



## 2015 MacRobert Award winner

The 2015 winner of the MacRobert Award, UK's longest-running and most prestigious prize for engineering innovation, was announced at this year's annual Awards Dinner on 16 July at the Landmark Hotel in London. The winner, Artemis Intelligent Power, was honoured with a gold medal and 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.

HRH The Prince Philip, Duke of Edinburgh and Professor Dame Ann Dowling DBE FREng FRS presented the prize to the winning team: Managing Director Dr Niall Caldwell; Operations Director Pierre Joly; Founder and Chairman Dr Win Rampen FREng; Non-Executive Director Professor Stephen Salter FRSE and Chief Engineer Dr Uwe Stein.

Edinburgh-based Artemis has pioneered a new Digital Displacement® power system, with digitally controlled hydraulics, that has the potential to transform the viability of offshore wind power and low carbon transportation. As well as dramatically improving power capacity, the system has been designed to overcome the significant reliability issues associated with existing turbines.

Artemis was up against MacRobert Award finalists Cambridge-based Endomag, which was selected for its breast cancer diagnostic tool that uses magnetic tracer signals to map the spread of cancer through the lymphatic system; and Blackpool-based Victrex, for the development of advanced polymers in ultra-thin sheets for use in smartphone and tablet speakers.

Dame Sue Ion DBE FREng, Chair of the MacRobert Award Committee, said, "The Artemis story is truly compelling. The company has achieved a technical advance of global importance, making significant power delivery from offshore wind considerably more credible and realisable. This is not simply evolutionary improvement but a complete step change."

A number of other Academy awards were presented during the course of the evening. They were the President's Medal to Sir Richard Olver FREng; the Rooke Award for public promotion of engineering to Professor Hugh Hunt from the University of Cambridge; the RAEng ERA Foundation Entrepreneurs Award to Dr Matthew Murray from the University of Leeds; three Silver Medals to Dr Susannah Clarke, Co-Founder of Embody Orthopaedic Ltd; Dr Don Syme, Principal Researcher at Microsoft Research UK and Dr Andy Ward, Chief Technology Officer of Ubisense Ltd; the Colin Campbell Mitchell Award to a team from UCL's Optical Network Group and the Major Project Award to a team from Atkins for Highlands and Islands Superfast Broadband. For more information on all of these awards, please visit our website [www.raeng.org.uk](http://www.raeng.org.uk)



The Awards Dinner was attended by Fellows and business leaders, and the keynote address was delivered by Matthew Barzun, the United States Ambassador to the United Kingdom.

The Academy's awards evening was made possible by the generous support of headline sponsor Atkins and silver sponsors BAE Systems, BP,

GKN, Jaguar Land Rover, Petrofac and RealVNC. The MacRobert Award is supported by The Worshipful Company of Engineers.

▲ **Top:** The MacRobert Award-winning team from Artemis Intelligent Power Ltd with the Senior Fellow, HRH The Prince Philip, Duke of Edinburgh and Academy President Professor Dame Ann Dowling DBE FREng FRS

**Above:** The United States Ambassador to the United Kingdom, Matthew Barzun  
Photos: Rob Lacey

# President's column



## Meetings and visitors

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

HRH The Duke of Kent  
Nick Boles MP, Minister of State for Skills  
Sir Frank Chapman  
Jo Johnson MP, Minister of State for Universities and Science  
Dr Ruth McKernon, Innovate UK Chief Executive  
Dr Naoto Nishida, Chief Technology Officer, Toshiba Corporation  
Sir John Parker GBE FREng, Immediate Past President and Chairman of Anglo American plc  
Lord Sainsbury of Turville HonFREng  
Dr Shiro Saito, Corporate Vice President, Toshiba Corporation  
Professor Sir Mark Walport, Government Chief Scientific Adviser  
Chris Wormald, Permanent Secretary, Department for Education

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

Council for Science and Technology  
Emerging Powers Fund  
Martin Baker Ltd  
Regional visit to Belfast where he visited Bombardier Aerospace and Queen's University Belfast

### She was interviewed by:

Peggy Hollinger, Industry Editor, *Financial Times*  
BBC Radio 4, *Woman's Hour*, for National Women in Engineering Day

The new government has come in with a mission to boost the UK's productivity and growth performance; critical areas in which the Academy is already active and seeking to build our capacity to contribute much more.

In May, I was pleased to attend the Enterprise Hub's Showcase that marked the end of its second year. This event celebrated the Hub's successes so far in stimulating growth through engineering innovation and entrepreneurship. With more than 100 Fellows now taking part as mentors, advisors and judges, the Hub is an exemplar of how the Academy is making a real difference in helping to turn engineering innovation into thriving businesses. To date, 30 early-stage entrepreneurs have created 19 companies that have raised over £6 million of external funding. We are now preparing to redevelop the lower ground floor of Prince Philip House as the focal point for Hub activities.

The Academy's awards and prizes recognise and encourage great innovation in engineering, and the publicity they gain helps spread the word that the UK is home to great technology, ingeniously applied. In July, with the support of Atkins and our other sponsors, we held another excellent Awards Dinner, in the presence of the Senior Fellow, the Duke of Edinburgh. Matthew Barzun, the United States Ambassador to the United Kingdom, gave the keynote address and Dr Dame Sue Ion DBE FREng, Chair of the MacRobert Award Committee, presented certificates to the finalists of the prestigious MacRobert Award, which was won by Artemis Intelligent Power Ltd. The terrific feats of engineering achieved by all those who received awards and prizes on the evening exemplify the best of what the UK can do - and the Academy's role in bringing this innovation to the notice of the public is an important one.

Another important role of the Academy is to support emerging economies in developing their capacity for engineering, enterprise and innovation. We have completed our first year of participation in The Newton Fund, during which we have provided entrepreneurship training and coaching to 149 researchers from eight emerging economies, who are trying to commercialise innovations that could support economic growth and social development. In June, the winner of the Academy's Africa Prize for Engineering, Dr Askwar Hilonga, was fêted at a ceremony in Cape Town. Prior to the selection of the overall winner, 12 shortlisted innovators had received mentorship and training to

enable them to develop their business ideas into viable commercial propositions.

As you will know, the Trustee Board has designated Professor Richard Williams OBE FREng as Vice President with responsibility for Fellowship Engagement. A key theme that emerged from the survey of fellows he initiated was the wish for the Academy to be more active outside London so that Fellows can engage where they live and work.

The Academy is now developing ways to encourage more Fellows to network and support activities that ensure a vibrant presence for the Academy across the country. A recent welcome development was the inaugural East Midlands lecture, given by Professor Helen Atkinson FREng, member of the Trustee Board and Chair of the Standing Committee for Education and Training.

We were very grateful to Babcock, our hosts for a spectacular summer soirée, in the presence of Royal Fellow HRH The Duke of Kent, at the Rosyth Dockyard in Scotland. The 150 guests were treated to excellent hospitality as well as a fascinating exhibition. The highlight of the event was the opportunity to visit the flight deck of the magnificent HMS Prince of Wales, the second of the Queen Elizabeth class aircraft carriers being built there - where we saw engineering on the grandest scale.

I have been impressed by the calibre of ideas and enthusiasm that I encountered in the regional workshops I hosted as part of my review of business and university research collaboration. I was invited to undertake the review by the last government. We created what I believe was a truly inclusive process for the work, hearing from academics and businesses of all sizes and receiving 212 submissions, an excellent response.

The report was launched on 2 July in an event at the House of Commons with Jo Johnson MP, Minister for Universities and Science, who wrote a very supportive forward to the review. The report underlines the importance of successful collaboration in driving innovation and shows that mobility of people between academia and industry, and personal relationships and trust are critical. It emphasises the key role of government in fostering conditions for collaboration and makes recommendations about how they can be enhanced.

## Dowling Review

On 2 July, the President's government-commissioned *Dowling Review of Business-University Research Collaborations* was published. The report, compiled after wide engagement with the wider research and innovation community, including over 210 written submissions of evidence from both academia and industry, and within a challenging timescale, has been exceptionally well received. The report received mentions in the government's recent Budget and Productivity Plan, and the Minister for Universities and Science, the Rt Hon Jo Johnson MP, who attended the report launch event, said: "Fostering

greater collaboration between business and universities will provide the new technology and high-level skills that are vital to raising our productivity. I want to thank Dame Ann for producing this important report. We will consider the recommendations very carefully to ensure we make Britain the best place in Europe to innovate, patent new ideas and set up a business."

The report acknowledges that there are already lots of successful long-term business-university research collaborations taking place in the UK that provide myriad benefits to their participants. However, more can be

done to ensure the UK is reaping the full potential provided by the opportunity to connect innovative business - from the UK and overseas - with excellence in the UK's academic research base. The overarching recommendation made in the review is that government should simplify the plethora of schemes aiming to facilitate business-university research collaborations across all disciplines, as well as ensuring that the interface to those seeking support for collaborative R&D is as simple and as accessible as possible.

Read the Dowling Review online at: [www.raeng.org.uk/dowling-review-report](http://www.raeng.org.uk/dowling-review-report)

## Africa Prize winner



A Tanzanian chemical engineer has won the first Africa Prize for Engineering Innovation with his specialised water filtration system. Dr Askwar Hilonga's invention - a sand-based water filter that cleans contaminated drinking water using nanotechnology - has earned him prize money of £25,000. The three runners-up each received £10,000.

Each Nanofilter is engineered for a specific body of water and absorbs the contaminants present - from heavy metals or minerals, including copper

and fluoride, to biological contaminants such as bacteria and viruses, and pollutants such as pesticides.

The United Nations reports that up to 115 people in Africa die every hour from diseases linked to contaminated drinking water and poor sanitation. In a 2014 report, former UN Secretary General Kofi Annan said AIDS, TB, malaria and other infectious diseases would not be defeated until the battle is won for safe drinking water, sanitation and basic health care.

The Africa Prize, launched by the Academy in 2014, aims to stimulate, celebrate and reward innovation and entrepreneurship in sub-Saharan Africa. Following applications from individuals in 15 countries, 12 entrants were shortlisted and received six months of business training and mentoring where they learned to develop business plans and market their innovations.

At the awards ceremony in Cape Town, South Africa on 1 June, the four finalists from sub-Saharan Africa gave their presentations, after which the Africa Prize judges and the competition audience voted for the most promising engineering innovation. The judging panel was led by Malcolm Brinded CBE FREng and included Dr Liesbeth Botha, Stephen Dawson, Professor Calestous Juma HonFREng, Dr Moses Musaaazi and Dr Bola Olabisi.

The prize is generously supported by the Shell Centenary Scholarship Fund; Consolidated Contractors Company; ConocoPhillips and the Mo Ibrahim Foundation.

▲ Dr Askwar Hilonga with his Africa Prize-winning water filter and lead judge Malcolm Brinded CBE FREng

# Innovation and entrepreneurship

## MacRobert display at BIS

The Department for Business, Innovation and Skills hosted an exhibition of engineering innovations from the finalists for the Royal Academy of Engineering's 2015 MacRobert Award. The MacRobert Award celebrates outstanding engineering innovation with tangible social benefit and proven commercial success.

A high-efficiency electronically-controlled wind turbine pump from renewable

energy company, Artemis Intelligent Power, demonstrated their Digital Displacement Technology innovation. Healthcare company Endomag showcased a pioneering alternative method of breast cancer diagnosis. A display from our third finalist, Victrex, brought the high-impact potential application of their high-performing ultra-thin plastics to life.

The exhibition provided an example of how the Academy and BIS work closely to promote growth through innovation, sharing a desire to inspire young people from diverse backgrounds to explore engineering careers.



▲ Dame Ann Dowling DBE FREng FRS with Minister for Universities and Science Jo Johnson MP at the MacRobert finalist display at BIS



## Korean delegation visit

On 19 May, the Academy hosted a delegation led by the National Academy of Engineering of Korea, accompanied by Gareth Davies, Head of the Science and Innovation Network at the Foreign and Commonwealth Office in Seoul. The main focus of this event was to exchange ideas on how best to foster innovation and entrepreneurship through engineering

academies. The visit coincided with the Academy Enterprise Hub Showcase, demonstrating the way in which the Academy supports young engineers to turn their ideas into innovations through mentorship and support from the Academy's Fellowship.

As part of the programme, the delegation also visited the UK government Department for Business, Innovation

and Skills to learn about UK policy for supporting innovation within key industries such as manufacturing.

▲ Professor Sir William Wakeham FREng, Academy Vice President and Chair of the International Committee (4th from right) and Academy colleagues with the National Academy of Engineering of Korea delegation

## New Delhi workshop

The Academy has been engaged as a delivery partner for the Newton-Bhabha Fund - an initiative of the Indian and UK governments to enhance science, innovation and research cooperation between the two countries. As part of the Newton-Bhabha Fund, the Academy has been partnered with the Federation of Indian Chambers of Commerce and Industry to enhance research and innovation capacity and improve engineering education within universities in India by creating links between industry and academia.

On 12-13 May 2015, a workshop was held in New Delhi to launch the collaboration and to discuss issues and trends in engineering education and research in India. The conference heard

presentations and contributions from academics, industrialists, policymakers and innovators from India and the UK. Breakout groups were also formed with a focus on designing high-impact models of cooperation which could be effected in a relatively short time frame.

A number of Academy Fellows participated, including Professor Sir William Wakeham FREng, Tim Askew FREng, Professor Muhammed Basheer FREng and Professor Ravi Silva FREng. They were joined by representatives from Cambridge University and Cranfield University. Other speakers included the Secretary, Ministry of Human Resource Development of the Indian government, senior representatives from a number of Indian universities, and leading industry organisations, including Larsen and Toubro and Rolls-Royce India.

## Innovators' Network

On 27 April, the Enterprise Hub hosted the first Innovators' Network dinner. The network provides an opportunity for individuals responsible for innovation in engineering companies to come together

and share best practice. They are also able to discuss how to support creativity and innovation in their companies and sectors.

Pre-dinner speakers were Dr Andy Harter FREng of RealVNC and Geoff Baker of Petrofac. The guests included representatives from over 20 companies

including Bosch, Weir Group, Johnson Matthey, Dyson and Schlumberger.

If you are responsible for innovation within an engineering company and would like to find out more, please contact [catherine.lawrence@raeng.org.uk](mailto:catherine.lawrence@raeng.org.uk)

## Enterprise Fellowships

The Academy's Enterprise Fellowships are now open for applications. Enterprise Fellowships provide funding and support to outstanding engineering researchers looking to commercialise their research, and it would be greatly appreciated if Fellows could encourage any suitable colleagues to apply. Applicants should be working at a UK university and wish to develop a spin-out business around their technological idea. Prior experience of commercialisation activities is not essential; the desire and capability to succeed are more important, and the Academy will equip them with the necessary skills through

a programme of training and mentoring.

The Fellowships provide £35,000 of salary support and £25,000 for the continued development of the innovation and associated spin-out company. Enterprise Fellows are provided with 1:1 business mentoring from the Academy's Fellowship. Fellows who are interested in being a mentor are encouraged get in touch.

Following the completion of the Enterprise Fellowship, awardees are invited to become members of the Enterprise Hub, gaining invaluable access to extensive entrepreneurial networks, events and continued training.



▲ Enterprise Fellow Dr Thomas Frame

The scheme is open to applications until 7 September 2015.

## Enterprise Hub Showcase

The annual Enterprise Hub Showcase on 19 May brought together Hub members, mentors, investors, business leaders and Academy Fellows. The evening began with the showing of a three-minute video introduction to the work of the Hub, before a welcome from Academy President Dame Ann Dowling DBE FREng FRS and an introduction from the host, the BBC's Naga Munchetty.

Two keynote speakers shared stories of how they founded their businesses: Mustafa Suleyman, co-founder of DeepMind, and Dr Robert Mullins, one of the Raspberry Pi founders. DeepMind was bought by Google in 2014 in its largest European acquisition to date, and Suleyman is now head of applied artificial intelligence at Google DeepMind.

Dr Mullins remained a Trustee of Raspberry Pi until recently. He has since helped to found and is directing the lowRISC project, which is creating open computing hardware with the help of the open-source community.

Each of the new Enterprise Hub members delivered their 'elevator pitch' to the packed room. The talks demonstrated the wide range of engineering disciplines being supported by the Hub - from a wrist strap made of photo-catalytic material that acts as a sunburn indicator to a device that records data from heavy goods vehicles and performs analyses in order to recommend fuel-saving products to the haulage industry.

The new Enterprise Hub video is available on [www.raeng.tv](http://www.raeng.tv)



▲ Academy President Dame Ann Dowling testing out Enterprise Fellow Jack Cohen's 3D virtual reality simulation headset

## Energy and natural resources

### Ethics of climate change

On 12 June, the Academy ran a workshop entitled *Engineers and climate change*. This brought Fellows together with ethicists and academics from a range of

other disciplines to discuss and examine the responsibilities of engineers in relation to climate change. The event was part of the Academy's work with the Inter-Disciplinary Ethics Applied (IDEA) Centre at the University of Leeds on ethics and responsibilities in engineering.

Drawing from participants' expertise as well as the Academy's past work, such as the *Statement of Ethical Principles*

produced jointly with the Engineering Council, the event comprised sessions focused on industry, the profession, and engineering education and training. Each session opened with speakers from a range of disciplines before moving into open, roundtable discussions between participants. The event was chaired by Richard Maudslay CBE FREng, Chairman of the National Nuclear Laboratory.

# Infrastructure and transport

## Innovation in autonomous systems

On 22 June, the Academy held an event, *Innovation in autonomous systems*, which brought together leading experts and innovators from across the sector. Professor David Lane FEng FRSE, Director of the Edinburgh Centre for Robotics, chaired the event, which showcased some of the most recent advances in autonomous systems.



The audience heard talks on a range of applications in sectors such as energy and the maritime industry.

There were also talks on the evolving relationship between people and technology, exploring artificial intelligence, virtual and augmented reality and using robots for human physical and social interaction.

Presentations from the day are available on [www.raeng.tv](http://www.raeng.tv) and a detailed report summarising the discussions at this event will be published later in the year.

The next event, *Innovation in agri-tech*, will be held on 12 October 2015.

◀ Professor David Lane FEng FRSE

## Cities and infrastructure dinner

On 13 May, as part of its ongoing work on Future Cities, the Academy held a dinner discussion on cities and infrastructure. Chaired by Dr Peter Bonfield CBE FEng, Chief Executive of the Building Research Establishment, it brought together Fellows to identify infrastructure challenges and potential priorities for the UK.

The dinner was held to support the Collaboratorium for Research in Infrastructure and Cities (UKCRIC) being led by Professor Brian Collins CB FEng, an initiative that received £138 million in funding in the final budget of the previous government.

UKCRIC will apply research to ensure that the UK's infrastructure is resilient and responsive to environmental and economic impacts.

It will include all the sciences and address the role of regulation, planning and legal guidance, policy, socio-technical aspects of infrastructure, foresight, improving international investment, capacity, long-term needs, localism, use of data and systems thinking.

The discussion provided an opportunity for Fellows to learn more about the programme and to determine, as an engineering community, how industry can mobilise support for UKCRIC.

## Sustainable buildings concordat

With the built environment responsible for around 45% of CO<sub>2</sub> emissions, the construction industry has a major role to play in reducing the UK's greenhouse emissions by at least 80% from 1990 levels by 2050 under the Climate Change Act. Current knowledge and skills are insufficient to achieve such dramatic

reductions, so in 2013, the Academy awarded 'Centres of Excellence in Sustainable Building Design' status to four universities: Heriot-Watt University, Loughborough University, the University of Sheffield and University College London.

These centres work in collaboration to demonstrate and share best practice in teaching and research. The collective aim is to deliver a new level of professionalism in the built environment for students, graduates and industry professionals, and to equip them with the technical knowledge and people management skills needed to face the climate challenge head on. A concordat between the Academy and the four centres has recently been signed to set out the aims and scope of the centres as collaborators to achieve this common goal.

## Built for living



On 21 July, the Academy, with Arup and the Economic and Social research Council, launched a report exploring the relationship between the design of the built environment and human behaviour, and the implications for design practice, research needs and policymaking, entitled *Built for living*. It follows a series of three workshops

hosted by the Academy, RIBA and Arup. These workshops explored ways in which the design of the built environment can have a significant impact on resource use (in particular, energy, water and waste), health and wellbeing, and performance and productivity. The study was carried out with the support of RIBA, University College London and the University of Leeds.

The workshops pointed out how design and human behaviour are interlinked and that stakeholders need to collaborate to capitalise on what is already known about the built environment and human behaviour.

A number of ways to improve design outcomes are suggested, including that design should be undertaken from a

systems viewpoint. It recommended that user input should be sought from the start of the process, and that a multidisciplinary team including designers, social scientists and engineers should work together using an iterative process, with interdisciplinary feedback.

Case studies within the report illustrate the various research methods, tools and techniques that can be used to inform or support this kind of approach to the design of the built environment.

See [www.raeng.org.uk/builtforliving](http://www.raeng.org.uk/builtforliving)

◀ Arup Realtime synthetic environment simulates navigation of a railway station  
© Alvise Simondetti, Arup

# Technology and society

## Global Grand Challenges

Following the successful inaugural summit in London in 2013, the second Global Grand Challenges Summit will be held in Beijing from 15-16 September 2015. The Global Grand Challenges Summit is an initiative organised by the national academies of engineering of the UK, the US (National Academy

of Engineering), and China (Chinese Academy of Engineering). The purpose of this event is to identify opportunities for global cooperation on engineering innovation, in order to solve some of the world's most pressing challenges related to sustainability, security and resilience, urban infrastructure, health, and education. Over 500 practising and future engineering leaders will hear from senior international figures about ways to develop the collaborations, networks and tools to implement practical solutions to these complex global problems.

Speakers confirmed for this event include: Jack Ma, Founder and Executive Director of Alibaba, and Charles Holliday, President of the National Academy of Engineering in the US and Chairman of Royal Dutch Shell.

To register for the event in Beijing, please visit the following website: <http://ggcs2015.cae.cn> using code: E6FWMB

## Global Grand Challenges Student Day

An important part of the 2015 Global Grand Challenges Summit taking place in Beijing will be its Student Day. Held the day before the main Summit on 14 September 2015, the aim of the day is to bring together students from the UK, US and China to work on scalable engineering solutions to solve some of the world's most pressing challenges. Last month, in preparation for Student Day, the Academy brought together 30 Engineering Leadership Award students to form small teams and start work on a business idea to solve one of the National Academy of Engineering Grand Challenges, listed here:

[www.engineeringchallenges.org](http://www.engineeringchallenges.org)

Throughout the preparation day, delivered by Thinkup consultancy, the teams took part in a range of exercises to develop their conceptual design skills. They will now work



remotely in groups and prepare to go head-to-head with each other, and the teams from the US and China, when they pitch their idea to a panel of senior engineers at the official Global Grand Challenges Summit Student Day in Beijing.

▲ Engineering Leadership Award students attend a preparation day at the Academy ahead of the Global Grand Challenges Summit Student Day in Beijing, 14 September 2015

## East Midlands Lecture

The University of Loughborough's School of Engineering held the Inaugural Regional East Midlands Lecture and Dinner on 13 May. Professor Helen Atkinson CBE FREng gave a lecture entitled *Cornflour, ketchup and parts for cars*. The presentation outlined how the thixotropic (having a viscosity that decreases when a stress is applied, as when stirred) property of metals can be exploited in a process called thixoforming to make parts for cars and cases for mobile phones. The audience for this event included several Fellows as well as university staff and students.

The lecture was followed by a dinner held at the university for Fellows and their guests. Professor Richard Williams OBE FREng, Vice President, was in attendance and gave a brief outline about his plans for Fellowship engagement. Dr Phil Bennett FREng organised the event along with University of Loughborough's engineering department.



► Professor Helen Atkinson CBE FREng

## Summer soirée and exhibition

Babcock International hosted this year's soirée on 4 June at the Rosyth Dockyard premises in Fife, Scotland. The Academy's Royal Fellow HRH The Duke of Kent attended the event, which was also enjoyed by some 150 Fellows and guests.

To mark the centenary of Rosyth Dockyard, Babcock staged an exhibition entitled *100 years of engineering excellence*. With a strong focus on engineering, the exhibition included displays from Babcock, BP, BAE Systems, Thales, Fife College, Primary Engineer and the University of Strathclyde.

The event included a tour of the facilities, with a view of the main basin, first flooded in 1915, before crossing over to capture the full length of the HMS Queen Elizabeth aircraft carrier. The highlight of the day was a visit to the HMS Prince of Wales, which gave guests the opportunity to step onboard the flight deck of the second ship in the class as it is being assembled.

In her speech to the dinner guests, Professor Dame Ann Dowling DBE FREng FRS, President of the Royal Academy of Engineering, highlighted and applauded the achievements of Babcock and its partners in the Aircraft Carrier Alliance,



and the extraordinary operation behind the construction of two huge and extremely complex warships.

▲ **Top L-R:** Academy President Dame Ann Dowling; Dock Master Jock Aitken; Archie Bethel CBE FREng FRSE, Chief Executive Officer, Marine and Technology, Babcock; and Academy Chief Executive Philip Greenish CBE with the Rosyth Dockyard log book

► **Right:** The President and Royal Fellow, HRH The Duke of Kent, at the reception



## Engineering Diversity Concordat

On 13 May, the latest Engineering Diversity Concordat (EDC) meeting was chaired by Professor Dame Wendy Hall DBE FREng FRS. The meeting shared progress reports on increasing women's membership, registration and governance within professional engineering institutions (PEIs). It also

took forward the Women's Engineering Society collaborative project aimed at encouraging more people, especially women, to return to the profession after a career break. Delegates were told that the Welding Institute has become the latest signatory to the EDC.

The Academy also shared a communication plan to raise the profile of work on diversity and inclusion.

## People and talent

◀ Chris Eady, Associate Director Professional Affairs and Certification of The Welding Institute, accepts the Engineering Diversity Concordat from Professor Dame Wendy Hall DBE FREng FRS

Stakeholders, including PEIs, will be invited to take part in an independent review of the Academy diversity programme in the coming months.

On the same day as the EDC meeting, the Academy hosted a dissemination event for the project addressing unconscious bias, led by BCS - The Chartered Institute for IT, and funded by the Academy. The session was attended by members of the EDC and the Science Council. Materials developed will be shared across all PEIs.

Anyone wanting to know more about how their institution can access unconscious bias training should contact [elena.fatisi@raeng.org.uk](mailto:elena.fatisi@raeng.org.uk)

## Research Chairs and Senior Research Fellowships



▲ Professor Mary Ryan

One new Research Chair and one new Senior Research Fellowship have been awarded as a result of the first competitive round of this scheme. Professor Mary Ryan has been appointed the Shell Global Solutions / RAEng Research Chair in interfacial nanoscience of engineering materials at Imperial College London. Dr Andrew Tyas has become the DSTL/RAEng Senior Research Fellowship in protection engineering against high explosive blast at the University of Sheffield.

These five-year posts are co-sponsored by industry to support exceptional academics in UK universities undertaking use-inspired research with industrial partners. The next funding round is open for applications, with a deadline of 1 September. Please see [www.raeng.org.uk/researchchairs](http://www.raeng.org.uk/researchchairs) for details, or contact [lucy.wheeler@raeng.org.uk](mailto:lucy.wheeler@raeng.org.uk)

## Research Fellowships

The Academy has announced the award of eight new Research Fellowships, including one award funded by Lloyd's Register Foundation as part of a new partnership. These five-year fellowships provide support for high-quality postdoctoral engineering researchers, to encourage them to develop their academic research as a stepping stone to a successful research career.

The new Research Fellows are Dr Mark Batty, University of Kent; Dr Martynas Beresna, University of Southampton; Dr Trung Duong, Queen's University Belfast; Dr Marco Endrizzi, University College London; Dr Amanda Foust, Imperial College London; Dr Pola Goldberg Oppenheimer, University of Birmingham; Dr Luca Magri, University of Cambridge; and Dr David Phillips, University of Glasgow.

Full details of the scheme are available on the website: [www.raeng.org.uk/research-fellowships](http://www.raeng.org.uk/research-fellowships)

## Future Leaders

In April, the Academy made 35 new awards under the Engineering Leadership Advanced Awards Scheme. These awards are made to engineering undergraduate students in UK universities who have demonstrated their potential as engineering leaders and role models for future generations of engineers.

At the selection event held at the Academy, 70 shortlisted applicants were interviewed by Fellows, Sainsbury Management Fellows and ELAA alumni. Awardees will receive an accelerated programme of personal development opportunities to support them moving into engineering leadership positions in UK industry in the future.

## Pathways to success

The Academy's Standing Committee for Education and Training published a new report in July. *Pathways to success in engineering education* highlights the career destinations of engineering graduates. The new research, which uses Sankey diagrams to illustrate the flow of students through the higher education system, examines prior educational attainment and career destinations of graduates.

The data show that, despite common perceptions that maths and physics A levels are prerequisites for engineering degrees, only 62% of engineering graduates had maths A level or equivalent Scottish Higher. Similarly, around 54% of graduates had physics at A level. The data also show little correlation between A level grades and degree classifications awarded. Of particular concern is that only 40% of graduates enter professional engineering roles, despite industry highlighting an engineering skills shortage. The report can be found at: [www.raeng.org.uk/pathways-to-success](http://www.raeng.org.uk/pathways-to-success)

## Queen's Birthday Honours

### Knights Bachelor - KBE

**Professor HKD Bhadeshia FREng**, Tata Steel Professor of Metallurgy, University of Cambridge, for services to science and technology.

**Patrick Head FREng**, lately Director, Williams Hybrid Power Ltd, for services to motorsport.

### Order of the Bath - Companions of the Order of the Bath - CB

**Peter Richard Worrell OBE FREng**, Chief of Materiel (Joint Enablers), Ministry of Defence, for services to defence.

### Honorary KBE - Knights Bachelor

**Dr Hermann Maria Hauser CBE FREng FRS**, Director, Amadeus Capital Partners, for services to engineering and industry

**Dr Ralf Dieter Speth FREng**, Chief Executive, Jaguar Land Rover, for services to the British automotive sector

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

**Alexander Beveridge Anderson OBE DL FREng**, Chair, Tees Valley Local Enterprise Partnership, for services to the Tees Valley Region.

**Carole Burke FREng**, Managing Director, Unipart Manufacturing Group, for services to engineering.

**Edmond Arthur Wallis FREng**, for services to business and charity.

**Nigel Gordon Whitehead FREng**, Group Managing Director, Programmes and Support, BAE Systems and Commissioner, UKCES, for services to vocational education and skills.

### Order of the British Empire - Officers of the Order of the British Empire - OBE

**Professor Christopher Hodge FREng**, Chief Electrical Engineer, BMT Defence Services Ltd, for services to Royal Navy engineering.

**Stephen John Wadey FREng**, lately Managing Director, MBDA UK, now CEO QinetiQ plc, for services to the UK defence sector.

## Diversity Leadership Group

On 3 March, the Academy hosted its eighth Diversity Leadership Group (DLG) meeting, chaired by Allan Cook CBE FREng. This was an extended session focused on inclusive leadership, with discussion led by Dan Robertson of the Employer Network for Equality and Inclusion. Several members shared presentations about the inclusion work being undertaken in their organisations.

DLG subgroups continue to work on practical outputs and will soon publish two sets of toolkits. One addresses good inclusion practice across the DLG members, and the other on guidance to engineering employers in delivering work experience for young people aged 14-19, especially those from diverse backgrounds.

► The Academy Diversity Leadership Group with its Chair, Allan Cook CBE FREng, front left



## Sexual orientation equality

On 11 May, senior managers from 10 engineering companies met to discuss and stimulate organisation-level action to improve sexual orientation equality in the sector. The roundtable was hosted by the Academy in partnership with Stonewall and InterEngineering.

Stonewall shared best practice knowledge in the area of sexual orientation equality and offered observations following the publication of the 2015 Stonewall Workplace Equality Index.

In addition, the InterEngineering group gave insights based on the needs and feedback of their individual members.

The discussion considered ideas, challenges and successes in establishing a proactive approach to lesbian, gay, bisexual and transgender (LGBT) inclusion. The group identified a number of possible threads for future collaboration, including potential for combining LGBT network groups across organisations and geographic regions. The positive dialogue showed that there is appetite within the companies present to achieve a cultural shift within the engineering sector.

## Teacher Coordinator recruitment



The Connecting STEM Teachers project is an educational programme that aims to engage a greater number and wider spectrum of school students with science, technology, engineering and mathematics (STEM). Central to the continued success of this project, which is now in its fourth year thanks to enhanced funding from BG Group, is the work of the Teacher Coordinators, who lead support networks for local STEM teachers. The Coordinators are experienced teachers of STEM subjects who not only disseminate free training and learning resources developed

by the Academy to over 400 schools across the UK, but also lead enhanced learning opportunities for hundreds of students every year.

◀ Academy Teacher Coordinators helping to develop STEM learning and teaching resources for secondary schools. Here, they look at designing propellers for quadcopter drones

## Big ideas workshop

The Academy and the Institution of Mechanical Engineers held a joint workshop to explore what is needed to transform education to improve progression to engineering careers. Effective mechanisms to inspire future engineers have often been constrained by looking for solutions within the current educational landscape. The Big Ideas workshop, attended by 40 experts across the education sector, explored provocative questions, such as how the structure of UK education discourages girls from becoming engineers and the importance of putting 'making' at the heart of education. A report of the workshop, including a poll conducted on the themes which emerged from the day, will be published in September.

## Widening HE participation

In response to Professor Perkins' Review of Engineering Skills, a steering group of 13 engineering employers has come together to increase the supply of female and ethnic minority graduates into their companies. The steering group has identified two key areas to address in order to not only engage and attract, but also recruit and retain, more diverse students.

The Academy has commissioned Sponsors for Educational Opportunity London, an organisation with a demonstrable track record for recruiting graduates from diverse backgrounds into law and banking, to deliver an engineering engagement programme. At the same time, steering

group companies will be reviewing their graduate recruitment and induction practices to ensure that they do not present unnecessary barriers to increasing diversity and inclusion.

The two-part engagement programme was launched on 22 July, during the Engineering Uncovered Summer School, which took place from 20-22 July. The Engineering Fast Track will commence in the autumn.

## Legacy gifts

The Academy has received a significant legacy from the late Geoffrey Argent FEng, who passed away in 2013. As a Fellow, he wanted his gift to make the biggest difference to the work of the Academy, and the planned redevelopment of the Lower Ground Floor at Prince Philip House will achieve this very well. This project, which includes the creation of dedicated facilities for the Academy's Enterprise Hub activities, is currently

at the advanced design and planning stage, with work onsite scheduled to begin next year. His legacy, added to the very generous donation towards the project made by Dr John C Taylor FEng, is the latest in a series of generous gifts and highlights the range of giving options available.

As many Fellows have expressed an interest in leaving a legacy to the Academy, a small group has been helping to develop an approach that looks to building a better

future through engineering through gifts in wills and to finding ways to promote gifts in wills. Progress will be shared at the Fellows' Day on 21 September. Meanwhile, if you would like to talk about legacies or need any information, please contact Sarah Philbrick, Director of Development at [sarah.philbrick@raeng.org.uk](mailto:sarah.philbrick@raeng.org.uk)

## 2014 Annual Fund

The 2014 Annual Fund appeal, launched in November 2014, has raised £27,000 in donations and pledges. The Academy extends its appreciation to all Fellows who have contributed. Donations can still be made using the form provided in the Leading your profession 2014 Annual Fund leaflet (additional copies can be obtained from Sarah Philbrick, Director of Development at [sarah.philbrick@raeng.org.uk](mailto:sarah.philbrick@raeng.org.uk)). The fund continues to be a valuable source of income for new initiatives and also provides additional capacity for existing work programmes.

## Select committee

The Academy and its three sister national academies were invited to appear before the first hearing of the newly-formed House of Commons

Science and Technology Committee on 15 July. Professor Richard Parker CBE FEng gave evidence on behalf of the Academy on the importance of public investment in research and innovation.

This followed evidence given in the preceding session by the recently appointed Minister for Universities and Science, Jo Johnson MP and by Department for Business, Innovation and Skills Directors-General Gareth Davies and Philippa Lloyd.

## Public engagement grants

Ingenious, the Academy's awards scheme for projects that engage the public with engineers and engineering, is open for applications.

The scheme provides grants for imaginative ideas that help engineers to communicate their expertise and

passion to a wider audience. The scheme aims to build capacity for public engagement in the profession while encouraging exciting and innovative ways of bringing engineering to life for the public.

Ingenious has funded over 140 projects to date, providing opportunities for over 2,000 engineers to take part in public engagement activities.

The closing date for applications is Monday 7 September 2015.

Ingenious is supported by the Department for Business, Innovation and Skills.

Visit [www.raeng.org.uk/ingenious](http://www.raeng.org.uk/ingenious) for more information and instructions on how to apply.

## News of Fellows

**Khalid Al-Falih** has been appointed Saudi Arabia's Minister of Health. He has also been appointed Chairman of Saudi Aramco

**David Ball** has been appointed Honorary Fellow of Institute of Concrete Technology

**Professor John Beynon** has been awarded the Bessemer Gold Medal by the Institute of Materials, Minerals and Mining

**Professor Muffy Calder OBE FRSE** has been appointed to the Engineering and Physical Sciences Research Council

**Professor Dame Ann Dowling FRS** has been awarded an honorary degree by Queen's University Belfast

**Professor Derek Hull FRS** has been awarded the Leslie Holliday Prize by the Institute of Materials, Minerals and Mining

**Jonathan Ive** has been made Chief Design Officer at Apple

**Professor Antony Jameson FRS** has been awarded the Association for Computational Mechanics John Von Neumann Medal

**Professor Nick Jennings** has been awarded a Regius Professorship in Computer Science at the University of Southampton

**Professor Nick McKeown** has been elected to the American Academy of Arts and Sciences

**Andrew McNaughton** is joining Tidal Lagoon Power as Director of Engineering and Construction

**Dr Gordon Moore** celebrates 50 years of Moore's Law

**Alan Mulally** has become a director at Carbon3D

**Professor Alison Noble OBE** has been awarded the Laura Bassi Award by the International Federation for Medical and Biological Engineering

**Professor Sir John O'Reilly** has been awarded an honorary doctorate from the University of Huddersfield

**Professor Sergio Pellegrino** is a co-principal investigator in the new Space Solar Power Initiative at Caltech

**Dr Matt Perkins** has joined e2V's Executive Committee as President of Space Imaging

**Professor Ravi Silva** has been awarded the Platinum Medal by the Institute of Materials, Minerals and Mining

**Professor Martyn Thomas CBE** has been appointed first IT Livery Company Professor of Information Technology at Gresham College

**Dr Tony Trapp DL** has been awarded an honorary Doctor of Engineering (DEng) by Newcastle University

## 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)

18 September 2015

### Research Forum

**Chair:** Professor Ric Parker FREng

**Venue:** Prince Philip House

21 September 2015

### Fellows' Day and AGM

**Chair:** Professor Dame Ann Dowling

DBE FREng FRS

**Venue:** Prince Philip House

29 September 2015

### Launchpad Competition Final

**Venue:** Prince Philip House

8 October 2015

### View from the top

**Speaker:** Dave Shemmans, Chief Executive, Ricardo

**Topic:** Future mobility, energy and resources – a perspective formed from 100 years of innovation

**Chair:** Professor Dame Ann Dowling  
DBE FREng FRS

**Venue:** Prince Philip House

12 October 2015

### Innovation in agri-tech

**Chair:** Professor Richard Godwin FREng

**Venue:** Prince Philip House

14 October 2015

### Fellows' visit to URENCO

**Venue:** URENCO, Chesire

## Support for regional STEM projects

The Academy's Stoke Engineering Project has received a grant of £15,000 from the Comino Foundation. The project, which involves 18 schools and colleges in the Stoke-on-Trent area, aims to improve uptake and attainment levels in STEM subjects and highlight pathways to apprentice, technician and undergraduate learning and employment. Over four years, the project aims to provide 25,000 opportunities for young people in Stoke to engage with, and be inspired by, engineering.

The Academy's Barrow Engineering Project has received a fourth consecutive year of support from the Sir John Fisher Foundation. Last year, the project reached over 10,000 pupils, teachers and other stakeholders in Barrow, contributing to the growth and development of STEM in the area.

## Publications received

*Upon the Plinth of a Barren Rock: 130 Years of Engineering Development in Hong Kong*, by KW Fung, YW Lau, and CM Chan.

This publication is available to read in the Fellows' Room at Prince Philip House.

Dr Stan Jones OBE FREng has written an e-book, *Ceramics-Art or Science?* It is available for free download at [www.ceramicsartorscience.co.uk](http://www.ceramicsartorscience.co.uk)

## Fellows' day

The Academy will hold a special event for Fellows on Monday 21 September, between 3.00pm and 9.00pm at Prince Philip House, in conjunction with the 39th annual general meeting. This event will aim to showcase the Academy's recent and current work and encourage more Fellows to experience the atmosphere of Prince Philip House. There will be an exhibition and presentations on the Academy's latest projects, and opportunities for networking. For more information about the speakers and programme, email [events@raeng.org.uk](mailto:events@raeng.org.uk)

## Ingenia article ideas

The *Ingenia* magazine editorial board is keen to attract articles that explore the breadth of UK engineering and its role in wealth creation and quality of life, and would welcome ideas from the Fellowship on subjects that could be covered in forthcoming issues. Subjects should be topical, accessible and well-illustrated. The *Ingenia* board is also seeking examples of new or recent engineering achievements that have a UK dimension, be they projects, products, innovations or even artworks. The magazine has the flexibility to present a variety of stories ranging from news and opinion pieces to the main articles, profiles and short features. The circulation of *Ingenia* is 11,000 and surveys suggest a readership of more than 30,000, which includes A-level students in 3,000 schools, engineering undergraduates and senior engineers in industry and academia, as well as MPs, civil servants involved with engineering issues and the general public.

Please send any suggestions or article proposals to the managing editor at [dominic.joyeux@raeng.org.uk](mailto:dominic.joyeux@raeng.org.uk)



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## Obituaries

### Mr Ronald Hugh Campbell OBE FREng

died on 3 February 2015, aged 90. He was formerly Managing Director, Babcock Energy Ltd.

### Professor Hywel Aled Davies FREng

died on 1 July 2015, aged 74. He was formerly Research Professor of Physical Metallurgy and Magnetic Research, University of Sheffield and Sheffield Centre for Advanced Magnetic Materials and Devices.

### Professor Howard Anthony Dorey FREng

died on 7 January 2015, aged 84. He was formerly Professor of Microsystems Technology, Department of Electrical and Electronic Engineering, Imperial College London.

**Mr James Gordon Eldridge FREng** died on 8 June 2015, aged 90. He was formerly Senior Partner, Binnie and Partners, and President, International Federation of Consulting Engineers.

### Mr Donald Malcolm Heughan HonFREng

died on 5 April 2015, aged 88. He was the creator of the MacRobert award, and formerly Chief Executive, Furniture Research Association.

**Sir John Horlock FREng FRS** died on 22 May 2015, aged 87. He was formerly Vice-Chancellor, Open University.

### Dr Kenneth Alan Glen Miller CBE

**FREng** died on 5 April 2015, aged 88. He was formerly Director-General, The Engineering Council.

**Mr Horace Roy Oakley CBE FREng** died on 20 April 2015, aged 94. He was formerly Senior Partner, MWH.

**Professor Roger Voles FREng** died on 5 May 2015, aged 84. He was formerly Consultant, RV Consultancy and Visiting Professor, University College London.