Global Grand Challenges Summit 2019

On 16 to 18 September, the Academy hosted the 2019 Global Grand Challenges Summit at the Queen Elizabeth Hall within the Southbank Centre, London.

This year’s Summit, the fourth in the series, had over 700 guests from 30 countries attending, including more than 300 students from some of the world’s leading engineering universities. The event was also livestreamed globally and accompanied by six satellite summits in India, Kenya, Mexico, Thailand, Uganda and Vietnam, which ensured the event reached thousands more people.

Under the title Engineering in an Unpredictable World, the Summit highlighted the role the global engineering profession needs to play in meeting two of the most serious challenges humanity faces; firstly, how to ensure global sustainability in the face of a growing population and accelerating climate change; and secondly how AI and other transformative technologies can be used for the benefit of humanity. The event represented a unique opportunity to showcase the full scope of the Academy’s activity and ambitions across research, enterprise, policy, education, international development and sustainable development goals, on a global stage.

Among the 51 speakers were HRH The Princess Royal, Lord Martin Rees Kt OM HonFREng HonFMedSci FRS, Dean Kamen, Dame Henrietta Moore FBA and young US inventor Gitanjali Rao. Academy Fellows also spoke, including Dr Caroline Hargrove FREng, Professor Liz Tanner OBE FREng FRSE and Professor Juergen Maier CBE FREng. In addition to the two-day plenary discussion, a programme of parallel sessions, mentorship meetings and networking events provided opportunities for intergenerational, international and cross disciplinary exchange.

Teams of students from the UK, US and China were selected to attend the summit through competitive national competitions to develop innovations that help to address the challenges being discussed. On arriving in London, all students participated in an intensive three-day Collaboration Lab, where they were split into cross-national teams and given 48 hours to conceive and present an innovation with global impact. The four most successful teams pitched their innovations to a packed hall on the second day of the summit; the winner of the public vote was EmPads, a project to use clothing dumped in landfill in India to make free sanitary towels for India’s poorest citizens. The Academy plans to offer support to all the national and international student teams who attended the summit help make their innovations a reality.

In her closing remarks Dr Hayaatun Sillem drew out lessons from the summit. She said that engineers were crucial to international efforts to address these rapidly evolving challenges, and that collaboration, diversity, and global responsibility should be embedded into the solutions created. She also highlighted the importance of cultivating and deploying engineering habits of mind throughout society, and promoting the values of collaboration, community, generosity and fellowship. She gave particular thanks to the chairs of the organising committee, Dr John Lazar CBE FREng and David Thomlinson FREng and to all the Fellows involved in the event’s conception and delivery.

The next Summit is due to be hosted in China in 2021. The agenda, the speakers and videos of the days’ activities are available at www.GGCS2019.com
President’s column

I feel honoured and privileged to be elected President of the Academy. I have benefited from an increasingly close relationship with the Academy in the past few years as Chair of the Research Committee, where I have had the pleasure of working with the Academy’s senior officers, delivery teams and an excellent group of Fellows from industry and academia. The talent we have been able to support and nurture, in partnership with the Department for Business, Energy and Industrial Strategy and other organisations, has been outstanding and is testimony to the ambition, quality and engineering excellence we have in the UK.

The deserved national and international reputation enjoyed by the Academy has acted as an attractor for engineers and applied scientists - at different career stages - to present us with their research and innovation propositions, often benefiting from industrial collaboration. As a result, we have helped to build major investment support for the programme and delivered significant economic and social impacts across the partner industry and public sector agencies. I look forward to consulting with Fellows in the coming months to benefit from their views, experience and vision as to how we can sustain and deepen that value in the next planning period.

I have a personal and professional commitment to collaboration, innovation and talent development. These have been key aspects of my own career development from, originally, a transmission and distribution protection engineer within the electricity supply industry when I first graduated, through to my current role as Principal and Vice-Chancellor of the University of Strathclyde. I joined Strathclyde at an exciting time, as a ‘new blood lecturer’ in the mid-80s, intending to stay for around five years! However, I enjoyed the research and lecturing so much that I stayed there taking the Rolls-Royce Chair in Electrical Systems in 1993 and becoming Director of the associated Rolls-Royce University Technical College, and Head of the Electronic and Electrical Engineering Department in 2003. I became Deputy Principal for Research and Knowledge Exchange in 2006 and then Principal in 2009.

I spend much of my time working at the interface between universities, industry and government and hope to bring my experience of exploiting the strength of engineering excellence, data/evidence-led decision-making and a focus on delivery to support the next exciting phase of the Academy’s strategic activities. I am involved in policy advisory roles for both the UK and Scottish governments and engage with the EU Commission in my role as President of CESAR, the consortium of 52 European universities of science and technology. These public sector and academic engagements are complemented by non-executive director positions I currently hold with Scottish Power, the Weir Group, National Physical Laboratory and the Offshore Renewable Energy Catapult.

As I look forward to the Presidency, I would like to acknowledge the excellent work of Dame Anne Dowling in her role as President over the past five years, which has brought enormous energy to the Academy’s activities through her leadership, commitment, knowledge and experience. There have been many successes that will reflect Anne’s contribution to the Academy including the Enterprise Hub, the This is Engineering initiative, the Dowling Review and the establishment of the National Engineering Policy Centre. It is obvious to me that the Academy is in a well-deserved position of influence and has an enormous opportunity to help build greater understanding and appreciation of the engineering profession and to drive economic growth, international collaboration, socially progressive policies, attract new generations of engineers and place engineering at the heart of society. This will help to address the skills gap in engineering to fill for young people, the 50th anniversary of the MacRobert Award, the annual Awards Dinner held at Banqueting House and the establishment of the National Engineering Policy Centre.

I want to build on the momentum that has been created and will work with the Fellowship, our central team and partners to develop our next strategic plan and priorities. We will soon launch a consultation process to consider our next five years as we move closer to our 50th anniversary in 2026. We are fortunate to have a highly motivated and professional team at the Academy. When we couple this with our outstanding Fellowship, I am confident that we will produce an ambitious new strategy that will provide us with an increasingly stronger platform to make a difference to our profession, the UK and the world. We will do this through collaborating across the Academy and working with and through others.

The future of engineering has a strong resonance with the McDonald family. My twin daughters are both engineers based in London working on energy, infrastructure and digital projects with utility and consultancy firms. My son is currently concluding an MEng degree as a Power Academy student and is following in my footsteps and those of my father and brothers who were all craftsmen in association with the Clyde ship building industry.

Consequently, I am enormously excited by the prospect of engaging with the Fellowship and to work together to produce a strategy that advances the Academy’s contributions and builds upon the great progress made in recent years.

Best wishes

Professor Sir Jim McDonald elected President at AGM

This year’s AGM took place at the Academy on 30 September. During the AGM, Professor Dame Ann Dowling DM DBE FREng FRS presented her final review of the Academy’s year. Highlights included the 2019 Global Grand Challenges Summit (see front cover story), the This is Engineering campaign bringing engineering to life for young people, the 50th anniversary of the MacRobert Award, the annual Awards Dinner held at Banqueting House and the establishment of the National Engineering Policy Centre.

This AGM marked the end of Professor Dame Ann Dowling’s five years as Academy President and the election of the new President, Professor Sir Jim McDonald FREng FRS. Sir Jim McDonald will also serve a term of five years.

The Annual Review and Financial Report and Accounts for the year ending 31 March 2019 were received, and Professor Stephen Young FREng, chair of the Finance Committee, gave the financial report.

The meeting also confirmed the newly elected Trustees, as well as the 50 new Fellows, Four International Fellows and one Honorary Fellow for 2019. The full list of new Fellows can be found at www.raeng.org.uk/new-fellows-2019

Sir Jim McDonald, as the new President, then presented two Academy awards. The Sir Frank Whittle Medal, awarded to an engineer whose sustained achievements have had a profound impact upon their engineering discipline, was given to Robert Benaim FREng whose career as an eminent civil engineer has had a profound effect on the industry, changing the ways in which consultants and contractors work together and leading a step-change in the development of pre-stressed concrete structures.

The Royal Academy of Engineering Armourers and Brasiers Company Prize, an award established with support from the Worshipful Company of Armourers and Brasiers for excellence in materials engineering, was presented to Professor Serena Best CBE FREng for translating research into clinical products that have profoundly benefitted patients worldwide. She has carried out outstanding work on biomaterials for tissue engineering and regeneration.

The evening concluded with a reception to celebrate Dame Ann’s achievements as Academy President.

Leaders in Innovation Fellowships events in Vietnam

In August, the Academy hosted an invite-only expert two-day workshop to bring together the entrepreneurial Leaders in Innovation Fellowships (LIF) Vietnam community from the past five years of the programme. The LIF programme is supported through the UK Newton Fund.

Since 2014, the Academy has supported over 70 Vietnamese innovators to pursue their entrepreneurship ambitions. A week of innovation-led activities took place to celebrate the success of entrepreneurs across Hanoi and Ho Chi Minh City, connect them to peers and provide access to facilitators who can help them to commercialise their innovations.

Professor Norman Apsey DBE FREng, Chair of the LIF steering group, presented the Academy’s work on global entrepreneurship at the networking reception hosted by the British Ambassador to Vietnam, Gareth Ward. The event promoted the positive impact engineering innovations can bring to the world.

Professor Apsey and Mahmuda Ali, Senior Manager in the Sustainable Development team, rounded off the week by providing keynote speeches on building and sustaining a global network of engineering entrepreneurs at the Fifth EAI International Conference on industrial networks and intelligent systems held at Nong Lam University.

To find out more about the LIF programme, please visit www.raeng.org.uk/lif
Frontiers of Development visits Malaysia

In July, the fourth Frontiers of Development symposium took place in partnership with Heriot-Watt University at its Malaysia campus.

The symposium focused on urban communities. Attendees participated in sessions addressing topics such as: preparing for and responding to urban environmental hazards; how to plan for a sustainable urban future; and how to build resilient urban communities.

The symposium was chaired by Professor Gareth Pender FREng FRSE, Deputy Principal (Research and Innovation) at Heriot-Watt University, and Professor Caroline Knowles, Professor of Sociology at Goldsmiths, University of London, and Director of the British Academy’s Cities and Infrastructure programme.

In addition to the core symposium sessions, participants had the opportunity to learn about Malaysia-specific case studies from AECOM and Mott MacDonald representatives. At the end of the four days, participants worked together in new collaborative partnerships to apply for seed funding awards of up to £20,000 that will help to kick-start new interdisciplinary projects that address global challenges.

This symposium was the first event in a new three-part ‘Building Resilience’ series, with the next two events focusing on disaster resilience and resilient resource use respectively.

For more information about the programme, please visit www.raeng.org.uk/fod

Mentoring for awardees

On 26 July, the Academy held its first annual mentoring training course as part of a mentoring and development programme to support the beneficiaries of its Fellowships. The aim is for the mentoring experience to be a two-way process so that both parties gain an understanding of what it is like for the other to work in engineering.

The training was provided by Different Development. The Academy will run an annual mentoring training course as part of a training programme to support its awardees.

The Academy is strongly committed to improving diversity and inclusion in the engineering profession. All mentors are encouraged to identify a mentee who is different to them - for example, someone who is a different gender or from a different ethnic background.

New Research Chairs and Senior Research Fellows

Six exceptional academics have been awarded Research Chairs or Senior Research Fellowships to undertake user-inspired research that meets the needs of industrial partners.

These five-year positions cover a broad spectrum of engineering research, from fibre-reinforced concrete to fusion engineering. The full list of awardees is:

- Dr Richard Bourne, University of Leeds, AstraZeneca / Royal Academy of Engineering Senior Research Fellow in digital manufacturing and discovery of pharmaceuticals
- Professor Adam Clare, University of Nottingham, Rolls-Royce PLC / Royal Academy of Engineering Research Chair in miniaturisation of electro-physical techniques for next generation on-wing repair
- Professor Lorenzo Iannucci, Imperial College London, Airbus / Royal Academy of Engineering Research Chair in advanced composite design for aircraft structures
- Dr Mahmoud Mostafavi, University of Bristol, UK Atomic Energy Authority / Royal Academy of Engineering Senior Research Fellow in high temperature fusion engineering
- Dr Indika Dinesh Bandara Pamanuwu, University of Bristol, Microchip Technology / Royal Academy of Engineering Senior Research Fellow in zero-leakage high-temperature electronics
- Professor Kypros Pikoukas, University of Sheffield, Twintec Ltd / Royal Academy of Engineering Research Chair in innovative and sustainable fibre reinforced concrete

The next round of applications is due to close on 3 March 2020.

For more information, please visit www.raeng.org.uk/researchchairs

Lloyd’s Register Foundation programmes

There are many opportunities for Fellows to support the ongoing development of the Lloyd’s Register Foundation (LRF)-funded programmes.

The Safer Complex Systems programme aims to increase safety in the design, management and governance of complex systems. The Academy launched a call for ideas to enable stakeholders across all sectors, and anywhere in the world, to input into the programme strategy. Call responses will help determine which countries and activities receive funding. The Academy published an invitation to tender for a Global Foresight Review on the Safety of Complex Systems – the deadline for proposals is 21 October 2019. For more information, please contact Shelley.Stromdale@raeng.org.uk

The Engineering Skills Where they are Most Needed on the Control of Naturally Ventilated Atria. By collaborating with industry, Dr Hazal Ingham strives to establish or enhance collaborative research between the two parties.

The Academy selected 19 new industrial Fellows for 2019 and they began their research initiatives in September. Dr Abigail Hathway from the University of Sheffield was part of the 2018 cohort of Industrial Fellows.

Her Fellowship in model predictive control (MPC) for low energy building operation is with Arup and partners.

Dr Hathway explores how advances in MPC can be applied to improving building performance with a particular focus on the control of naturally ventilated atria. By collaborating with industry, Dr Hathway aims to identify opportunities and challenges for implementing MPC more widely to support the delivery of a low carbon built environment.

The scheme will relaunch in November 2019. For more information, please visit www.raeng.org.uk/ifs

New Research Fellows

In August, the Academy announced 18 new engineering Research Fellowships with each awardee receiving five years’ worth of funding and mentorship to advance their research careers.

The research topics include next-generation fibre-optic gyroscopes, waste-heat recovery systems, germanium-tin quantum detectors, and an affordable solar home for use in rural India.

Five of the awards have been made as part of the Academy’s Engineering for Development Research Fellowships. Funded through the Government’s Global Challenges Research Fund, these fellowships are awarded to research projects that directly tackle the challenges faced by developing countries and highlight the vital role of engineering in achieving sustainable global development.

To see the full list of fellowships go to www.raeng.org.uk/research-fellowships-2019
Innovation Fellowships launched

In March, the Academy launched a new initiative, the Africa Innovation Fellowship (AIF), to increase the female talent pipeline for the Africa Prize for Engineering Innovation.

The programme involved an in-person training week in Kampala, which coincided with the final Africa Prize 2019 event in June. The AIF fellows were inspired by the Africa Prize pitches and benefited from networking with Africa Prize alumni and stakeholders from the Ugandan entrepreneurship ecosystem.

During their training week, AIF fellows focused on pitching, branding, leadership and overcoming business challenges. On the final day, they pitched their innovations, with Evangelista Chekera of Passion Poultry declared the winner. She gained the opportunity to be part of a panel on improving lives at the Global Grand Challenges Summit alongside Shakir Mohammed of DeepMind and three Africa Prize alumni.

AIF is delivered by WomEng, a South African organisation that aims to develop a more gender-diverse engineering workforce. It provides female African innovators with leadership and business training.

The first cohort of AIF fellows includes 25 women from 14 sub-Saharan African countries. AIF fellows have been mentored through the Africa Prize application process, with the hope that some will be selected for the 2020 shortlist.

To find out more about the programme, visit www.womeng.org

Africa Prize student summer internships

In August, the first UK engineering students arrived in South Africa to support Africa Prize alumni Andre Nel and his team, as part of the Engineering a Better World: 2019 internships.

Five students from University College London (UCL) and Churchill College, Cambridge provided technical support to three Africa Prize alumni businesses: Weza Ventures in Kenya, Eco-V in South Africa, and Nanofilters in Tanzania.

Subah Levinson, a mechanical engineering student from UCL, was one of the students working with Andre Nel. Africa Prize Finalist 2017 and founder and technical director of Eco-V, Eco-V provides renewable hot water and electricity solutions for communities (homes, hospitals and schools) and industries in the form of affordable containerised hybrid solar microgrids.

By putting their skills to practical use and learning first-hand about the challenges of engineering in different environments, the scheme enables skill-building and knowledge exchange. It also aims to inspire students to pursue careers in innovation for sustainable development. For more information contact cordelia.burch@raeng.org.uk

Transforming systems through partnerships

The Academy has re-scoped its flagship international industry-Academia Partnership programme, which runs in six emerging countries through the UK government’s Newton Fund.

The programme is now called Transforming Systems Through Partnership, and runs under the Lloyd’s Register Foundation Challenge Hub. It will help seed collaborations from industry, academia, the public sector and civil society within the target country. This will enable joined-up research and innovation activity to address a shared challenge.

For more information on the programme, contact shaarad.sharma@raeng.org.uk

Increased funding for Africa capacity strengthening programmes

This year the Academy secured an additional £2 million of Global Challenges Research Fund (GCRF) funding to help build on the successes of its Higher Education Partnerships in sub-Saharan Africa programme (HEP SSA), which is also supported by the AngloAmerican Group Foundation.

HEP SSA has introduced a research and innovation element to the programme to support the strengthening of African research in higher education. The implementation of entrepreneurship and innovation inputs into the programme will help ensure robust education systems and partnerships between industry and academia in sub-Saharan Africa.

Since 2016, the Academy has received funding through the Department for Business, Energy and Industrial Strategy’s GCRF Fund. The funding has acted as an important backbone for the Academy’s international activities, establishing the GCRF Africa Catalyst and Frontiers programmes as well as strengthening and scaling up the flagship Africa Prize for Engineering Innovation and HEP SSA programmes.

For more information and to get involved visit www.raeng.org.uk/hepssa

Lowestoft Education and Employer Network

The Academy partnered with the STEM Hub of Lowestoft and Great Yarmouth to launch the Lowestoft Education and Employer Network. The inaugural meeting, held on 1 July at Orbis Energy in Lowestoft, was attended by over 25 people representing primary, secondary, post-16 and local engineering employers.

The network is a legacy from the successful Lowestoft Engineering Project. During the meeting, attendees laid the foundations for a mutually-beneficial partnership. Work will now focus on getting teachers into industry and industry representatives shadowing teachers in school. It will also develop a timetable of topics being delivered in local schools and local employers’ requirements to help support those topics.

Welsh Valleys Engineering Project

On 11 July 2019 at Merthyr College, the Academy celebrated the success of the Welsh Valleys Engineering Project, launched 18 months before.

The celebration event was attended by 150 students, teachers, parents, local employers and Welsh government representatives. It was an opportunity for the 15 participating schools and colleges to showcase the engineering-based STEM activities they had taken part in, and resources they had purchased, using funding provided by the project. A series of presentations were made by senior staff and students from primary, secondary and post-16s talking about the impact of the project. All 15 schools and colleges were presented with a certificate of participation in the project to display in their reception areas.

Since its launch, fundraising success has allowed the Academy to increase its support to include primary school provision, and fully-funded summer internships for further education engineering students. It has also funded 30 Future Engineers bursaries to students in Year 11 progressing with STEM subjects that lead to engineering.

Sainsbury Management Fellowships

In July, eight new Sainsbury Management Fellowships (SMF) were awarded.

Each year up to 10 SMF are awarded to engineers with between 4 and 10 years’ experience who are looking to complement their technical skills and move into leadership and management positions in UK engineering and industry through completing an MBA at a leading international business school. This year’s fellows will be attending business schools across Europe and the US including London Business School, IESE, INSEAD, MIT, Harvard and Wharton. So far, more than 350 fellowships have been awarded over 30 years.

Applications are currently open for the final two SMF for 2019, which will be awarded in December. For more information, visit www.raeng.org.uk/smf

Record Enterprise Hub Funding

Dr Simon Thomas, CEO of Paragraf, and an alumni of the SME Leaders programme, raised £12.8 million last month for his graphene company - a record fundraise for an Enterprise Hub member. Paragraf has developed a proprietary method that can reproducibly deliver functionally-active graphene, the missing link to developing high quality graphene-based technologies. This breakthrough is expected to finally enable graphene electronics to be realised at a commercially viable scale.

In September, the Enterprise Hub welcomed its sixth cohort of SME Leaders. The SME Leaders programme supports individuals in executive roles in high-growth UK engineering and technology companies. This enables them to develop their leadership skills through coaching, mentoring, workshops and a grant for leadership courses. The new cohort can be found at tinyurl.com/yy9kfy3

If fellows know any engineering companies with scale-up ambitions that may be suitable for the SME Leaders programme, applications are open until 18 November 2019.

For any questions about the programme, please email catherine.capone@raeng.org.uk

Education and skills

A Welsh Valleys Engineering Project primary school pupil demonstrates kinetic energy changes and the forces applied to a roller-coaster
Lord Bhattacharyya tribute programmes

In partnership with the Department for Business, Energy and Industrial Strategy, the Academy will be leading two tribute programmes to continue Lord Bhattacharyya’s legacy and pave the way for the next generation of engineers.

Lord Kumar Bhattacharyya CBE FREng FRSE established the now world-renowned Warwick Manufacturing Group (WMG) in 1980, leading its work for four decades. The first legacy programme is a £2.5 million programme for the West Midlands, which will provide 80 bursaries annually for local students from lower socio-economic backgrounds. It will also provide an engineering education support programme for schools and further education colleges in the South West Midlands region, as well as industrial secondments for teachers and lecturers.

The second is a new annual award in Lord Bhattacharyya’s name, to reward the kind of long-term industrial-academic collaborations that he spent decades fostering. The application process for the award will be announced in October. A panel of Academy Fellows will identify a shortlist of partnerships to be showcased at a prize event, with one awarded the annual prize of a grant of £25,000, increasing recognition of the most effective partnerships between academia and industry.

Policy Centre round up

The National Engineering Policy Centre has been working on a number of collaborative projects.

On 2 July, a cross-sector event on safety and ethics of autonomous systems brought together regulators and stakeholders from across industry, academia and government. The event was a series of panel discussions to explore the risks and benefits of autonomous systems, the regulatory step change required to mitigate these risks and the range of non-regulatory mechanisms that can be used to support development of autonomous systems in the meantime.

The Centre is running a project on behalf of the Infrastructure and Projects Authority exploring issues around delivering a low carbon system. It brings together partners from engineering, housing, infrastructure, planning and placemaking communities to create a system map of current housing and infrastructure delivery in the UK.

In July and September, three systems mapping workshops took place. The first, at the institution of Engineering and Technology, had 16 organisations represented. The outputs from the workshop will feed into the development of the systems map and the next iteration of the project, including work on coordination and governance for housing delivery. It will also study the role of education in creating holistic places and different motivations for new and existing residents.

The Centre initiated the next phase of work to inform the government’s efforts to increase R&D investment to 2.4% by 2027 and to encourage business to invest more in R&D in the UK. This project focuses on driving more investment into late-stage development and demonstrations.

Following the government’s major new target to reach Net-Zero carbon emissions by the year 2050, the Policy Centre is also set to look at decarbonisation across the UK’s energy and carbon-emitting systems.

To find out more about National Engineering Policy Centre projects, please contact marine.shah@raeng.org.uk

Thought Leadership

National Engineering Policy Centre

On 10 July, the UK’s leading engineering institutions came together to discuss some of the most pressing challenges and opportunities facing the UK, as part of the work of the National Engineering Policy Centre.

Delegates participated in three interactive sessions to inform the Centre’s work in three existing priority areas. One was an exploration of the factors influencing engineering businesses’ decisions to invest in research and development in the UK. It sought practical ways to remove the barriers to increased business investment and discussed how to better support engineering companies to innovate and transform their ideas into products to market.

Another discussion concerned digital skills, engineers and the fourth industrial revolution. It proposed identifying the digital skills needs of engineers across different disciplines, encompassing both new technologies and existing systems.

A third discussion focused on the safety and ethics of autonomous systems. This considered how the UK might regulate these new technologies in a way that encourages innovation while ensuring safe and ethical use.

Shadow Industrial Strategy Minister Chi Onwurah MP gave the keynote address at the plenary session held at the Royal Aeronautical Society. She championed the important role of engineering, highlighting the potential for it to change people’s lives for the better.

Emeritus lunch

On 1 August, the Academy held an Emeritus Fellows’ lunch at Prince Philip House, following the success of its ‘Over 90s’ Fellows’ lunch held last year.

The lunch was an opportunity for the 60 Emeritus Fellows who attended to network with colleagues, friends and Academy staff.

Before the lunch, Dr Peter Collins, Emeritus Director at the Royal Society, gave a talk about his upcoming book Origins of the Royal Academy of Engineering: a pre-history of the Academy.

There was also time for the Fellows to ask questions and express their interest in obtaining a copy of the book, which will launch later this year. Please see page 14 for further details on the book and launch event.

Race Equality Award

On 10 July, the Academy’s Graduate Engineering Engagement Programme (GEEP) won the Race Equality Award at the Business in the Community’s 2019 annual Responsible Business Awards Gala.

The awards celebrate the innovative ways that businesses in the UK and abroad are making a sustained difference and transforming communities. The Academy’s approach was singled out for its work in increasing the transition of engineering graduates from diverse backgrounds into engineering employment.

GEEP was developed in response to the engineering skills gap, as only 7.8% of engineering professionals come from black, Asian and minority ethnic (BAME) backgrounds, while 27% of graduates are BAME. It is delivered in partnership with 16 engineering employers and SEO London, with support from the Association for Black and Minority Ethnic Engineers.

GEEP is currently encouraging more companies to take part. For more information visit www.raeng.org.uk/GEEP or email diversity.team@raeng.org.uk

October is Black History Month

In October, the Academy is celebrating Black History Month through a social media campaign promoting black, Asian and minority ethnic backgrounds (BAME) engineering role models, and by raising awareness among staff and the Fellowship.

Black History Month was developed to mark the achievements and contributions to the social, political, economic and cultural development of the UK from people from BAME backgrounds.

The Academy’s Creating cultures where all engineers thrive report found that BAME engineers were over 50% less likely to speak up about inappropriate behaviour than their white (84%) and male (86%) colleagues. Analysis from the Office of National Statistics shows that race continues to impact on pay, with Bangladeshi, Pakistani, black, African or Caribbean UK workers earning up to 20% less than white workers.

The Academy continues working to show how diversity and inclusion will benefit society.

For more information, visit www.raeng.org.uk/BHM19

Celebrating Black History Month

#EngDiversity
Engineering priorities published

On 27 August, the National Engineering Policy Centre’s first publication was launched. Engineering priorities for our future economy and society.

It sets out the profession’s priorities for upcoming spending and policy decisions in the UK. The report includes 20 key policy proposals that were developed through discussions between the professional engineering institutions. The priorities cover skills, innovation, infrastructure, digital, and energy and climate change. They included:

- **Skills**: improve the recommendations of the Perkins Review, setting out actions to ensure an adequate supply of engineering talent for the UK thus securing the engineering skills needed for the future.
- **Innovation**: Increase Innovate UK’s budget to boost support for business innovation and the ‘2 of R&D to increase productivity.
- **Digital**: Deliver fast and resilient digital infrastructure, a thriving business environment, excellent digital skills and a diverse pipeline of workers to create a world-leading digital economy.
- **Infrastructure**: Deliver on the recommendations of the National Infrastructure Assessment or set out alternative plans to meet the UK’s long-term infrastructure needs.
- **Energy and climate change**: Deliver on the UK’s ambitious climate change goals by investing in demonstration and deployment of new low carbon heat, charging of electric vehicles and carbon capture and storage technologies.

Following the launch, partners of the Centre are looking to ensure the document is distributed as widely as possible among policymakers and the wider engineering community. It can be read at www.raeng.org.uk/priorities

Professor Frances Arnold celebratory lunch

On 12 July, the Academy hosted a Fellows’ lunch in honour of Professor Frances Arnold FREng, the first female Nobel Laureate in the history of the Academy.

Professor Arnold was one of the awarders of the 2018 Nobel Prize in Chemistry for her work in “tuning bioengineering upside down” by developing proteins that can catalyse chemical reactions. These protein catalysts have wide applications in energy, chemical engineering and medicine. She also received the 2016 Millennium Technology Prize in recognition of her work.

The Academy President, Professor Dame Ann Dowling, gave the introductory talk for the 60 Academy Fellows present. Also in attendance were several Academy Chairs in Emerging Technologies as well as Enterprise Hub members.

Professor Frances Arnold FREng

Public engagement

Celebrating 50 years of the MacRobert Award

To celebrate the 50th anniversary of the MacRobert Award, the Academy commissioned photographer Ted Humble-Smith to create conceptual images celebrating past winners in a special project generously co-funded by the Intellectual Property Office with the support of the MacRobert Trust.

Ted Humble-Smith talked to engineers involved in MacRobert Award-winning projects to picture the concepts behind the innovations. His images capture the thought process behind the breakthroughs, rather than illustrating the innovations’ technical workings.

In the picture for 1994 winner Soil Machine Dynamics for example, he created an image to convey the concept of simultaneously laying and burying fibre optic cable on the sea bed in shifting sand, surrounded by water. The cable threads through the image with shapes of sand-coloured liquid, creating the illusion of a trench in the process of being covered up again.

The images were displayed at the Global Grand Challenges Summit 2019, and will be on show at other venues later in the year.

Ingenia at 20

Ingenia is celebrating twenty years since the Academy published its first issue.

Create the Future podcast

On 16 July, the QEPrize launched a new podcast series called Create the Future. The series looks at the skill, creativity, and innovation that engineering encompasses while highlighting the daily impact that engineers have on people’s lives.

The podcast is hosted by Sue Nelson, an award-winning radio producer, science journalist, and former BBC TV science and environment correspondent. Each month’s episode explores a different area of engineering bringing together the knowledge, experiences, and ideas of leading ing industry experts and young engineers.

The first three episodes discuss the environmental challenges facing the world around us, celebrate the 50th anniversary of the Moon landing, and explore the potential for smart cities to become platforms for social and economic change.

Create the Future is available on all major podcast platforms, including Spotify, Overcast, and iTunes Podcasts.

For more information about the QEPrize and the podcast series, contact ryan.gibson@qeprize.org.

Ingenious projects

This summer, Ingenious projects have been taking place across the UK. The Ingenious scheme funds projects that engage the public with engineers and engineering.

The BLAST Fest project explores the engineering behind Caribbean cultural festivals. It has delivered workshops on the engineering behind Jamaican sound system culture and the role of sound engineers. BLAST Fest has appeared at festivals across the country and will be delivering more events in October to tie in with Black History Month celebrations.

From 13 to 15 September Bristol Open Doors took place, collaborating with engineers for events such as engineer-led tours of the harbour and local sites including the Clifton Suspension Bridge.

In east Kent, the Mars Safari project brought together a team of 24 engineers and 850 Girl Guides, aged 5 to 19, in small teams to design, build and test large working models of a Mars Rover.

The Fellows who originally proposed the magazine envisaged a publication that would celebrate UK innovations across all engineering disciplines. They also asked that it do so in a way that could be easily understood by anybody with an interest in engineering – from Fellows to schoolchildren. It is the only publication with free distribution that engages such a broad audience with engineering.

For 34 years, Dr Scott Steedman CBE FREng has been its Editor-in-Chief. Together with the 12 Fellows on the editorial board and Academy staff, the magazine has produced stories covering a vast range of engineering topics by a wide variety of contributors.

Ingenia has a print run of nearly 12,000 with 3,800 going to schools in the UK with a sixth form, 900 to individuals at universities and the rest to engineers and other interested professionals. The online version has tens of thousands of monthly views from all over the world.

In its reader survey, 95% of readers rate it good or very good. Fellows will have received a questionnaire in the September issue and further feedback is encouraged by either returning the hardcopy form or by visiting www.surveymonkey.co.uk/r/ingenia2019

Ingenia’s editorial board would also like to highlight the opportunity for companies and educational establishments to support the magazine. Over the years there have been several high-profile sponsors of Ingenia including BAE Systems, Rolls-Royce, Mott MacDonald and Arup. Enquiries about what the magazine offers supporting organisations can be addressed to antonia.bonilla@raeng.org.uk
This is Engineering Day, 6 November

In September, the Academy announced that 6 November will be This is Engineering Day, a day dedicated to celebrating the engineers shaping the world around us and to challenging narrow public stereotypes of engineering.

This is Engineering Day represents the next major moment in the Academy’s This is Engineering campaign. The day is designed to raise awareness of what engineers and engineering really look like among the wider public, particularly among the parents and teachers who influence the subject and career choices made by young people.

On the day, the Academy will unveil a new, publicly available, library of images that better represent engineers and engineering, and announce an ambition to change Google image search results for the word ‘engineer’ using these images and simple search engine optimisation techniques. In the run up to the day, organisations are being encouraged to pledge to support that ambition.

A range of supporters including Facebook, Google, Network Rail, the BBC, the Science Museum and the campaign’s funding partners will also be showcasing engineers and engineering in public-facing channels, and supporting the day on social media.

The Academy would welcome support from Fellows and their networks, and has produced a toolkit all organisations and individuals who want to show their support can use, at www.raeng.org.uk/thisday-toolkit.

If you have any questions, please contact Poppy-Jayne Morgan at poppy-jayne.morgan@raeng.org.uk

MacRobert Award 50th anniversary reception

On 30 July 2019, HRH The Princess Royal hosted a reception at St James’s Palace celebrating the 50th anniversary of the MacRobert Award, the UK’s longest running and most prestigious national prize for engineering innovation.

Guests included past and present winners, finalists and judges, as well as supporters and funders. The evening recognised the enormous support and commitment that the Senior Fellow, HRH The Prince Philip, Duke of Edinburgh, has provided for the MacRobert Award since its inception.

The Princess Royal also acknowledged Dr Dame Sue Ione DBE FREng FRSA’s enormous contribution over the last five years as Chair of the MacRobert Award Judges.

For more information please call the awards team on awards@raeng.org.uk or call 0207 766 0630.

Academic roundup

This is Engineering Day reception

On 5 September, the Academy hosted its annual reception to celebrate the success of the This is Engineering campaign, thank partners and supporters, and look ahead to the next phase of the campaign.

This is Engineering is a multi-year campaign led by the Academy in partnership with EngineeringUK, industry and academia, to encourage more young people from all backgrounds to consider a career in the profession. To date, campaign films have been viewed more than 35 million times by a gender-balanced audience of teenagers, and are having a significant impact on their interest in engineering. Whereas 39% of teenagers said they would consider a career in engineering before the campaign launched, after one year, 72% of those who had seen the films agreed with that statement.

The annual reception highlighted how critical partners and supporters had been to that success, and brought together a panel of experts to discuss the importance of imagery and representation in helping inspire future generations. The discussion was chaired by Dr Hayatun Sillem, and speakers included Nina Giovami, who runs the BBC’s 50:50 project, Gareth Reakes, Director of Software Engineering at Facebook, and Daniela Paredes Fuentes, one of the engineers who features in This is Engineering, and co-founder of an Enterprise Hub supported company.

Event attendees were also treated to a preview of the new season of This is Engineering films, which explore themes important to teens, including creativity, shaping the future and helping people and the planet. The films were launched online and on social media on 18 September, and can be viewed at www.thisisengineering.org.uk or www.YouTube.com/ThisIsEngineering
Committee update

Professor Sarah Hainsworth OBE FREng is Chair of the Diversity and Inclusion Committee.

Engineering diversity and inclusion is one of the key areas for delivering on the Academy’s strategy and is a cross-cutting theme over all of the academy’s work. The team has recently changed with Dervilla Mitchell CBE FREG to take the lead. We are looking forward to working with Polly Williams as the new Diversity and Inclusion Coordinator.

Polly has been with us now for a few months and has worked closely with the team on initiatives such as the Academy’s first Diversity and Inclusion Conference and the launch of the Diversity and Inclusion Office. She has also been working closely with the Royal Society and the Royal Academy of Engineering on joint initiatives.

We have been working closely with Polly on a new diversity and inclusion strategy for the Academy, which will be launched at Prince Philip House at 3pm on 9 December.

One of our first challenges is to ensure that the impact from the existing frameworks and reports is fully delivered by consolidating and embedding the good practice contained within them in the widest possible way. Another important aspect will be broadening our activities to include those areas of the sector that we haven’t yet reached.

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Book launch

Origins of the Royal Academy of Engineering will be launched at Prince Philip House at 3pm on 9 December.

The author of the book, Dr Peter Collins, will give a talk outlining the pre-history of the Academy to interested Fellows. There will be a great platform for us to build on.

We are lucky to have recruited Polly Williams as the new Head of Diversity and Inclusion from her previous role at the Royal Society. Polly has been in post since the beginning of September. Both Polly and I are therefore excited to be taking on the leadership of the Academy’s efforts in diversity and inclusion and to build on the committee’s great work to date.

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It was really great to see the Graduate Engineering Engagement Programme being recognised with the Race Equality Award at the Business in the Community’s Education Partnership Awards. This is an important programme that helps students from diverse backgrounds develop their personal capital to secure engineering employment. The programme works with engineering employers to help students present their skills and attributes in a professional way.

This is an exciting time to be taking over the chair of the Diversity and Inclusion Committee and look forward to seeing the work of the committee reach across all of the Academy’s areas. We will continue to deliver important leadership in equality, diversity and inclusion for the engineering sector.

News of Fellows

Sir David Brown has been appointed the new Chairman of the Manufacturing Technology Centre.

Sir George Buckley and Professor Juergen Maier CBE have each received honorary degrees from the University of Sheffield.

Professor Dame Ann Dowling OM FREng, President, Nanjing Hydraulic Research Institute and Hannah Olmberg-Soesman, COO and Co-Founder of Guguplex Technologies were joint winners of the Institute of Engineering and Technology Bragg Medal and Prize.

Professor Robert Young FRS was awarded the Chapman Medal.

Media roundup

Academy CEO, Dr Hayaatun Sillem, and Enterprise Hub member Dr Erass Abo-Hamed appeared in British Vogue’s special ‘Forces for Change’ September issue. Guest edited by HRH The Duchess of Sussex, Dr Abo-Hamed is founder of energy company H2GOD and is also part of the This is Engineering campaign. Vogue’s photography feature was part of a section on inspiring leadership, together with leaders in other professions, including Paralympic champion Baroness Tanni Grey-Thompson, DBE, and campaigner Baroness Lawrence of Clarendon OBE.

This is Engineering Day, a national day for engineering on 5 November, was announced in September as part of the This is Engineering campaign. This was covered in regional and trade press, with Dr Sillem interviewed on Jazz FM and regional radio around the UK.

Other media highlights over the summer included coverage of Enterprise Hub members MIT in the Mirror and on BBC regional radio for its affordable prosthetic arm technology development, which is particularly suitable for use by children. Hub members LettUs Grow were profiled in the Express and Hub member Dr Felicity de Gogan extensively featured in regional media for a clean coating that can be used in hospitals.

August’s announcement of the National Engineering Policy Centre engineering priorities for government was featured as the poll of the week in The Engineer and covered by Research Fortnight and engineering trade publications.

The Ingenious public engagement programme was featured in The Engineer with a column by panel Chair Professor Anthony Finkelstein CBE FREng.

Academy Vice-President Naomi Climer CBE FREng was quoted in a BBC article about surveillance at work. Academy President Professor Dame Ann Dowling was interviewed on BBC Radio Scotland about James Watt and quoted in The Engineer on proposed visa changes for engineers and scientists.

Academy programmes in honour of the late Lord Bhatcharyya CBE FREng FRS were reported in Eastern Eye.

Significant social media engagement was obtained for the Global Grand Challenges Summit in September. Academy posts about the event on Twitter, Facebook and LinkedIn were seen 300,000 times, including 12,000 views of interviews.

The Queen Elizabeth Prize for Engineering team also recorded an episode for their new Create the Future podcast with summit speakers Professor Dame Wendy Hall DBE FREng FRSE and technology entrepreneur Azeem Azhar.

The Economist recorded an episode of its weekly Babbage podcast at the summit, including interviews with Professor Nilay Shah FREng, Chair of Alibaba Cloud, Africa Prize finalists Anne Bevers and Andrei Niel, and Dr Armit Chandan, founder of Acceleron. BBC World Service also recorded a discussion with summit speakers for World Business Report. Other media coverage included Engineering & Technology and a series of articles by summit speakers in the Engineer magazine.

Academy roundups

Dr Hermann Hauser KBE FREng has been appointed Vice-Chairman of the European Innovation Council pilot advisory board.

Steve Holliday has been appointed the non-executive chairman of CityFibre.

Professor Sir Colin Humphreys CBE FREng has been appointed an University of Canterbury Erskine Fellow.

Professor Emeritus Pat McKeown OBE was awarded the General Pierre Nicolau Medal by the International Academy for Production Engineering.

Professor Doug Oakereve CBE has been charged by government to oversee a review of the HS2 project.

Dr Andrew Palmer CMG, chief executive of Aston Martin, has joined the G50 Royal Auxiliary Air Force Squadron.

Professor William Webb has been awarded an Honorary Doctor of Science degree from the University of Hertfordshire.

Sir Hossein Yassaie has joined the board of Agile Analog as a non-executive director.

Professor Roger Whatmore and Professor Robert Young FRS were joint winners of the Institute of Materials, Minerals and Mining’s Platinum Medal. Professor David Jones was awarded IOM’s Griffith Medal and Prize. Professor John Fisher was awarded the Chapman Medal.

The Global Grand Challenges Summit had a panel discussion on increasing resilience. How can engineering reduce the risks of climate change? The participants were: (L-R) Professor Klaus Lackner, Director, Center for Negative Carbon Emissions; Dr Armit Chandan, Co-Founder and CEO of Acceleron; Professor Jiajun Zhang, FREng, President, Nanjing Hydraulic Research Institute and Hannah Olmberg, Societan, ODG and Co-Founder of Guguplex Technologies.
Forthcoming events

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

24 October 2019
Launchpad competition final
Venue: Prince Philip House
Time: 5.30pm to 8.30pm

7 November 2019
New Fellows’ briefing
Venue: Prince Philip House
Time: 12.30pm to 5.00pm

7 November 2019
New Fellows’ dinner
Venue: Drapers’ Hall
Time: 7.00pm to 10.45pm

12 November 2019
Research Forum
Venue: Prince Philip House
Time: 9.15am to 5.30pm

21 November 2019
In Conversation with 2019 MacRobert Award winner: Bombardier
Venue: Prince Philip House
Time: 6.30pm to 8.30pm

28 November 2019
Sir Ralph Robins Lecture
Venue: University of Warwick
Time: 4.00pm to 6.30pm

5 December 2019
Fellows' visit
Venue: University of Huddersfield
Time: 12.00pm to 4.00pm

9 December 2019
Origins of the Royal Academy of Engineering book launch
Venue: Prince Philip House
Time: 3.00pm

4 February 2020
Hinton Lecture
Venue: Prince Philip House
Time: 6.00pm to 10.00pm

12 February 2020
Fellows’ Day
Venue: Prince Philip House

Diversity data monitoring

The Academy is monitoring Fellowship diversity as part of a wider programme to increase understanding of the diversity of people participating across Academy activities.

It would be appreciated if Fellows filled out the diversity form on the Academy website by 31 October. This will help the Academy better evaluate the effectiveness of its equality, diversity and inclusion policy.

Disability Confident Employer

The Academy has become a Disability Confident Employer (level 2). Disability confident is a government scheme that is designed to help organisations recruit and retain disabled people and people with health conditions for their skills and talent.

Obituaries

Leslie William Barclay OBE FREng died on 31 July 2019 aged 83. He was an Arctic explorer and a radiowave consultant.

Roger Swinburne Dobson OBE FREng died on 6 September 2019 aged 83. He was formerly Director General and Secretary of the Institution of Engineers.

Dr Thomas William Farthing OBE FREng died on 13 August 2019 aged 91. He was formerly Managing Director, IMI Titanium Ltd.

Professor Dr Ing Bacharuddin Jusuf Habibie FREng died on 11 September 2019 aged 83. He was formerly the President of Indonesia.

Sir Terence Harrison DL FREng died on 21 June 2019 aged 86. He was formerly Chairman of Alfred McAlpine plc and Chief-Executive of Rolls-Royce plc.

Professor Christopher Julian Hewitt FREng died on 26 July 2019 aged 50. He was formerly Pro-Vice-Chancellor, Executive Dean and Professor of Biological Engineering at the School of Life and Health Sciences, Aston University.

Ronald Walter Howard CBE FREng died on 23 July 2019 aged 90. He was formerly Chairman of GEC Avionics Ltd.

Professor Gunter Hans Joachim FREng died on 20 September 2013 aged 84. He was formerly the Director of Fraunhofer Institute for Production Systems and Design Technology.

Dr Elizabeth Audrey Killick FREng died on 7 July 2019 aged 94. She was the first woman to be elected a Fellow of the Academy and was former Head of Weapons Department at the Admiralty Underwater Weapons Establishment.

Dr Eng Giovanni Alessandro Lombardi FREng died on 28 May 2019 aged 93. He was formerly President of Lombardi Engineering Ltd.

Professor Alan Pugh FREng died on 21 July 2019 aged 83. He was formerly Emeritus Professor of Electronic Engineering at the University of Hull.

Professor James Neville Randle RDI FREng died on 6 July 2019 aged 81. He was formerly Engineering Director at Jaguar Cars and Technical Director of Gibbs Technologies High Speed Amphibians.