



## A new dedicated space for the Enterprise Hub

In late 2015, planning permission and listed building consent for the redevelopment of the lower ground floors at Prince Philip House was secured and preparatory works are now well underway. Due for completion in early 2017, the project will provide dedicated space for the Academy's Enterprise Hub and will see the floors transformed into a suite of facilities to house the Hub's growing programme of activities.

The Enterprise Hub was launched just under three years ago and since then it has become a 'start-up' success story in its own right. There is no sign of the Hub's rapid growth trajectory levelling off and, as envisaged, it is developing into the destination of choice for UK technology entrepreneurs who have the most potential. Fellows have now mentored more than 30 early-stage technology companies that have collectively created some 90 jobs and attracted £23 million in investment.

Through the Hub, the Academy has strengthened its connections to the venture capital and business angel communities, and is forging valuable links to technology transfer offices and research institutions across the UK. All this positions the Hub optimally for the next stage of its development, with the Academy aiming to set a benchmark for a supportive environment for the most ambitious engineering entrepreneurs and commercially promising technologies.

While the redevelopment work is carried out, the Academy's catering facilities, heating system and other building services equipment will undergo much-needed renewal. This work will bring many efficiencies and long-term cost savings to the Academy's operations. A new corridor at the mezzanine level and an additional lift will improve access throughout the building, adding considerable value and usability to the areas of the building already refurbished. The Academy is grateful to

Dr John C Taylor OBE FREng and the late Geoffrey Argent FREng for their generous support for the redevelopment.

Building on the continuing success of the Hub, the latest Enterprise Fellowships have recently been awarded. Full details are available on the Hub website. The latest awardees cover a broad range of innovations: Dr Sam Chapman and eco-friendly bricks made from recycled waste; Dr Oliver Stevens and a novel method for non-invasive cancer diagnosis; Dr Damien Coyle and a tool for assessing patients' levels of consciousness following traumatic brain injury; Dr Alexander Enoch and an educational programmable robot; Dr Nicholas Everdell's method for imaging brain activity in real time; Silo Meoto and a novel bone-grafting material to repair bones prior to dental surgery; Andrew Marsden with improved material for gas storage and separation; and Dr Yunjia Li and improved speech recognition software for university lectures for assisted learning.

All of the awardees are embarking on a journey to develop their innovations, build businesses and achieve lasting success. The Hub is already supporting some highly promising businesses that have excellent prospects for sustained growth, and the continuing support of Fellows is key to taking an idea from lab to fully realised product.

Details and case studies of Hub entrepreneurs and mentors can be found on the Hub website. If any Fellow would like to support any of the awardees, please contact the Hub team at <http://enterprisehub.raeng.org.uk>

▲ An architect's visualisation of the redeveloped space for the Enterprise Hub

# President's column



## Meetings and visitors

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

Professor Sir Mark Walport, Government Chief Scientific Adviser and Head of the Government Office for Science

Dr Alan Finkel, Australia's Chief Scientist  
Professor Tim Dafforn, Chief Scientific Adviser, Department for Business, Innovation and Skills

Sir Venki Ramakrishnan, President of the Royal Society

Gareth Davies, Director General for Business and Science, Department for Business, Innovation and Skills

### She also attended the following events and meetings:

The Council for Science and Technology meeting and dinner

The QEPrize Board meeting

Foundation for Science and Technology debate on the Nurse Review

Scottish Council for Development and Industry, annual lecture

Keynote speaker at the Royal Society industry Fellows' networking event

Sainsbury Management Fellowships reception

Engineering Talent Project Strategic Leadership Group

Pi Capital Breakfast

Institution of Engineering and Technology, lunch with President Naomi Climer, and CEO Nigel Fine

Meeting and dinner with Professor Sir Mark Walport and Chief Scientific Advisors

Institution of Engineering and Technology, annual dinner

Council for Science and Technology seminar, the Royal Society

RAEng/RSE annual joint lecture, Edinburgh

### She was interviewed by:

Sarah Gordon, Business Editor, *Financial Times*

2016 continues to be an exciting year for the Academy and for UK engineering as a whole.

At the start of the year, I was extremely honoured to be admitted to the Order of Merit by the Queen, something that I certainly never expected to receive. What was particularly exciting for me, however, was that the two other new appointments to the Order of Merit are Fellows of the Royal Academy of Engineering, Sir James Dyson and Honorary Fellow Rt Hon Professor Lord Ara Darzi of Denham. In addition, eight Academy Fellows were recognised in the New Year Honours list for services to engineering, science, industry and defence. This is a strong and public testament to the achievements and contributions to society of the Academy's Fellowship.

The honours were also, I hope, a sign of growing recognition of the value of engineers and engineering. Early in the New Year, Academy Past President Lord Browne guest edited a brilliant edition of BBC Radio 4's flagship *Today* programme. He secured a remarkable interview with the Academy's Senior Fellow, HRH The Prince Philip, Duke of Edinburgh, who declared that "Everything that wasn't invented by God was invented by an engineer". His comments were not just music to the ears of the engineering community, but were well received by far broader national and international audiences through the significant media coverage they received.

Since the last newsletter, I have been busy discussing the Academy's policy positions and many activities with a range of policymakers and influencers in government departments, engineering industry, academia and the media. A very stimulating discussion was had at a meeting that the Academy held with the government's Chief Scientific Advisers, which raised topics ranging from skills and innovation to cybersecurity and waste. I was also pleased to attend, on the Academy's behalf, a House of Commons Science and Technology Committee seminar to inform a letter to the Chancellor ahead of the Budget about what is needed to encourage greater and more impactful research and innovation in the UK.

Innovation, and the activities of the Enterprise Hub in particular, is one area of the Academy's work set to grow this year. The redevelopment of the lower ground floor at Prince Philip House has started and will provide dedicated space for the Hub and its growing programme of activities. It will also provide an informal drop-in space for Fellows.

Another important area of work are the Academy's efforts to close the skills gap that threatens the future sustainability of our profession. In early February, we convened the first Strategic Leadership Group meeting for our Engineering Talent Project: an ambitious, multi-year campaign to increase the uptake of engineering among young people through marketing communications, engagement in schools, improvements to industry culture and practice, and a drive to address structural barriers in education and training. This will be delivered collaboratively with seven industry partners, and seeks to unite and align with the multitude of existing initiatives with similar aims.

As you may know, the Academy has now received news of our funding allocation from the Department for Business, Innovation and Skills. In light of a very challenging spending review for the government, and at a time when all government departments are being asked to find significant savings, it is a positive outcome that we have secured level funding in cash terms for our core grant over the next four years. This will allow us to continue to deliver the important programmes, schemes, grants, prizes and policy advice for which the Academy is so valued. However, it also means that we will need to seek new funding sources to grow our activities.

We certainly have some ambitious projects in the pipeline. A particular focus is to build much stronger engagement with our Fellowship and I continue to seek to meet Fellows in my visits around the UK and at the many events and meetings at Prince Philip House in London. I look forward to working with you on the Academy's critical agenda of promoting engineering excellence, influence and impact in the year ahead.

## Academy initiatives encourage more young engineers

On 25 November, the Academy launched the latest in its series of regional STEM support programmes, with Lowestoft joining successful projects in Barrow-in-Furness and Stoke-on-Trent. These programmes encourage more young people from a diverse range of backgrounds to become engineers and technicians.

Engineering can provide an excellent opportunity for social mobility for young people. To this end, the Academy has worked for many years in areas with engineering skills shortages, which have high levels of unemployment and low attainment in STEM subjects.

The event, held at Lowestoft Sixth Form College, saw 60 students from participating schools and colleges undertake the challenge of designing, developing and racing wheelchairs to be used in Paralympic sports as part of the Academy's successful *Winning Medals* teaching and learning resource. Talks were given by students and key speakers, including the college principal Yolanda Botham, Helen Cavill, process and improvement manager at M&H Plastics, and Suffolk County Council's Mark Bee. The Academy's Director of Engineering and Education Dr Rhys Morgan also gave an address and presented certificates to the various schools and colleges.



During the initial three-year project, the Academy, together with the Ogden Trust, which promotes the teaching and learning of physics, public-sector initiative Lowestoft Rising and Suffolk County Council, will provide funding of up to £60,000 a year to enrich STEM teaching and learning in the 18 schools and colleges taking part. The project aims to generate enthusiasm and a stronger skills base among Lowestoft's young

people through links with local companies and first-hand experience of engineering, visits to companies, real engineering projects, challenges and other extracurricular activities. The project will also fund summer internships in the local energy industry for Year 12 students from the two colleges in the town.

▲ Above: School students design and develop wheelchairs for Paralympic sports events

## Armourers and Brasiers Company Prize

The inaugural Royal Academy of Engineering Armourers and Brasiers Company Prize has been awarded to Professor Judith Driscoll, professor of materials science at the University of Cambridge.

Professor Driscoll's research has revolutionised the properties of high temperature superconductors, enabling them to carry much higher currents in a magnetic field. By creating nanostructured superconducting thin films, Professor Driscoll has merged the properties of composite materials and electronic materials. This has

transformed conventional thinking and generated hundreds of millions of dollars' worth of investment in research in these new materials.

The £2,000 prize was presented at the Academy's New Year reception on 18 January to Professor Driscoll by Academy President Professor Dame Ann Dowling and Professor William Bonfield CBE FREng FRS, chairman of the Armourers and Brasiers Company's materials science committee.

The prize is awarded every two years for excellence in materials engineering, demonstrated in the successful application of novel materials, science and technology in practical engineering systems.

## Innovation and entrepreneurship



▲ Academy President Professor Dame Ann Dowling OM DBE FREng FRS and Professor William Bonfield CBE FREng FRS present Professor Judith Driscoll (centre) with the Armourers and Brasiers Company Prize

## Nominations for the 2017 Queen Elizabeth Prize for Engineering

Nominations for the 2017 Queen Elizabeth Prize for Engineering (QEPrize) will officially open on 20 April 2016. The QEPrize is a global £1 million prize that celebrates groundbreaking innovation in engineering. It rewards an individual or team of engineers

whose work has had a major impact on humanity.

The QEPrize celebrates stories of these engineering successes, raising the international public profile of engineering and inspiring new generations of engineers to take up the challenges of the future. The inaugural prize in 2013 was awarded to the pioneers of the internet and World Wide Web: Robert Kahn, Vinton Cerf, Louis

Pouzin, Sir Tim Berners-Lee FREng and Marc Andreessen. Dr Robert Langer FREng of Massachusetts Institute of Technology won the 2015 prize for his work in controlled-release large molecule drug delivery.

All nominations are to be managed through an online process. To make a nomination or for more information on the prize, criteria and past winners, please go to [qeprize.org/nominate](http://qeprize.org/nominate)

## QEPrize judging panel and search group



▲ New chair of the judging panel for the Queen Elizabeth Prize for Engineering, Professor Sir Christopher Snowden FREng FRS

Professor Sir Christopher Snowden FREng FRS has been announced as Chair of the judging panel for the 2017 QEPrize.

Recently appointed Vice-Chancellor of the University of Southampton, he is a distinguished engineer with extensive experience in both business and academia, with particular expertise in the microwave and semiconductor industry.

Speaking on his appointment as chair of judges, Sir Christopher said: "The QEPrize is the highest accolade for engineers, recognising the most significant contributions around the globe and inspiring a new generation. I look forward

very much to our work on the judging panel to find the prize winner."

Professor Stephen Williamson FREng will take over from Sir William Wakeham FREng as Chair of the QEPrize search group. Professor Williamson recently stepped down as the Chair of the Rolls-Royce Electrical, Control Systems and Electronics Advisory Board, a position he held for 13 years.

The search group, made up of eminent engineers, is tasked with identifying engineering innovations and scrutinising nominations that have been submitted from around the world.

## Innovation in space

On 14 March, *Innovation in space* showcased innovations in space technologies and space-enabled services, and explored future opportunities and challenges for innovation in the sector. The event was chaired and introduced by Sir Martin Sweeting OBE FREng FRS, group chief executive of Surrey Satellite Technology Ltd, who pioneered small satellite engineering using off-the-shelf components.

Speakers, panellists and audience members included people from

industry and academia, as well as the UK Space Agency and the Satellite Applications Catapult. The audience heard presentations on satellite technologies, telecommunications, satellite constellations, navigation and earth observation. Innovations in technologies, applications and business models were explored, as were their impact on the economy and society.

A lively panel discussion, in response to questions from both speakers and the audience, considered the impact of innovations and how they could be

captured. The panel discussion was followed by an exhibition and drinks reception, in which SMEs and larger companies displayed innovations in space instrumentation, propulsion, structures, satellite systems and nuclear space batteries.

This was the tenth event in the Academy's *Innovation in...* series that have previously considered aerospace, agri-tech and autonomous systems.

To be placed on the mailing list for future *Innovation in...* events, please email [events@raeng.org.uk](mailto:events@raeng.org.uk)

## Reverse pitching

At the end of January, the Enterprise Hub hosted a 'reverse pitching' event to give Hub members a chance to turn the tables and put the investors in the hot seat. The event, introduced by enterprise committee chair Ian Shott CBE FREng, aimed to help demystify the funding landscape as well as introduce Hub members to a network of potential backers. Speakers included representatives from Hub partners

Cambridge Angels, London Business Angels, BGF Ventures, Balderton Capital, Albion Ventures, Schlumberger and Barclays. There were also representatives in attendance from alternative funding providers Market Invoice, which provides businesses access to cash by buying their unpaid invoices, and specialist crowdfunders Syndicate Room, which only lists angel-led start-up opportunities. The investors and funders took to the stage to 'sell' themselves and let the audience know what they look for in

potential investments, the way they work and what they can offer their investees, as well as giving advice on pitching and the questions to ask investors to help find the right match.

An article on the event by Hub member Sorin Popa is at [www.theengineer.co.uk/financing-some-bright-ideas](http://www.theengineer.co.uk/financing-some-bright-ideas)

If you are interested in becoming a Hub partner or attending future events, please contact [enterprise@raeng.org.uk](mailto:enterprise@raeng.org.uk)

## Innovators Network meeting

In 2015, the Royal Academy of Engineering set up the Innovators Network to create a community of SMEs and corporates seeking to drive innovation in engineering by sharing ideas and lessons learned. The network's meeting in January focused on the role of SMEs as agents of innovation in corporate supply chains.

The event saw panellists from both SME and corporate environments share their experiences of challenges and successes in this space. Attendees heard from Robin Shaw of Hyperdrive Innovation Ltd, Josh Valman of supply chain and design consultancy RPD International, Colm Reilly

of PA Consulting, and Stephen Allott, who previously held a government role as Crown Representative for SMEs.

Chair of the event, and 2013 Academy Silver Medal winner, Elspeth Finch stated that forming partnerships can help to create competitive advantage, win work in new markets, and solve problems faster, more efficiently and in new ways. However, a recent government report had listed 14 barriers to SME collaboration. While a common goal to work together was clear among all parties, there was also an acknowledgment that, in practice, things can be more complicated. Many issues were raised at the event, but the three issues that stimulated most debate were procurement, intellectual property and communication.



Elspeth Finch's blog post about the event can be read at <http://enterprisehub.raeng.org.uk/innovators-network-unlocking-the-key-to-innovation-in-supply-chains/>

▲ Elspeth Finch, Chair of the Innovators Network meeting and 2013 Academy Silver Medal winner

## Systems thinking in health and social care

The Academy is in the initial scoping phase of a policy study that will look at the value of systems thinking in supporting the UK's health and social care. Through its *Five Year Forward View*, NHS England has challenged the health and social care sector to think in systems terms to deliver improvements in productivity and efficiency. However, while there are many pockets of excellence, the language of design and systems thinking in healthcare are not generally understood. There can be

a lack of clarity about what systems thinking is, how to describe it, how it can be utilised and what tools might be needed. It is also not clear whether leaders in the health sector have the broader understanding of systems principles and access to materials to help them respond to demands in systems terms.

Engineers employ systems thinking successfully in the course of their work and the Academy is looking to share knowledge and ideas to help support the delivery of the *Forward View*. A key aim will be to develop an appropriate

## Technology and society

language of systems that is accessible and to provide pointers to how it could be employed.

The Academy is interested in speaking to Fellows who have expertise in this area and have employed systems thinking in healthcare. Those who would like to get involved should please contact [philippa.shelton@raeng.org.uk](mailto:philippa.shelton@raeng.org.uk)

## Connecting data

Following the publication of *Connecting data: driving productivity and innovation* by the Academy and the IET in November 2015, the Academy has organised two workshops to address recommendations from the report.

The first, *Cyber safety and resilience: strengthening the digital systems that support critical infrastructure and the Internet of Things* was chaired by Professor Nick Jennings CB FREng on 21 March 2016. It involved experts in software, cybersecurity, communications and infrastructure as well as representatives from the Home Office and the PETRAS Internet of Things research hub.

The second, *Data as an asset: exploring how to value data better and unlock its*

*potential for wealth creation*, will be chaired by Professor Jim Norton FREng and is planned for 28 April 2016. It will explore how value is generated from data, the benefits of valuing data, and the challenges of finding appropriate methodologies to do so.

## Engineering methods applied to policymaking

The Academy is seeking to explore and test the value of engineering methods when applied to the policymaking process. Partnerships are being developed with policymakers and analysts from across government and, with them, the Academy is developing case studies that will enable engineering methods and approaches to be tested in terms of their contribution to real-life policy problems. The aim is to carry out a broad range of case studies

where engineering and systems thinking are routinely applied to policy, as well as to areas where few would think to approach an engineer for input.

In developing this project, the Academy is currently working with the Department for Environment, Food and Rural Affairs, the Department for Transport, the Ministry of Justice, and the Infrastructure and Projects Authority. It has also made links with the Cabinet Office's Policy Lab - to learn from its experience with embedding design principles across government - and has partnered with the Centre for Science and Policy (CSaP), at the University of Cambridge, on the identification of interesting case studies.

As this project develops, Fellows will be invited to contribute their perspectives and expertise to the policy problems identified as case studies.

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# People and talent

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## Dame Judith Hackitt DBE FREng gives *View from the Top* lecture



The first lecture in 2016's *View from the Top* series was delivered by Dame Judith Hackitt DBE FREng, Chair of the Health and Safety Executive (HSE).

Entitled *Health and safety: the journey back to common sense and personal responsibility*, the lecture provided delegates with lessons learned from Dame Judith's eight years leading the HSE.

The HSE has fought hard to re-establish its reputation in the UK, having faced exaggerated stories in the media that have little to do with the prevention of death and serious injury in the workplace.

Dame Judith told the audience that the HSE's ability to horizon scan, combined with the deep knowledge and unrivalled expertise that resides in its research capability, are now in use with partners around the world to improve health and safety and to ensure better business outcomes.

She also reaffirmed that, in order to remain a world leader in risk management, the UK must continue to develop high-quality capability, anticipating tomorrow's workplace challenges and using a goal-setting approach to address them in ways that will still enable innovation to flourish.

◀ Dame Judith Hackitt DBE FREng discussed what she had learned in her role as chair of the Health and Safety Executive

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## Big Bang Fair 2016

This year, the Academy again had a popular stand at the Big Bang Fair. Based around the Academy report *Thinking like an engineer: implications for the education system* and the six engineering habits of mind identified within it, the Academy stand had a series of practical activities for visitors that linked to the characteristics outlined in the report.

Over the four days of the fair, some 8,000 visitors to the Academy's stand took part in activities such as the Rugged Rovers

game, which was developed by the Science Museum for the *Engineer Your Future* exhibition. Visitors were invited to draw a simple chassis on a tablet, add their wheels and then launch their vehicle onto an alien terrain on a screen to see how far it would travel. They then had the opportunity to refine their design before re-launching. The furthest distance travelled was 2,943m.

An electronic memory game, challenging visitors to observe and then repeat a computer-generated sequence, was also a big attraction. The game used touch

sensors, a microcontroller and outputs, and was designed to be an example of a system.

The third activity on the stand was a human coding challenge, a physical demonstration of coding. This challenged visitors to select the right program to command their partner to get from one end of a grid to the other. Some visitors had a go at writing their own program using a limited set of available commands. The challenge was to make it to the other end of the grid using the fewest commands possible.

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## Sainsbury Management Fellows reception

On 21 January 2016, the Academy's President, Professor Dame Ann Dowling OM DBE FREng FRS, and Lord Sainsbury of Turville HonFRS HonFREng hosted a drinks reception for Academy Fellows and Sainsbury Management Fellows.

The event was held to foster closer links between the two organisations and recognise the valuable role of the Sainsbury Management Fellows in supporting Academy endeavours, such as the engineering leadership awards, the Enterprise Hub and international activities.

Lord Sainsbury highlighted the importance of enterprise and innovation in UK wealth creation and the critical

role that engineers must play in this. Dame Ann encouraged the continuing relationship between the Academy and the Sainsbury Management Fellows, particularly expressing the gratitude of everyone present for the leadership shown by Lord Sainsbury in supporting UK science and engineering.

The Sainsbury Management Fellowship Scheme, funded by the Gatsby Charitable Foundation, provides grants to young engineers with leadership qualities so that they can undertake full-time MBA courses at major international business schools.

Applications are now being accepted for the Sainsbury Management Fellowships with a deadline of 6 June 2016. For further information, please contact [jacqueline.clay@raeng.org.uk](mailto:jacqueline.clay@raeng.org.uk)

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## ASE Conference

On 7-9 January, the Academy's education team went to the Association for Science Education (ASE) annual conference at the University of Birmingham to showcase to teachers the array of Academy learning resources.

The team took along sample resource boxes for demonstration, as well as resources and posters for teachers to take away and use. There was excellent attendance at the exhibition and a very positive response from the teachers; the resources proved so popular that the team ran out of posters to give away by the second day.

To obtain a set of *Engineering Is* posters for a local school, please contact [education@raeng.org.uk](mailto:education@raeng.org.uk)

## Tackling homophobia in engineering

In December 2015, Conservative MP Alec Shelbrooke published his report *Engineering Action: Tackling Homophobia in Engineering*.

The report, jointly authored with Dr Mark McBride-Wright, chair and co-founder of industry network group InterEngineering, highlights that further action is required to tackle homophobia across the engineering profession.

Report findings show that over half of LGBT people employed in engineering are choosing to remain in the closet through fear of homophobia and concerns about the impact of coming out on their professional careers.

On 29 February, an afternoon tea event was held at the House of Commons to mark the launch of the report. On the day, the discussion considered the problem of homophobic and transphobic



discrimination in the sector and ways in which engineering institutions could eradicate it.

This is part of the Academy's ongoing work to collaborate with InterEngineering and Stonewall to

help attract, support and retain LGBT engineers in the workplace.

▲ (From left to right): Philip Greenish CBE, CEO of the Royal Academy of Engineering; Dr Mark McBride-Wright from InterEngineering; Debra Wilfong from BP; Alec Shelbrooke MP; and Ruth Hunt, CEO of Stonewall UK

## Connecting STEM Teachers expansion

Additional funding, secured by the Academy's development team, has facilitated the expansion of the education department's Connecting STEM Teachers (CST) programme from 28 teacher support networks to 38. The CST programme helps teachers across the UK engage a greater number, and a wider spectrum, of secondary school pupils with science, technology, engineering and mathematics (STEM), through the provision of free learning resources and training. The training is

led in the regions by the programme's teacher coordinators, who teach STEM subjects and carry out a consultancy role for the Academy. The programme's resources, which support STEM learning opportunities using engineering contexts, are created by the Academy's education team.

Prior to this expansion, the Academy's 28 teacher coordinators were working with 595 teachers in 483 schools. More than 50,600 pupils are reported to have benefited from the programme since the start of its second phase, which began in September 2014. The current expansion

and recruitment of additional teacher coordinators will make a significant contribution to the reach and impact of the CST programme.

However, the success of the project relies on the work of the Academy's teacher coordinators. The autumn and spring terms have therefore provided the teacher coordinators team with a number of professional development opportunities designed to ensure they can lead training in the use of the Academy's latest STEM learning resources: *Drones: friend or foe?* and *Controlling Motion*.

## Engineering Engagement Programme

A recent evaluation of the pilot year of the Engineering Engagement Programme, a collaborative project between the Academy and engineering employers, has shown that it is beneficial to both students and employers, with a number of students making successful applications and companies praising its potential for long-term impact. It will run for another two years with a focus on delivering maximum impact.

The programme's fast-track workshop events allow students the opportunity to meet potential employers, and companies to share insights into

careers and recruitment practice. Since its launch, 157 students have taken part, of which 30% were female, 96% were black and minority ethnic (BME), and 96% were from socially disadvantaged backgrounds or post-1992 universities.

The Academy established the project in October 2014 to increase engagement and raise the profile of engineering careers with ethnic minority and female engineering undergraduates and recent graduates. The project aims to respond to recommendations from Professor Perkins' *Review of Engineering Skills* and other research into the diversity and employability of engineering undergraduates.



It works with a steering group of companies, including Rolls-Royce, BAE Systems, Atkins, Metaswitch, Capita, Arup, Amey, AECOM, Renishaw, Selex ES, Network Rail, Siemens and CH2M.

▲ Engineering students attend the latest Engineering Engagement Programme fast-track event in January 2016

## Annual Visiting Professors' Conference 2015

The Academy's annual Visiting Professors' Conference took place on 19-20 November at Aston University in Birmingham.

The conference attracted 53 participants and seven speakers from industry and academia. The theme was *Influence of industry on undergraduates* and included guest speakers Professor Helen Higson (Aston University), Barbara Lane (Arup, pre-dinner guest speaker), Jess Power (Academic Champion from Huddersfield University) and Dr Rhys Morgan (the Academy's Director of Engineering and Education).

The first day started with an afternoon induction for the 23 newly appointed awardees. Ian Forristal, Head of Research and University Programmes at the Academy, began the conference with an overview, followed by a talk by conference chair, Professor Peter Goodhew FREng of *The rough guide to being an Academy Visiting Professor*.

The conference included group discussions that facilitated active participation from attendees. Stephanie Leddington, from the Women's Engineering Society (WES) and Selex ES, led a session and discussion on how to encourage more female industrialists to engage with universities and act as Visiting Professors.

The event received positive feedback, with awardees stating that it had inspired them in their respective roles.

## Leverhulme Trust Senior Research Fellowships

The Academy has recently awarded seven new Fellowships under the Leverhulme Trust Senior Research Fellowship Scheme. The scheme allows mid-career academics to concentrate on their research full time, by relieving them of their day-to-day responsibilities. Each fellowship pays for a replacement academic to cover their teaching and administrative workload for up to one year.

The standard of applicants was particularly high and the panel, chaired

by Bill Milne FREng, reviewed 52 applications. This year's awardees cover a diverse range of research areas, from robotics to turbulent flow models. This is the 12th round of awards from the Academy under the Leverhulme Trust Senior Research Fellowships scheme.

## Newton Research Collaboration Programme

In January, the Academy decided to make 12 awards under the Newton Research Collaboration Programme. This programme facilitates international exchanges between postdoctoral engineering researchers in the UK and selected partner countries; these most recent awards will support exchanges between the UK and Brazil, Turkey and the scheme's newest partner Malaysia.

As the programme is part of the UK government's Newton Fund, the research carried out must focus on enhancing economic development and social welfare in the partner country. The recent awardees will carry out research in fields such as bioengineering and healthcare, sustainable structures and smart cities.

## International Women's Day

International Women's Day is celebrated across the world on 8 March each year. This year, the Academy used the opportunity to celebrate women engineers in the Fellowship.

To mark the day, a page with profiles of 43 women Fellows was launched on the Academy website. Commenting on the profiles, the President Professor Dame Ann Dowling said: "International Women's Day is a great opportunity to celebrate the achievements of our women Fellows, while at the same time demonstrating

over and over again that engineering offers rewarding careers. Their stories illustrate the creativity, variety and breadth within engineering. We hope that this will inspire and encourage more people to choose engineering careers."

To view the profiles, visit [www.raeng.org.uk/IWD2016](http://www.raeng.org.uk/IWD2016)

## Distinguished Visiting Fellowships

The Academy has awarded 12 Distinguished Visiting Fellowships at 10 UK universities. This will bring world-leading researchers to the UK

from academic centres of excellence in Canada, Spain, Brazil, the USA, South Africa, Greece and China.

These awards enable university engineering departments to host a Distinguished Visiting Fellow for up to one month, with the aim of stimulating new international academic collaborations.

Professor David Bogle FREng stepped down as chair of the Distinguished Visiting Fellowships following the selection panel meeting, and was thanked for his contribution and commitment to the scheme. Professor Bogle will be succeeded by Professor Bill Lee FREng.

## Engaging the public with Ingenious

Through its Ingenious public engagement grant scheme, the Academy has funded 23 new projects that aim to engage the public with engineers and engineering. This year's successful awardees include the University of Bath, which will be training postgraduate engineers to deliver entertaining performances about their research by busking on the streets of Bath. Another

Ingenious project will see engineers working with the Science Museum to develop new interactive events that explore the cutting-edge engineering behind contemporary robotics. These events will coincide with the opening of *You, Robot* the Science Museum's blockbuster 2017 temporary exhibition.

Imperial College London has also been awarded funding to run an all-woman 'Hackathon' weekend, where attendees will learn programming techniques and

get to code an app, game or website, which will then be presented to a judging panel.

Ingenious is funded by the Department for Business, Innovation and Skills. It gives engineers opportunities to take part in public engagement activities, developing communication skills and bringing engineering in to the centre of society. A full list of projects funded by the scheme this year can be found at [www.raeng.org.uk/ingenious](http://www.raeng.org.uk/ingenious)

## SET for Britain



On 7 March, 60 young engineering researchers attended Parliament as part of SET for Britain, an annual poster competition to engage scientists and engineers with policymakers.

The exhibitors from institutions around the UK, representing different engineering disciplines, were shortlisted from nearly 300 applicants by a panel of experts including Academy Fellows. The judging panel then selected bronze, silver and gold medal winners from the 60 exhibitors on the day.

Dr Patricia Perez Esteban, a chemical engineer from the University of Bath, won the gold medal and £3,000 prize for her poster on developing an animal-free cosmetic testing model to better predict how compounds enter the blood stream.

◀ (From left to right): Dr Stephen Benn, 3rd Viscount Stansgate, Royal Society of Biology Director of Parliamentary Affairs and SET for Britain Master of Ceremonies; Dame Ann Dowling OM DBE FREng FRS; gold medal winner Dr Patricia Perez Esteban; Colin Dixon, Head of Marketing at Essar Oil UK; and Stephen Metcalfe MP, Chairman of the Parliamentary and Scientific Committee

## Legacy giving

A new booklet has been produced to raise awareness among Fellows about legacies and how they can help the Academy. *Build a Better World* explains the types of legacy that can be made and the impact they can create, as well as providing useful contacts for further information.

Legacies are an important and effective way for Fellows to support the Academy, which has benefited greatly from legacies it has been left in the past.

Many Fellows have already informed the Academy that they intend to make a lasting gift by way of a legacy, which is greatly appreciated.

The booklet is available from the Academy's website at [www.raeng.org.uk](http://www.raeng.org.uk), and hard copies can be obtained from the development department. Fellows who would like to have an informal discussion about legacies, can contact Clare Flynn Scarcelli, Head of Major Giving, on **020 7766 0652** or [clare.flynn@raeng.org.uk](mailto:clare.flynn@raeng.org.uk)

## New Year Honours

Congratulations to the eleven Fellows of the Academy who were recognised by the Queen in this year's New Year Honours list.

### Order of Merit

**Rt Hon Professor Lord Ara Darzi of Denham PC KBE FREng FRS FMedSci**, Paul Hamlyn Chair of Surgery, Imperial College London, for services to medicine.

**Professor Dame Ann Dowling CBE FREng FRS**, President, Royal Academy of Engineering, for services to mechanical engineering.

**Sir James Dyson CBE FREng FRS**, Founder and Chief Engineer, Dyson, for services to industrial design.

**Companion of the Order of the Bath Professor Nicolas Jennings FREng**, Chief Scientific Adviser for National Security and Regius Professor,

University of Southampton, for services to computer science and national security science.

### Order of the British Empire

**Dame Commander of the Order of the British Empire**

**Judith Hackitt CBE FREng**, Chair, Health and Safety Executive, for services to engineering and health and safety.

**Knight Commander of the Order of the British Empire**

**Air Marshal Simon Bollom CB (military division) FREng**.

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

**John Baxter FREng**, Group Head of Engineering, BP International plc., for services to engineering, education and the energy sector.

**Professor David Lane FREng**, Professor of Autonomous Systems

Engineering, Heriot-Watt University, and Founding Director, Edinburgh Centre for Robotics, for services to engineering.

**Officers of the Order of the British Empire**

**Professor Liz Tanner FREng**, Professor of Biomedical Materials, University of Glasgow, for services to biomedical engineering.

**Dr Alan Turnbull FREng FRS**, Senior Fellow in Electrochemistry and Corrosion, National Physical Laboratory, for services to science and industry.

**Member of the Order of the British Empire**

**Professor Roger Kemp FREng**, Professorial Fellow, Engineering Department, University of Lancaster, for services to engineering.

## Aerospace MSc Bursary Scheme

Last September the Aerospace MSc Bursary Scheme, managed by the Academy and the Royal Aeronautical Society (RAeS), successfully concluded its recruitment phase having reached the

target of up to 500 bursary holders. The awardees are a mix of new entrants to the sector and existing employees who are all studying a relevant aerospace MSc. Data shows that six months after graduation, 85% of those in employment are working in UK aerospace. However, the emphasis now is on helping as many graduates as

possible enter UK aerospace, a process that the Aerospace Growth Partnership is leading on.

## Infrastructure and transport

# Academy roundup

## Priorities in connecting

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

The recent opportunities to meet and receive views from many Fellows have highlighted a number of areas that the Trustee Board and staff are keen to address.

A questionnaire sent to Fellows last year identified a number of issues of concern. These included the imperative for the Academy to ensure its primary role to lead the national debate on engineering policy and the economy even more strongly, the development of the Academy building to become a more

welcoming place for Fellows to visit, and greater opportunities to share news and information with both the Academy and other Fellows. Another priority is for more meetings and social opportunities to be organised right across the UK. Specific initiatives are now underway in these areas with more planned in the future. Through this column I intend to highlight some developments.

Fellows may have noticed significant growth in local events and lectures in the last nine months, organised by groups of Fellows in different regions. In the last two years we have sought to ensure that a high proportion of new Fellows are connected with Academy activities.

Last year's Academy Fellows' Day attracted great interest from Fellows. It enabled Fellows to see the work being undertaken by other Fellows and Academy staff, meet the Trustees and staff in informal settings, and network with one another.



▲ Professor Richard Williams OBE FREng, Vice President for Fellowship Engagement

As the Academy begins transforming the lower ground floors, we look forward to a reshaping of facilities that will provide space for Fellows to visit more comfortably.

I continue to welcome your ideas, observations and advice, and can be contacted at

**[vicepresident@raeng.org.uk](mailto:vicepresident@raeng.org.uk)**

## Royal Society book reveals Academy's beginnings

The Academy has recently acquired a copy of *Royal Society and the Promotion of Science since 1960* by Dr Peter Collins, Director of the Royal Society Centre for

History of Science. The recently published book provides a detailed account of how the Royal Society developed from the second half of the 20th century onwards, with a significant section covering how it responded to the need for a greater focus on engineering. Ultimately, the Fellowship

of Engineering was created, which was later renamed the Royal Academy of Engineering.

The copy has been placed in the library in the Fellow's Room and can also be bought from Cambridge University Press.

## Research Fellowship: awardee profile



▲ Dr Tawfique Hasan, RAEng Research Fellowship awardee

Dr Tawfique Hasan was awarded a RAEng Research Fellowship for his work in developing functional inks of graphene and other graphene-like materials at

the University of Cambridge. Working at the interface between engineering, materials science and nanotechnology, Dr Hasan is pioneering the formulation of a functional two-dimensional nanomaterial ink platform for a variety of printing technologies at the Cambridge Graphene Centre.

In collaboration with Cambridge-based technology company, Novalia Ltd, his team at the Hybrid Nanomaterials Engineering group recently developed a highly conductive graphene ink formulation for inexpensive, high-speed manufacturing of printed electronics, similar to the way that newspapers and crisp packets are printed.

Dr Hasan's formulation uses chemically unmodified graphene powders and a mixture of low temperature, non-toxic solvents, making the ink economic and environmentally sustainable. The ink can be printed onto a variety of

flexible substrates, including paper and biodegradable polymers. It already has the potential to be an alternative for commercially available metal nanoparticle ink systems in printed electronic applications, such as interactive touch surfaces, with a significant reduction in materials and production cost.

The team is currently looking at near term applications of this ink in smart packaging, electrically conductive coatings and barriers. In the longer term, Dr Hasan is working towards the incorporation of additional functionalities to the ink system for printable and disposable biosensors, energy harvesters and radio-frequency identification tags.

The next funding round for Research Fellowships is now closed for applications, but will reopen in 2016. Please see **[www.raeng.org.uk/raeng-research-fellowship](http://www.raeng.org.uk/raeng-research-fellowship)** for more information about the scheme.

## New Year reception 2016: Engineering forever

The New Year reception, held at Prince Philip House on 18 January 2016, was chaired by Academy President Professor Dame Ann Dowling OM DBE FREng FRS, and attended by nearly 100 Fellows and their guests.

Philippe Mellier, CEO of De Beers Group, gave a fascinating insight into the role of innovative engineering in the modern diamond industry.

Mellier talked of the challenges in finding new diamond sources, and about a pioneering development in airborne technology that uses super conducting quantum interference device technology (SQUID). He explained this technology “measures and records how components of the Earth’s magnetic field change in different directions” and is able to work in “places traditional systems struggled to operate”.



He then illustrated the sheer size of some of the excavation work taking place at the Jwaneng mine in Botswana - one of De Beers Group’s largest mine expansion programmes that, according to Mellier, will result in “one of the biggest man-made holes in the world”.

The lecture is now available to view at <http://raeng.tv>

▲ Philippe Mellier, CEO of De Beers Group, holding a large uncut diamond, and Nick Smart, Executive Technical Assistant to the CEO, at the New Year reception

## News of Fellows

**Professor Bashir Al-Hashimi** and his research group, ARM-ECS Research Center, have been named University Research Group of the Year by the National Microelectronics Institute

**Rt Hon Professor Lord Ara Darzi PC KBE FRS FMedSci** has been awarded an honorary degree from the University of York and has also been elected to the Order of Merit

**Lord Bamford** has been appointed an honorary Fellow of the Institution of Mechanical Engineers

**John Baxter CBE** has been appointed chair of the University of Strathclyde’s Advanced Nuclear Research Centre

**Archie Bethel CBE** has been appointed CEO of Babcock International

**Sir Peter Bonfield** has been appointed chairman of GlobalLogic

**Tim Broyd** has been appointed President of the Institution of Civil Engineers

**Professor John Burland CBE FRS** has been elected as a Foreign Member of the USA’s National Academy of Engineering

**Allan Cook CBE** has been appointed industry co-chair of the Defence Growth Partnership, and also a patron of STEM education provider, Greenpower Education Trust

**Janice Crawford** has been appointed Regional Director of Infrastructure Projects at Network Rail

**Professor Sir Richard Feachem KBE** has been awarded an honorary doctorate in medicine from the University of Queensland

**Iain Gray CBE** has been appointed to the board of Versarien, which develops advanced engineering materials

**Dr Andrew Herbert OBE** has been appointed trustee of the National Museum of Computing, Bletchley Park

**Professor Nick Jennings CB** has been appointed Vice Provost (Research) at Imperial College London

**Professor Lin Li**, of the University of Manchester, has been elected to President of Laser Institute of America

**Bernard Looney** has been appointed Chief Executive of BP Upstream

**Professor Mark Miodownik** has received the 2015 public engagement with science award from the American Association for Advancement of Science (AAAS)

**Dr Frances Saunders CB** has been awarded an honorary doctorate from the University of Nottingham

**Colin Smith CBE** has been appointed Group President at Rolls-Royce

**Dr Nicholas van Someren** has been appointed Chief Technology Officer of the Linux Foundation

**Ratan Tata GBE** has been appointed an honorary Fellow of the Institution of Mechanical Engineers

**Professor Colin Whitehouse** has been appointed chair of the Compound Semiconductor Centre, a joint venture between IQE and Cardiff University

**Khalid Al-Falih** has been named 2016 Energy Intelligence Petroleum Executive of the Year

**General Sir Peter Wall GCB CBE DL** has been appointed to the advisory board of Cyrus Investment Management

**Professor Sir Mark Welland FRS** has been elected master of St Catharine’s College, Cambridge, where he takes office in September 2016

**Professor Paul L Younger** has been elected a Fellow of the Royal Society of Edinburgh

## 2015 Annual Fund

In November 2015, the Academy launched the 2015 Annual Fund, which to date has raised £25,000 in gifts and will support the Academy's enterprise, diversity and international work.

The 2014 Annual Fund raised £33,000. This was invested in:

- regional STEM education projects
- expert training for the three 2015 Launchpad competition finalists
- publicising examples of engineering excellence.

The Academy would like to extend its thanks to all those who have supported the Annual Funds. For further information about it, please contact the Academy's development team on **020 7766 0600**.

## Winter media round-up

On 2 January, past president Lord Browne of Madingley FREng FRS was guest editor of BBC Radio 4's *Today* programme. He interviewed guests including Senior Fellow HRH The Duke of Edinburgh, whose comments that "Everything that wasn't invented by God was invented by an engineer" were widely reported in more than 250 news clippings. This included significant coverage in local press, which acknowledged the role of the Academy and the QEPrize.

In March, the announcement of the Academy's new Enterprise Fellows received significant media interest. An article in *The Daily Telegraph* showcased some of the promising innovations, and the Academy's Head of Enterprise Ana Avaliani discussed the scheme on *BBC News*. In February, *The Sunday Telegraph* also profiled Enterprise Hub member George Frodsham and his MediSieve technology.

In December, the *Transport congestion challenge* paper was the focus of articles in *The Times* and *The Sunday Express*, in addition to trade publications. The Academy's diversity toolkit also continues to receive good media coverage.

## Nominations of prospective new Fellows

The Academy's effectiveness depends critically on the talent, energy and commitment of its Fellows, and the role of the Fellowship is central to the whole membership process.

The deadline for making nominations for prospective new Fellows is **1 May 2016**. This can be done via the Academy's online system, which is found in the Fellows' secure area of the Academy's website: [www.raeng.org.uk/fellows-area](http://www.raeng.org.uk/fellows-area). Fellows will require a username and password to access it. To retrieve a forgotten password, email [webmaster@raeng.org.uk](mailto:webmaster@raeng.org.uk). All other queries regarding nominations should be directed to [membership@raeng.org.uk](mailto:membership@raeng.org.uk)

## Motorola Solutions Foundation grant

The Motorola Solutions Foundation has awarded a grant of £38,000 to the Academy, which will support a new programme of female visiting teaching engineers in up to 15 further education colleges. Focusing on institutions in under-served areas, the programme will strengthen the Academy's diversity agenda by providing valuable role models to encourage greater numbers of young women to study engineering subjects. The Academy is most grateful to Graeme Hobbs FREng for his help in securing this grant.

## Forthcoming events

This is a selection of Academy events. For a complete list, visit [www.raeng.org.uk/events](http://www.raeng.org.uk/events)

12 April 2016

**In conversation with 2015 MacRobert Award winners: Artemis Intelligent Power**

**Venue:** Technology and Innovation Centre, University of Strathclyde

4 May 2016

**East Midlands Regional Lecture and Dinner**

**Speaker:** Professor Tim Gordon, head of the school of engineering, University of Lincoln

**Venue:** University of Nottingham

23 June 2016

**Awards Dinner 2016**

**Venue:** The Pavilion at the Tower of London



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## Obituaries

**Dr Allen E Puckett FREng** died on 31 March 2014, aged 95. He was formerly Chairman and Chief Executive of Hughes Aircraft Company.

**Mr David Anthony Claydon FREng** died on 27 February 2016, aged 80. He was formerly Chairman and Chief Executive Officer of Talisman Energy Inc.

**Sir Kenneth Corfield FREng** died on 11 January 2016, aged 91. He was formerly chairman of Tanks Consolidated Investments Ltd, Chairman and Chief Executive of Standard Telephones & Cables and founding chairman of the Engineering Council.

**Dr James Anthony Gaffney** died on 2 March 2016, aged 87. He was formerly Director of Engineering Services at West Yorkshire Metropolitan County Council and a former President of the Institution of Civil Engineers.

**Mr John Neville Martin FREng** died on 11 January 2016, aged 83.

**Professor Jane Plant** died on 4 March 2016, aged 71. She was Anglo-American Professor of Geochemistry at Imperial College London, and formerly Chief Scientist at the British Geological Survey.

**Dr Vernon Walter Eldred MBE FREng** died on 15 December 2015, aged 90. He was formerly head of the fuel examination and fuel performance divisions of AEA Laboratories at Windscale.