisun An was awarded a Google Europe Fellowship in Social Computing. Jisun is a member of the Systems Research Group under the supervision of Jon Crowcroft.
- Work carried out by David Coyle, Per Ola Kristensson and Alan Blackwell in collaboration with the Psychiatry Department won an honourable mention for best paper at the 2012 ACM CHI conference, with a paper titled "I did that! Measuring users' experience of agency in their own actions."

## Activities

In July, members of staff attended an Away Day at Girton College to discuss the Computer Laboratory's operational strategy and tactics for the future. Andy Hopper outlined the Computer Laboratory's funding strategy and four members of staff, Frank Stajano, Simone Teufel, Robert Watson and Simon Moore, talked about their research funding. Andy Rice gave a presentation about on-line teaching methods and this was followed by a discussion covering a wide range of topics relating to teaching and administration.

June 2012 saw Cambridge hosting the Turing Centenary Conference 'CiE 2012 - How the World Computes', marking the centenary of the birth of Alan Turing. Anuj Dawar was the main local organiser of the conference which was attended by nearly 400 participants. The conference heard talks on a range of topics, reflecting Alan Turing's varied contributions to computability, mathematical logic, morphogenesis and dynamical systems, artificial intelligence, cryptography, and computer engineering.

Raspberry Pi was launched at the end of February 2012 engendering a great deal of press coverage locally and internationally. There are currently around 400,000 Raspberry Pi users worldwide, growing at around 100,000 per month. Raspberry Jams, meetings for Raspberry Pi owners and enthusiasts, hobbyists, developers, teachers, students and families, were held in places as diverse as Penzance, Manchester and Melbourne. The Computer Laboratory has bought Raspberry Pi boards for each of this year's freshers to play with.

Membership of the Supporters Club remained constant. Demand for a stand at the annual recruitment fair was such that we were forced to operate a wait list. A number of members submitted proposals for the Part IB group design projects and acted as clients.

The Computer Laboratory participated in the Cambridge Science Festival for the first time. An item on Anglia News proclaimed Charles robot head as star of the show.

## Research

The Computer Laboratory's research programme continues to produce world-leading work. The Laboratory has over 200 active researchers. In addition to the permanent academic staff there are over 100 PhD students, half a dozen Fellows of prestigious institutions, and several tens of post-doctoral research associates.

Research provides about three-quarters of the Laboratory's total income. In the financial year ending 31 July 2012 research grant income alone amounted to £4.7M, constituting about half of the Laboratory's budget. A further quarter of the budget came via research-linked central funding. Research is therefore the heart of the Laboratory's business.

The last couple of years have seen a shift in sources for our research funding. Prior to 2011, the vast majority of our funding came from the UK government via the EPSRC. We have recently seen a small downturn in this income, as the UK government tightens its belt, although the quality of our research means that we remain relatively successful in our bids for EPSRC money. Over the same period, we have seen a pleasing upturn in funding from the EU, with the award of several European Research Council grants (see below) and with the award of several grants sponsored by the US government through DARPA and IARPA. We expect that these trends will continue, with the Laboratory's research grants increasingly coming from outside the UK.

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

- Simon Moore was awarded 1.6 million pounds from the US Defense Advanced Research Projects Agency (DARPA) to investigate new sandboxing techniques to improve security of systems. This builds on work capability based protection mechanisms epitomised by the Lab's 1970s CAP computer but using modern quantitative design principles from the RISC era.
- Three members of staff were awarded prestigious European Research Council Starter grants each worth in excess of 1 million euros. The projects that have been selected are 'Distributional Compositional Semantics for Text Processing (DisCoTex)' (Stephen Clark), 'Specialisable, Programmable, Efficient and Robust Microprocessors (SPEAR)' (Robert Mullins) and 'Pico: no more passwords' (Frank Stajano). The ERC grants enable the most promising scientists to develop their best ideas at the frontiers of knowledge.
- Stephen Clark is the coordinator of a 5-site, 3-year EPSRC grant, awarded to the Universities of Cambridge, Edinburgh, Oxford, Sussex and York. The total award of 1.5 million pounds is for inter-disciplinary research on Distributional Compositional Semantics.
- Sean Holden and Kathryn Lilley of the University of Cambridge Department of Biochemistry have been awarded a grant "Data Fusion and Inductive Transfer for Organelle Proteomics" by the BBSRC.

## Teaching

Teaching in the Computer Laboratory has been changing rapidly. The MPhil in Advanced Computer Science (ACS) started in 2009: we introduced an undergraduate fourth year (Part

III) in 2011 sharing modules with the MPhil and primarily designed for students who intend to carry on to do research. Two students took Part III in the first year it was introduced, increasing to 10 in 2012-13.

We are looking at expanding our teaching for the undergraduates at Part 1A. This is partly in response to significant challenges which arise from the changing nature of CS teaching in schools: in particular, while some students have taken CS at A-level, others have not had that opportunity. There has been a considerable rise in the number of applications for the Computer Science Tripos over the last two years, but the proportion of female applicants is still very low.

There is considerable interest in the department in online delivery of some components of some courses. We intend to investigate whether such material could be made available outside Cambridge, for instance to prospective students.

### **Building and Facilities**

The Systems Administration and Building Services teams in the William Gates Building continued their programme of works to reduce energy consumption through the installation of energy-aware computers and servers and through rigorous monitoring of the heating and cooling systems; in the past 12 months savings of £28,000 have been achieved. The first solar panels were installed on the roof of the building with the intention of becoming part of the power source for the LED lighting currently on trial. Experimental work on this continues and is expected to achieve even greater savings in the future.

### **Visitors**

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

- Professor Haroon Ahmed, Emeritus Professor of Microelectronics, Cavendish Laboratory
- Professor Brian Carpenter, University of Auckland, Australia
- Professor Warren Hunt, University of Texas at Austin, USA
- Professor Peter G Neumann, SRI International, USA
- Dr Brian Shand, Easter Region Cancer Registry
- Dr Anna Slobodova, Centaur Technology, USA
- Professor Bjarne Strustrup, Texas A&M University, USA

AH/MAL  
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## 1. Graduate Applications

Applications submitted for admission as research students in 2012-13 were lower than the previous year but this was more than matched by an increase in the number of applications received for the M.Phil in Advanced Computer Science. The number of CST graduates admitted to the research degree has remained constant since the introduction of the M.Phil, although not as high as the 12 CST graduates admitted in 2005-2006.

### Research applications

Admission year	Applications	Conditional Offers	Admitted	CS Tripos graduates (inc. Part III & ACS)	MPhil graduates
2012-13	119	50	23*	5	8
2011-12	147	49	32	6	10
2010-11	141	51	22	5	6

\*Around 7 further students expected to be admitted in January 2013.

### M.Phil in Advanced Computer Science applications

Admission year	Applications	Conditional Offers	Admitted	CS Tripos graduates
2012-13	239	89	49	0
2011-12	204	86	44	2
2010-11	214	89	38	1

## 2. Funding

Securing funding continues to be a problem for international and European research applicants. Most EU students who have been admitted have been awarded a package of EPSRC Doctoral Training fees-only awards in conjunction with the Cambridge Trusts (CHESS) or with the School of Technology's Qualcomm Research Scholarships.

International students who have been admitted are largely funded by Cambridge Trust Scholarships including, in 2012-13, the Science without Borders Scholarships which are part-funded by the Brazilian government. The Gates Cambridge Trust accounts for just one research award over the last two years while the Cambridge International Scholarship Scheme awarded three full scholarships.

The Computer Laboratory's Premium Scholarships have assisted six students in the last two years. Further details about these students may be found in section 2c.

The majority of M.Phil students self-fund their studies; around 20% win full or partial funding from the Cambridge Trusts. The Cambridge Assessment ESOL awards, earmarked for students who will be working in the Natural Language and Information Retrieval group, account for a large proportion of this funding.

## a) Research

	2011-2012	2012-2013
<b>Qualcomm award (SoT)</b>	<b>0</b>	<b>2</b>
<b>Premium Scholarships [Q]</b>	<b>3 + [1]</b>	<b>1 + [1]</b>
<b>Cambridge Trusts (inc Gates)</b>	<b>7</b>	<b>5</b>
<b>EPSRC Doctoral Training</b>	<b>8</b>	<b>6</b>
<b>EPSRC grant</b>	<b>5</b>	<b>1</b>
<b>Other research grant (inc. Industry)</b>	<b>5</b>	<b>3</b>
<b>College</b>	<b>1</b>	<b>3</b>
<b>Overseas government</b>	<b>1</b>	<b>2</b>
<b>Self-funding</b>	<b>2</b>	<b>1</b>

Note: research students are funded frequently by more than one source.

## b) M.Phil

	2011-2012	2012-2013
<b>Cambridge Trusts (inc Gates)</b>	<b>4</b>	<b>4</b>
<b>EPSRC Doctoral Training</b>	<b>4</b>	<b>1</b>
<b>Cambridge Assessment</b>	<b>3</b>	<b>4</b>
<b>College</b>	<b>0</b>	<b>1</b>
<b>Overseas government or self-funding</b>	<b>33</b>	<b>39</b>

## c) Computer Laboratory Premium Scholarship students

All awards are for 3 years unless otherwise stated.

**2012-13**

**Thomas Pasquier**, supervised by Prof. Jean Bacon on “Trust Management for De-Identified Medical Records Dissemination in the Cloud”; the Premium Scholarship (**Qualcomm**) award ensured that Thomas would be able to continue his MPhil work with ECRIC (Eastern Cancer Registry) on Prof. Bacon’s CloudSafetyNet project. The work is on anonymisation and watermarking of data sets. Watermarking would mean that any leak could be traced to its source. [The success of Prof. Bacon’s grant proposal means that this award will be needed for two terms at most.]

**Douwe Kiela**, supervised by Dr Stephen Clark on “Unsupervised learning of information structure”; the Premium Scholarship, covering College fees, meets the difference between an EPSRC-funded research studentship and the University’s approved tuition and College fees

**2011-12**

**Raoul Gabriel Urma**, supervised by Prof. Alan Mycroft on “Program Language Evolution”; the Premium Scholarship (**Qualcomm**) funds research focused on developing program analysis and transformation techniques for language designers to facilitate the evolution of programming languages.

**Claudio Angione**, supervised by Dr Pietro Lió on “A common optimisation framework for organelles”; the Premium Scholarship is part of a combined EPSRC, Cambridge Home and EU Scholarship Scheme (CHESS) and CL award.

**Lucian Carata**, supervised by Prof. Andy Hopper on “Provenance-based computing”; the Premium Scholarship is part of a combined EPSRC, Cambridge Home and EU Scholarship Scheme (CHESS) and CL award.

**Karthik Nilakant**, supervised by Dr Eiko Yoneki on “WEDGE: A Wide-area Efficiently Distributed Graph Engine”; the Premium Scholarship provides funding for overseas fees.

**2010-11**

**Daniel Wagner**, supervised by Dr Andrew Rice on “Personal Analytics on a Global Scale”; the Premium Scholarship (**Qualcomm**) is part of a combined award with EPSRC DTA fees funding.

**Ramana Kumar** [One year], now supervised by Prof. Mike Gordon on “Relating formal theories”; in 2010, Ramana was awarded an exceptional Premium Scholarship for one year to fund his M.Phil in Advanced Computer Science. Ramana subsequently came top in the M.Phil class and was awarded a full Gates Cambridge Trust scholarship for his research degree.

**d) School of Technology Qualcomm Studentships students**

All awards are for 3 years unless otherwise stated.

**2012-13**

**Jannis Bulian**, supervised by Prof. Anuj Dawar on “Parameterized Complexity on Nowhere-Dense Graphs”; the School of Technology **Qualcomm** Studentship is awarded in conjunction with an EPSRC fees-only award.

**Raphael Proust**, supervised by Prof. Alan Mycroft on “Practical Linear Typing”; the School of Technology **Qualcomm** Studentship is awarded in conjunction with an EPSRC fees-only award.

**2010-11**

**Andreas Koltes**, supervised by Dr Robert Mullins on "Loki: A Polymorphic Low-Energy CPU" which explores the design of a novel general-purpose computing fabric called Loki. The fabric is to high-level programming as an FPGA is to digital design; the School of Technology **Qualcomm** Studentship is awarded in conjunction with an EPSRC fees-only award.



Here are the current facts about women, computer science, the UK and the Computer Laboratory (source - HESA, CL):

	UK	Cambridge CL
UG	18%	10%
PG MPhil		18%
PG Phd	21% (MPhil + PhD)	19%
Staff	20%	14%
Profs	5%	5%

Moreover, the trend is going down for women in the CL, helped only a little by the MPhil in ACS course. In comparison to the UK, we are doing poorly on most levels, but particularly in terms of female UG students and academic staff. We are also worse than all Russell group universities (source HESA 2002 – current data is likely to be worse: from 12.5% in 2002 to 10% in 2012 in the CL). Clearly we have a problem that we need to address!

There are many reasons for the current dire situation, and there are a number of ways that this problem could be addressed. The *women@CL* network provides one forum for supporting women in computing nationally, as well those that come to the Computer Lab.

The *women@CL* network was launched in 2003 at the Computer Laboratory, supported by Microsoft Research and Intel. In 2004, Ursula Martin and I won an EPSRC network grant that continued to finance the network until 2008. Since then, I have directed *women@CL* with generous support from our industrial sponsors. *women@CL* provides local, national and international activities for women engaged in computing research and academic leadership.

*women@CL* always aimed to put in place a sustainable programme that would support women in computer science research nationally. Our UK programme included activities such as career development workshops at major conferences, regional Hopper meetings for women in computing (with a technical and networking emphasis), senior women’s leadership summits, childcare initiative, evaluation, media training, etc. At the end of the EPSRC grant, we passed the programme on to the British Computer Science Society, which has continued to run and support some of the events that we put in place.

On the local level, however, *women@CL* continues to run events for our students and young researchers in the Computer Lab. We are hugely helped by enthusiastic and proactive students, admin support and very generous sponsorship from our industrial partners. The list of sponsors in the last 9 years includes: EPSRC, Microsoft Research Cambridge, Intel Cambridge Research, Google, University of Cambridge Computer Laboratory, Newnham College Cambridge, Cambridge-MIT Institute, Oxford Internet Institute, British Computer Society, IBM.

We run 3 types of events:

- **Big Sister Little Sister Events** - The Big Sister Little Sister programme was formed following requests for informal student-to-student mentoring. Events such as dinners, movie nights and formal halls provide opportunities for students to get together. Every new female student is paired with an existing female student for



support, mentoring and socializing.

- **Coffee and cakes** - Coffee & cakes offers students a chance to socialize on a regular basis. *women@CL* pays for coffee and cake.
- **Speaker Lunches** - Our *women@CL* flagship lunch talks provide an opportunity for everyone to network with early-career and senior women role models in research, industry and start-ups. These lunch events are open to all, we provide free lunch including chocolate cake, and our attendance is high with the approximate split of 50-50 between women and men.

In addition, we hold a number of special events including gaming event, CV clinics, career workshops, mini conferences for PG students, revision events for UG students, day trips to Google and IBM offices, etc.

The support from the students is fantastic; almost all of our female students help out with organizing events, as evidenced also by our large organizing committee. We also value our departmental administrative support in helping with the logistics of events.

Our annual budget is currently £3000. We would like to accrue enough funding to provide an endowment fund that will make *women@CL* funding sustainable. Until then, our biggest and most generous sponsors are Google and Microsoft Research who keep our budget very healthy.

The primary lesson that we have learnt in these almost 10 years of running *women@CL* is that **what is good for women is good for everyone**. *women@CL* is a success because of:

- support from the top in Cambridge University and sponsors;
- dedicated senior staff time and admin support;
- enthusiastic staff and student team.

What can we do next? Here are a few suggestions:

- Proactively recruit female students and staff.
- Proactively promote achievements of female students and staff.
- Proactively liaise with national support and awards schemes for women.
- Major campaign to change the image of computer science.
- Improve presentation and understanding of CS in schools.
- Grand challenges to create visions of future research.
- Find exciting and worthwhile ways to develop leadership skills.

Mateja Jamnik  
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