The Royal Academy of Engineering

News
Spring 2012

Forum for engineering

On 16 April, The Royal Academy of Engineering will reopen following a nine-month building redevelopment project that will transform the Academy's public space.

The project, which is running to time, budget and specification, has been made possible by a fundraising campaign that, despite challenging economic conditions, raised the £6.5million required. The campaign, led by Academy President Sir John Parker FREng, drew on the extraordinary generosity of our supporters within the Fellowship and beyond, and in the process helped the Academy to forge valuable new relationships and revitalise others.

The transformation begins outside: a striking, sinuous bridge (see photo), built by apprentices at Babcock's Rosyth Dockyard and set within a small landscaped garden, leads to a new entrance. Inside, the ground floor has been remodelled to create four large interconnected rooms that will enhance the presentation of the Academy's meeting and events programme. On the first floor, a 170-seat lecture theatre has been created with capacity for a further 50 in an adjacent room. The rooms are configured for flexible usage and are equipped with high quality acoustic and audio-visual facilities.

A new Fellows' room will be named after the late Lord Wolfson HonFREng, whose family foundation is one of the many generous donors to the project. One of the main rooms will be known as the David Sainsbury Room, in recognition of Lord Sainsbury's exceptional support of the Academy's education programmes over the last two decades.

The building itself will be named Prince Philip House, in honour of the Academy's Senior Fellow. The Senior Fellow will also be celebrated in a specially commissioned portrait by renowned artist Paul Brason. Commissioned by Dame Stephanie Shirley FREng, it will be unveiled when the building is formally opened in October.

The public rooms in Prince Philip House will be collectively referred to as the Forum for engineering. This reflects the Academy's aspiration that the venue will act as a focal point for the engineering profession and contribute towards raising the visibility and recognition of engineering. It will underline the Academy's leadership role and will support more frequent, systematic and effective engagement with key audiences. A lively programme of events and activities is in development, including an international conference and exhibition on rehabilitative and sports engineering to coincide with the London Paralympics, and a series of activities during the September 2012 London Design Festival. The Forum will host the Academy's AGM in July 2012, which will be an excellent opportunity for Fellows to see the new facilities at first hand.

The sinuous bridge being lifted into position. The bridge will allow access to the Academy for wheelchair users and pedestrians alike. Photos of the construction project can be seen at ***http://bit.ly/v6Ej0C***

PRESIDENT'S COLUMN

The President visits Sheffield Forgemasters Steel Ltd. L-R: Mark Tomlinson, Operations Director, Sheffield Forgemasters; Dr Chris Coulter, Fellowship Manager, The Royal Academy of Engineering; Sir John Parker FREng; Sarah Philbrick, Director of Development, The Royal Academy of Engineering; Andy Garner, Forge Shift Manager, Sheffield Forgemasters.

The UK is an engineering nation to the core, and we are home to several of the world's great wealth-building engineering companies. As one of the leading economies, we have a massive challenge to remain internationally competitive, as rising global economies, especially China, are shifting strategy from cheap mass contract production to high-tech, high-value engineering design and production. In my view, we can only meet this challenge by focusing more intently on our capacity for innovation, supported by an industrial strategy for the future of the UK as a nation that designs, makes and exports world-beating technology.

In February, I addressed an event in London organised by the Academy and supported by BAE Systems, where over 100 of the UK's leading industrialists, academics and commentators gathered to discuss how engineering can drive sustained economic recovery. Speakers included Shadow Innovation and Science Minister Chi Onwurah MP and Nigel Whitehead FREng. Through all of their contributions, it was clear that the UK needs a sustainable industrial strategy with engineering at its heart.

New opportunities can also be found by taking a broader view of manufacturing as a strategic activity within business. The Academy has published the results of a study, chaired by Professor Steve Garwood FREng, on capturing value from industrial systems. The report outlines how production is vital for the UK to stay competitive internationally because it enhances research and enables commercialisation, while providing infrastructure for other businesses, protecting intellectual property, and maintaining the UK's skills base and quality processes.

Research is of course a key driver of an innovation nation and we need to find ways of translating more of the fruits of research directly into commercial application. The Academy's new Engineering Enterprise Fellowship scheme aims to do just that by allowing entrepreneurial researchers to develop their work in a university setting. Six of these prestigious Fellowships have recently been awarded and will provide funding and support to allow researchers to spend 12 months developing the commercial potential of their research, plus access to business angels and venture capitalists (see page 8).

The Academy has for many years been supporting research at the highest level and we currently fund just over 100 permanent posts in UK universities, many of them with the support of business and industry. In March, I had the pleasure of meeting one of the Academy's funded researchers who also became a Fellow of the Academy in 2010. Professor Anne Neville is the first holder of the Academy's Chair of Emerging Technologies, and I was delighted to attend her lecture. It was titled *Nature and Nano – it's all going on at engineering surfaces*. Her talk explained how research into surface interactions at the nanoscale can offer engineering solutions across the oil and gas, biomedicine, and automotive industries.

Professor Neville spoke at the Academy's annual regional lecture which took place this year in Leeds. The fact that we are a national Academy is very important to me and I have recently had the opportunity to travel and meet with a number of Fellows across the UK where they live and work. I have visited Babcock Marine in Scotland, Queen's University Belfast, Sheffield Forgemasters and the Advanced Manufacturing Research centre in Rotherham. My next visit will be to Wales, with plans to visit some of the English regions later in the year.

Earlier this year I co-chaired a half-day event which brought together several of the UK's leaders in the field of innovative construction techniques. It reminded me that innovation is not just about the economy but making sure we are the best at what we do, we are the most efficient we can possibly be and we take into account the environmental impact of our work. Topics included the government's role in encouraging innovative construction, how sustainability can promote innovation and reduce building costs, and the use of smart technologies in infrastructure. We plan to model future Academy events on this knowledge-sharing template.

Our Academy can play a key role in creating a culture of engineering where research, innovation and business can flourish across the UK.

Meetings and visitors

The President recently met:

Ian Barlow
Senior Advisor, KPMG

The Rt Hon David Cameron MP
Prime Minister

Vivienne Cox
Chairman, Climate Change Capital

Martin Donnelly
Permanent Secretary at the Department for Business, Innovation and Skills

Sir Peter Gregson
Vice-Chancellor Queens University Belfast

Sir Paul Nurse
President, Royal Society

Chi Onwurah MP
Shadow Minister for Innovation, Science and Digital Infrastructure

Mark Prisk MP
Minister of State for Business and Enterprise, Department of Business, Innovation and Skills

Nominations open for Queen Elizabeth Prize for Engineering

The £1 million prize, which will be given in the name of Her Majesty the Queen, recognises outstanding advances in engineering that have changed the world. The prize will be awarded to one person or up to three people whom the judges find to be directly responsible for a ground-breaking application of engineering that benefits humanity. Nominations are open now, and close on 14 September 2012.

The international judging panel, chaired by Lord Broers FREng FRS, comprises eminent international figures representing the range of engineering disciplines. The panel includes leading academics and heads of corporations. For more information about the prize and information about how to make a nomination, go to the prize website **www.qeprize.org**

Fellows recognised in the New Year Honours List

Congratulations to the following Fellows of the Academy who have been recognised in the New Year Honours list:

Knights Bachelor - Knighthoods

John Alexander Armitt CBE - Chairman, Olympic Delivery Authority, for services to engineering and construction.

Michael David Bear - Lord Mayor, City of London 2010-2011, for services to regeneration, charity and the City of London.

Professor Christopher Maxwell Snowden - Vice-Chancellor, University of Surrey, for services to engineering and to higher education.

Order of the British Empire - Knight Commander of the British Empire - KBE

Jonathan Paul Ive - Senior Vice President, Apple Inc, USA, for services to design and enterprise.

Order of the British Empire - Commanders of the Order of the British Empire - CBE

Professor Alan Bundy - Professor of Automated Reasoning, University of Edinburgh, for services to computing science.

David Jonathan Flint - Chief Executive, Oxford Instruments, for services to business and science.

Professor Keith Ridgway OBE - Research Director, Advanced Manufacturing Research Centre, for services to manufacturing research.

Professor Sarah Springman - Head of Institute of Geotechnical Engineering, ETH Zurich, for services to triathlon.

Professor Philip Sutton - formerly Director, Science and Technology Strategy, Ministry of Defence.

Professor Lionel Tarassenko - Director, Institute of Biomedical Engineering, University of Oxford, for services to engineering.

Dr Andrew Oliver Tyler - formerly Chief Operating Officer, Defence Equipment and Support, Ministry of Defence.

Order of the British Empire - Members of the Order of the British Empire - MBE

Faith Wainwright - Director, Arup, for services to the built environment and engineering professions.

News of Fellows

Sir Peter Bonfield CBE has been appointed Loughborough University's Chair of Council.

Sir David Brown has been appointed Deputy Chairman and Chairman Designate of the British Standards Institution.

Professor John Burland CBE has received the honorary degree of Doctor of Science from the University of Hertfordshire.

Professor Amanda Chessell, Professor Dame Anne Dowling, and **Sir Martin Sweeting** received certificates for the Honorary Fellowship of the Institution of Engineering Designers, presented by **HRH Prince Philip**.

Professor Phil Coates has been appointed a 'Famous Overseas Scholar' by the China Ministry of Education and a 'leading overseas professor' at Sichuan University.

Professor Michael C Forde has been awarded the Bridge Engineering Research Award by the Bridge Engineering Association (USA), has been made a Fellow of the American Concrete Institute and an Honorary Member of the Engineering Institute of Serbia.

Professor Steve Furber CBE and **Sophie Wilson** have been appointed Fellows of the Computer History Museum.

Dr Paul Golby CBE has been appointed Chair of the Engineering and Physical Sciences Research Council and non-executive director at National Grid.

Dr David Grant CBE has become Chairman of STEMNET's Board of Trustees.

Dr Dame Sue Ion has been elected a Foreign Associate of the National Academy of Engineering.

Professor Stuart Littlejohn has been given a lifetime achievement award by the International Conference on Grouting and Deep Mixing.

Professor Adrian Long OBE has been awarded the Institution of Civil Engineers Gold Medal for 2011.

Professor Geoffrey C Maitland recently chaired the Maitland Report on the UK offshore oil and gas regulatory regime, published in December 2011.

Sir John Parker has received an honorary degree from Aston University.

Professor Richard Parry-Jones CBE has been appointed Chairman Designate of Network Rail.

Professor John Perkins CBE has been appointed Chief Scientific Adviser to the Department for Business, Innovation and Skills.

Professor Rod Smith has been appointed Chief Scientific Adviser to the Department for Transport.

Professor Sir John Meurig Thomas has been awarded the Kapitza Gold Medal of the Russian Academy of Natural Sciences.

POLICY AND PUBLIC AFFAIRS

Sustainable ICT

On 2 December, Professor Andy Hopper FREng chaired a half-day meeting to discuss sustainable computing at a roundtable of industry and academic experts. There are 15 quadrillion (15,000,000,000,000,000) bytes of data generated every day, and 10 times more data were stored in 2011 than in 2006, with rates continuing to rise.

The growth of the information and computing technology sector has raised increasing demands on energy and raw materials. As new developments such as cloud computing and thin client (server-dependent) computing gain momentum, future sustainability issues need to be considered.

Panelists asked whether the world has the energy needed to run more powerful and growing numbers of servers; whether cheaper and more efficient computing is beneficial or whether it leads to faster consumption of finite, and increasingly costly, resources; and whether constantly available and highly responsive computing is a realistic aspiration.

A report of proceedings from the event can be found at **www.raeng.org.uk/futurecomputing**

Policy roundup

The Academy, in partnership with the Royal Society, has announced a study entitled *Shale gas extraction in the UK: a review of the scientific and engineering evidence*.

A new report, *Heat: degrees of comfort*, published in January, looks at the challenges of matching the UK's demand for domestic heating with the binding requirement to reduce our overall carbon emissions. It examines new technologies including heat pumps, considers options such as district heating and combined heat and power schemes and looks at incentives and drivers for the creation of new markets.

The report can be downloaded from the Academy website **http://bit.ly/zXjGDq**

Manufacturing Summit

In March, the alliance of professional engineering organisations, *Engineering the Future (EtF)*, held a Manufacturing Summit which brought together people from industry with government to debate the way forward for growth.

Last year, following a request from DECC, the alliance produced a report on *Nuclear Lessons Learned*, examining issues for those engaged in delivering the new fleet of nuclear power plants. Following this, *EtF* has published a series of best practice guides on safety culture, welding and concrete for the nuclear new build supply chain and related industries.

The alliance developed a set of timelines showing planned and expected infrastructure development as well as longer term challenges across major areas of national infrastructure. This work was referred to in HM Treasury's National Infrastructure Plan, published at the end of 2011.

The alliance also supported a series of meetings on water recycling, security and behaviour change and demand management. A report summarising the key points will be published this spring.

Public affairs roundup

Chief Executive Philip Greenish was called to give evidence to the Science and Technology committees in the House of Lords (25 October) and the Commons on behalf of the *Engineering the Future* (7 December) alliance. He discussed the role of Chief Scientific Advisers in government with the Lords committee, and the interface between engineering and government with the Commons committee. His comments were recorded for an item on the BBC News website.

As part of the public affairs programme for the Academy's Biomedical Engineering Panel, Jim Cunningham MP for Coventry South, visited The Institute of Digital Healthcare on 9 December.

Academy President Sir John Parker FREng attended the Council for Science and Technology (CST) meeting with the Prime Minister on 6 February. The CST was reconstituted a year ago with the appointment of 11 new members including four Fellows: Dr Paul Golby FREng; Dr Mike Lynch FREng; Colin Smith FREng and Professor Chris Snowden FREng FRS as well as the Presidents of the four national academies.

Professor John Perkins CBE FREng took up his post as the Chief Scientific Adviser at the Department for Business, Innovation and Skills on 10 January. Professor Rod Smith FREng has been appointed Chief Scientific Adviser to the Department of Transport.

Innovation in construction

The President and Peter Hansford, Immediate Past President of the Institution of Civil Engineers (ICE) chaired a conference on *Innovation in construction*, jointly organised with ICE, and the University of Cambridge's Centre for Smart Infrastructure and Construction.

Ray O'Rourke KBE HonFREng, Chairman and Chief Executive, Laing O'Rourke, set out a vision of 90 per cent of construction being completed offsite to boost efficiency and make a huge reduction in time and the associated costs of today's traditional 'block and build' approach.

The ability for sensor technologies to monitor infrastructure across its lifetime was discussed by Professor Robert Mair CBE FREng FRS, Head of Civil and Environmental Engineering, University of Cambridge.

Bill Hewlett, Technical Director, Costain, focused on the advantages of sharing innovative ideas and research, as well as risk.

Dr Scott Steedman CBE FREng, Director of Standards, British Standards Institution, said tough sustainability targets and aspirational standards could promote innovation and reduce building costs.

The government's role in encouraging innovative construction was outlined by Paul Morrell, Chief Construction Adviser to the UK Government.

A fuller account of the meeting can be read here: **http://bit.ly/yCVWKq**

A report on Smart Infrastructure, launched at the conference, can be downloaded here: **http://bit.ly/y2cE6e**

Scotland

The Academy is keen to increase its policy and public affairs activities in Scotland, and to engage further with Scottish Fellows, MSPs, civil servants, policymakers, and the science and engineering community. In conjunction with The Royal Society of Edinburgh, the Institution of Engineers and Shipbuilders in Scotland, the Engineering Policy Group Scotland and Scottish Engineering, the Academy has organised an Oxford-style debate on the motion: 'This House believes that Scotland's energy industry will be the envy of the world'.

The debate took place on 27 March at the Royal College of Surgeons and was chaired by Gordon Masterton FREng. Speakers for the motion were Dr Simon Harrison CEng FIET, energy expert and visiting professor at the University of Southampton, and Professor Stuart Haszeldine FRSE, Scottish Power Professor of Carbon Capture and Storage, University of Edinburgh.

Speaking against the motion were Dame Sue Ion FREng, Non-Executive Director, UK Health and Safety Laboratory, and Dr John Constable, Director of the Renewable Energy Foundation.

PUBLIC ENGAGEMENT

Ingenious grants

Professor Kathy Sykes brainstorms ideas with finalists at the FameLab Masterclass

As London looks forward to the arrival of the Olympics, visitors across the UK are to be given the chance to learn more about the engineering behind the games, thanks to a number of projects funded by the Academy's grant scheme, *Ingenious*.

The Science Museum will play host to a series of debates and discussions on recent sporting developments while, at the V&A Museum of Childhood, sports engineers will be on hand to answer visitors' questions both online and in person.

Among the other projects funded by *Ingenious* is *~Flow*, a floating tide mill on the River Tyne, which creates sounds and data in response to its changing environment. The *Ingenious* funding will allow *~Flow* to extend its events programme, giving audiences the chance to meet engineers involved in its creation.

The successful competition *FameLab*, which asks experts to describe their work in just three minutes, has also been awarded an *Ingenious* grant to run heats especially for engineers.

Ingenious is funded by the Department of Business, Skills and Innovation. This year, 22 projects have been funded by the scheme to encourage and train engineers to engage the public in their work.

Visual identity refresh

Eight years after the Academy's visual identity was adopted, plans are underway to refresh and bring it up to date. With the imminent launch of the Forum for engineering, the Academy will be reaching out to a wider audience than ever before.

The aim of the project is to refresh and redevelop the Academy's current visual identity in order to maximise its impact, and ensure it is effective across digital as well as print formats and that it is accessible to the Academy's diverse range of target audiences. Further details will be published in the next newsletter.

INTERNATIONAL

Exploring Mars

Dr Charles Elachi delivers the ERA Foundation International Lecture

Dr Charles Elachi, Director at NASA's Jet Propulsion Laboratory (JPL), delivered the Academy's ERA Foundation International Lecture on 5 March, titled *Engineering and technological challenges in robotic space exploration*.

JPL has been at the forefront of space exploration for more than 50 years. In 1958, it built and operated the first US satellite, Explorer 1, and over the following decades sent robotic spacecraft to the moon and then to all of the solar system's planets. It currently has 23 spacecraft and 10 instruments conducting active missions, including its new flagship Mars rover mission, the Mars Science Laboratory, named Curiosity, and the most distant human-made objects from Earth, Voyagers 1 and 2.

Dr Elachi talked about the organisation's history and future plans, focusing on the engineering challenges of designing the Curiosity rover, and the planning involved for its landing on Mars on 6 August 2012. Dr Elachi led the project to design the 100kg rover which will analyse rock samples to search for evidence of life on the red planet.

He explained how the rover will fire a laser at rocks or drill them with its arm to take dust samples. These will be analysed with an onboard mass spectrometer and X-ray equipment. Like its predecessors, Curiosity has stereo cameras and can be controlled remotely by NASA to grasp and analyse particular rock samples.

The lecture was chaired by Professor Sir William Wakeham FREng, Vice-President and International Secretary of the Academy. The Rt Hon David Willetts MP, Minister for Universities and Science, attended the event along with many senior figures from the UK space industry.

A video of Dr Elachi's lecture, in which he talks about the engineering behind the planned rover landing, is available on **www.RAEng.tv**

International research schemes

Awards have been made for two Academy international research cooperation schemes.

The Research Exchanges with China and India scheme promotes academic collaboration between high-quality engineering researchers in the UK and China and India. It also supports the expansion of international networks of excellence.

In the 2012 round, 30 awards have been made. Collaborative projects have been funded under the scheme on topics including computational flow study of large-scale tidal turbines, grain-size effect in materials for energy storage and nanocomposites for bone implants.

Dr David Hann at the University of Nottingham and Professor Wei Dai from the Chinese Academy of Sciences in Beijing have jointly received an award to fund research into efficient thermoacoustic engines for refrigeration and electrical generation. This exchange will develop research that leads to more efficient, cheaper engines that may provide a more affordable alternative to solar and wind power and will help to improve the lives of those who live off-grid in developing nations.

The Distinguished Visiting Fellowship scheme provides funding to enable an academic engineering department at a UK university to be a host for up to a month to a Distinguished Visiting Fellow from an overseas academic centre of excellence. Five collaborations were funded in this round, including visitors from Australia, Japan and the USA. Details of the next round will be announced in April 2012.

UK and China energy storage roundtable

On 14 February, Professor Richard Williams OBE FREng of Birmingham University and Professor Jinghai Li FREng, Vice-President of the Chinese Academy of Sciences (CAS), jointly chaired a roundtable meeting with a group of key stakeholders exploring ways to develop and implement energy storage technology in both the UK and China.

The roundtable followed on from two joint energy storage workshops organised last year by the Academy and the Chinese Academy of Sciences. Participants included two UK departmental Chief Scientific Advisers (CSAs), Professor David MacKay FRS, CSA at the Department of Energy and Climate Change, and Professor John Perkins CBE FREng, CSA at the Department for Business, Innovation and Skills. The meeting examined the draft report of the joint workshops in the context of recent technical and policy developments in the field of energy storage in both countries. It discussed a set of final recommendations for UK-China cooperation in this field and identified potential follow-up activities. The final joint RAEng-CAS report will be released later in 2012 and will contain policy recommendations for both the UK and Chinese governments.

AWARDS

Tier 1 Exceptional Talent visas awarded

The Academy is one of the designated competent bodies advising the UK Border Agency on applications for the Tier 1 Exceptional Talent route of the points-based system for visas. The Academy has endorsed five applications under both the Exceptional Talent route, for world leaders in their field, and the Exceptional Promise route, for researchers who have the potential to be world class.

An Iranian chemical engineer, Dr Roghieh Azerinezhad, has been successful in applying under the Exceptional Promise route and will take up a research position at Hydrafact, a spin-out company of Heriot-Watt University. A Korean researcher, Professor Jong Min Kim, currently at

Dr Rogieh Azerinezhad

Samsung Electronics, has successfully applied under the Exceptional Talent route and will take up a Chair in Electrical Engineering at the University of Oxford.

Further information on these visa routes is available at: **http://tinyurl.com/74uh978**

Natural Resources in the Global Economy – water debate

L-R: Dr Jean Venables CBE FREng, Trevor Bishop, Chris Binnie FREng, and Dr Sue Cavill

The third debate of the Academy's 'Natural Resources in the Global Economy' series took place on 17 January. The motion debated was: 'This House believes that when water is in short supply, engineers should prioritise human needs over environmental concerns'. Speaking for the motion were Chris Binnie FREng, an independent consultant with over 30 years' experience in the water sector, and Dr Sue Cavill, a water supply and sanitation expert and Associate Programme Officer at Engineers Against Poverty. Speaking against the motion were Dr Jean Venables CBE FREng, Chief Executive of the Association of Drainage Authorities and Chairman of Crane Environmental, and Trevor Bishop, Head of Water Resources for the Environment Agency.

Chris Binnie and Sue Cavill argued that while the environment should not be ignored, the human right to water should be the priority in cases of severe drought. In response, Jean Venables emphasised the need to attend to the environment in order to meet human needs, and Trevor Bishop argued that water supply policies needed to be adaptive to environmental needs in order to be sustainable in the long term. Following an animated audience discussion, the motion was defeated.

Sustained Achievement Award

Dracos Vassalos, Professor of Maritime Safety at the University of Strathclyde and Director of the Ship Stability Research Centre, has won the 2011 Royal Academy of Engineering Sustained Achievement Award for his career-long achievements and their profound impact on his discipline. Professor Vassalos received his award from the Academy's Senior Vice President, Professor Sir William Wakeham FREng, on 1 December.

Professor Dracos Vassalos

Professor Vassalos has spent 32 years researching and developing ship stability and safety, through initiatives such as the SSRC, a centre of excellence for ship stability and safety research, which he established in 1996, and Design for Safety, an initiative which brought together industry and academia in an unprecedented effort to help catalyse continuous safety improvement in the maritime industry.

During his career, Professor Vassalos has overseen over 100 major research contracts to the value of more than £25million and has supervised 41 PhD students. He has also served as a government advisor and lectured around the world on maritime safety.

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RESEARCH

Engineering Enterprise Fellowships

Dr Susannah Clarke

The Academy recently awarded the first Engineering Enterprise Fellowships to six outstanding entrepreneurial researchers at UK universities.

One of the recipients, Dr Susannah Clarke, is a design engineer specialising in medical devices. She has degrees in both engineering (University of Cambridge) and industrial design (Royal College of Art) and has won numerous awards for her design concepts. She has been awarded the Fellowship to establish a spin-out company from Imperial College London which will develop devices to improve orthopaedic surgery and increase its accuracy. She will be developing these products with Professor Justin Cobb, chair in orthopaedic surgery at Charing Cross Hospital, Imperial College NHS trust. Professor Cobb is globally recognised as a leading surgeon and investigator into the use of technology to improve surgical precision.

The Enterprise Fellows will spend 12 months developing the commercial potential of their research. Business training will also be provided along with the support of experienced engineering business experts, drawn from the Academy's Fellowship. Details of all six Enterprise Fellows and their work can be found on our website **http://bit.ly/yICgux**

New Research Chairs appointed

Professor Akid's research will address the effects of extreme environments on the performance of materials used in the oil and gas industry

Professor Robert Akid has been appointed to the BP/Royal Academy of Engineering Research Chair in Corrosion and Materials at the University of Manchester. Professor Akid's research addresses a number of prominent corrosion-related structural integrity problems in the oil and gas sector through a mechanistic understanding of damage mechanisms. This research work, in collaboration with BP, will develop more robust predictive models for materials performance, and will further strengthen the engineering research portfolio of the University of Manchester.

Professor Peter O'Hearn has been appointed to the Microsoft/Royal Academy of Engineering Research Chair in Logic and Software Verification at University College London. As a co-inventor of separation logic, Professor O'Hearn is internationally regarded for addressing some of the key concerns in the practical applicability of logic and software verification. The partnership with Microsoft will provide opportunities to generate further industrial interest in this area.

EVENTS

Technology Visionaries

Professor Nigel Shadbolt FREng, Professor of Artificial Intelligence at the University of Southampton, addressed a packed theatre on 22 February as guest lecturer in the Academy's *Technology Visionaries* series. His lecture, *Open data: powering the Information Age,* examined applications of public data for public benefit, from generating maps for relief efforts to pinpointing crime hotspots.

Professor Nigel Shadbolt FREng

Professor Shadbolt is currently working on the midata project, which aims to get consumers' data back from government and business and put in a format which makes it easy for consumers to organise and control the use of their information, proving that this type of data can empower individuals. He described the benefits of the linked web (or semantic web) and called for the use of more open licences and structured data with unique Uniform Resource Identifiers to facilitate the beginning of a linked web of information. A video of the lecture is available to watch at **RAEng.tv**

Vodafone lecture

Speaking at the Royal Society on 27 February as part of the Vodafone lecture series, Tom Standage, Digital Editor of *The Economist*, examined how mobile phones were driving economic growth in developing nations.

He attributed the spread of the mobile phone into some of the world's poorest countries to standardisation, the effect of Moore's Law, (whereby the number of transistors that can be placed inexpensively on an integrated circuit doubles approximately every two years leading to rapid improvements in processing performance of electronic devices), the use of microfinance and pre-paid billing to make mobiles more affordable, and deregulation. To view the lecture, visit **RAEng.tv**

DEVELOPMENT

Forthcoming events

This is a selection of Academy events; for a complete list visit: **www.raeng.org.uk/events**

30 April - 2 May 2012
UK visit of Professor Zhou, President of the Chinese Academy of Engineering
Venue: 3 Carlton House Terrace
Contact: shane.mchugh@raeng.org.uk

16 May 2012
Designing better care for older people: how technology can make a difference
A conference organised by Academy Panel for Biomedical Engineering and Age UK
Venue: Electric Works, Sheffield Digital Centre, Sheffield S1 2BJ
Contact: katherine.macgregor@raeng.org.uk

24 May 2012
Summer Soirée and Exhibition
Engineering a better society
Host: Cardiff University
In the presence of HRH The Princess Royal
Venue: Cardiff University
Contact: melissa.obi@raeng.org.uk

26 June 2012
Academy Awards Dinner
In the presence of HRH The Princess Royal
Venue: Royal Opera House, London
Contact: melissa.obi@raeng.org.uk

16 July 2012
AGM
Chair: Sir John Parker FREng
Venue: 3 Carlton House Terrace
Contact: melissa.obi@raeng.org.uk

27 August - 14 September 2012
Side by side: innovation in engineering at the Paralympics
A programme of events combining a conference, workshops, lectures, reception and an exhibition
Contact: melissa.obi@raeng.org.uk

12 September 2012
Engineering Research Forum
Venue: 3 Carlton House Terrace
Contact: robert.barrett@raeng.org.uk

Campaign board thanked

With the opening of the Forum for engineering and the launch of the Queen Elizabeth Prize for Engineering, a new medium-term fundraising strategy has been agreed by the Academy's Council. A development advisory board, chaired by Dick Olver FREng, will be created to sustain the benefit delivered by the campaign board over recent years.

More than £11 million has been raised by the campaign board members: Sir John Parker FREng, Ian Barlow, Lord Broers FREng FRS, Vivienne Cox, Alex Dorrian FREng, Syamal Gupta FREng, Lady Judge, Dr Gordon Masterton FREng, Terry Morgan FREng, Dick Olver FREng, Sir Simon Robertson, Sir Ian Robinson FREng, Edmund Wallis FREng and Lord Browne FREng FRS when President. This includes: £6.5 million for the Forum and £4.5 million for education activities benefiting thousands of young people and their teachers.

Nuffield Foundation grant

The Nuffield Foundation, one of the UK's most eminent educational charities, has awarded the Academy a grant of £100,000 to support a bursary programme for undergraduate engineers. The bursaries will allow students to gain practical research experience during their summer break and will help build the UK's future research capabilities. Details of the programme can be found on the Academy website **http://bit.ly/yesjD8**

HRH portrait

Dame Stephanie Shirley DBE FREng has generously commissioned a triptych portrait of HRH Prince Philip, Duke of Edinburgh, for display in the Academy's refurbished building.

Artist Paul Brason is currently working on the project; examples of his work can be seen at **www.paulbrason.co.uk**.

A noted art collector, Dame Stephanie has commissioned many works over the years, including portraits of Professor Sir Tim Berners-Lee OM RDI FREng FRS and Professor Stephen Hawking CH CBE FRS, both on display at the Royal Society.

We are grateful to the Senior Fellow for consenting to the commission. The work will further recognise the Senior Fellow's central role in the founding and development of the Academy.

Room naming

Rooms in the Forum for engineering will be named for major benefactors to the project. The first floor lecture theatre will be known as the Al-Qasimi Lecture Theatre, after H H Dr Sheikh Sultan Bin Mohamed Al Qasimi.

Adjoining rooms will be known as the ERA Foundation Room and the Michael Bishop Foundation Room; the Fellows area will be named the Wolfson Rooms.

The ground floor major rooms will be named for National Grid, Rolls-Royce, Sir Kirby Laing and David Sainsbury. The garden entrance and reception area will honour Past President, Lord Browne FREng.

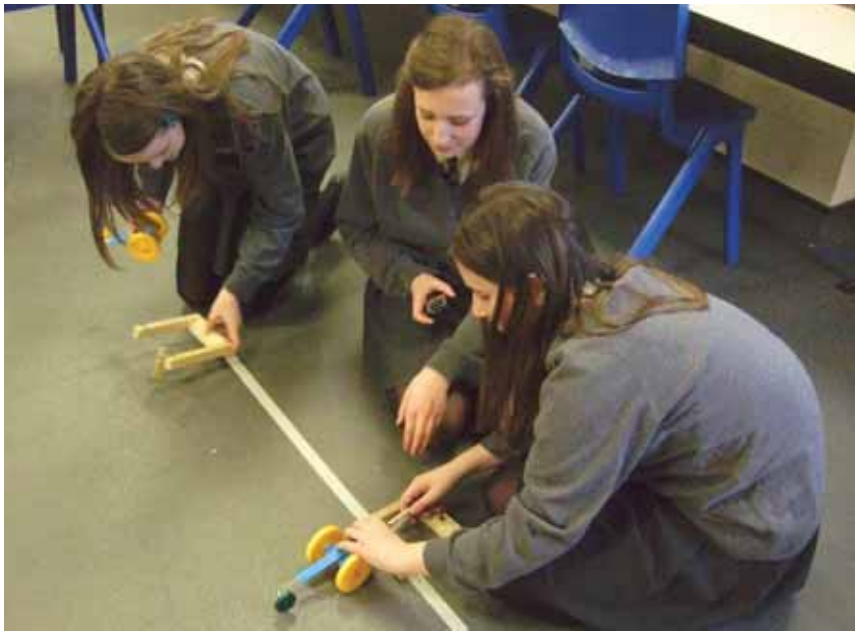
Inheritance tax relief

As a registered charity, the Academy can benefit from forthcoming changes to the inheritance tax regime. From April 2012, the rate of inheritance tax will be cut from 40% to 36% for those who leave at least 10% of their estates to charities. At present inheritance tax is only payable on net estates worth more than £325,000. An estate of £500,000 would therefore see beneficiaries receive £430,000 and HMRC £70,000. However, if 10% of that estate above the £325,000 threshold were given to the Academy, the beneficiaries would receive £425,800, HMRC £56,700 and the Academy £17,500.

Information on leaving a legacy is available on the Academy's website **http://bit.ly/xDN4cA**

EDUCATION

Wheelchair resource



Students at Cotswold School, Bourton-on-the-Water, assemble and launch a racing wheelchair

The Paralympics provide opportunities for athletes to compete at the highest level. There are many wheelchair sports and the Academy has created a classroom resource that enables students to compare the wheelchairs used for track events and basketball.

The three-wheeled racing chair is constructed for speed, whereas the four-wheeled basketball chair is made for manoeuvrability. Students can create their own scaled-down versions and find out how the designs of wheelchairs used in competitive sports are tailored for their specific uses and examine how they can give athletes a competitive edge.

This new resource will help teachers and STEM ambassadors deliver a context-based activity that clearly demonstrates the links between the STEM subjects. Scheduled to be delivered by Easter 2012, this resource will be available for use in schools from the summer term.

Visiting Teaching Fellows

The Academy's commitment to enriching student learning experience at university through experience-led education continues with the appointment of 13 new Visiting Teaching Fellows at 11 universities in the UK. Similar in scope to the highly successful Visiting Professor programme, the Visiting Teaching Fellows initiative involves early-stage practitioners who relate and apply curriculum teaching material to the operational challenges and real-life engineering problems students address on a daily basis. Not only do students find this contextualisation of theoretical material invaluable, they are also able to gain an insight into the challenges they may potentially face if they choose to work in industry.

This latest cohort of Visiting Teaching Fellows is drawn from a broad spectrum of high-tech industries and will be instructing students in areas including wave and tidal renewable energy, advanced materials characterisation, water management and sanitation, international development, sustainable design in the built environment and wellhead subsea systems.

Diversity programme

The diversity programme has hosted two significant events over recent months. In December, the Academy convened a working meeting to consider diversity data collection. This brought together the organisations that are currently the main collectors of diversity data within engineering. Discussions centred on identifying the gaps in the existing data picture and how they could best be filled in future.

In February, the Academy ran a collaborative workshop hosted by the Institution of Civil Engineers. The focus of the event was to share examples of good practice in diversity and inclusion, with invited speakers from Arup, the Institution of Engineering and Technology, the Law Society, the Royal Institute of British Architects and the Academy. One purpose of the event was to identify subjects and participants for funded pilot projects and we are now in the process of defining three projects across at least six engineering institutions.

The Academy will receive the report and results of an assessment against the SET Fair Standard during March. Plans for communication and follow-on action are being prepared and will provide a catalyst for renewed focus on inclusive practice across all the Academy's activities. For more information about the programme, please contact **diversity@raeng.org.uk**

CPD for lecturers

As part of the BP-supported Engineering Further Education Programme, the Academy has developed a hands-on CPD session on smart materials for college lecturers who teach engineering. The aim of the CPD session is to allow lecturers to develop an understanding of smart materials. A range of smart materials such as self-healing polymers, Faraday film, shape memory alloys and quantum tunnelling compounds is covered as part of the session. The first event ran at the University of Liverpool on 24 February and was attended by delegates from 16 colleges. A second event hosted by Jaguar at their Castle Bromwich site on 26 March was oversubscribed within 12 hours of advertising and 34 lecturers registered to attend. Another CPD session using programmable microcontrollers is currently in development.

Connecting STEM teachers

The Academy's *Connecting Teachers* project offers professional development training to teachers of science, technology, engineering and maths (STEM) across the UK. *Connecting Teachers* gives these teachers the tools to increase STEM engagement among greater numbers of students.

Good teachers can inspire young people to engage with STEM, which is why the Academy is recruiting experienced secondary school teachers of STEM subjects from across the UK as teacher coordinators to provide professional development opportunities for other teachers in their local schools. These teacher coordinators are a central component of the *Connecting Teachers* project. They are responsible for building a STEM support network for their local schools and providing training in key areas, such as contextualising STEM learning, supporting greater diversity in engineering and challenging young peoples' misconceptions about engineering.

To ensure the teacher coordinators make a strong start in creating their local school networks, the Academy has held two induction days at BG Group's offices in Reading. These featured training in the use of the Academy's STEM teaching and learning resources. During the induction sessions, BG Group, which provides support for the *Connecting Teachers* Project, demonstrated an internet-based meeting space for the teacher coordinators and their school networks, which will be another invaluable source of support and ideas for them. Feedback from the induction training was very positive and showed that all the teacher coordinators left feeling confident to perform their role.

The Academy has now recruited 16 of the planned 24 teacher coordinators with eight English regions and Northern Ireland, Scotland and Wales now having at least one teacher coordinator. A further round of recruitment to strengthen the project's UK-wide coverage is starting now.

Another aspect of the *Connecting Teachers* project is the creation of an expert panel to provide high level strategic advice on the direction of the project and how to maximise its impact. The expert panel comprises representatives of the Academy, BG Group, the STEM support community, policymakers and teacher coordinators. The inaugural meeting of the expert panel took place in January. It provided an excellent insight into the STEM landscape in the UK's regions and stimulated discussion about the key areas of focus and priorities for the project.

The Big Bang Fair

A record number of people attended the annual Big Bang Fair and National Science and Engineering Competition at the Birmingham NEC in March. The event was attended by 55,000 visitors across the three days, including live shows from TV's *Brainiac* and *Bang Goes the Theory* and a show floor that featured exhibitors from all areas of science, engineering, mathematics and technology.

The Academy's stand at the event was visited by a continuous stream of young people involved with hands-on activities and curriculum resources which the Academy has developed through the BAE Systems-funded Engineering Engagement Project. The Academy is grateful to all the volunteers who gave up their time to help us during the fair.

Mark McEvoy, winner of the Royal Academy of Engineering prize ,with Dr Paul Golby FREng and his teacher (far left) and father (far right)

The Royal Academy of Engineering prize for best engineering project based on engineering principles was awarded to Mark McEvoy from St Colman's College in Newry, Northern Ireland. His project, 'Multilift', is an adaptor for farmyard machinery to lift 500kg fertiliser bags and heavy equipment. It stood out among the other high quality competition projects. All the components in the structure, designed by 16-year-old Mark, were underpinned by force calculations and force diagrams which would normally be tackled at undergraduate level. He then went on to teach himself MIG welding and plasma cutting to build the structure, which was very much a finished article. He has already been approached by JCB who were in attendance at the show.

Obituaries

Sir Sidney Bacon CB FREng died aged 93 on 14 February 2012. Before his retirement he was Managing Director of the Royal Ordnance Factories.

Sir Alan Cottrell FREng FRS died aged 92 on 15 February 2012. At the time of his death he was Research Associate, Department of Materials Science and Metallurgy, University of Cambridge.

Dr Walter 'Eric' Duckworth OBE FREng died aged 86 on 4 February 2012. Prior to his retirement he was Managing Director, Fulmer Ltd.

Dr William Forrest OBE TD FREng died aged 93 on 15 February 2012. Before his retirement he was Deputy Director (Mining), National Coal Board.

Mr Bryan Hildrew CBE FREng died aged 91 on 11 January 2012. Before his retirement he was Managing Director, Lloyd's Register of Shipping. He was a Founder Fellow.

Professor John Hutchinson FREng died aged 84 on 21 December 2011. Prior to his retirement he was Emeritus Professor of Engineering and Geomorphology and Senior Research Fellow Imperial College London.

Mr Ian Phillipps DL FREng died aged 86 on 28 July 2011. Prior to his retirement he was Chairman,The BSS Group plc.

Professor Roger Pollard FREng died aged 65 on 3 December 2011. At the time of his death he was Consulting Engineer, Agilent Technologies, Santa Rosa, CA, USA.

Mr Barry Smale-Adams OBE FREng died aged 79 on 21 February 2012. Prior to his retirement he was a Consulting Mining Engineer, Rio Tinto Zinc Corporation plc.

Mr John Speechley OBE FREng died aged 88 on 22 January 2012. Prior to his retirement he was Managing Director, Westland Aircraft.

Professor Hugh Sutherland OBE FREng FRSE died aged 91 on 20 December 2011. At the time of his death he was Emeritus Professor and formerly Dean of the Faculty of Engineering and Head of Department of Civil Engineering, University of Glasgow.

Council nominations

As a Fellow of the Academy, you will have recently received an invitation to nominate candidates for election to Council. The Academy would like to remind Fellows that they have the option of nominating candidates for election to the Council either by post or online by logging onto the private area of the Academy's website; the deadline for doing so is 30 April 2012.

The same options will be subsequently offered to Fellows for voting on the nominated candidates to Council. The Council nomination and election process is an important part of the Academy's governance and Fellows are urged to participate by whatever method suits them. However, the online option does have the advantage to the Academy of a significant saving in administrative effort and cost.

Publications donated to the Academy

David Royle has donated two publications to the Academy. A book, *From Vintage to Classic to Amphibian*, describes the world's first high-speed amphibious vehicles, and a DVD shows the machines in action.

Professor J Helszain OBE FREng has donated the following books: *Radiation and Scattering of Waves* by Leopold B Felsen and Nathan Markuvitz; *Electrical Network Theory* by Norman Balabanian and Theodore A Bickart, with contributions from the late Sundaram; and *Methods of Theoretical Physics* by Philip M Morse and Herman Feshbach.

Staff news

Chris Dixon, Resource and Training Coordinator, is returning to teaching at Acton High School.

Heather Hawthorne, Project Director, HE STEM Programme – Engineering, has left to work at Engineering UK.

Ed Holmes, Press and Communications Officer, has left to work at St Paul's Cathedral.

Melissa Obi has joined the Academy as Events Manager, as maternity cover for **Helen Berrington**. Melissa previously worked for Euromoney Conferences.

Jon O'Neill, Corporate Development Manager, has become father to a son, Rowan Timothy George.

Melanie Washington, Project Manager, Education, has left to work at STEMnet.

Jenny Young, Head of Diversity, was elected to the Fellowship of the IET.

Membership news

Last year, 2011, saw the highest ever number of new nominations for Fellowship of the Academy, 112 in all. For this, all the Fellows who have worked hard to propose, second and assess these nominations must be commended and thanked for their efforts. However, this burgeoning number of nominees means that there is now ever greater and more intense competition for the limited number of places available for New Fellows each year. Consequently there will be more disappointment, but this ought not to deter Fellows from continuing to put forward nominations from among the best and leading engineers whom they know. Ultimately, more high quality nominations will lead to an enlarged and strengthened Fellowship.

The Academy continues to encourage new nominations, in particular from the less well-represented areas and sectors of engineering and for nominees from under-represented groups. If you would like to discuss a potential nomination please contact Fellowship Manager, Chris Coulter (phone **020 7766 0687** or email **chris.coulter@raeng.org.uk**) for advice and assistance.

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