Insight

The newsletter of
the Corporate Liaison Programme

UNIVERSITY OF CAMBRIDGE
Research Services Division

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In this issue...

The personal touch

"The vast majority of drugs – more than 90 per cent – only work in 30 to 50 per cent of people."

Allen Roses, Worldwide VP Genetics, GSK

In 1953, Cambridge scientists James Watson and Francis Crick discovered the double-helix structure of DNA. 50 years later, other Cambridge scientists such as John Sulston were key in decoding the human genome, and another fundamental breakthrough had occurred that might allow us one day to personalize medicine.

Imagine it – you visit your GP and the first thing they do is to painlessly collect a sample of your DNA from your cheek or fingerprint. A press of the key on their computer brings up your individual genome, a couple of minutes later your DNA has been analysed, and your doctor can prescribe the drugs that will suit your individual genetic make-up. The analysis might predict your response to a particular medicine, recommend the dose you need and indicate what side-effects you might have. The need for educated guess work – gone! Although such a scenario sounds fantastical, pharmacogenetics, pharmacogenomics and advances in new technologies mean that it could become a reality.

Personalized medicine, a reality that could dramatically change the delivery of health care by altering the way diseases are defined, patients are treated and new medicines are discovered and developed, will be the focus of Cambridge University's next *Horizon* seminar on 11 October. The latest thinking of many prestigious academic and industry speakers will be featured in the day.

Dr Kenneth Hillan, VP Development Sciences, Genentech, will talk to delegates about Herceptin(R) – probably the most famous example of a personalized medicine. This novel anti-cancer drug failed its initial clinical trials as it worked in only a fraction of patients. Normally such drugs are abandoned on efficacy and cost-effectiveness grounds. However Genentech performed further work and discovered that the drug worked extremely well in a subset of women whose cancers over-expressed the protein HER-2. The drug is now considered a vital treatment for these women who are identified on the basis of a pharmacogenetic test. Other industry speakers will include Dr Brent Vose, Vice-President and Head of Oncology, AstraZeneca, and Dr Alan Smith, Chief Scientific Officer, Genzyme. *cont. p2*

Editorial

Welcome to another edition of *Insight*, the newsletter of the Corporate Liaison Programme. Inside you will find articles on the many ways in which Research Services Division helps companies of all sizes, from regional start-ups to multinationals, work with Cambridge University to build enduring and sustainable relationships. We also have news on current licensing opportunities from our sister office, Cambridge Enterprise (see back page) and a list of upcoming events where you can make new contacts in academia and industry.

Our flagship series of seminars, *Horizon*, continues to draw diverse audiences to Cambridge four times a year. Coming up in October, we will be examining the often controversial area of 'Personalized Medicine' and the promises and challenges that it holds from academic, commercial and legal points of view (see front page). In December we turn our attention to 'Cities of the Future', looking at the rise of the megacity and the likely consequences for planners and infrastructure providers (see right and pages 3–6). Booking is open for both events and you can register online at www.rsd.cam.ac.uk/events/horizon/. The final event of this series will be in March 2006 when we will be taking a look at some of the breakthrough science in quantum computing and cosmology: areas of great promise but as yet undefined application. We will shortly be launching the fourth *Horizon* series, running from June 2006, so do bookmark the *Horizon* web page.

The Corporate Liaison Programme is effective in providing a clear framework for managing the relationship between industry and academia. We are delighted to welcome Amgen as an Information-level member, and look forward to working with the company on projects of mutually beneficial interest. Some recent major initiatives for us include the visit of a high-level delegation from Samsung (see p7), Kodak's move to establish a European Research Division in Cambridge (see p8) and a new initiative in systems biology (see p9). The next academic year promises more of the same alongside our day-to-day interactions with companies and academics. Happily, we have a couple of new faces to help with our company work: Dr Anja Minnich joined the team in June 2005 and will head up the Electronics Sector as Quentin Tannock leaves to pursue new ventures, and Gordana Najdanovic joined us in July to strengthen the Engineering team, focusing particularly on energy and infrastructure.

If you have a question about working with Cambridge University please do not hesitate to contact us. Our website at www.rsd.cam.ac.uk has recently been re-launched with improved content and structure for both our academic and industrial audiences – please take a look and let us know what you think!

Tamsin Pert, tamsin.pert@rsd.cam.ac.uk

Cities of the Future

How can we ensure that our mega-cities remain world class centres despite the growing pressures they face? This is the focus of the *Horizon* seminar on 13 December entitled 'Cities of the Future'. Academics from across the University will present and discuss their latest research in urban design, architecture, transport modelling, pollution, energy use, materials and construction. The aim of this seminar is to explore how urban planners, architects, property developers, transport operators, businesses and government can meet the challenges faced by mega-cities such as London. The seminar will include presentations from leading Cambridge academics in these fields, including Professor Frank Kelly, Chief Scientific Advisor to the Department of Transport, Professor Marcial Echenique, Department of Architecture, and Professor Christine Whitehead, Land Economy. In addition, external speakers include Professor Michael Joroff from MIT, Lynne Wenberg from Boeing and Mark Kleinman, Head of the Urban Policy Unit, Office of the Deputy Prime Minister.

As a taster, the next four pages provide a focus on engineering with news of research on ageing infrastructure in cities, the impact of flooding on urban centres and electricity policy.

If you would like to know more about any aspect of the articles here, about other areas of research at Cambridge, or would simply like to receive information on the *Horizon* event please contact Kate Creswell on kate.creswell@rsd.cam.ac.uk or 01223 766163.

cont. from p1 At Cambridge, many researchers are working to decipher the molecular and genetic basis of complex diseases. For example, Dr Sabine Bahn from the Institute for Biotechnology will discuss her research into the genetic basis of neuropsychiatric diseases such as schizophrenia and bi-polar disorder. Drug treatment for mental illness is currently hit and miss and patients often discontinue treatments due to severe side-effects. Dr Bahn's particular focus is therefore on identifying biomarkers and genetic traits which will lead to the development of pharmacogenetic tests to guide drug use, as well as offering new targets for drug development. The day will also see Professor Chris Lowe, Head, Institute of Biotechnology, talking about the latest developments in biosensors and diagnostics and Professor Carlos Caldas, Department of Oncology, presenting his work on clinical cancer genomics and molecular profiling as a new tool for the determination of cancer.

However, personalized medicine has major ethical, legal and social implications associated with it in areas such as patient consent and genetic testing. For example: will small groups of patients with certain genetic profiles be left without treatments because drug companies are not willing to develop drugs for them? Should pharmacogenetic tests be available over the counter or only in doctors' surgeries? The Cambridge Genetics Knowledge Park (CGKP) focuses on issues such as these and delegates will hear from its Director, Dr Ron Zimmern and from Professor Peter Lipton, Head of History & Philosophy of Science and Chair of the Nuffield Report on Pharmacogenetics.

If you are interested in joining us for what promises to be a truly memorable day, you can download an agenda and register online by visiting www.rsd.cam.ac.uk/horizon.

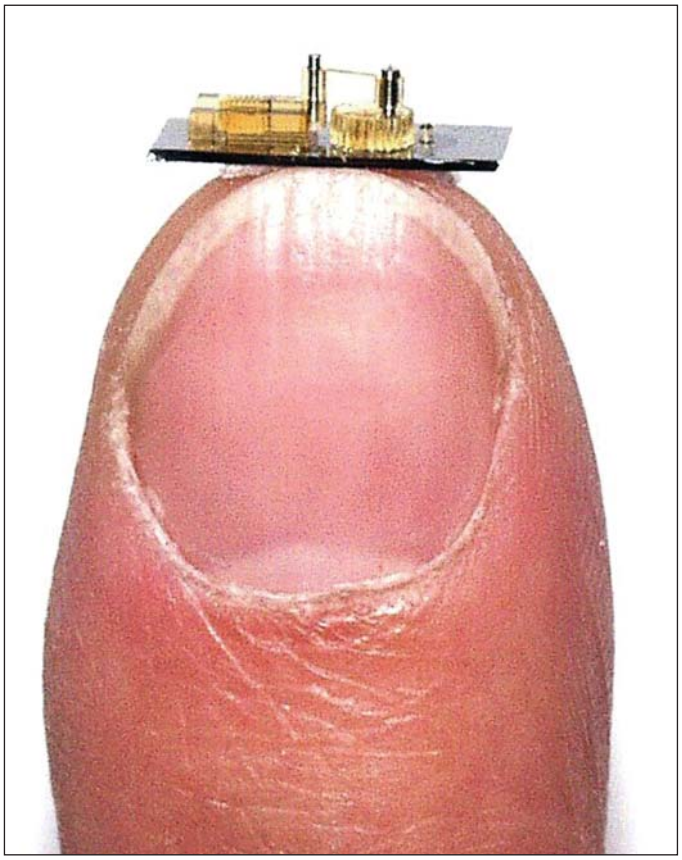
Micro-engines at your fingertips

A programme for research on millimetre-scale internal combustion engines is being jointly developed by Cambridge University Combustion Research Centre and the Centre for Micro-Engineering and Nanotechnology at the University of Birmingham. This micro-engine project brings together novelties in fabrication, combustion and micro-engine design with a close interaction of micro-fabrication and combustion expertise.

Most liquid hydrocarbon fuels hold over 300 times more energy per unit weight than a NiCad battery and 100 times more than a Li-ion battery. A micro-engine would have the potential to release the energy from the fuels and possibly replace batteries in portable devices. It would not only last much longer than a battery of the same weight (about 20 times longer at 10 per cent efficiency), but would also require little time to change its fuel capsule. As a highly compact energy source, micro-engines could find applications in medical devices, military equipment, PDAs, notebook computers, mobile phones and even toys!

The original idea for making a micro-engine using MEMS technology was proposed by Alan Epstein and Stephen Senturia of MIT in the mid-1990s. Research in Europe started at the University of Birmingham in 1999 and resulted in a patented fabrication process and several prototype micro-engines. The proposed collaboration project between the two universities intends to produce a micro combustion engine, with a platform of 5x15x3mm in overall dimension and an expected indicated power output at 11.2W at a speed of the order of 50,000rpm.

One of the major problems with the micro-engines is that silicon-based components cannot withstand the high temperatures of combustion. A second barrier is to actually produce sustained combustion in the small dimensions, which are affected by heat transfer. The solution proposed by the investigators is to make micro-components out of ceramic materials, and to operate the engine at high speeds using autoignition processes, which will overcome the heat transfer problem. The investigators are hopeful that the development of the process will allow micro-engines to be brought to the market.



For more information about this project, please contact Professor Simone Hochgreb on sh372@cam.ac.uk.

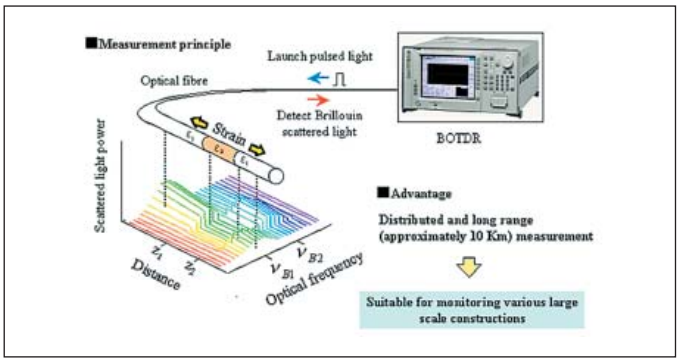
Smart infrastructure taking the strain

One of the challenges facing engineers in the 21st century is the maintenance, upgrading and safe operation of ageing infrastructure. Most high-profile civil engineering projects specify the use of extensive monitoring systems to observe the influence of new construction on existing infrastructure. The successful evaluation of the effects of construction and also the long-term behaviour of infrastructure hinges on the availability and quality of appropriate measurements. The aim of a new project being conducted in the Engineering Department at the University of Cambridge is to contribute to the development of Smart Infrastructure by the commercialisation of an innovative but proven low-cost fibre optic sensing system enabling continuous strain measurement by means of Brillouin Optical Time-Domain Reflectometry (BOTDR).

The critical deterioration of civil infrastructure has driven the search for new methods of rehabilitation and repair by incorporating sensors and developing remote systems that would allow monitoring and diagnosis of possible problems. In the context of underground infrastructure, such as tunnels and pipelines, it is envisaged that structures will eventually be able to monitor themselves and inform owners of their state (Smart Infrastructure). Design limits are frequently based on strain developing in the structure. Although strain measurement is well established, current practice has until recently been restricted to measurement of point strains only by means of vibrating wire (VWSG) or metal foil strain gauges and more recently fibre optics utilising Fibre Bragg Grating (FBG) technology. When instrumenting building components such as columns or beams, where the strain distribution is merely a function of the end conditions and applied loading, point sensors are suitable to define the complete strain profile. However, where structures interact with soil (eg underground infrastructure such as foundations, tunnels or pipelines), or indeed in the case of a soil structure (a road or dam embankment), the state of the structure is not fully understood unless the complete *in situ* strain regime is known. In the context of monitoring strain in piled foundations, tunnels, pipelines,

slopes or embankments, capturing the continuous strain profile is often invaluable to pinpoint localised problem areas such as joint rotations, deformations and non-uniformly distributed soil-structure interaction loads.

BOTDR offers very exciting possibilities for major advances in strain measurement. The novelty of the technology is vested in the ability to measure strain along the full length (up to 10km) of a suitably installed optical fibre. When the fibre is strained, some of the light travelling down the optical fibre is scattered back to the source. In the case of Brillouin scattering, the frequency of the backscattered light is shifted by an amount proportional to the strain at the scattering location, which upon analysis provides the complete strain profile along the full length of the fibre (readings at minimum 50mm spacing). This is a major advantage over conventional 'point sensing' techniques. For extensive application to develop 'smart infrastructure', in which strain measurement becomes more routine than at present, cost is particularly important. The cost of a standard optical fibre is very low (from 10p per metre) compared to other point measurement sensors, and can be employed over distances of several kilometres using a single continuous fibre. Most of the capital investment relates to the analyser (£68k), which can be connected to a number of fibres or be shared at different sites. BOTDR can be used with standard cheap telecommunication optical fibre cables wrapped around or embedded in structures, where a single optical fibre potentially replaces a very large number of point sensors, providing an economic and effective solution and having considerable potential as a system for long-term monitoring (an important criterion for 'smart' underground structures).



Research conducted to date at the University of Cambridge has focused on developing BOTDR fibre optic technology for application to underground structures. In London, the following installations have been made to date:

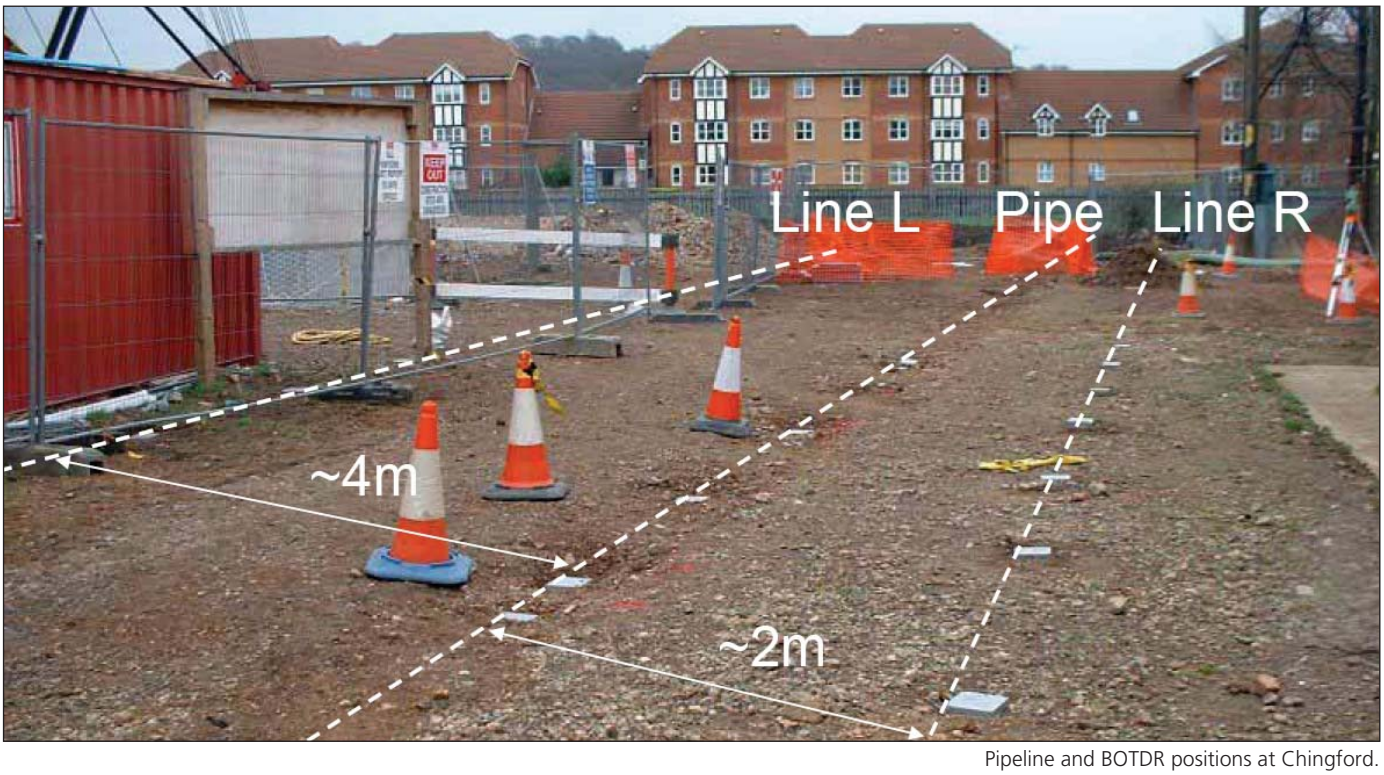
Bankside 123 (Cementation Foundations Skanska)
Monitoring strain development in 1.5m diameter x 50m deep piled foundations as building construction progresses.

Thameslink Tunnel, King's Cross Station (Railtrack and RailLink Engineering)
Monitoring lining deformations of a masonry tunnel affected by tunnel construction as part of the Channel Tunnel Rail Link project.

Chingford (RWE Thames Water)Monitoring the effect of pipe jacking on existing 30" concrete-lined steel cylinder pipeline. See the photograph below of the site, showing pipeline and BOTDR left and right positions.

Monitoring of piled foundations which will in future be affected by tunnelling as part of the proposed CrossRail project.

'Smart infrastructure' will be the topic for the Breakfast Briefing on 16 November, and will also be discussed at the *Horizon* 'Cities of the Future' seminar on 11 December.



Pipeline and BOTDR positions at Chingford.

CURBEing the risk of North Sea storm surges

Cambridge University Centre for Risk in the Built Environment (CURBE), a cross-departmental organisation, has published a volume of the Philosophical Transactions of the Royal Society (June 2005) devoted to North Sea storm surges. It is the result of a meeting of government agencies, industry, engineers and scientists held on the 50th anniversary of the last great storm surge inundation in which 2,000 people lost their lives. The volume brings together the current state of understanding of the numerous processes involved and the various approaches to flood defence around the North Sea coast. In light of the disaster in New Orleans, the state of flood-preparedness of London is of particular significance, with the large-scale Thames Gateway development, bolstered by the success of the Olympic bid, proposing to move the order of a million additional people into the low-lying areas along the banks of the Thames Estuary.

Much of the existing flood defence system for London and the North Sea coast in general, strengthened and raised after 1953, is approaching the end of its design life, and few coastal defences specifically allow for accelerated near-future sea level rise. The potential impacts are significant: modelling for Eastern England suggests that under a 'high' climate change scenario, a 1 in 100 year defence standard could be reduced to 1 in 2-8 years by 2050, with many defences at or below 1 in 1 year by 2080.

RI Pienaar

The Thames Barrier, officially opened in 1984, protects London against the surge risks of the tidal Thames.

The paper by Sarah Lavery and Bill Donovan of the UK Environment Agency states "Of course, the current defences provide a high standard of flood protection, with an allowance for sea level rise being built into the design, providing at the year 2030, a standard of protection of 1:1000 years or 0.1% risk of flooding. It took almost 30 years to plan and build the current system of defences following the 1953 flood. With less than 30 years remaining before this design standard is reached in 2030, the time is right now to commence planning for the next generation defences for London and the Thames Estuary"

Over £80bn worth of property now lies within the Thames tidal flood plain, with the majority located in central London. Direct damages in the event of a major tidal flood are estimated to be in excess of £30bn. 1.25 million people live and work in the Thames tidal floodplain and this is set to escalate. The Thames Gateway development envisages the construction of 120,000 new homes, all in areas designated as high flood risk. This presents a dual challenge of planning the next generation defences, but ensuring that the right decisions are made now concerning the nature and location of new building in the tidal floodplain.

It has been estimated that £22–£75bn of new engineering works will be required by 2080 to implement a portfolio of responses to managing river and coastal flood risk in the UK. The estimated annual expenditure to achieve this, of around £1bn, is approximately twice that currently allocated.

For more information, contact Allan McRobie (fam@eng.cam.ac.uk) or Dr Thomas Spencer (ts111@cam.ac.uk).

Jump-starting the connected car

A new generation of sentient vehicles is just around the corner and, according to the Cambridge-MIT Institute-funded Communications Research Network, its arrival will have a profound effect on our transport systems and communications networks.

As the latest information and telecommunications technology becomes integrated into vehicle system design, motorists will become just as connected in their cars as they are in their offices and homes. But this technology isn't just about being able to be access your email on the daily commute, or keeping the kids quiet in the back with in-car entertainment systems. The 'connected car' will also be able to continuously gather and relay information on road conditions, congestion, position and even driver health.

Potentially new applications include automatic collision notification, pay-as-you-drive insurance systems, sophisticated navigation aids, and in-car black boxes, similar to those used on aircraft to analyse accidents. However, as our cars become increasingly connected, they will also become increasingly vulnerable to the same security problems that currently face our computers; namely hackers, spyware and viruses.

cont. p6

cont. from p5 With technology this disruptive on the way, it's essential that industry and society are geared up and ready to meet the opportunities and, indeed, the challenges head on. That's why the Communications Research Network held a two-day seminar entitled "The Connected Car" in Cambridge on 15–16 September, exploring the latest developments and predicting future applications in this interface between communications and automotive technology.

The fee-paying seminar brought together 50 delegates from companies including Convergys, Microsoft Research, BT, Wanadoo, Mapflow, Cambridge Consultants, Vodafone, and Philips Research. Expert speakers from car manufacturers, regulatory bodies, telecommunications networks, insurance firms and the Department for Transport addressed pressing issues including standardising architecture, congestion charging, road pricing, vehicle positioning, opportunistic networking, traffic management systems, potential environmental impact and the contentious prospect of "pay as you drive" insurance systems.

David Cleevely, Chairman of the CRN, was clear about the need for effective knowledge exchange; "A lack of shared vision at this developmental stage could severely limit the potential for innovation, so it's absolutely vital that all the stakeholders work together on roadmapping the future of the connected car. This seminar, with senior representatives attending from so many interested sectors, is an ideal way to encourage some joined-up thinking."

The CRN is a knowledge integration community, founded and funded by the Cambridge-MIT Institute, with the aim of promoting the progress of the entire communications industry through a partnership of UK companies and leading academics from the University of Cambridge, Oxford University, University College London and the Massachusetts Institute of Technology.

To read the presentations delivered at the Connected Car seminar and to find out more about future CRN events please visit www.communicationsresearch.net.

Following the crowd: tracking pedestrian motion

Professor Roberto Cipolla and Gabriel Brostow at the Engineering Department at the University of Cambridge, are working on a project to detect and track individuals in crowd situations. Roberto and Gabriel met with London Transport and West Anglia Great Northern Railway (WAGN), who have different reasons to need to detect and track people in crowds.

London Underground use cameras at each of their stations to watch their passengers. The cameras are filtered to some extent; if no one is moving, those cameras are not shown on the monitoring screens. Hundreds of cameras are monitored by staff but it is impossible to have the manpower to observe all these cameras closely enough to watch for all potential incidents.

WAGN need information about when people travel. People buy tickets and may use them that day or the following month. Planning the number of compartments on each train and when to run trains would be more accurate if detailed pedestrian-traffic information was available. In both scenarios people counting is required.

Light against dark: detecting people in crowd situations.

Recently there has been success at tracking up to 33 people but crowds are often much larger. A high-level model for detecting one person would portray them as a 'stick-figure' model; the camera would be looking for the body parts in relation to one another. If the camera detected these body parts in the correct order, the object would be recorded as a person. Predictably, when used to detect people in crowd situations, this high-level model did not transfer very well. In a crowd you may only see the top of a head or maybe a torso.

There is a need for accurate person detection in order to be able to move to the next step of tracking those people. A method of detecting these features is based on recording each point where light meets dark. Such corner detection is a standard algorithm.

The figure shows how a new algorithm clusters the corner features, giving collections of dots that represent individuals. The dots are joined depending upon their proximity to one another and their coherent motion. The method can fail at times: for example, detecting two people as one when they are moving in unison like soldiers. If person has a backpack, the motion of this item may be slightly different to that of the pedestrian and the luggage may be recorded as a separate person.

Another of the collaborators in this research is Niccolò Caderni of Legion International Ltd. Legion simulates how massive numbers of pedestrians would move within a public venue such as a transport terminal or sports stadium. Detailed models of how people walk and interact in crowds underpin their software. It is the algorithms for learning people-traffic models from real world video footage of crowds that Gabriel and his team are refining. For more information and videos of the work contact Professor Roberto Cipolla at cipolla@eng.cam.ac.uk or Gabriel Brostow at gbrostow@acm.org.

Samsung Electronics to work closely with Cambridge

In November 2004, Samsung Electronics joined the University of Cambridge Corporate Liaison Programme (CLP). Research Services Division and the Samsung Electronics Co. Ltd Corporate Technology Operations division worked systematically to match divisions of the company with academics in the University interested in exploring a working relationship with each other. To consolidate this relationship, the Corporate Technology Operations division of Samsung Electronics Co. Ltd led a two day Mission Tour to Cambridge in June to meet Cambridge counterparts and explore collaboration opportunities in more detail.

From Samsung Electronics Co. Ltd, alongside the Corporate Technology Operations division, representatives of the LCD R&D Center, Telecommunication R&D Center, Mechatronics & Manufacturing Technology Center and Samsung Advanced Institute of Technology (SAIT) all participated in the visit. Alongside Research Services Division, the Mission Tour met with over 20 University representatives drawn from Cambridge Enterprise, the Computer Vision & Robotics Group, the Electron Microscopy Suite, Electronic Devices & Materials Group, Institute for Manufacturing, Medical Imaging Processing, Nanoscience Centre, Photonics & Sensors Group, Polysilicon Thin Film Transistors Group, Signal Processing Group, Digital Technology Group and the Rainbow Group in the Computer Laboratory.

The visit was beneficial for both parties. The head of the Samsung delegation, Vice President Pak, made the following comment: "We were impressed with the depth and breadth of research being conducted at Cambridge. I see a great potential for successful collaborations in the future."

Several members of the Samsung Electronics Co. Ltd. delegation took the opportunity to attend June's *Horizon* seminar, hosted by Research Services Division, where they heard about University research in human-computer interaction and met senior representatives of the University and of other leading global companies who were attending the event.

The Corporate Technology Operations division of Samsung Electronics Co. Ltd and Research Services Division are now working together to explore and develop existing R&D collaboration opportunities and the several new opportunities that were identified in Mission Tour meetings and at the *Horizon* seminar. David Secher, the University's Director of Research Services, sees a positive future ahead for the partnership with Samsung: "We were delighted to welcome the visitors from Samsung. The visit allowed us to gain a deeper understanding of the research interests of each of the different business units within the company. We hope to maintain a long term relationship with Samsung and to extend the company's engagement with the University."

Encouraging industrial MPhil student placements

An integral part of any student's degree these days has to be the practical work experience gained in conjunction with academic studies. In an increasingly competitive graduate employment market, it is what students have learnt in the workplace that can set them apart from equally well-qualified candidates.

Mark Mniszko

Many degrees, particularly masters' programmes, now offer work placements in industry as a compulsory part of the course. In order for their students to maximise the valuable opportunity this offers, three of the MPhil courses run by the University of Cambridge have joined together to form a working group which shares knowledge and company contacts. The course co-ordinators of the MPhils concerned (Computational Biology, Bioscience Enterprise and Nanotechnology) meet several times a year and regularly update information held on a shared database which all of them are able to access at any time.

Their latest venture, an event aimed at encouraging more organisations to offer student placements, takes place at the Institute of Biotechnology on Tuesday 18 October. Not only will the event provide the chance for companies to learn about how they can benefit from offering a placement to a student, but it will allow some of the current students to meet industry representatives face to face and to ask questions about potential placement projects first hand. It is hoped that the event will prove beneficial to all parties concerned and as such will become an annual fixture.

If you would like more information on the event, or on how your organisation could offer MPhil student placements, please contact Rebecca Collins on rebecca.collins@rsd.cam.ac.uk.

Electricity Policy Research Group wins major funding

Just one month after it was launched in May 2005, the Electricity Policy Research Group (EPRG) based in the Faculty of Economics and the Judge Business School, won a major research grant. The EPRG will receive funding in the region of £2m over five years, from the TSEC – the joint Research Councils' initiative, 'Towards a Sustainable Energy Economy'. This will support economic policy analysis of sustainable development, focusing in particular on the secure supply of energy in liberalised markets, governance processes in the energy sector and developments in fuel emissions and energy technologies. The research will inform policy making to support progress towards a sustainable energy sector.

The EPRG will be working in collaboration with two other newly established research institutions: the ESRC Centre for Competition Policy at the University of East Anglia and the UK Energy Research Centre. The core expertise that the EPRG brings to this work is in electricity policy. This is a vital area, since the electricity sector accounts for close to 30 per cent of the UK's greenhouse gas emissions. The EPRG team is lead by Professor David Newbery, one of the UK's leading energy economists and an economics adviser to Ofgem, amongst other regulators.

The EPRG was launched to capitalise on the earlier work of the Cambridge-MIT Institute Electricity Project and to provide a focus for research into electricity policy at the University of Cambridge. The EPRG's existing research grants include SuperGen, which investigates paths towards sustainable electricity generation and supply in the UK, and the SESSA Project, which is evaluating best practice in electricity sector reform in the EU. This research is complementary to that of TSEC, and, by coordinating them, the EPRG team becomes one of the most significant working in this area anywhere in the world.

Electricity Policy Research Group

Applied research, such as that undertaken by the EPRG, necessarily has the greatest impact when it both influences and reflects the concerns of practitioners in the corporate and policy-making spheres. The Electricity Policy Forum (EPF) has been set up within the EPRG, to offer a membership programme providing intellectual leadership of the dialogue at the centre of the policy debate. Through active membership of the EPF, members can not only come to a better understanding of the implications of the latest research, but can participate in the policy debate as it unfolds. This is an innovative approach to dissemination in the widest sense and the EPRG is enthusiastic about forming partnerships that add value to their research as well as the industry and policy makers.

For more information, please contact Liz Hooper at the EPRG, on l.hooper@jbs.cam.ac.uk or visit www.electricitypolicy.org.uk.

Kodak chooses Cambridge for research base

Eastman Kodak Company has announced that it will consolidate its research operations in Europe, opening a ground-breaking European Research Division facility in Cambridge.

The move is in line with Kodak's long-term digitally orientated growth strategy, which includes a focus on optoelectronics, materials research and software.

Based at the new facility, Kodak's European Research Division will be responsible for identifying unique science and technology and discovering new opportunities that serve the needs of the diverse and increasingly digital European markets. This team will ensure that Kodak continues to be a world leader in developing the most technologically advanced and customer friendly imaging products.

The Cambridge facility will be formed following the planned consolidation of European research facilities.

Benefiting from increased links with Europe's leading university, and the location's status as a high-tech cluster (technopole) with a large community of start-up companies, the Cambridge facility will be operational in late 2005, employing approximately 25 to 30 people. Commenting on today's announcement, Dr Sam Weller, European Research Division Director, said: "This ground-breaking research facility will improve our ability to globally position Kodak to build on our recent successes in the digital marketplace.

"By developing this exciting research facility in Cambridge, Kodak is demonstrating the company's commitment to take advantage of European innovation and determination to remain at the forefront of technological advances in digital imaging, display technology and healthcare.

"It is our mission to focus on unique European science and technology skills through collaborative partnerships with universities. However, specifically locating in Cambridge, putting us at the centre of a highly networked environment, will significantly increase our success rate. Cambridge is the highest ranked University in Europe with an impressive supporting infrastructure of science parks, start-up companies and research institutes.

"This new center at Cambridge will also allow us to collaborate with other companies while operating from within our own focused laboratories, enhancing our ability to increase our market share as we continue to diversify in the increasingly digital world."

For more information, please contact Dr Karen Smith on karen.smith@rsd.cam.ac.uk.

Praxis technology transfer training

High professional standards are a must for today's technology transfer practitioners and Praxis is leading the way in developing excellence across the skills base. Formed in 2002 by a group of technology transfer directors, with funding provided by the Cambridge-MIT Institute and the DTI, Praxis is a national training programme aimed at technology transfer professionals working in universities, research institutions, government and industry. It is a non-profit organisation led by a team of volunteer expert practitioners, all of whom are committed to the sharing of best practice in the commercialisation of intellectual property through their creative, inspirational courses. Praxis courses have already made a significant impact on the continuing professional development of the sector and continue to grow and develop apace, earning a well-deserved reputation for quality and affordability. More than 650 satisfied customers have attended courses and joined the Praxis network since November 2002.

Praxis maintains quality through constant focus on market requirements and a comprehensive feedback and review system. Delegates regularly cite Praxis courses as 'the most useful they have ever attended.'

Forthcoming courses:

4-7 October	Research Contracts
22-25 November	Business Development (new)
9 December	Market Research Masterclass (new)
22-24 February 2006	Fundamentals of Tech. Transfer
21-24 March 2006	Advanced Licensing Skills
25-28 April 2006	Research Contracts
16-19 May 2006	Creating Spinouts
20-23 June 2006	Business Development
6-8 September 2006	Fundamentals of Tech. Transfer
10-13 October 2006	Research Contracts
14-17 November 2006	Advanced Licensing Skills

A number of new courses will be offered in 2006. For more information about Praxis and further details of the Training Programme, visit www.praxiscourses.org.uk.

PRAXIS

Cambridge Systems Biology Centre

Over the past few years the Departments of Biochemistry and Genetics have built up a considerable genomics, proteomics and informatics research infrastructure based around the analysis of the fruit fly *Drosophila melanogaster*. Now, through a major investment by the School of Biology, the University is preparing to integrate this in a new initiative, the Cambridge Systems Biology Centre.

The major objectives of the Centre are to provide access to 'omics' platform technologies for all researchers in the University, and also to nucleate the development of new integrated Systems Biology approaches. Combining mathematical and engineering expertise with research expertise in genomics, proteomics, metabolomics and informatics, the aim is to build a research programme focused on understanding complex cellular and organismal processes at a systems level via a cycle of high-throughput data generation, predictive modelling and *in vivo* model evaluation. The combination of experimental and computational research in close partnership is essential for driving the systems-level analysis necessary for realising the potential of rational drug design and personalized medicine programmes. The CSBS is keen to develop productive interactions with industrial partners in the area of systems level research.

Hand in hand with this development, and working in close collaboration with the Cambridge Computational Biology Institute (CCBI), the aim is also to increase the breadth and capacity of our postgraduate training programmes in Computational and Systems Biology. There is currently a bid in place for an EPSRC-funded Doctoral Training Centre in Systems Biology. As part of this initiative it is intended to develop close interactions with the industrial biosciences and biomedical research communities. There are clear benefits for both academic and industrial research as postgraduates are trained in the application of cutting-edge computational and engineering skills necessary to translate large-scale datasets into useful predictive models using data and problems relevant to industrial partners. Joint PhD projects, within the framework of a Doctoral Training Centre where students carry out industrially relevant research under joint industrial and academic supervisors, will be encouraged. For more information, please contact Dr Steve Russell on sr120@mole.bio.cam.ac.uk or Dr Karen Smith on karen.smith@rsd.cam.ac.uk.

Paul Z Myers, www.pharyngula.org

'White-eye' mutants of Drosophila melanogaster, the 'workhorse of the lab' for geneticists.

Fitzwilliam Museum eGuide brings exhibits to life

The Fitzwilliam Museum is one of Cambridge's outstanding visitor attractions, hosting a collection that has been described as 'one of the greatest art collections of the nation and a monument of the first importance' . Each Egyptian mummy, oriental vase or Picasso has its own history of where it came from and why it is in the collection. This is practical information for museum staff, but can enhance the visitor experience by telling the story behind the exhibit.

Providing access to such fascinating facts is the driving force behind the Fitzwilliam's Information & Communications Technology (ICT) programme, which is pioneering new and imaginative ways of providing electronic access to the collections. Resources now available include websites, databases and the eGuide, a mobile gallery information system.

The eGuide adds an extra dimension to the audio guides used by many museums and galleries. By picking up a PDA at the reception desk, visitors can access a wealth of additional audio and visual information on selected exhibits around the museum. Technology developed by the Cambridge start-up Hypertag Ltd is used to trigger information on the PDA. An electronic map helps the user to navigate around the exhibits and take in additional sights at the same time. In trials the eGuide has proved very popular with visitors young and old, and the Museum now aims to develop the service by adapting content for different audiences and by providing a more dynamic method of storing and accessing content using a wireless network and innovative user interfaces.

To get the very latest insight into the use of mobile and digital imaging technologies, the Museum's access team has been talking to the University's Computer Laboratory and Engineering Departments, while at the same time exploring commercial links through Research Services Division. The potential for development is exciting and could combine 3D imaging technologies with new interface and collaboration tools in imaginative new ways: providing visitors with a personal log, school groups with an electronic record of their trip, or even bringing suits of armour to life on screen!

The application of ICT to enhance and broaden visitor access in museums and galleries is a priority for the sector and the Fitzwilliam is well placed to lead the way in setting standards and developing new tools. If you would like to collaborate and help fund development of the eGuide and other digital resources, please contact Sue Rhodes, Development Officer at the Fitzwilliam Museum, on sr295@cam.ac.uk, or Tamsin Pert, Research Services Division, on tamsin.pert@rsd.cam.ac.uk.

Cambridge Technology Showcase 2005

On 23 June, Research Services Division arranged a Technology Showcase seminar in partnership with the Japan External Trade Organization (JETRO), a member of the Corporate Liaison Programme.

The Technology Showcase seminar was designed to give invited participants from leading Japanese corporations a first look at current research and developments in the most exciting areas of human-computer interaction at Cambridge, and an introduction to how the University works with industrial partners. To provide as much information as possible, the day consisted of an intense series of presentations from senior academics in the morning, followed by visits to laboratories to view technology demonstrations in the afternoon.

Thirty delegates from over twenty leading Japanese organisations met with prominent Cambridge academics and their company peers to share views and experiences during the day and over drinks at an evening reception at St Catharine's College.

Throughout the day, in addition to introductions to working with Cambridge from Research Services Division (Quentin Tannock) and Cambridge Enterprise (Malcolm Grimshaw), delegates were treated to research and technology demonstrations from Cambridge University's Computer Laboratory (John Daugman, Frank Stajano), Computer Vision and Robotics Group (Roberto Cipolla, Tom Drummond), Engineering Department (Philip Guildford), Engineering Design Centre (Pat Langdon) and Speech Group (Phil Woodland, Mark Gales).

Over lunch, Professor Ian White, Chair of the Council of the School of Technology, provided an introduction to the School. After a brief tour of new R&D infrastructure developments at the West Cambridge Site, conducted by site manager Andrew Gordon, the day ended with a walk through the grounds of King's College and a drinks reception hosted by Pro-Vice-Chancellor for Research at the University of Cambridge, Professor Ian Leslie.

Feedback on the event from delegates and Cambridge researchers has been very positive. Several collaboration opportunities were identified which are currently being explored with assistance from Research Services Division. To build on this success, Research Services Division and JETRO have agreed to hold a similar Technology Showcase seminar annually for the next several years.

Horizon highlights the benefits of design and usability

June's *Horizon* seminar focused on 'Technology: Interaction & Design' to explore issues of product and process design, form and function and how technology affects us, the user. This seminar was an ideal opportunity to hear from a range of industrial and academic speakers reflecting on their approach to technology design and the rationale behind it. Some focused on the experiential benefits of a technology, like snapping your fingers to trigger a CD track, while others examined the theoretical process behind design.

Professor John Clarkson, Director, Engineering Design Centre, opened with a compelling business case for inclusive design, addressing the bottom line for any manufacturer or service provider by explaining how the ability to use products and services changes with age, experience and impairment. The importance of understanding design principles was emphasised by Nathan Crilly, EDC, who discussed product aesthetics and Max Bielenberg from the Design Council's Technology Programme, where user-centric design is being built into early-stage business planning for technology start-ups.

Technology advances in user interaction were illustrated by the Computer Laboratory's Rainbow Group with Dr James Scott, Intel Research, and Nicola Millard, BT, providing glimpses into the near future of ubiquitous computing. Nicola's lively look at the world of call centres vividly illustrated the value of putting people at the centre of communication systems and allowing them to contribute creatively to their environment.

The Crucible network uses design as a catalyst to promote collaboration between technologists and researchers from the Arts, Humanities and Social Sciences. Dr Alan Blackwell explained how Crucible's impressive range of projects have all been pursued with the same underlying principles of good design, contextual awareness and, importantly, respect for different disciplines in collaborative teams. Microsoft's Cambridge Research Laboratory is also pursuing research with these principles in mind, as Dr Ken Wood illustrated in his presentation of the 'SenseCam' – a personalised video diary. The speeded up images of a train journey from Cambridge to Brighton (taking only 2 minutes!) were remarkably effective and evocative. This is a fun application, but one that could also have practical uses for people suffering from partial memory loss. Microsoft's multidisciplinary team looks not only at how people adopt technology, but at the experiences generated by something as simple as sending and receiving a text message. These observations are then fed back into the design cycle.

Tony Temple, Head of Ease of Use, IBM, and Ian Hoskins, Scientific Generics closed the day. Tony made the point that design needs to be built in to the production process to reduce faults and failures at the production end. Ian took a different approach to encourage us to think not only of the youth market for the next big thing, but of the ageing population which demographics predict will be the consumer market to address in the future. The importance of inclusive design, so clearly set out by John Clarkson at the outset of the day, was underlined once again here.

If you would like to know more about the speakers or topics mentioned in this article, please contact Tamsin Pert on tamsin.pert@rsd.cam.ac.uk.

References:

Inclusive Design Resource at the Engineering Design Centre:
http://www.eng.cam.ac.uk/inclusivedesign/

The Crucible Network
http://www.crucible.cl.cam.ac.uk/

Bill Thompson's BBC Online review of the day:
http://news.bbc.co.uk/1/hi/technology/4619793.stm

Beijing Speaks English

As part of the preparations for the 2008 Olympic Games, the People's Beijing Municipal Government launched the 'Beijing Speaks English' programme three years ago. The goal of the programme is to underpin Beijing's status as an international city by raising the English language level of its citizens. As part of the programme, last year University of Cambridge ESOL Examinations (Cambridge ESOL) signed an agreement to provide a series of language packages and examinations which will meet the different demands of various industries. Cambridge ESOL was chosen because its language examinations contribute to a positive learning experience, meet international standards and are linked to an international framework.

Beijing Speaks English specifically targets five key industries: Tourism, Personnel, Commercial, Transportation and Public Security. Cambridge ESOL is currently running trials with groups from each of these five industries and will submit a report to the Vice-Mayor of Beijing for his approval. A high-profile launch of the programme is expected later on this year.

Licensing opportunities from the University

If you would like to act on an opportunity – or explore a link for your company further – send an email, detailing what you require and quoting the case number, to enquiries@enterprise.cam.ac.uk, or telephone Rob Ellis, Case Administrator, Cambridge Enterprise, on +44 (0)1223 760339.

Cambridge Enterprise

Life Sciences

Collagen / glycosaminoglycan / calcium phosphate biocomposite for tissue engineering: A novel, bioresorbable composite with four degrees of compositional freedom, for promoting the repair or regeneration of compromised bone. **Case: Bon-767-03**.

Improved antibody constant regions: Novel, improved, human antibody constant regions which lack destructive effector functions. **Case: Cla-146-98**.

Programmable dispenser: A new programmable delivery device for lab techniques requiring multiple additions of components to a reaction or cell mixture. **Case: Man-1126-04**.

Transgenic mouse model for immunological studies: Transgenic mice capable of expressing human KIR genes, enabling testing for effects on NK or T cell activity. **Case: Tro-401-03**.

Waste water treatment for activated sludge: Harnessing predatory organisms and hydrodynamic cavitation to reduce sewage biomass volumes by up to 1/3. **Case: Tun-338-01**.

Physical Sciences

Electrochemical annealing: A method of annealing and hardening the surfaces of metals such as low-carbon, austenitic stainless steels (eg 304L). **Case: Bur-142-00**.

Micromixer and microreactor: Allowing microsecond-scale non-invasive mixing of nanolitre volumes of liquid. **Case: Cou-1056-04**.

High-resolution widely-tuneable diode laser: An extended cavity diode laser system which emits single-mode radiation in the blue spectral region, providing a wide mode-hop-free tuning range (100-115 GHz). **Case: Hul-676-03**.

Carbon-encapsulated metal nanoparticles: A cheap, effective sysnthesis route, with predicted ease of scale up to tonnage production volumes, and very high yields. **Case: Joh-78-03**.

Adjustable focus spectacles: An effective technology for the correction of presbyopia that can provide a full field of focused vision at variable distances. **Case: Mey-1208-02**.

Forthcoming events

11 October 2005: Horizon – Personalized Medicine
Challenging disciplinary frontiers and exploring novel applications.
See www.rsd.cam.ac.uk/horizon for more details.

16 November 2005: Smart Structures Breakfast Briefing
Focusing on providing monitoring for the infrastructure requirements within our growing cities, and featuring presentations from Cambridge's leading academics in geotechnics. To be held at Reuters, Canary Wharf.
See www.rsd.cam.ac.uk/horizon for more details.

16 November 2005: Investors Forum
Allowing potential investors in University-created companies to meet the founders and find out more.
Email joanna.dayaram@enterprise.cam.ac.uk for details.

30 November 2005: CULIL: Networks and networking
An evening seminar on the importance of networks to today's industry, followed by a networking dinner.
See www.rsd.cam.ac.uk/culil for more details.

13 December 2005: Horizon – Cities of the Future
Using London as a case study, this seminar will examine the issues megacities currently face.
See www.rsd.cam.ac.uk/horizon for more details.

22 March 2006: Horizon – R&D: Beyond Einstein
Showcasing emerging technologies from the University.
See www.rsd.cam.ac.uk/horizon for more details.

More details can also be found on **www.rsd.cam.ac.uk/events**.

Research Services Division, 16 Mill Lane, Cambridge CB2 1SB
Telephone +44 (0)1223 333543
www.rsd.cam.ac.uk

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