

Bombardier win the MacRobert Award

On 11 July, Bombardier won the MacRobert Award for its innovative, resin-infused advanced composite wing at the Academy's annual Awards Dinner at Banqueting House in Whitehall.

The event celebrated the 50th anniversary of the MacRobert Award, the UK's longest running and most prestigious national prize for engineering innovation. It honours the winning organisation with a gold medal, and the team members with a cash prize of £50,000. The award is supported by The Worshipful Company of Engineers.

Bombardier's innovative wing minimises the aircraft's environmental impact by reducing both weight and fuel burn in flight, and waste during manufacture. The team were one of a shortlist of four finalists, and were announced as winners on the night by Academy President Professor Dame Ann Dowling OM DBE FREng FRS. HRH The Princess Royal presented the gold medal to the winning team: Mark Braniff, Head of Strategic Technology, Composites; David Patterson, Engineering Fellow, Aerostructures; Trevor Poots, former Chief Manufacturing and Tooling Engineer; David Riordan, Engineering Fellow, Engine Nacelle Design; and Sam Wilson, Senior Composites Specialist.

Dr Dame Sue Ion DBE FREng FRS, Chair of the MacRobert Award judging panel, said: "Bombardier's composite wing reflects how excellence in aeronautical engineering benefits both society and the environment. At a time of uncertainty for Belfast's engineering community, we hope this award helps them achieve the worldwide recognition they deserve."

The other three finalists were Darktrace for Antigena, an AI-powered 'self-healing' cybersecurity system that can both identify and neutralise cyberattacks; M Squared, whose SolisTiS titanium:sapphire laser produces the world's purest light, enabling new scientific discoveries and bringing about radical transformations in quantum computing, healthcare, navigation and climate change technology; and OrganOx for creating the metra, a world-first device that can keep a human donor liver functioning outside the body for up to 24 hours prior to transplant.

Fiona Bruce, news anchor and broadcaster, hosted the ceremony where a number of other Academy awards were presented. The President's Medal went to Professor Richard Williams OBE FREng FRSE in recognition of his extraordinary service to the Academy over two decades.



▲ Dame Ann and HRH The Princess Royal with the Bombardier team

The Silver Medals, which recognise outstanding personal contributions to engineering in the early to mid-stage of careers, were presented to Dr Daniel Elford, Chief Technology Officer, Sonobex; Jennifer Griffiths MBE, Founder, Snap Tech and Professor Paul Newman FREng, Founder, Oxbotica.

The Rooke Medal went to European Space Agency Astronaut Major Tim Peake CMG in recognition of his inspirational promotion of engineering and space through the Principia mission's education programme, the largest and most successful educational campaign supporting a European astronaut mission. Unfortunately, he could not be there on the night, but pre-recorded a video message thanking the Academy.

The RAEng Engineers Trust Young Engineer of the Year awards, established with the support of The Worshipful Company of Engineers, were presented to Rosie Goldrick, Engineering Director, MASS; Sophie Harker, Aeronautical Performance Engineer, BAE Systems; Dr Giorgia Longobardi, Founder and CEO of Cambridge GaN devices Ltd; Dr Áine Ní Bhreasail, Senior Engineer, Arup; and Dr Mariia Sorokina, Academy Research Fellow, Aston University. Rosie also won the Sir George Macfarlane Medal for demonstrating outstanding excellence in the early stage of her career.

The Major Project Award was presented by Warren East CBE FREng FRS, CEO of Rolls-Royce, to the team behind BP's Shah Deniz 2. This project delivers part of the Southern Gas Corridor, a European Commission initiative to provide a reliable source of natural gas from Caspian and Middle Eastern regions to Europe.

The Academy's Awards Dinner was supported by headline sponsor Rolls-Royce and silver sponsors BP and Lockheed Martin.

President's column



This year's annual Awards Dinner was a very special occasion. Once again, the Academy recognised and rewarded some exceptional engineers at all stages of their careers, but this time much of the focus was on the MacRobert Award's 50th anniversary. Since 1969, the award has celebrated innovation in UK engineering, honouring the engineers behind projects that have achieved commercial success and benefited society. On 30 July, the Academy will again celebrate the achievements of these pioneering engineers at a reception at St James's Palace for former winners and finalists.

The Awards Dinner was just one event in a very busy summer, and it was a pleasure to meet up with Fellows on many occasions. Following her keynote speech at the Awards Dinner, Professor Frances Arnold FREng was honoured at a lunch at Prince Philip House. This was our opportunity to congratulate one of our Fellows on winning the 2018 Nobel Prize in Chemistry: Professor Arnold's breakthrough research on directed evolution of proteins and enzymes has led to many engineering and medical innovations, as well as recognition at the highest level. Earlier in June, the Academy also hosted a lunch to celebrate International Women in Engineering Day. First introduced in 2018, the event is a great opportunity for young women engineers to network with senior industry leaders. At the lunch, we heard from Dr Caroline Hargrove FREng, Chief Technology Officer at Babylon Health, who discussed why emerging technologies are attractive to women engineers.

Another event I was pleased to see return, after first being introduced in 2018, was the Summer Reception. This provided Fellows with an opportunity to enjoy one another's company and the wonderful views from Prince Philip House's terrace. This year, it was also particularly important for me to be able to thank Fellows for their

support, as my five-year term as President finishes at the end of September.

Over that time, the Academy, and the engineering landscape in general, have seen some significant changes. In 2014, I was the first woman to be appointed as President of the Academy and I am pleased to say that since then diversity and inclusion (D&I) within the profession has been high on the agenda. The Academy has led a successful D&I programme to support and inspire more women, those from minority ethnic backgrounds, lesbian, gay, bisexual and transgender individuals, and people with disabilities to start and advance careers in the field. To date, close to 100 businesses have engaged in this effort. In 2018, we gained our first female Chief Executive with the appointment of Dr Hayaatun Sillem, and I know that she and our new President will continue to drive our D&I efforts forwards.

D&I is critical in a profession that develops solutions for the whole of society, and also an important part of how we address the skills gap. The skills shortage in engineering has been persistent, but we are beginning to see some progress. The *This is Engineering* campaign has helped open up engineering to a new generation and demonstrated the wealth and breadth of opportunities available in the profession. The films launched as part of this campaign have been viewed over 35 million times. Research carried out at the end of the campaign's first year has shown that consideration of engineering as a career option has almost doubled among teenagers who have seen the films, and increased more significantly among female and minority ethnic students. It is great to see that this work is having such an effect and the campaign has even more ambitious plans for the future, which I hope many people will get involved with.

Another area that the Academy will continue to influence going forward is policy, into which engineering input is so crucial for the UK at present. When I was appointed as President one of my first tasks was to lead a review, commissioned by the then Department for Business, Innovation and Skills, examining how government could support the development of more effective collaborations between businesses and universities. I am pleased that the government fully endorsed the review's findings in 2016. As well as policy changes, the review has led to developments in how the government supports universities and businesses to build collaborations. The Academy's own programmes have always encouraged

business-university collaboration and I am delighted that additional funding from the government's Investment in Research Talent programme has tripled our support for researchers and innovators.

Collaboration has been a consistent theme of my term as President and it is vital to every area of the Academy's work. In recent years, the Academy has coordinated policy reports and responses on behalf of the engineering profession. Building on that, a collaborative way of working has now been embedded through the establishment of the National Engineering Policy Centre, led by the Academy but bringing together the expertise of all of the UK's professional engineering organisations to provide advice to policymakers. I believe that this is a significant step forwards in ensuring that engineering realities and systems thinking inform government policies.

Engineering is playing an increasingly important role in society, and the engineering landscape has evolved significantly since I took up this post, progress that I believe the Academy's activities have contributed positively to. This has been enabled by our marvellous staff, our many collaborators, and particularly the support and involvement of Fellows. I would like to take this opportunity to thank you all for what you do for the Academy. There has never been a more important time for the Academy to advance and promote excellence in engineering so that our profession can continue to contribute to societal wellbeing and economic growth.

Meetings and visitors

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

Engineering UK
The National Academy Presidents with Sir Adrian Smith FRS and Science Minister Chris Skidmore MP
Andrew Stephenson MP
Engineering and Physical Sciences Research Council with Dr Hayaatun Sillem

She attended the following events and meetings:

Hosted the President's Dinner
Department for Business, Energy and Industrial Strategy Brexit High-Level Group meeting
Order of Merit Luncheon, Windsor Castle
James Watt Bicentenary Symposium
House of Lords Science and Technology Committee inquiry into science research funding in universities
Council of Science and Technology
Speech at Universities UK Pro-Vice Chancellors' Research Seminar

Smart medicine dispenser wins the Africa Prize for Engineering Innovation

On 4 June, Neo Hutiri, a 31-year-old South African electrical engineer, won the Academy's 2019 Africa Prize for Engineering Innovation at a ceremony in Kampala, Uganda.

Hutiri and his team developed Pelebox, a smart locker system designed to dispense medicine to patients with chronic conditions. It is a simple wall of lockers, controlled by a digital system. Healthcare workers stock the lockers with prescription refills, log the medicine on the system, and secure each locker. Pelebox then sends patients a one-time PIN, which they use to open their locker and access their medicine. The system is used at public healthcare facilities in South Africa, cutting down on long queues and easing pressure on the healthcare system.

Training received through the Africa Prize helped the Pelebox team to change their focus from product development to manufacturing, and to obtain a trademark for the brand.

Dr John Lazar CBE FREng, an Africa Prize judge, said "Hutiri is a deserving winner. Pelebox will improve healthcare for everyone using and working in a severely strained public healthcare system."

Hutiri won the first prize of £25,000, after the four finalists from across sub-Saharan Africa delivered presentations at the final event in Uganda. The Africa Prize judges and a live audience then voted for the most promising engineering innovation.

Hutiri said: "Winning the Africa Prize is a massive achievement for us. We can now ramp up our manufacturing efforts using the prize money. The networks we are part of will also be instrumental for the growth of our business."

The three runners-up each won £10,000. They are: KAOSHI, a mobile app that connects money senders across the globe invented by Chukwunonso Arinze from Nigeria; Smart Havens Africa, sustainable smart homes built from appropriate and affordable technologies that make home ownership more accessible to African women, created by Anne Rweyora from Uganda; and Sign-IO, a mobile app with smart gloves that track



▲ Neo Hutiri (centre) with judges Dr John Lazar CBE FREng and Marième Jamme

and translate sign language movements into speech and text in real time, developed by Roy Allela from Kenya.

The 16 shortlisted Africa Prize entrants, from six countries in sub-Saharan Africa, received eight months of training and mentoring where they developed business plans and learned to market their innovations. The group received coaching on communicating effectively, focusing on customers and approaching investors with confidence.

Their innovations included affordable, disposable baby delivery kits, an online platform to track vaccination data, a 'farm-in-a-box' for urban areas and an app to teach toddlers basic language and numeracy skills in their native language.

The Africa Prize for Engineering Innovation is Africa's biggest prize dedicated to engineering innovation. Now in its sixth year, it encourages talented sub-Saharan African engineers, from all disciplines, to develop innovations that address crucial problems in their communities in a new and appropriate way. It provides a unique package of support, including comprehensive business training, bespoke mentoring, communications support and access to the Academy's network of high profile, experienced engineers and experts.

For more information on the Africa Prize, visit www.raeng.org.uk/africaprize



▲ (left) Pelebox Smart Lockers, and (right) Anne Rweyora, Founder of Smart Havens Africa, which builds sustainable smart homes for women

Research and innovation

Regional Enterprise Hubs

The Enterprise Hub is currently pursuing opportunities to set up regional Enterprise Hub centres in different parts of the UK.

One of the Enterprise Hub's key challenges is raising awareness of its activities across the UK to attract the best candidates for its early-stage entrepreneurship and SME programmes. Regional Enterprise Hubs could address this challenge. Several conversations have been started in Northern Ireland, Wales, Scotland, Sheffield, Leeds, Harwell, Manchester, and Cambridge.

The regional centres would be an Enterprise Hub-branded space on the premises of an independent third party. This would enable Hub members and mentors to use the premises regularly for mentoring, networking events and training. Funding permitting, the Academy will have a dedicated employee to manage and grow the Hub's regional presence and ensure that the Enterprise Hub is embedded in the local innovation and entrepreneurship ecosystem.



▲ Hub members at the Launchpad competition

The Academy is looking for regional champions: Fellows who are interested in supporting the Enterprise Hub's mission and are willing to help grow its activities outside London and the South East.

If you are interested in becoming an Enterprise Hub regional champion or if you know of any organisations regionally that you believe would be good partners for the Enterprise Hub, please contact Ana Avaliani, Head of Enterprise, at ana.avaliani@raeng.org.uk

East Midlands regional lecture

On 2 May, the University of Nottingham hosted the East Midlands regional lecture. Professor Serena Best CBE FEng, Professor of Materials Science at the University of Cambridge, delivered the talk on tissue engineering scaffolds.

For many years, biomaterials have been used to replace human tissues damaged by injury or disease. However, Professor Best explained that more recent research has focused on ways to encourage the body to repair itself by encouraging biological

cells to assist in the regeneration process. The lecture also covered recent work that has been undertaken to optimise the structure and properties of scaffolds for a range of clinical applications in hard and soft tissue repair. (This work featured on a commemorative postage stamp in the recent Royal Mail celebration of British engineering – see page 13).

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

WASHing away inequalities - Frontiers of Engineering for Development travels to Mexico

In June, the seventh symposium of the GCRF Frontiers of Engineering for Development programme took place in Mexico City. It focused on how resilient and robust systems and innovative solutions in the water, sanitation and hygiene field can help tackle inequalities.

The event gathered 60 early- to mid-career engineers and WASH practitioners from around the world to build new interdisciplinary, collaborative partnerships. It was co-chaired by Professor Barbara Evans who holds the chair in public health engineering in the School of Civil Engineering at the University of Leeds and sits on the Academy's International Committee, and Dr Darren Saywell who is an internationally recognised WASH expert and AECOM's Director of Water Services. Both event chairs shared a wealth of expertise and knowledge with the delegates.

At the end of the event participants collaborated to write



▲ Participants at the symposium in Mexico City

applications for follow-up seed funding worth between £15,000 and £30,000 that will help to kick-start new interdisciplinary projects between groups of event participants. To find out about the successful applications, for more information about the programme, or to nominate someone to attend a future symposium, please visit www.raeng.org.uk/FoE-for-Dev

Changing the innovation ecosystem in the Philippines

In April, the Academy published an impact report about its Leaders in Innovation Fellowships (LIF) in Manila, the Philippines.

The report was based on an evaluation study of LIF's impact in the Philippines, and found that one of LIF's greatest impacts was on institutional entrepreneurship and innovation (E&I) capacity. LIF participants, and other stakeholders who have been inspired by LIF, have gone on to set up technology transfer offices, introduced new entrepreneurship courses, and developed E&I enabling policies and procedures at their home institutions.

The report highlights the importance of UK collaboration with emerging countries where science and innovation is a priority area for development. The Academy is building expertise in applying engineering and innovation to tackle global challenges practically through entrepreneurship.



▲ A report about the impact of LIF in the Philippines was launched in Manila

LIF is an entrepreneurship capacity-building programme that has supported over 900 innovators across 16 emerging economies under the Newton Fund. In the past five years, the LIF Philippines programme has supported 75 Filipino researchers to commercialise innovations aimed at addressing social and economic challenges in their country, as well as the UN Sustainable Development Goals.

For more details on the LIF programme and its global impact, contact Cristina Lisii at cristina.lisii@raeng.org.uk

Leverhulme Trust Senior Research Fellowships

In March, the Academy awarded seven UK researchers with Leverhulme Trust Senior Research Fellowships.

These awards aim to support academics to concentrate on full-time research by funding a replacement academic to take over their teaching and administration duties for up to a year. The awardees will take up the fellowships in September and October 2019.

The newly appointed awardees and their research projects are:

Dr Richard Martin, Aston University - Developing bioactive glasses for bone cancer therapy

Dr Rosa Letizia, Lancaster University - Additive manufacturing scaffolding of complex millimetre-wave components for space and wireless communications

Dr Konstantinos Tsavdaridis, University of Leeds - Flexible and resilient 3D-printed metallic connections for modular buildings

Dr William Smith, University of York - Model-based computer vision meets deep learning

Dr Wenqing Liu, Royal Holloway University of London - A solution for robust nano-electronics: topological protection

Dr Tuck Seng Wong, University of Sheffield - FlexiChem: feedstock flexibility in chemical manufacturing

Dr Min Pan, University of Bath - Digital hydraulic converters for next-generation fluid power transmission technology

The next call for proposals for the scheme will open later in 2019, for Fellowships starting in 2020. Visit www.raeng.org.uk/leverhulme for more information.

In the spotlight: Dr Priti Parikh

Dr Priti Parikh from University College London has taken up the post of BBOXX/Royal Academy of Engineering Senior Research Fellow in smart solar solutions for all (S34ALL).

Dr Parikh develops predictive models to understand energy consumption for smart solar home system users in Rwanda and Kenya. Using real-time energy consumption data collected through BBOXX's Internet of Things platform, combined with qualitative tools such as consumer interviews, Dr Parikh and her team will use artificial neural network models to predict energy consumption trends for low to middle income countries. Consumption patterns in these countries are often erratic and

historical data is limited. The models will provide valuation evidence to inform decision-making on market expansion in sub-Saharan Africa.

Dr Parikh said: "At approximately 42% in 2016, the household electrification rate in sub-Saharan Africa is the lowest in the world. As energy access has a fundamental role to play in poverty alleviation, S34ALL's aim of generating an evidence base, ensuring sustainable and affordable energy access, is vitally important."

The five-year Research Chair and Senior Research Fellowship posts are co-sponsored by industry to support excellent academics in UK universities who are undertaking use-inspired research with industrial partners. The next deadline for Research Chair and



Senior Research Fellowships applications is 4.00pm on 3 September.

For further information, please see www.raeng.org.uk/researchchairs or contact lucy.wheeler@raeng.org.uk

Nine new Chairs in Emerging Technologies

In April, the Academy announced nine new Chairs in Emerging Technologies.

The scheme awards £2,780,000 to global research visionaries over 10 years, who will lead major research, translation and innovation programmes around key emerging technologies that will have significant UK economic and social benefit.

The newly appointed Chairs in Emerging Technologies and their research projects are:

Professor Yiannis Demiris, Imperial College London – Personal assistive robots

Professor Judith Driscoll FREng, University of Cambridge – Scaleable ultralow power memory through materials innovation

Professor Daniele Faccio, University of Glasgow – Artificial intelligence and quantum-inspired imaging

Professor Michael Fisher, University of Liverpool – Responsible autonomous systems

Professor Alejandro Frangi, University of Leeds – INSILEX: Computational precision medicine for in silico trials of medical devices

Professor Peter Lee, University College London – Transforming additive manufacturing via multiscale in situ imaging

Professor Barry Lennox FREng, University of Manchester – Transforming operations in the nuclear industry using robotics

Professor Keith Mathieson, University of Strathclyde – Neural interfaces for the understanding and treatment of neurodegenerative conditions

Dr Guy-Bart Stan, Imperial College London – Accelerating engineering biology: efficient engineering of reliable and high-performance biosystems

The next round will open in October. For more information about the scheme, visit www.raeng.org.uk/ciet

GCRF Africa Catalyst awardee meeting

From 28 April to 1 May, awardees, alumni and key stakeholders of the GCRF Africa Catalyst programme met in Kigali, Rwanda to discuss shared challenges and lessons learned from the programme's activities to date, as well as the future aspirations for the community of professional engineering institutions in sub-Saharan Africa.

The topics discussed at the meeting were selected by the awardees, many of whom are prominent members of the African engineering community. The discussions fell into six categories: questioning what it means to be a catalyst; success stories in capacity building; inspiring the next generation; diversity and inclusion; stakeholder engagement; and how to maximise impact. Lively discussions on these topics were chaired by members of the programme steering group – Joanna Maduka, Yewande Akinola and David Thomlinson FREng. Key lessons and advice gathered at this event will help shape future phases of the GCRF Africa Catalyst programme, with Phase 3 projects due to begin in October 2019.

The programme aims to support capacity-building activities for professional engineering bodies in sub-Saharan Africa, to effectively promote the profession, share best practice and



▲ Participants of the GCRF Africa Catalyst awardee and alumni annual meeting 2019

increase local engineering capacity to help drive development.

Between December 2016 and July 2017, the Academy funded 15 pilot projects. These included organisational capacity building, promoting diversity and inclusion within the profession, and bridging the skills gap between university graduates and the needs of local employers. Following a review of the pilot stage, the programme sought a more strategic approach, awarding eight projects in December 2017 under Phase 2. These range in length from one to three years and vary in the size of each grant.

For more information about the programme and related resources, please visit www.raeng.org.uk/Africa-Catalyst

Business and commercialisation training for awardees

In March and June, the Academy held its first business and commercialisation training sessions for Research Fellows.

The programme consisted of two sessions over four days, which covered a range of hard and soft skills to provide

Research Fellows with a foundation on which to develop their research ideas commercially. Research Fellows learned the fundamentals of business environment and customer markets, intellectual property protection, finance and options for commercialisation. In June, the sessions covered presentation and communication skills, leadership and team management. Former Research Fellows were also invited to give talks and

share their commercialisation experience with the delegates.

The Academy has appointed Ecleqtig and Searle Management Consulting to deliver the training programme.

The Academy will run the business and commercialisation training annually as one of several training programmes to support Research Fellows.

Lloyd's Register Foundation programmes

The Academy is implementing three new programmes on behalf of the Lloyd's Register Foundation. The programmes will focus on building engineering skills where they are most needed; improving safety at the end of engineered life; and improving the safety of complex systems.

The skills programme has commissioned the *Economist* Intelligence Unit to conduct a Global Engineering Capability Review, mapping skills to current and projected demand for countries across the world. This is accompanied by a 'Call for Ideas' survey that gathered over 100 respondents to identify critical areas of need and shape an open grants call that will help address them.

On 8 and 9 July, the first workshop to address safety issues in the decommissioning of offshore structures including ships

took place. This was part of the Academy's *Global review on safe decommissioning*, a study that will map global engineered waste flows and assess the relative safety of the decommissioning practices where they end up. It will identify unsafe hot spots for each sector and the Academy will then convene relevant stakeholders to identify and address challenges through thematic workshops and grant fund collaborations.

On 19 July, the safer complex systems programme held a workshop to scope and identify case studies of global failures and successes. Funding and public engagement programmes will follow.

The Academy welcomes Fellow engagement in shaping the content of the programmes, and identifying key partners to work with to broaden reach and deepen impact. To find out more, email shaarad.sharma@raeng.org.uk

National academies gather in Sweden

Between 25 and 28 June, an Academy delegation attended the 2019 International Council of Academies of Engineering and Technological Sciences (CAETS) convocation in Sweden.

The annual event was hosted by the Royal Swedish Academy of Engineering Sciences, and gathered national academies from around the world to share knowledge and focus collaborative effort towards tackling the biggest global challenges. Delegates included representatives from CAETS's 29 member academies plus local professionals and students.

This year's theme was *Engineering a better world: the next 100 years*. The event explored challenges and solutions from fields including healthcare, transport, astrophysics, energy, and social science. The Academy discussed challenges impacting the engineering profession including D&I, education and public engagement through CAETS discussion groups and bilateral meetings with partner academies.

The Academy's delegation was led by Professor Dame Ann Dowling OM DBE FREng FRS and International Committee Chair David Thomlinson FREng. Professor Nick Tyler CBE FREng was on the CAETS 2019 International Programme Committee. The conference speakers included Brian Mwitwi Mwenda, 2018 Africa Prize finalist, and Yewande Akinola, a QEPrize Ambassador.

Connecting STEM Teachers celebration event

On 3 July, the annual Connecting STEM Teachers celebration event took place at the Academy.

It showcased the achievements of teacher coordinators, teachers and pupils who are part of the programme. Teachers and pupils had the opportunity to share their experiences about STEM learning in their school.

During the spring and summer terms, the Academy also gained nine new teacher coordinators. The programme now has 43 teacher networks across the UK, including on the Isle of Wight, in south west Wales, and on the east coast of Kent. Networks in Blackpool, Glasgow, Edinburgh, Northern Ireland, the north coast of Cornwall and Scarborough will follow.

Connecting STEM Teachers is now in its eighth year and continues to be the Academy's flagship schools programme. It is designed to help address the UK's well-documented shortage of engineers and technicians, whose skills are necessary to drive economic growth. Since 2011, the programme has created a national support network for more than 900 primary and secondary school teachers across the STEM subjects. Teachers have engaged more than 359,000 student beneficiaries in STEM activity across the UK.

Education and skills



▲ Students from Bolton UTC at the celebration event

Connecting STEM Teachers continues to be supported by Shell, The Helsington Foundation, Boeing and Petrofac.

Welsh Valleys summer internships

In May, the Welsh Valleys Engineering Project launched its summer internship scheme to support future career pathways for engineering students from two further education colleges.

The scheme was set up to encourage promising students from disadvantaged backgrounds and underrepresented groups to develop technical and personal skills through work placements in the local engineering and technology industry. This summer, the 10 four-week placements are at companies including BAE Systems, Panasonic and Hawker Siddeley Switchgear.

In September 2018, the Future Engineers Scholarship Bursary Scheme was introduced to allow GCSE students to study STEM-

focused A level or vocational qualifications. In the first year, 10 bursaries were awarded and this year the number has risen to 30, of which 33% were awarded to female students.

Launched in November 2017, the Welsh Valleys Engineering Project is a regional schools programme that delivers focused STEM education support for students and teachers in Blaenau Gwent and Merthyr Tydfil.

The Welsh Valleys Engineering Project is supported by the Panasonic Trust with additional contributions from two other funders.

To find out more, visit www.raeng.org.uk/welshvalleys

Building capacity through industry-academia partnerships

In June, the Academy opened a new call for funding for its Higher Education Partnerships in sub-Saharan Africa (HEP SSA) programme.

HEP SSA was established in 2013 to strengthen engineering education through structured industry-academia partnerships. The programme's aim is to ensure that students are graduating with the necessary skills needed by local and regional industry. To date, the scheme has funded 15 universities across sub-Saharan Africa. It has supported over 200 engineers from both industry and academia to undertake secondments to develop practical skills and improve teaching approaches. It has also enabled over 2,000 students to strengthen their

practical skills through exposure to local and regional industry.

Dr Esther Phiri, a lecturer at the University of Malawi the Polytechnic, was seconded to Castel Malawi, the leading beverage producer in Malawi. She explained that the three-month secondment helped her develop industrial experience, turning theories into practical knowledge and provided first-hand experience on how to improve her curricula and teaching.

There is a real need to strengthen engineering capacity in sub-Saharan Africa. According to the *Engineers for Africa* report, engineering courses are often too theoretical, based on outdated curricula and not relevant to local needs. Working with UK academia, HEP SSA supports sub-Saharan African universities to tackle local challenges and build capacity, showcasing engineering as both a driver of economic and international



▲ Students at the University of Zimbabwe during a practical tutorial

development. The Academy is seeking UK and African academics to form partnerships aimed at strengthening engineering education. For more information on the programme and to apply for funding, visit www.raeng.org.uk/hepssa

Theme park education resource for Wonder Park

The Academy has worked with INTO Film to develop an educational resource for primary schools based on *Wonder Park*, a computer-animated adventure film about a theme park produced by Paramount.

Over four lessons, the *Wonder Park: imagination and invention* resource explores the engineering feats that go into building a theme park, introducing concepts such as push and pull, gravity, friction, and size of forces. The resource takes one of the most exciting things for a young person – theme parks – and uses that excitement to enhance their knowledge and skills across STEM and other curriculum areas.

The resource has already been downloaded 1,000 times by primary school teachers across the country, with 400 printed packs sent out to the first 400 schools who registered interest. Schools were invited to enter a competition where young learners can demonstrate their creativity and design skills



▲ The *Wonder Park* competition winners at the Connecting STEM Teachers event

and the competition winners were invited to the Academy Connecting STEM Teachers celebration event.

The resource can be downloaded for free from www.intofilm.org/resources/1497

The Big Bang Fair

In March, the Academy took part in EngineeringUK's Big Bang Fair in Birmingham, a free four-day festival celebrating science, technology, engineering and maths.

The Academy's stand was a hub of activity where young people could take a Marvel quiz to find out which *This is Engineering* hero matched their attributes. Attendees could also take part in the Rugged Rovers competition, where they were challenged to design a space rover that could travel the furthest distance across Mars. Young learners also had the opportunity to program Marty the Robot to travel across an obstacle course, and could work collaboratively to construct a bridge.

The fair attracted 80,722 visitors over the four days, of which 60,501 were young people, with an equal gender split.



▲ Students collaboratively build a bridge at Big Bang Fair

Engineering Leaders Scholarships

On 25 March, the Engineering Leaders Scholarships selection event took place. Almost 70 undergraduates who demonstrated both leadership potential and a commitment to engineering took part in interviews and activities to determine who should be awarded this year's scholarships.

The scheme received a record number of applications this year and, thanks to the introduction of three Sir Ralph Robins Scholarships each year, can now award up to 38 scholarships. The Sir Ralph Robins Scholarships recognise individuals from underrepresented and underprivileged backgrounds who

also meet all the requirements of the Engineering Leaders Scholarships programme.

48% of the awardees are women. The awardees attend 20 different higher education institutions across the UK and cover the breadth of engineering disciplines.

Any Fellows who would like to support the scholars either through mentoring, becoming involved with the annual training and networking weekend, or through introducing scholars to organisations and networks, should contact Jacqueline Clay at jacqueline.clay@raeng.org.uk

New Visiting Professors

On the 15 May, the Academy announced 34 new Visiting Professors across 27 universities, including seven post-92 universities.

This year, the scheme had a record 68 applicants, including 10 applications from women, which were all awarded. On the 18 June, the new Visiting Professors attended an induction conference at the Academy with their host academic champion. The new professors had a chance to meet each other and discuss their plans, goals, concerns and what success will look like for them over the next three years. Attendees also heard from past awardees about their experience.

This industry-into-academia initiative aims to use the Visiting Professors' experience to enhance student learning and the employability and skills of UK engineering graduates.

Under the scheme's objectives, senior industry practitioners participate in course development, face-to-face teaching and mentoring of engineering undergraduates at the host university for at least 12 days a year for three years.

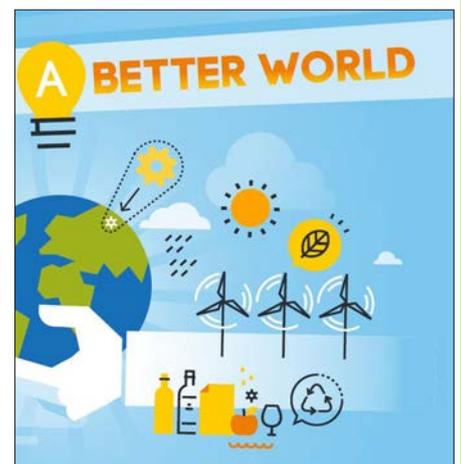
Engineering a better world resource

On 3 July, the Academy launched a STEM resource inspired by innovations from the Africa Prize for Engineering Innovation.

Engineering a better world is a series of activities, practical tasks and discussion points that explore the role that young engineers and entrepreneurs play in developing innovations that bring social and environmental benefits to different countries across sub-Saharan Africa. It provides practical and contextualised

applications to demonstrate the role that STEM-based learning plays in global real-world engineering scenarios.

The Academy worked closely with Charles Ofori, Co-Founder of the DEXT Science Set, a 2018 Africa Prize finalist. Charles and the team helped develop practical tasks for the resource, and a DEXT Science Set is included in each resource box. The activities link to Africa Prize for Engineering Innovation businesses, such as building a circuit and lighting systems for a window farm, inspired by The Vertical Farm.



Thought leadership

Royal Academy of Engineering and Royal Society of Edinburgh Joint Lecture

On 5 June, Professor Dame Ann Dowling OM DBE FREng FRS delivered this year's Royal Academy of Engineering and Royal Society of Edinburgh Joint Lecture.

The lecture took place at the University of Glasgow after a one-day symposium that was part of the University of Glasgow's events celebrating the bicentenary of James Watt FRS FRSE.

In her talk, Dame Ann explored the role of grand challenges, from climate change to providing resources for an expanding world population, inspiring and driving progress in engineering.

Dame Ann also received an Honorary Degree from the



▲ Dame Ann Dowling received an Honorary Degree from the University of Glasgow after giving the annual joint lecture with the Royal Society of Edinburgh

University of Glasgow. Her lecture was followed by a Q&A session hosted by Dame Ann Glover DBE FRS FRSE, President of the Royal Society of Edinburgh.

D&I framework for SMEs

The Academy is developing a framework to support improvements in diversity and inclusion (D&I) in SMEs.

The new framework will build on the existing *D&I Progression Framework* for professional engineering organisations (PEIs). Analysis by the Office of National Statistics for EngineeringUK indicates that the engineering industry is dominated by smaller firms (those with under 50 employees), which account for 98% of all engineering businesses in the UK. This means that any attempt to increase D&I across engineering must actively engage with smaller employers.

The framework will be specifically designed for organisations employing 250 people or fewer - including startups, scaleups and steady-state SMEs. It will be proportionate to organisation size, address SME D&I needs and aspirations, challenge the status quo, and use a maturity model approach to support the integration of D&I across organisational functions.

To successfully deliver this project, the Academy is seeking engagement with SMEs to inform both the research and the pilot phases of framework development. To find out more or get involved, please email arti.dillon@raeng.org.uk

Women's Engineering Society Centenary Survey

The Academy has partnered with the Women's Engineering Society (WES) to mark its centenary with a survey of women and men in engineering.

The online survey was launched on 23 June to coincide with International Women in Engineering Day 2019 (INWED). It aims to take a critical view of the experiences of women and men in the engineering profession and compare experiences to better understand key information.

Questions include what keeps them in engineering, what they enjoy about their roles, and whether they have the support they need (both professional and personal) to reach their career goals. The results will be available in late 2019.

The Academy was one of INWED's main sponsors this year, supporting WES in its centenary year. The theme for this year was transform the future, and the day was used to inspire more women and girls into a career in engineering.

To take part in the survey, visit <http://bit.ly/2ZPaCF5>

LGBT+ STEM day

This year, the Academy marked LGBT+ STEM day by raising awareness internally, attending London Pride and hosting a panel discussion.

On 6 July, Academy employees took part in the London Pride parade, celebrating 50 years of activism, protests and victories such as the decriminalisation of homosexuality in the UK.

On 16 July, *The power of numbers: the importance of measuring diversity* panel discussion took place at the Academy. The event was organised jointly with InterEngineering to discuss the power of data. The Academy's inclusive cultures report found that LGB engineers were over 40% less likely to be open about their sexual orientation than their heterosexual counterparts. The panel also discussed findings from the US Chamber of Commerce Foundation, which found that LGBT-inclusive companies attract better talent, increase retention and have stock prices grow by an average of 6.5%. As an industry, engineering needs to become better at measuring D&I to be able to make meaningful progress.

For more information, visit www.raeng.org/LGBTSTEM2019

INWED Leadership Lunch

On 17 June, as part of INWED celebrations, the Academy hosted its second INWED Leadership Lunch to provide a forum for the next generation of engineers to network with senior industry leaders to share advice, experience and encourage participation from both sides.

Dr Caroline Hargrove FREng, Chief Technology Officer at Babylon Health, gave the keynote presentation on *Why emerging technologies attract female leadership*. She highlighted that despite the near equal gender split overall, there are still very few women in AI and engineering. However, most teams are multidisciplinary, so are reasonably well-balanced and probably better performing as a result. Dr Hargrove said: "I believe that emerging technology companies with a social purpose can really help promote and develop women leaders."

A high-level guestlist made up of Fellows, female senior industry representatives and Academy stakeholders met early-



▲ Dr Caroline Hargrove FREng with Dame Ann Dowling

career female engineers to encourage diversity and broaden networking opportunities.

For more information on the INWED campaign, visit www.raeng.org.uk/IWD

National Engineering Policy Centre roundup

In May, the Centre held a working group meeting chaired by Tim Chapman FREng to map the current system of housing and infrastructure delivery at the request of the Infrastructure Project Authority. The Centre will develop a shared perspective with partners and stakeholders from across housing, infrastructure and planning, including relevant PEIs, thematic experts and other professional bodies.

In the same month, the working group for the *Safety and ethics of autonomous systems* project also met. Led by

Professor Nick Jennings CB FREng, the project aims to support the UK to lead in this potentially very large market by looking at how autonomous systems are developing across sectors, investigating the common challenges, approaches to regulation and emerging best practice.

The Centre is also working with its partners to develop a set of shared messages on the priorities for the engineering community ahead of upcoming spending and policy decisions from the government. The Centre and its partners are embarking on a coordinated set of activities and engagement to provide a unified voice for the engineering community on policy

decisions during the spending review.

Following the Academy's explainers on *Increasing R&D investment: business perspectives*, the Academy is collaborating with PEIs for further work. The new project will dig deeper into the barriers that prevent companies investing more in R&D in the UK and will help identify actionable policy solutions to these, informed by practitioners. Professor Neville Jackson FREng chairs the project, which is being carried out over the summer and autumn to feed into the publication of the government's roadmap to reaching its 2.4% target for investment in research and development.

Policy Fellowships

Following a successful pilot, the National Engineering Policy Centre has awarded five Policy Fellowships to senior civil servants.

The new Policy Fellows are:

- Alex Holmes, Deputy Director for Cyber Security at the Department for Digital, Culture, Media and Sport
- Siobhan Campbell, Head of the Department for Transport's Central Research Team and the department's Deputy Chief Scientific Adviser
- Katie Black, Director of Policy, National Infrastructure Commission
- Matt Crossman, Team Leader on Infrastructure Resilience, National Infrastructure Commission
- Louise Owen, Science and Technology within the Office for Security and Counter-Terrorism at the Home Office.

The programme enables Policy Fellows to explore pressing policy questions facing them and their departments, increases their understanding of engineering and strengthens their propensity to engage with the technical community in the development of policy.

The pilot kicked off on 28 March with a half-day session on engineering, systems thinking and a brief unpacking of participants' questions. Participants then completed a bespoke programme of interactions with engineering leaders drawn from Academy Fellows, Enterprise Fellows, Senior Research Fellows and Chairs in Emerging Technologies.

The pilot was overseen by a working group chaired by Dr David Cleevly CBE FREng and will be confirmed as a new feature of National Engineering Policy Centre in the autumn.

Global Grand Challenges student competition

In June, the Global Grand Challenges competition showcase took place, and five winning UK teams were selected to compete with teams from the US and China at the Global Grand Challenges Summit in September.

The five winning teams were from the University of Cambridge, University of Surrey, Heriott-Watt University and two teams from Loughborough University. They were selected after a workshop in April where 18 interdisciplinary teams from across the UK identified the global problems to be solved and created business models. The teams gave *Dragons Den*-style pitches, and received feedback from Academy Fellows, Queen Elizabeth Prize for Engineering Ambassadors and senior Academy staff.

To ensure that the Global Grand Challenges Summit 2019 is a global event, the Academy is holding an open call for emerging



▲ The University of Cambridge team with their innovation

economy country organisations to host a satellite event that will be directly linked to the summit in London. The Academy is also inviting engineers, innovators and researchers across all career stages from emerging economies to apply to attend the summit to benefit from the expertise and discussion that will take place in September. For more information, contact catherine.wanjiku@raeng.org.uk

Prizes, awards and grants workshop

On 16 May, the Academy and the Science Council held a workshop for PEIs and science bodies to increase D&I in prizes, awards and grants.

The workshop focused on developing professional body capability to increase D&I in these areas by exploring challenges and sharing good practice. The event was hosted by the Institution of Engineering and Technology. A separate workshop focusing on education, training and accreditation, and examinations will take place in the autumn.

Thought leadership events

On 11 April, the Academy jointly organised a breakfast roundtable on *Upskilling for a digital economy* with Siemens in Manchester.

Professor Juergen Maier CBE FREng, Chief Executive of Siemens UK, hosted the event and Professor John Perkins CBE FREng facilitated the discussion. The discussions covered key areas such as the workforce skills needed for Industry 4.0, and the changes needed for the UK

education system to meet these needs. Participants also discussed what could be done to encourage and incentivise the full spectrum of the engineering industry to upskill their workforce.

On 11 June, the Academy hosted a dinner on future mobility. Guests were invited to discuss the question *How can we power a low-carbon transport system?*

The event brought together Fellows with academic expertise in the subject, as well as representatives from the aerospace, energy and transport sectors. Richard

Bruce, Director of Energy, Technology and Innovation at the Department of Transport, also attended as a government representative.

On 25 June, the Academy collaborated with BAE Systems to hold a one-day conference on *Skilled for the future* to address future manufacturing techniques and the engineering skills needed for them.

Delegates included senior stakeholders from the armed forces, industry and academia. Academy CEO Dr Hayaatun Sillem chaired a panel discussion.

Public engagement

La Sagrada Família in the making

On 23 May, Tristram Carfrae RDI FREng, Deputy Chairman of Arup, delivered a talk about Arup's role in the completion of Gaudí's La Sagrada Família.

During the talk, Tristram shared his insights on how engineering techniques have evolved to help complete the six main towers of the La Sagrada Família in Barcelona, using traditional craftsmanship alongside new digital methods.

Tristram has contributed to the design of many award-winning buildings, including the Singapore Sports Hub and 111 Eagle Street in Brisbane. He led the Arup team that received the



2009 MacRobert Award for the Water Cube, the venue for the swimming events at the Beijing 2008 Olympic Games.

The lecture and Q&A session was chaired by Michelle McDowell MBE FREng, Chair of the Engineering Council Group, and the talk attracted many students and school pupils.

Seven engineering wonders

In March, the *This is Engineering* campaign worked with young engineers to compile a list of the 21st century's engineering wonders to highlight the breadth of engineering.

The cutting-edge innovations that were chosen were YouTube, Gore-Tex Fabric, Hawk-Eye, 3D-printed bone implants, clean water, the iPhone and Dolby Atmos cinema sound. The list was drawn up with input from a range of experts and a panel drawn from the Academy's programmes for young engineers. It is part of the *This is Engineering* campaign, which aims to raise awareness of the diversity of engineering careers and help address the significant engineering skills and diversity shortfall that is holding back growth and productivity across the UK economy.

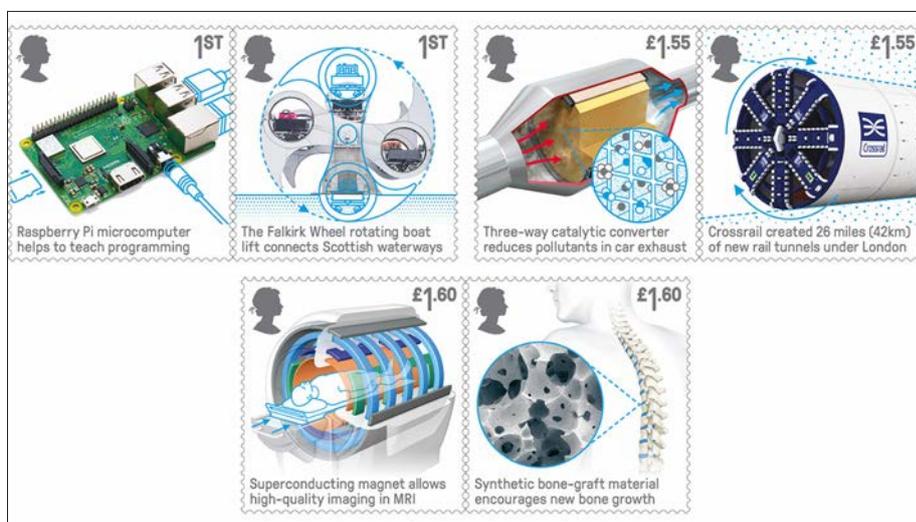
The list was also informed by a survey of 2,000 11 to 18-year-olds' attitudes to, and awareness of, engineering careers and industries. Over 95% of respondents were unaware that engineering jobs exist in the arts, healthcare, fashion, beauty and hospitality. While over half of teens correctly listed famous construction projects such as the Eiffel Tower, London Underground and the Shard as examples of engineering, less than 20% were aware that social media apps such as Snapchat and Facebook have been developed by engineers.

Professor Mark Miodownik MBE FEng, engineering broadcaster and writer, said "Engineering plays an essential part in everyday life, from the water we drink to the gadgets we use, and it's also vital to addressing the challenges of the future ... We hope our list of surprising, 21st century engineering wonders will inspire today's teenagers and give them new opportunities."

Royal Mail creates British engineering stamps

In May, Royal Mail launched a set of commemorative stamps to celebrate some of the marvels from the last 50 years of British engineering.

The new set of 10 stamps featured three past winners of the Academy's MacRobert Award, which marks its 50th anniversary this year. The set included the Raspberry Pi, the three-way catalytic converter developed by Johnson Matthey, and Oxford Instruments' superconducting magnets that enable MRI scanning. The stamps also feature the Falkirk Wheel, the world's only rotating boat lift, and Crossrail's tunnel boring project. The synthetic bone-graft material developed at Queen Mary University of London and used in orthopaedic treatment around the world completes the six-stamp set.



▲ The celebratory stamps feature three previous MacRobert Award winners: the Raspberry Pi, the three-way catalytic converter and the superconducting magnet © Royal Mail

A miniature set of four stamps featured the Harrier Jump Jet, celebrating 50 years since it entered RAF service. The Harrier was the first operational jet fighter in the world to use revolutionary

vertical short take-off and landing technology, powered by Rolls-Royce's Pegasus engine, joint first winner of the MacRobert Award in 1969.

Queen Elizabeth Prize for Engineering Ambassador app launched

The QEPrize is introducing new ways for its global ambassador network to communicate and collaborate with each other more easily.

The network has continued to grow and its membership now spans more than 14 countries around the world. The new ambassador app will enable members to share project resources, discuss engagement opportunities and access resources to help them to inspire the next generation.



▲ QEPrize Ambassadors with HRH The Princess Royal

Using the app, ambassadors will be able to: connect through shared interests and skills, providing access to the expertise needed to create projects and initiatives;

create and collaborate on engineering outreach projects using integrated social media sharing, project management, and document editing tools; and access key resources for training and projects. The app includes a comprehensive collection of resources, lesson plans, templates, and tips for members who want to make their ideas into a reality.

For more information on the ambassador network, and to learn how the network can benefit your organisation and colleagues, go to qeprize.org/ambassadors

Changing the image of engineering



▲ A prosthetics engineer © Institution of Engineering and Technology/ Linda Bennett

On 6 November, *This is Engineering* Day aims to change the public image of engineering.

Last year, the Academy's hugely successful *This Is Engineering* campaign introduced a different side of the profession to young people. This year, it wants to reach their parents, as career-gatekeepers. The project will involve creating a public library of images of what engineers and engineering really look like, in all their breadth and diversity. The Academy is working with partners to use the images as widely as possible online, to move diverse images of engineers and engineering further up Google search results. Currently, Google's image results for 'engineer' offer a singular and stereotypical view of the

profession, whereas the true image of the profession is much more varied in the 21st century.

This Is Engineering Day will be a day dedicated to publicly showcasing and celebrating a different, varied and surprising image of engineering and engineers. It will see the Academy work with a wide variety of companies and brands to share these images via online and offline public channels.

The Academy would welcome support from Fellows for this initiative. If you can help by providing or sharing exciting images of engineers and engineering, please contact Poppy Morgan at poppy-jayne.morgan@raeng.org.uk

Academy roundup

Reflecting on 50 years of innovation

Dr Dame Sue Ion DBE FREng FRS is Chair of the MacRobert Committee

Fifty years ago, the very first MacRobert Award was shared jointly between engineers from Freeman, Fox and Partners for its groundbreaking Severn Bridge design and engineers from Rolls-Royce for the Pegasus aircraft engine. The MacRobert Award was made possible by the generosity of Lady Rachel MacRobert who donated all her wealth to set up the MacRobert Trust after sadly losing her three sons as pilots just before and during the Second World War. The Trustees, prompted by one of their number Douglas Heughan HonFREng, created the MacRobert Award to celebrate the best of UK engineering, in keeping with Lady MacRobert's spirit.

Since then, we have seen the full breadth of UK engineering showcased. Over the years, finalists and winners

of the award have demonstrated in-depth understanding and advancement of science, and shown world-class engineering innovation and ingenuity to yield a range of commercially successful products with significant societal benefit.

Many have shown how important engineering is to the medical world in the creation of devices to advance diagnostics, from the EMI CT scanner in 1972 to Owlstone Medical's Breath Biopsy device last year, and in the advances in artificial limbs' functionality showcased by the Touch Bionics prosthetic hand (2008) and Blatchford's Linx prosthetic leg (2016).

For some, such as the Microsoft X-Box Kinect and the Raspberry Pi in the world of computer and software engineering, the technology has reached applications far beyond those for which it was originally conceived.

The judges have an almost impossible job of selecting a winner from what is always an outstanding field of submissions. This year was arguably one of the hardest - if not THE hardest - in comparing and contrasting companies in aerospace, photonics, medical engineering and artificial intelligence. All are commercially successful with very different business



▲ Dr Dame Sue Ion DBE FREng FRS

models and all affect lives for the better globally. They represent the absolute pinnacle of UK engineering.

Being a member of the MacRobert Committee and subsequently Chair is one of the most rewarding and enjoyable things I have ever done - albeit very challenging when it comes to selecting a winner. It has brought me into contact with some of the most exciting developments in engineering across a wide range of sectors and represents UK engineering talent at the top of its game. Some of the innovations we have encountered during my spell on the committee have been truly groundbreaking and life-changing on the global stage - who wouldn't want to be part of that!

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 September 2019. This can be done via the Academy's online system, which is found in the Fellows' area of the Academy's website: www.raeng.org.uk/fellowsarea. Fellows will require a username and password to access it. To retrieve a forgotten password, email webmaster@raeng.org.uk. All other queries regarding nominations should be directed to membership@raeng.org.uk

Media roundup

The announcement of the Academy's President-elect, Professor Sir Jim McDonald FREng FRSE, received extensive media coverage in February, with articles featured in *The Times*, *Mail on Sunday* and various Scotland-based outlets. The winners of the 2019 Queen Elizabeth Prize also continued to receive coverage throughout February and March, both nationally and internationally.

In March, the finalists of Pitch@Palace Africa 3.0 were interviewed by BBC World Service Business in Africa and featured in articles in *The Voice* and numerous Africa-based news outlets. The 'seven wonders of the engineering world' feature, run as part of the Academy's *This is Engineering* campaign, was featured in *Forbes*, *The Daily Star*, Fox News and engineering trade outlets. The annual STEM for Britain competition also attracted extensive coverage in local media.

In May, the annual Enterprise Hub showcase was covered by BBC World Service Tech Tent and London Live, which featured interviews with Hub members, and was covered by a variety of trade media. The series of Royal Mail stamps, which featured three past MacRobert Award winners, was covered by *The Scotsman*, regionals and trade, and received lots of engagement on social media.

The announcement of Bombardier as the winner of the 50th MacRobert Award was covered on BBC online, as well as extensive national, regional and trade coverage, including the *Financial Times*, *Independent*, Mail Online, *City AM*, *Metro*, and *The Engineer*. The win was mentioned on the early morning News Briefing on Radio 4 and Gavin Campbell FREng from Bombardier was also interviewed about the win on the BBC News Channel.

Legacies received

The Academy has received a legacy from Herbert Clements CBE FREng (1926 to 2016). It will provide additional support for the Academy's Connecting STEM Teachers programme. An obituary of Mr Clements, who developed the SSS clutch system, can be found on the Academy's website.

The Academy has also received a legacy from the estate of Lady Brenda Rooke,

widow of Sir Denis Rooke OM CBE FREng FRS, who served as the Academy's President from 1986 to 1991. As part of the legacy, the Academy has been gifted the collection of medals and awards that Sir Denis received during his distinguished career. The Academy is grateful to Diana and Peter Blair-Fish - daughter and son-in-law of Sir Denis and Lady Rooke - for the donation. The collection will be permanently displayed at the Academy.

2018 Annual Fund update

Thank you to all Fellows who contributed to the 2018 Annual Fund, which has raised a total of £38,000.

Since 2012, the Annual Fund has provided the Academy with valuable support for a range of existing Academy programmes and new initiatives. An update on how funds have been used will appear in the autumn newsletter.

Leave a lasting legacy

Thank you to all Fellows who have generously pledged a bequest to the Academy. Legacy gifts help the Academy bring together the most successful and talented engineers from across the profession to put engineering at the heart of a sustainable and prosperous society. For a confidential discussion about legacy giving, please contact Samantha Bagchi, Development Director, on 020 7766 0681 or samantha.bagchi@raeng.org.uk

Grant from Blavatnik Family Foundation

The Blavatnik Family Foundation has renewed its support of the Academy's Enterprise Hub for a further four years. As one of the Hub's earliest and longest-serving supporters, the foundation has played a key role in the Hub's growth and development. The Academy is most grateful for this continuing support.

News of Fellows

Professor Sir Tim Berners-Lee OM KBE FRS has been named the *Financial Times*' Person of the Year

Rt Hon Professor Lord Ara Darzi OM PC KBE FRS FMedSci has been awarded Japan's Order of the Rising Sun, Gold Rays with Neck Ribbon

Professor John Fisher CBE FMedSci has been awarded the Institute of Materials, Minerals and Mining's Chapman Medal

Professor Iain Gray CBE FRSE has been appointed Chair of the Centre for Modelling and Simulation

Dr Hermann Hauser KBE FRS has been appointed Vice-Chair of the European

Innovation Council pilot advisory board

Professor David Jones has been awarded the Institute of Materials, Minerals and Mining's Griffith Medal and Prize

Professor Robert Langer has joined the advisory board of Daré Biosciences

Professor Juergen Maier CBE has been appointed to the board of the Digital Catapult

Professor Lord Robert Mair CBE FRS has been elected a Foreign Member of the US National Academy of Engineering

Andrew MacLeod has been appointed Senior Independent Director of IQGeo Group plc

Professor Sir Jim McDonald FRSE has been awarded the Energy Institute's Melchett Award

Sir David McMurtry CBE RDI FRS has been named one of Ireland's greatest inventors

Sir John O'Reilly FLSW has been awarded the Honorary Citizen Award by the government of Singapore

Sir Robin Saxby FRS has been awarded the IEEE's Founders Medal

Sir Hossein Yassaie has been appointed Chair of Frontier Smart Technologies

Professor Robert Young FRS has been awarded the Institute of Materials, Minerals and Mining's Platinum Medal

HM The Queen's Birthday Honours

Congratulations to the four Academy Fellows who were recognised by HM The Queen in this year's Birthday Honours list.

Commanders of the British Empire
Sophie Wilson FREng FRS for services to computing

Officer of the British Empire
Professor Paul Collier FREng for services to science and technology
Professor Michael James Norton FREng for services to engineering and the digital economy

Professor Graham Wren FREng for services to education, to science and to engineering

This is Engineering supporters

Support for *This is Engineering* has continued to grow. During the second year of the campaign, additional support has come from MBDA, Teledyne e2v and Petrofac, as well as new academic partners the University of Oxford and Aston University.

For further information please visit www.thisisengineering.org.uk/partners

Forthcoming events

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

16 to 18 September 2019
Global Grand Challenges Summit 2019: Engineering in an unpredictable world
Venue: Queen Elizabeth Hall, Southbank Centre

30 September 2019
AGM
Venue: Prince Philip House

7 November 2019
New Fellows' briefing
Venue: Prince Philip House

7 November 2019
New Fellows' dinner
Venue: Drapers' Hall

21 November 2019
In Conversation with 2019 MacRobert Award winner: Bombardier
Venue: Prince Philip House

26 November 2019
Hinton Lecture and dinner
Venue: Prince Philip House

Sir John Fisher Foundation

The Sir John Fisher Foundation has confirmed an eighth year of support for the Barrow Engineering Project.

Since 2012, the foundation has enabled the Academy to provide the educational institutions involved in the project with small grants to support and develop STEM enhancement and enrichment activities.

The programme involves 10 primary schools, five secondary schools and the local college. These grants have helped provide over 70,000 STEM engagement opportunities for students in the Barrow area to date.



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Published by the Royal Academy of Engineering, Prince Philip House, 3 Carlton House Terrace, London SW1Y 5DG

Tel: 020 7766 0600 www.raeng.org.uk



The Royal Academy of Engineering promotes excellence in the science, art and practice of engineering. Registered charity number 293074

Obituaries

Professor Gero Madelung FREng died on 1 December 2018, aged 90. He was formerly Professor of Aircraft Design at Munich Technical University.

Mr Arthur Walsh CBE FREng died on 8 February 2019, aged 92. He was formerly Managing Director of the Marconi Company.

Professor Raymond Steele FREng died on 6 March 2019, aged 84. He was formerly Founder of Multiple Access Communications Ltd.

Mr Hugh Allen FREng died on 8 March 2019, aged 84.

Dr John Forrest FREng died on 11 March 2019, aged 75. He was formerly Chairman of Narec Capital.

William Carlyle FREng died on 3 April 2019, aged 92. He was formerly Senior

Partner at Binnie and Partners.

Mr Lionel Harris FREng died on 3 April 2019, aged 93. He was formerly Director at British Telecom.

Professor Leonard Maunder OBE FREng died on 20 April 2019, aged 91. He was formerly Emeritus Professor of Mechanical Engineering at Newcastle University.

Professor Fred Ward Williams FREng died on 23 April 2019, aged 79. He was formerly Emeritus Professor at Cardiff University.

Professor Michael Streat FREng died on 25 April 2019, aged 82. He was formerly Head of Chemical Engineering at Loughborough University.

Mr Albert Wheeler CBE FREng died on 3 May 2019, aged 85. He was formerly Deputy Chairman of British Coal.

Professor Ralph Benjamin CB FREng died on 7 May 2019, aged 96. He was

formerly Director of the Admiralty Underwater Weapons Establishment.

Mr Granville Camsey FREng died on 26 May 2019, aged 83.

Mr Robert Davidson Reith FREng died on 1 June 2019, aged 80. He was formerly Managing Director of Oscar Faber Consulting Engineers.

Mr Denis Earp FREng died on 1 June 2019, aged 90. He was formerly Director of Technical Services at Welsh Water.

Dr Stuart Mustow CBE FREng died on 3 June 2019, aged 90. He was formerly Past President of the Institution of Civil Engineers.

Dr Michael Reece FREng died on 3 June 2019, aged 92. He was formerly Director of Research and Development at GEC ALSTHOM.

Mr Roger Beteille FREng died on 14 June 2019, aged 97. He was formerly President and Chief Executive of Airbus.