



2016 MacRobert Award winner

The 2016 winner of the MacRobert Award, the longest-running and most prestigious prize for innovation in UK engineering, was announced at this year's annual Awards Dinner on 23 June at the Pavilion at the Tower of London. The winner, Blatchford, was honoured with a gold medal for its intelligent prosthetic limb innovation and the team members shared a cash prize of £50,000. Known for spotting the 'next big thing' in the technology sector, the MacRobert Award identifies outstanding innovation with proven commercial success and tangible social benefit.

Blatchford, which was up against automotive engineering giant Jaguar Land Rover and MRI scanner pioneers Siemens Magnet Technology, has developed the first ever prosthetic limb with integrated robotic control of the knee and foot; a system in which the parts work together like a human leg. Where previously lower leg prosthetics wearers had to plan their days meticulously according to the limitations of terrain they could tackle, the smart robotics in the Linx limb system constantly monitor and adapt to the wearer's movements and the environment, giving users much greater confidence and freedom.

HRH The Princess Royal and Academy President Professor Dame Ann Dowling OM DBE FREng FRS presented the prize to the winning team: Professor Saeed Zahedi OBE FREng, Technical Director; Nadine Stech, Senior Control Engineer; Andy Sykes, Principal Electronic Engineer; Dr David Moser, Principal Mechatronic Engineer; and Rob Painter, Senior Mechanical Engineer.

Dr Dame Sue Ion DBE FREng FRS, Chair of the MacRobert Award judging panel, said: "Blatchford has combined a compassionate approach to patient needs with huge ambition and exceptional systems engineering. The team behind this incredible innovation are true role models who show the positive impact that engineering can have on society."

A number of other Academy awards that celebrate and recognise engineers who have made a remarkable contribution over the course of their careers were also presented throughout the

evening. Professor Danielle George, Professor of Microwave Communication Engineering at the University of Manchester, received the Rooke Award for her remarkable contribution to the public promotion of engineering through her work with various media channels, such as presenting the engineering-themed Royal Institution Christmas Lecture series in 2014. The Major Project Award was presented to a team from BAE Systems' AI Labs for its Intermediate Frequency Modem System project. The Prince Philip Medal, the Academy's highest individual accolade, went to Dr Jonathan Ingram for his groundbreaking work on BIM (building information modelling).

The Silver Medals, which recognise outstanding personal contributions to engineering in the early stage of careers, were presented to Dr Damian Gardiner, Technical Manager at Tracerco, Dr Demis Hassabis, co-founder and CEO of DeepMind and Vice President Engineering at Google, and Professor Tong Sun, Professor of Sensor Engineering at City University London.

The first RAEng Engineers Trust Young Engineers of the Year awards were presented to Dr Sithampanathan Sabesan from the University of Cambridge, Dr T Ben Britton from Imperial College London, John Collins from Arup, Orla Murphy of Jaguar Land Rover, and Dr Paul Shearing from University College London. Established with the generous support of the Worshipful Company of Engineers, these are awarded to UK engineers in full-time higher education, research or industrial employment, who have demonstrated excellence in the early stage of their careers. Dr Sabesan went on to win the Sir George Macfarlane Medal for his work in electronic engineering and as a co-founder of technology company PervasID.

The Academy's awards evening was made possible through the support of headline sponsor Atkins and silver sponsors BAE Systems, BP, GKN, Jaguar Land Rover, Lockheed Martin and Petrofac. The MacRobert Award is supported by the Worshipful Company of Engineers.

▲ The MacRobert Award 2016 winning team from Blatchford receives the gold medal from HRH The Princess Royal and Professor Dame Ann Dowling

President's column



Meetings and visitors

In her capacity as President, Dame Ann has met with:

Dr Jeremy Farrar OBE FRS, Director of Wellcome Trust
Kelly Gillis, Associate Deputy Minister at Canada's Department for Innovation, Science and Economic Development
Earl of Selborne GB FRS DL
Juergen Maier, CEO of Siemens UK
National Academy of Technologies of France: Alain Bugat, President; Bruno Revellin-Falcoz, Honorary President; Olivier Appert, General Delegate; and Jacques Lukasik, Secretary General of Euro-CASE.
Professor Hiroshi Amano, Nobel Laureate
Paul Dreschler CBE, Chairman of the CBI
Lord Sainsbury
Koji Omi, Founder and Chairman of the STS forum
Steve Holliday FREng, Executive Director of National Grid
Jo Johnson, Minister of State for Universities and Science
Professor Sir Robert Lechler, President, and Dr Helen Munn, Executive Director, Academy of Medical Sciences
Wang Zhongwei, Chairman of the Counsellors' Office of the State Council, People's Republic of China
Koji Tsuruoka, Ambassador of Japan to the UK
Naoto Nishida, Corporate Executive Vice President and Head of Technology, Toshiba

She attended the following events and meetings:

Prince Philip Designers Prize Award
Commons Science and Technology Committee - Higher Education and Research Bill
Council for Science and Technology
Top 50 Women in Engineering breakfast launch
Queen Elizabeth Prize for Engineering Trustee Meeting
CAE delegation lunch and meeting
The Worshipful Company of Armourers and Brasiers Master's Day Dinner

She was interviewed by:

Sarah Sands, Editor of the *Evening Standard*
Kirsty Young, Presenter, for *Desert Island Discs*, BBC Radio 4

11 June 2016 marked the 40th anniversary of the Fellowship of Engineering, which would later become the Royal Academy of Engineering. In 1976, 130 of the UK's finest engineers came together with a shared purpose: to define and lead best practice within engineering, and to promote engineering to those outside the profession.

Forty years on, the Academy's commitment to these two goals is stronger than ever. Less than a fortnight after the 40th anniversary, we hosted our annual Awards Dinner, now the highlight of the Academy calendar and a time when we celebrate and reward some of the very best engineering and engineers in the UK today. I am always humbled by the talent and innovation recognised, from the winner of the Prince Philip Medal Dr Jonathan Ingram, in recognition of his exceptional contribution to engineering, to an engineer at the opposite end of his career, the Sir George MacFarlane medal winner Dr Sithamparanathan Sabesan, for demonstrating excellence less than 10 years since graduating from a first degree in engineering.

The highlight of the evening for me is always the presentation of the MacRobert Award – the UK's premier award for innovation. This award has consistently recognised and celebrated technologies that go on to have a transformational impact on society. This year's winner, Blatchford, has achieved something truly remarkable that is now making such a difference to amputees worldwide. Congratulations to all of our winners.

This year's Awards Dinner fell on National Women in Engineering Day. It was an honour and a privilege to be recognised in a list of the UK's top 50 women in engineering, alongside many other Academy Fellows and friends, which was published jointly by the Women's Engineering Society and the *Daily Telegraph* on the day. In 1976, none of the founding Fellows were female. With 70 brilliant female engineers in our current Fellowship, we are making steps forwards.

There was of course a bigger event in the diary on the same day. This year's dinner coincided with an unprecedented shift in the relationship between the UK and its continental neighbours: on 23 June, the British public voted to leave the European Union (EU). While the Awards Dinner gave us a glimpse of what will be possible as a result of engineering innovation in the future, the following morning raised many more questions about the future of the country as a whole.

While our Fellows do not all agree on whether the outcome of the referendum

will be positive or negative for the future of the country, one thing we can all agree on is that negotiations in coming months and years must be informed by a clear understanding of the potential solutions, opportunities and risks from the perspective of UK engineering. We need to ensure that the UK maintains its position as a centre of world-class engineering research and innovation and that it provides the environment for the creation and growth of successful engineering businesses. As an Academy, we are taking up the request from the 38 organisations representing the engineering profession, through the Engineering the Future policy group, to provide a coordinated source of engineering information and expertise for government. This advice needs to be representative of the whole profession.

We want to ensure that engineering businesses, large and small, feature strongly in the industrial strategy and can access the talented workforce they need. The higher education and research community has benefited significantly from EU funding and is understandably concerned about the uncertainty resulting from the vote to leave. This follows on from a planned re-organisation of the UK funding for research and innovation: ahead of the referendum, the government launched the Higher Education Bill, which my review of business-university research collaborations helped to inform. The plans included the establishment of a new body, UK Research and Innovation (UKRI), to bring greater coherence to research and innovation funding.

While the Academy has expressed concerns about the status of Innovate UK within this new body, the vote to leave the EU means that having a strong integrated voice for research and innovation will be more important than ever. I will continue to discuss how the creation of UKRI can best support this with Jo Johnson, Minister of State for Universities and Science.

23 June will shape the future of UK engineering in ways that it will be impossible to predict. I am proud of the Academy, its partner institutions and the engineering profession as a whole for their quick response to the referendum result and the leadership the community has shown in uniting to support government in securing the best outcome for the UK. Many of you will be called upon to help inform the advice we prepare over the coming months, and I thank you for your support in this endeavour.

Ann Dowling

Healthcare technology innovation wins the Africa Prize

Arthur Zang, an innovator from Cameroon, has won the second Africa Prize for Engineering Innovation for his heart-monitoring device, the Cardio-Pad. This invention could change the way that Africans access treatment for heart disease, a critical illness across sub-Saharan Africa.

The Cardio-Pad is a small tablet device that allows any medical professional to perform heart diagnostics at any location. These diagnostics, sent to a cardiologist via a mobile phone network, can be interpreted in less than 20 minutes and enable the cardiologist to discover, monitor or rule out a heart condition. As cardiologists are often located in big cities, the device will reduce the number of expensive trips that people living in rural areas will have to take.

Arthur's innovation earned him a prize of £25,000, and three other finalists from Kenya, South Africa and Uganda each received £10,000 to support their businesses in the fields of health technology and energy access.

The Academy launched the Africa Prize for Engineering Innovation in



2014 with the aim of stimulating, celebrating and rewarding innovation and entrepreneurship in sub-Saharan Africa. It encourages talented engineers to use their skills to develop solutions to local challenges, highlighting the importance of engineering in improving quality of life and economic development. Twelve shortlisted Africa Prize entrants, from nine countries in sub-Saharan Africa, received business training and mentoring, during which they learned to develop business plans and market their innovations.

At the awards ceremony in Dar es Salaam, Tanzania, on 26 May, the four finalists pitched their innovations to the judges and audience, who then voted on the most promising engineering

innovation. The judging panel was led by Malcolm Brinded CBE FREng and included Dr Liesbeth Botha, Strategic Digital Transformation Director at PricewaterhouseCoopers Africa, Stephen Dawson, Chairman at Jacana Partners, Dr Moses Musaazi, Senior Lecturer, Makerere University and Managing Director of Technology for Tomorrow Limited, Uganda, and Dr Bola Olabisi, CEO, Global Women Inventors & Innovators Network.

The prize is supported by the Shell Centenary Scholarship Fund, Consolidated Contractors Company, the Foreign & Commonwealth Office, Conoco Phillips and the Mo Ibrahim Foundation.

▲ Africa Prize winner Arthur Zang with lead judge Malcolm Brinded CBE FREng

Enterprise Hub showcase

On 18 May, entrepreneurs, engineers and investors attended the Enterprise Hub Showcase, an annual event to highlight the UK's emerging entrepreneurial engineering talent, and showcase the Enterprise Hub's new members to potential investors and customers.

The members' exhibitions were the highlight of the showcase and generated interest from *Sky News*, the *Financial Times* and *Forbes*, as well as investors and Enterprise Hub stakeholders.

The keynote speech was delivered by Gerard Grech, CEO of TechCityUK, who spoke about the importance of developing the capabilities of the next generation of technology entrepreneurs.

Mark Bryant, Head of Manufacturing at the Business Growth Fund, led a panel

discussion on *Breaking the Growth Barrier* during which industry leaders Paul Loeffen, CEO of Cobalt Light Systems, Lesley Eccles, founder of fantasy sports company FanDuel, and Steve Allpress FREng, founder of Icera inc., shared personal stories and advice from their own experiences of creating fast-growing companies.

Innovation and entrepreneurship

Next year's event will celebrate the opening of the Academy's new Enterprise Hub facility.



▲ Enterprise Hub member and 2015 Launchpad Competition winner James Roberts demonstrates his inflatable incubator innovation to showcase attendees

QEPrize nominations launch party



▲ Guests at the launch party try out a 3D-printed pen

In April, nominations for the 2017 Queen Elizabeth Prize for Engineering (QEPrize) were launched at a reception at the Design Museum in London, attended by more than 250 Fellows, engineering ambassadors and representatives from donor companies.

The evening opened with speeches from Lord Browne FREng FRS, Chairman of the Queen Elizabeth Prize for Engineering Foundation, Sir Christopher Snowden FREng FRS, Chair of the QEPrize judging panel, and Steve Holliday FREng, former Chief Executive at National Grid.

In his address, Sir Christopher told guests that the QEPrize recognises the greatest engineering contributions from across the globe and acts as a catalyst to inspire the next generation of engineers, which is vital for meeting the challenges of the future.

Throughout the evening, guests enjoyed a range of innovative engineering exhibitions, which included the world's first 3D-printed pen and interactive virtual reality games featuring telekinetic agents and lunch-stealing seagulls.

Nominations close on 26 August 2016 and Fellows are encouraged to nominate outstanding engineers in industry or academia, whose work has resulted in a lasting global impact on humanity. For more information on the nominations process, or to submit a nomination, visit qeprize.org/nominate/

New engineering university

A potential project to establish a new university dedicated to engineering has been highlighted in the *Spending Review and Autumn Statement 2015* and the recently published white paper on higher education. The university, New Model in Technology and Engineering (NMiTE), is supported by the Academy and aims

to increase the number of engineering graduates in the UK.

It will offer an accelerated integrated master's in liberal engineering to students whose backgrounds do not necessarily include maths and science qualifications. The curriculum is being developed in collaboration with industry and will focus on industry-related projects, with fewer traditional lectures.

The NMiTE team is currently holding discussions with the University of Warwick and Institution of Engineering and Technology about accreditation, validation and the award of degrees, and would also like to hear from Academy Fellows. To be involved in the consultation, please email rhy.s.morgan@raeng.org.uk

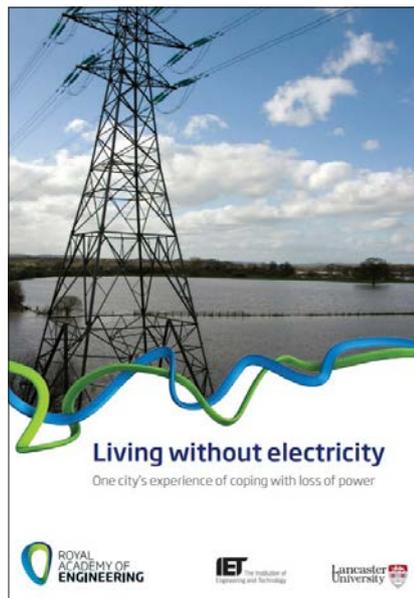
To find out more information, please visit www.nmite.org.uk

Infrastructure and transport

Living without electricity

In May, the Academy published *Living without electricity*, a report that was put together with Lancaster University and the Institution of Engineering and Technology, and which detailed the loss of virtually all modern infrastructure in Lancaster for four days in December 2015, caused by unprecedented flooding in north Lancashire and Cumbria.

Professor Roger Kemp MBE FREng, a Professorial Fellow at Lancaster University, used this local crisis as an opportunity to observe how modern society copes without a regular supply of electricity. He first wrote a blog post, which was followed by a workshop and publication of the report.



Attended by local and national service providers and government representatives, the workshop considered how the UK should prepare for such serious events in a society that

is becoming more and more reliant on electronic and digital infrastructure that depends on electricity supply.

The report outlines the balance that needs to be struck between ensuring sufficient resilience in national and local infrastructure, and ensuring that infrastructure remains practical, efficient and affordable.

The report provides both a warning and advice to a wide range of audiences: national and local planners, utilities, emergency services, education providers, local authorities, transport operators, and the retail and banking sectors.

To read the report in full, please visit www.raeng.org.uk/livingwithoutelectricity

◀ The *Living without electricity* report will be of interest to a wide range of audiences, including planners, emergency services and transport operators

HS2 risk workshop

On 10 May, a roundtable was held on the topic *HS2 and risk: learning from other complex major programmes*, chaired by Dame Judith Hackitt DBE FREng.

The workshop, which was held at the request of HS2, began with HS2 outlining its approach to risk, governance and assurance. This was followed by a discussion between

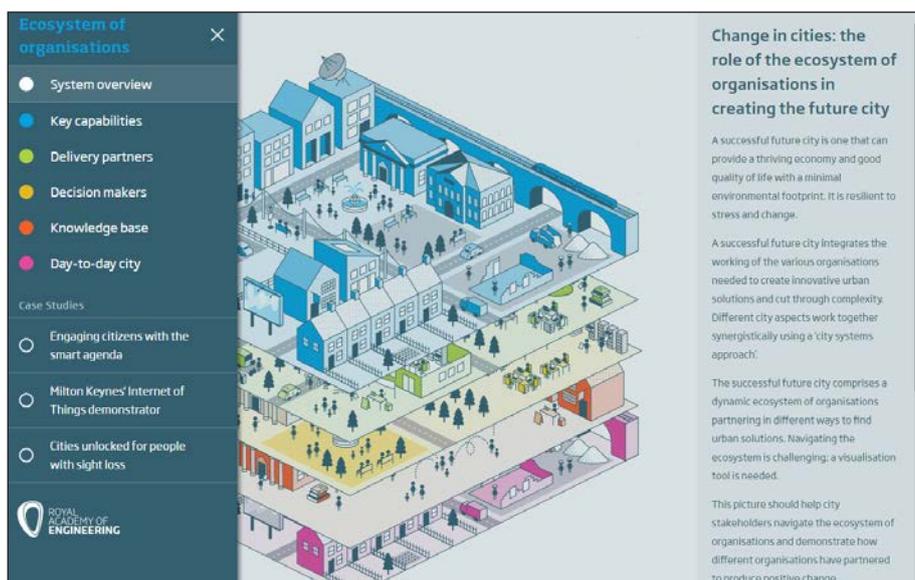
Fellows and other experts from the railway, oil, energy, built environment and digital systems sectors about risk management, both strategic and technical, when working on major UK-based projects.

The discussion allowed HS2, and other large project teams, to learn from the experiences of those who had led and made considerable contributions to programmes of similar scale and complexity so that they will be better prepared to manage risk.

Interactive tool for exploring future cities

The Academy has launched a digital interactive to explore the ecosystem of organisations involved in planning and creating future cities.

Navigating this ecosystem can be challenging, and the Academy developed the interactive to help city stakeholders visualise the types of



Technology and society

organisations they need to engage with. Through three case studies, it demonstrates how different organisations have partnered to produce positive change.

The digital interactive examines the roles of different organisations and identifies sectors where partners might be found, such as key decision makers within the knowledge base. Users can select each individual component to reveal more information.

Explore the interactive at futurecities.raeng.org.uk and join the conversation on Twitter using [#RAEngCities](https://twitter.com/RAEngCities) and [@RAEngNews](https://twitter.com/RAEngNews)

◀ The interactive tool will help organisations involved in the development of future cities

Robots: faithful servants or existential threat?

As part of UK Robotics Week 2016, the Academy was invited by the Engineering and Physical Science Research Council and the UK-RAS (Robotics and Autonomous Systems) Network to host an expert panel discussion, *Robots: faithful servants or existential threat?*, exploring the ethics of robotics and autonomous systems.

Held on 29 June, the event was chaired by Fiona Fox, Director of the Science Media Centre. Panellists included two Fellows, Professor Darwin Caldwell FREng from the Italian Institute of Technology and Professor Tony Gillespie FREng, Visiting Professor at University College London, alongside Professor Alan Winfield from the University of the West of England, Dr Natasha McCarthy from the British

Academy and Dr Sandra Wachter from the Alan Turing Institute. Between them they covered the technical, economic, social and legal aspects of the debate. The event attracted a large and diverse audience from academia, industry and government.

A lively panel discussion considered the sufficiency of existing legislation against cybersecurity attacks and the ethical frameworks that should guide developments in artificial intelligence. The discussion was followed by a drinks and networking reception.

The event was streamed live over social media, receiving comments from around the world, and a write-up of the debate featured on the *Daily Mirror* website the following day.

The Academy is in the initial phase of organising an expert roundtable that



will consider the engineering voice in the debate surrounding the ethics of autonomous systems. As this develops, the Academy is interested in speaking to Fellows who have expertise in this area. Those who would like to get involved can contact Philippa Shelton at philippa.shelton@raeng.org.uk

▲ Pepper, the UK's first educational robot, interacted with attendees at the event

Inquiries and consultations

The Academy has responded to a number of Parliamentary Select Committee inquiries and government consultations.

A short response was submitted to the Treasury's consultation on the setting up of the National Infrastructure Commission. This new body will be responsible for assessing what infrastructure the nation will need in the coming years, and as such, will be an important organisation that the Academy is keen to support.

Responses were given to two House of Commons Science and Technology Committee inquiries: about smart meters, and robotics and artificial intelligence. The smart meters response

drew on previous work by the Academy to advise on how to get the most out of the upcoming national installation of the meters. The second response also drew on a growing body of evidence in the digital systems sectors. A response was also submitted to the Transport Select Committee inquiry on rail technology: signalling and traffic management.

A response was submitted to the Energy and Climate Change Committee on future energy technologies. This response highlighted small modular reactors and energy storage (including virtual storage) as technologies that could potentially revolutionise the energy sector. However, it also stressed the need to integrate existing technologies into whole systems, rather than concentrating on unproven innovations.

Glasgow MacRobert Award lecture

On 12 April, an event hosting the winners of the 2015 MacRobert Award, *In conversation with Artemis Intelligent Power*, took place at the University of Strathclyde's Technology and Innovation Centre in Glasgow.

Dame Sue Ion DBE FEng FRS, Chair of the MacRobert Award judging panel, spoke with Professor Win Rampen FEng and Dr Niall Caldwell, two members of the team behind the award-winning Digital Displacement power system that has the potential to transform the viability of offshore wind power and low-carbon transportation. They talked about their journey from the company's beginnings

over 20 years ago as a spin-out from the University of Edinburgh to their position as a world leader in hydraulically powered systems.

The event was first held in London in 2015 and was repeated in Glasgow as part of the Academy's continuing drive to raise its profile outside London.

Support for CAETS

The Academy has secured funding from The Wellcome Trust and Mott MacDonald to support it in hosting the conference, *Engineering a Better World*, in London this September.

The Wellcome Trust is sponsoring a networking reception on the first evening, as well as funding 10 bursaries for young

engineers from developing countries to attend the conference.

Mott MacDonald is a sponsor of a thought leadership publication that brings together contributions from conference speakers, and business and engineering leaders, to comment on how engineering can help meet the UN Sustainable Development Goals.

The conference marks the end of the Academy's presidency of CAETS, the International Council of Academies of Engineering and Technological Science, and will be held at the Institution of Engineering and Technology from 12 to 14 September.

For further information and to register, please see www.raeng.org.uk/caets2016

People and talent

Leaders in Innovation Fellowship



▲ Leaders in Innovation Fellows from across Southeast Asia attended the first Regional Hub Conference in Bangkok

In July, the Academy hosted the first Regional Hub Conference for participants in its Leaders in Innovation Fellowship

(LIF) programme in Southeast Asia. The conference was held in Bangkok and was supported by partners in Thailand, Vietnam and the Philippines.

Hosted by Seeram Ramakrishna FEng, Vice President of the National University of Singapore, the event featured an opening speech from Thailand's Minister of Science and Technology, and enabled LIF alumni to network with potential investors from across the region and the UK.

For almost three years, the programme has provided training for researchers in emerging economies who want to commercialise their innovations. In that time, the Academy has trained over 370 researchers in 12 emerging countries throughout Asia, Africa and South America, and built international networks of innovators and technology entrepreneurs.

In conversation with world-leading engineers

Three leading engineers have discussed the challenges and triumphs behind their iconic constructions in a film made for the QEPrize.

Keshini Navaratnam, QEPrize Director, spoke to structural engineer William F Baker FEng, the man behind the Burj Khalifa, the world's tallest building; Ilya Espino de Marotta, Executive Vice President of the Panama Canal Expansion Project; and Dr Michel Virlogeux FEng, designer of the Millau Viaduct in France.

The three engineers were in London to take part in an event organised by the Royal Commission for the Exhibition of 1851, which was also filmed for the BBC World Service.

To watch the film, please visit qeprize.org

Lord Browne V&A Engineering Season lecture

On 17 June, past president Lord Browne, Chairman of the Queen Elizabeth Prize for Engineering Foundation, gave a lecture on the *Art of engineering* as part of the opening of the Victoria and Albert Museum's (V&A) Engineering Season.

Attended by more than 250 V&A members, the lecture drew on both his experience as an engineer and his appreciation of the

arts, discussing how the greatest feats of engineering are an art form of their own. He also highlighted the vital role that engineering plays in solving humanity's greatest problems, and the need to encourage more young engineers to step up and meet the challenges of the future.

The V&A's Engineering Season runs until 6 November. To find out more, please visit www.vam.ac.uk

► Lord Browne in conversation with Keshini Navaratnam, QEPrize Director



New presentation promotes engineering careers

Tomorrow's Engineers has launched a new careers presentation to help employers, teachers and advisers showcase engineering to young people. *Make a difference - be an engineer* encourages pupils aged 11 to 14 to consider how engineering affects their daily lives and educates them about the range of career opportunities available across different sectors.

The presentation uses real engineers to bring the industry to life and carries the central message that engineers can improve people's lives and solve problems around the world.

Developed with input from teachers and industry professionals, and in collaboration with the Institution of Civil Engineers, Institution of Engineering and



Technology, Institution of Mechanical Engineers, and the Institute of Physics, the presentation challenges stereotypical ideas of engineering.

Additional guidelines have also been developed to help presenters make the most out of this opportunity; they are encouraged to share their own experiences and link to online

video content of engineers talking about their work.

The presentation and guidelines are free to download from www.tomorrowsengineers.org.uk/makeadifference

▲ The *Make a difference - be an engineer* presentation promotes engineering careers to pupils aged 11 to 14

The UK STEM education landscape



▲ The *UK STEM education landscape* report calls for future initiatives in STEM education to be better coordinated

In May, the Academy published *The UK STEM education landscape* report, providing a useful summary of the key issues affecting engineering skills today. It highlights that young people are not

studying STEM subjects beyond GCSE, despite over 10 years of activity from more than 600 organisations encouraging them to do so. Of the 650,000 school students who take GCSEs each year, only around 30,000 then study A-level mathematics and physics.

The report calls for future initiatives to be far more coordinated, with better evaluation of their long-term impact. It also sets out the factors affecting involvement and interest in engineering beyond age 16. These include:

- Poor perceptions and attitudes towards engineering careers among young people and their influencers.
- The need for more teachers to engage in professional development

that improves their understanding of the application of science and mathematics to real-life contexts.

- Issues with the qualifications, assessment and accountability systems that focus schools' attention on a narrow set of academic qualifications.
- The need for improved careers guidance and employer engagement and better articulation of the many pathways open to young people after school.
- Issues with facilities and capacity across the whole education landscape.

The report was commissioned by Lloyd's Register Foundation and can be found at www.raeng.org.uk/stemlandscape

Diversity Programme celebration event

Over 120 Academy Fellows, stakeholders and industry partners gathered at the Institution of Engineering and Technology (IET) on 1 June to launch the Academy's *Diversity Programme Report 2011-2016*, and share plans for the next phase of the programme.

The report and event provided an opportunity to celebrate the programme's achievements over the past five years. These have included:

- Setting up a Diversity Leadership Group that has directly engaged with 50 employers and employer-led organisations, and published a case study toolkit and benchmarking report to support increasing diversity and inclusion across engineering employment.
- Establishing an Engineering Diversity Concordat that 32 organisations have signed in support of increasing diversity and inclusion across professional engineering institutions.
- Initiating a three-year higher education employer diversity pilot project with 13 employers and SEO London to broaden diversity of engagement with students.
- Supporting InterEngineering, a network to connect LGBT engineers, encourage dialogue, and promote diversity and inclusion.



Speakers at the event included Naomi Climer FEng, Professor Dame Wendy Hall DBE FEng FRS, Allan Cook CBE FEng, Philip Greenish CBE and Dervilla Mitchell CBE FEng.

Feedback from the event was encouraging, with attendees supporting the plans and focus of the renamed Diversity and Inclusion Programme.

The event also hosted the launch of an Innovate UK campaign to celebrate women in innovation.

To read the report, please visit www.raeng.org.uk/diversityreport2016

▲ Speakers at the Diversity Programme report launch (L-R): Jenny Young, Academy Head of Diversity; Naomi Climer, President of the IET; Arun Batra, Director at EY and CEO of the National Equality Standard; Allan Cook, Chairman of Atkins; Professor Dame Wendy Hall, Professor of Computer Science at the University of Southampton; Philip Greenish, Academy Chief Executive; and Bola Fatimilehin, Academy Head of Diversity

Engineering Talent Project

The Engineering Talent Project, the Academy's multi-intervention social marketing programme to address the engineering skills crisis, is gathering pace. The project has attracted the support of seven corporate partners and a comprehensive qualitative research study

has been carried out to provide greater understanding of the young people whom the Academy hopes to reach.

The research findings will inform the project's four main strands of activity: addressing the structural barriers that prevent take up of engineering careers; engineering engagement in schools; improving culture and practice across

the sector to improve employment experiences; and communications to promote engineering and its wide range of specialisms and opportunities.

The project is designed to change public perceptions of engineering and will encourage young people to see the potential of studying STEM subjects and pursuing a career in engineering.

Lowestoft Engineering Project: primary school engineering events

Twelve primary schools in Suffolk have each hosted a full-day continuing professional development event as part of their introduction to the Lowestoft Engineering Project, the Academy's latest regional STEM support programme.

Steve Smyth, a specialist science consultant working for the Academy, spent a day in each school carrying out practical and engaging science and engineering activities with teachers and pupils. The events were intended to provide primary school teachers with the confidence to deliver hands-on and inspiring lessons to their pupils, igniting a 'spark' for STEM subjects early on in pupils' education.

The events attracted significant local press coverage, appearing on the front page of the *Lowestoft Journal*, and led to support from local employers. Peter Aldous, MP for Waveney, called the project a "great opportunity" that "is going to play a very important role to ensure that the young people from the area have the skills that local companies and businesses require".



▲ The continuing professional development events at the Suffolk primary schools were covered in many of the region's newspapers

Superhuman vs Superhero

On 11 June, the Academy hosted a discussion at *The Times* Cheltenham Science Festival on *Superhuman vs Superhero: can life imitate art, and should it?*

Professor Mark Miodownik FEng, Director of University College London's Institute of Making, kicked off the discussion with a clip from the 1970s TV series *The Six Million Dollar Man*, which featured the 'world's first bionic man', stating that the technical optimism of 40 years ago is yet to be fully realised.

Professor Kevin Warwick, Professor of Cybernetics at the University of Reading, described his experience as the world's first cyborg. In 2002, he was implanted with a BrainGate implant that could harness his neural signals to receive external sensor information and experiment with motion impulses. His wife had a similar implant for one day and they were able to transmit nerve signals to each other.

Dr Andy Miah, Chair in Science Communication and Future Media

at the University of Salford, spoke about how the meaning of being a superhero changes over time, and discussed the issue of gene editing and 'designer babies'.

The event was chaired by broadcaster Timandra Harkness and drew a capacity crowd, who put some challenging questions to the panel.

Visiting Professors

In April, The Happold Foundation, an organisation established by the partners of international engineering consultancy BuroHappold, joined the Academy's Visiting Professors scheme as a partner.

The Happold Foundation is an organisation that promotes engineering's contribution and responsibility to society. Its support of the scheme will fund a Visiting Professorship in the built environment.

For almost 30 years, the Visiting Professors scheme has placed senior engineers in universities to enhance students' learning and equip them with skills to help their careers.

New Research Chairs and Senior Research Fellowships

The Academy has announced the award of five new Research Chairs and Senior Research Fellowships.

The five awardees cover a broad spectrum of engineering research and are based at Imperial College London, University of Leeds, University of Oxford, University of Leicester and University of Southampton. They will hold these positions for five years from September 2016 and will each be mentored by a Fellow during this time.

This programme strengthens the links between industry and academia by supporting academics in UK universities to undertake use-inspired research that meets the needs of the industrial partners. The scheme's partners include Petronas, DePuy Synthes, TWI Ltd., MAN Group and SPI Lasers.

A second round of applications closes on 5 September. For more information, please visit www.raeng.org.uk/researchchairs

East Midlands lecture and dinner

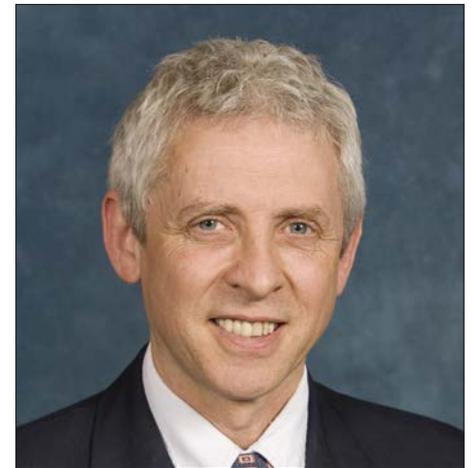
In May, Professor Tim Gordon, Head of Engineering at the University of Lincoln, gave the latest East Midlands regional lecture with a talk entitled *Self-driving cars - a safe bet?*, hosted by the University of Nottingham.

Professor Gordon spoke to an audience of students, members of the public, Academy Fellows and university staff about how future intelligent vehicles will need networked support from an intelligent infrastructure and explained that, despite claims in the

media, fully autonomous driverless cars were more than 30 years away.

The lecture was followed by a dinner for Academy Fellows and their guests hosted by Professor Andy Long, Pro-Vice-Chancellor of the University of Nottingham's Faculty of Engineering.

With the assistance of Professor Colin Garner FEng, the next event planned is a visit to the Caterpillar factory at Desford, Leicestershire, on the afternoon of Thursday 27 October, with a tour and machine demonstration followed by an early dinner.



▲ Professor Tim Gordon, Head of Engineering at the University of Lincoln

National Women in Engineering Day

On 23 June, National Women in Engineering Day (NWED) provided an opportunity to promote gender equality in engineering and celebrate the achievements of women engineers. Hundreds of schools and organisations across the UK hosted their own events, with the aim of helping more women consider engineering as a career.

The theme of the 2016 event was 'raising profiles', which was demonstrated on the day by the publication of the

top 50 women in engineering in *The Daily Telegraph*. The Academy is delighted that 13 Fellows were included on the list: Professor Dame Ann Dowling OM DBE; Professor Helen Atkinson CBE; Baroness Brown of Cambridge DBE; Jayne Bryant; Professor Muffy Calder OBE; Amanda Chessell CBE; Naomi Climer; Professor Lynn Gladden CBE; Dame Judith Hackitt DBE; Professor Dame Wendy Hall DBE; Professor Karen Holford; Dame Sue Ion DBE; and Dervilla Mitchell CBE.

To get involved with NWED 2017, visit www.nwed.org.uk

STEMM Disability Advisory Committee conference

On 17 March, the science, technology, engineering, medicine and mathematics (STEMM) Disability Advisory Committee (DAC) held a conference at the Royal Society to share and develop best practice in supporting the transitions of disabled people across STEMM education and employment.

The conference brought together employers, education support workers, service providers and others involved in the transition of disabled people within education, and between education and work or apprenticeships.

Speakers included Philip Connolly from Disability Rights UK, Rachel Bashabe



from Babcock International, Loraine Martins MBE from Network Rail, Margaret Meehan from Swansea University, Dr Duncan Shewsbury from the University of Worcester, and Alison Stokes from Plymouth University.

The conference programme included breakout groups that explored issues regarding recruitment, induction, outreach

and technical skills development for people with disabilities, and concluded with a lively networking session.

The Academy is a founding member of STEMM DAC. For more information visit www.stemdisability.org.uk

▲ Attendees at the STEMM DAC conference in March

Engineering Leadership Awards selection event

On 18 March, 70 of the UK's top engineering undergraduates attended a selection event at Prince Philip House to determine this year's Engineering

Leadership Awardees. Applicants participated in a day of interviews and team-based activities with Academy Fellows, Sainsbury Management Fellows (SMF) and Engineering Leadership Award (ELA) alumni. The 35 who best demonstrated their future leadership

skills and ability to act as role models were chosen for this year's awards.

Awardees will spend three years on the scheme, which provides them with £5,000 to use towards their career development goals. They will also attend an annual training weekend, have opportunities to meet and network with other undergraduates, and have access to advice and mentoring from Academy Fellows, SMFs and ELA alumni.

To register interest in advising or mentoring awardees on the scheme, please contact Jacqueline Clay at jacqueline.clay@raeng.org.uk



◀ Undergraduates attending the selection event for this year's Engineering Leadership Awards © sharronwallace.com

Academy roundup

Spring media round-up

On International Women's Day in March, a number of Fellows featured across many print and online publications. This included an article by the President on engineering recruitment in *New Scientist*, a letter about gender parity in engineering from Naomi Climer FREng in the *Guardian*, and mentions

of women Fellows in over 30 local newspapers. Following her *View from the top* lecture at the Academy in March, Dame Judith Hackitt DBE FREng was the focus of a profile article in the *Financial Times* on 23 April.

BBC Radio 5 Live covered an event on *Innovation in space* on 19 March, with a package that also appeared across 36 local BBC radio stations and in a *Naked Astronomy* podcast, a spin-off from BBC Radio's *Naked Scientists* show. In May, the Academy's report, *Living without*

electricity, featured in both the *Sunday Times* and the *Guardian*, in addition to trade and local press.

Academy award winners have received significant coverage in national outlets from the *Daily Mirror* to *The Times*, and the BBC featuring the MacRobert Award finalists.

Following the Academy's Awards Dinner, MacRobert Award winner Blatchford received further interest from media with features appearing on *BBC South Today*, *ITV News Meridian* and online.

Engaging with each other online and offline

Professor Richard Williams OBE FEng, Vice President of Fellowship Engagement, provides an update on the Academy's Fellowship activities.

The past year has seen many developments in the organisation of national and regional events, such as dinners, lectures, lunches and visits. Fellows have developed new initiatives with such vigour and I hope that everyone will prioritise attending or contributing to an event during the rest of the year.

One of the great pleasures in meeting Fellows is their overwhelming desire to see the Academy be more influential in supporting engineering policy development

in the UK and internationally, and the annual CAETS Convocation in September provides such an opportunity. With the theme of *Engineering a Better World*, the meeting focuses on the role that leading engineers can play in enabling social and economic development by building global capacity and creating partnerships with governments and communities.

Two of my priorities as vice president are to support the development of the Academy's digital engagement activities and to encourage better engagement with international Fellows. Current plans for the website and social media aim to allow Fellows to have more opportunities to interact with each other.

I hope that many Fellows will be able to attend the CAETS Convocation or follow the event as it unfolds. I also encourage



you to explore the range of talks and debates recorded available on the Academy's website and at raeng.tv

I continue to welcome your ideas, observations and advice, and can be contacted at vicepresident@raeng.org.uk

News of Fellows

Professor Christos Christopoulos has been awarded an Honorary Professorship by Xi'an Jiaotong University, China

Professor Andrew McNaughton has been appointed Chief Operating Officer of Systra

Professor Keith Ridgway CBE has been appointed Executive Chairman of the University of Strathclyde's Advanced Forming Research Centre

Dr Paul Golby CBE has been reappointed Chair of the Engineering and Physical Sciences Research Council for a further two years and has also been appointed chairman of Costain Group plc

Professor Jonathan Seville has been appointed President of the Institution of Chemical Engineers

Ursula Burns has been appointed Chairman of Document Technology Company (one of the two companies that Xerox Inc will be split into in late 2016)

Baroness Brown DBE has been made an honorary Fellow of the Institute of Materials, Minerals and Mining.

Dame Sue Ion DBE has been awarded its Platinum Medal and **Professor Johannes Cilliers** has been awarded the Futers Gold Medal

Khalid al-Falih has been appointed Energy Minister of Saudi Arabia

Professor Michael Walker OBE has been elected an Honorary Fellow of Royal Holloway, University of London

Nicholas Cooper has been appointed Moving Structure Lead at Tottenham Hotspur Football Club

Professor Polina Bayvel, Professor Pratibha Gai, Professor David Hight, Dame Sue Ion and Professor Philip Withers have all been elected as Fellows of the Royal Society

Dr David Jiles has been selected as a Jefferson Science Fellow, a scientific adviser to the US Department of State

Dame Judith Hackitt DBE has been given the Lifetime Achievement Award from the Institute of Risk Management

Sir Peter Gershon CBE has won the 2016 NED Award for best non-executive director of a FTSE 100 company

Professor Peter Hansford has been appointed Professor of Construction an Infrastructure Policy at Unniversity College London

Alan Mulally has been appointed a Senior Fellow at Seattle University Business School

Professor Chinemelu Anumba has been appointed Dean of the University of Florida's College of Design, Construction and Planning

David Waboso CBE has been appointed Managing Director of National Rail's Digital Railway programme

Professor Andrew Blake FRS has been awarded the 2016 Lovelace Medal from the British Computer Society

Dr Norbert Morgenstern has been appointed an Honorary Professor at Zhejiang University, People's Republic of China

Professor Hai-Sui Yu has been appointed Pro-Vice-Chancellor (International) at the University of Leeds and has also been awarded the 2015 British Technological Association Medal

Sir John Parker GBE has been appointed Chair of the UK's National Shipbuilding Strategy

Dr Shirley Ann Jackson has been awarded the US National Medal of Science

Professor Ian Cluckie has been appointed a Foreign Academician at the Chinese Academy of Engineering

John Robinson CBE has won the 2016 *The Times*/Sternberg Active Life award

Professor Albert Rodger has been elected a Fellow of the Royal Society of Edinburgh

Sir Peter Bonfield CBE has been re-elected as Chair of the Board of NXP Semiconductors N.V.

Professor Dame Ann Dowling OM DBE has been made a Fellow of the Science Museum and has received an Honorary Degree from the University of Strathclyde

Professor Anne Neville FRSE has been awarded the 2016 Leverhulme Medal by the Royal Society

Professor Jeremy Watson CBE has been announced as the next President of the Institution of Engineering and Technology, and Mike Carr has been announced as Deputy President

Dr Hermann Hauser FRS has been awarded an honorary KBE

HM The Queen's Birthday Honours

Congratulations to the eight Fellows of the Academy who were recognised by the Queen in this year's Birthday Honours list.

Knighthoods

Dr David Grant CBE FREng, for services to engineering, technology and skills in the UK

Terence Morgan CBE FREng, Non-Executive Chairman, Crossrail Ltd, for services to UK infrastructure, skills and employment

Order of the British Empire Commanders of the Order of the British Empire

Professor Anthony Finkelstein FREng, Professor of Software Systems Engineering, University College London, for services to computer science and engineering

Professor Nigel Gilbert FREng, Professor of Sociology and Director in Social Simulations, University of Surrey, for services to engineering and the social sciences

Dr John Lazar FREng, Chairman, Metaswitch Networks, for services to engineering

Officers of the Order of the British Empire

Dr Stephen Huntington FREng, Chief Executive Officer and Chairman, HR Wallingford, for services to engineering and environmental hydraulics

Members of the Order of the British Empire

Dr Stephen Bold FREng for services to engineering and to charity

Nigel Perry FREng, Chief Executive, Centre for Process Innovation, for services to engineering

Forthcoming events

This is a selection of Academy events. For a complete list, visit www.raeng.org.uk/events

8 September 2016

Research Forum 2016

Venue: Royal College of Surgeons

8 September 2016

AGM

Venue: Royal College of Surgeons

13 to 14 September 2016

Engineering a Better World: CAETS Convocation

Venue: Institution of Engineering and Technology

22 September 2016

Launchpad Competition

Venue: Prince Philip House

Record number of Fellowship nominations

The Academy received the highest-ever number of new nominations this year, with 119 candidates proposed for Fellowship and International Fellowship. The record result can be seen as an endorsement of the new membership system introduced following Dame Sue Ion's 2013 membership review. Thank you to all Fellows who have given their time.

Publications received

TSOM Structural Engineering by Finn MacLeod has been donated to the Academy by the author and added to the library in the Fellows' room.

Brilliant Lives: The Clerk Maxwells and the Scottish Enlightenment by Dr John W Arthur FREng is available to read in the Fellows' room.

Royal Society Publishing has published a special issue of *Philosophical Transactions* entitled *Super-sensing through industrial process tomography* compiled and edited by Manuchehr Soleimani, which is available in the Fellows' room library. It can also be accessed online at bit.ly/PTA2070



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Obituaries

Dr John Aldwyn Lacey FREng died on 1 June 2016, aged 86. He was formerly Programme Controller of the R&D division at British Gas.

Mr Dudley Dennington FREng died on 12 May 2016, aged 89. He was formerly Traffic Commissioner and Director of Development at Greater London Council and Senior Partner at Bullen and Partners.

Mr Paul Lane Charlesworth FREng died on 23 April 2016, aged 83. He was

formerly Managing Director at BOC Cryoplants Ltd.

Dr Cecil Charles John French FREng died on 10 April 2016, aged 89. He was formerly Group Technology Director at Ricardo International and served as President of the Institution of Mechanical Engineers.

Dr Adrian Foss Ellis CB FREng died on 23 March 2016, aged 72. He was formerly Director of Field Operations at the Health and Safety Executive.

Mr Edward George Dubois FREng died on 24 March 2016, aged 64. He was

formerly the Director of Dubois Naval Architects.

Professor Bernard George Neal FREng died on 26 March 2016, aged 93. He was formerly a professor of structural engineering at Imperial College London.

Dr Eric William Carpenter FREng died on 20 December 2015, aged 84. He was formerly AGR Programmes Director at Nuclear Electric.

Mr David George Jefferies CBE FREng died on 19 March 2016. He was formerly Chairman of National Grid.