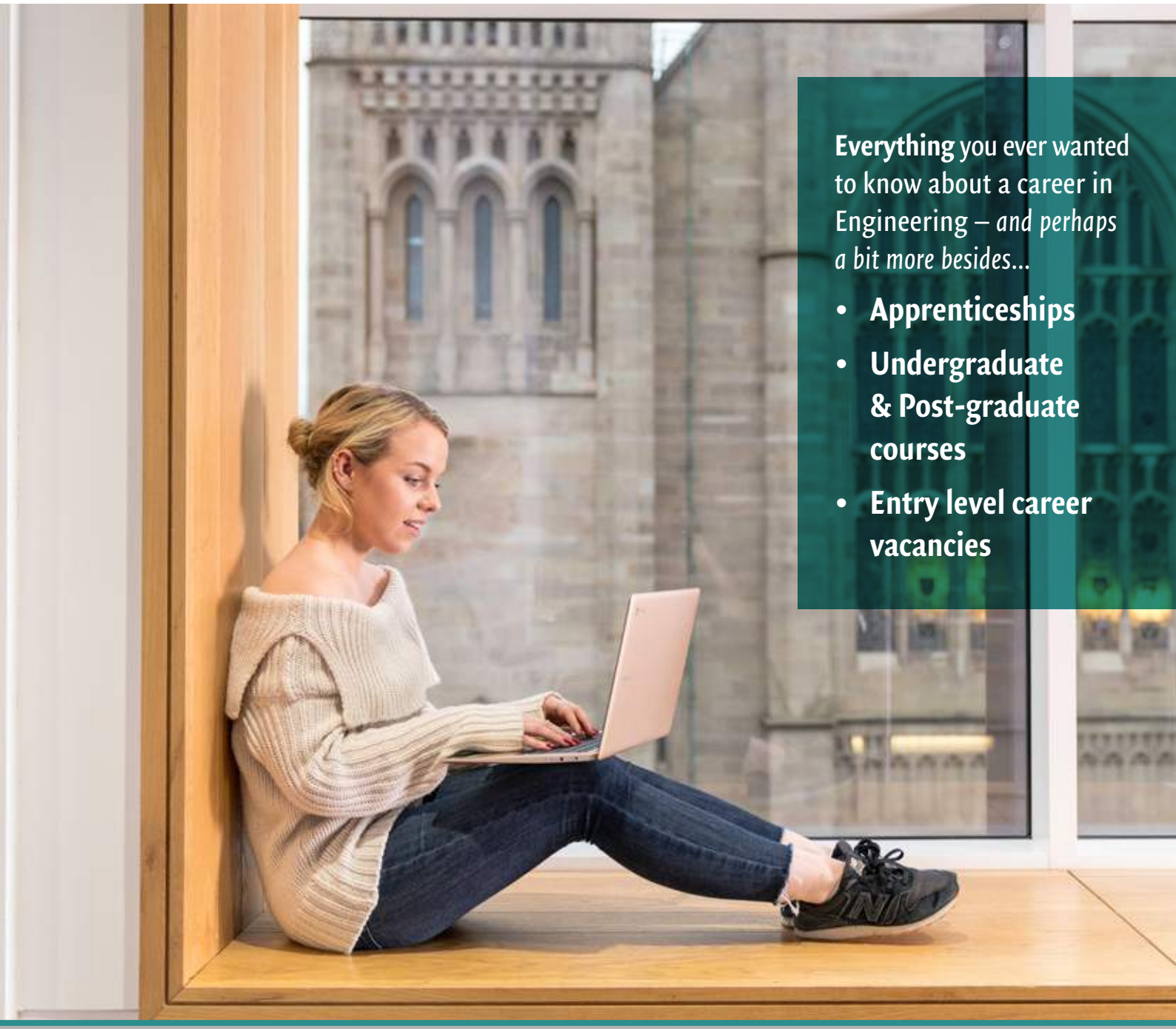
Spring 2019 Issue

Engineering Success

From the publishers of the **Official Year of Engineering** programme



Everything you ever wanted to know about a career in Engineering – *and perhaps a bit more besides...*

- **Apprenticeships**
- **Undergraduate & Post-graduate courses**
- **Entry level career vacancies**

Building on the success of the **Year of Engineering.**
Free to the next generation of Engineers.

"Britain has a proud engineering heritage. We lead the world in many engineering-led sectors and through that, industry continues to thrive today, delivering huge economic benefits to our country. However, there remains a shortfall in engineering graduates and skilled technicians, with a marked lack of diversity in the workforce."

ENGINEERING SUCCESS – Introducing The Future

Despite the considerable success of the governments Year of Engineering initiative, many of the problems which it set out to address are as acute as ever. There is still a chronic shortage of skilled, qualified engineers, technicians and scientists. There is still a gross under-representation of women (as low as 9% in some sectors). And there is still a lack of genuine diversity amongst those being attracted into these fields.

It was always going to take a lot longer than one year to redress a problem which had accumulated over decades and more.

With that in mind, we at West Argyll Technical Publications intend to make use of the considerable experience, insight and industry contacts, acquired as official publishers of the Year of Engineering programme, to help drive forward those same aspirations that were at the heart of 2018. To build upon the success of the Year of Engineering in a very practical way.

This new publication will be distributed twice a year. In winter, to coincide quite deliberately with UCAS applications (which must be in by January); and in summer, as exam results are received and career choices are often reassessed.

It will be of the same exceptional quality as the Year of Engineering programme itself, and will similarly showcase the very best opportunities for a successful career in STEM

"Young people, especially girls and people from black, asian and minority ethnic groups, often misunderstand careers in engineering and so discount them at an early age. However, when presented with the reality, and particularly when they begin to understand the variety, creativity and the positive contribution that engineering makes to people's lives, they readily change their views."

Contents

THIS IS ENGINEERING 6

A multi-year, multi-faceted campaign led by the Royal Academy of Engineering, bringing engineering to life for young people around the UK.

BIG BANG 2019 20

More than just a theory. The Big Bang UK Young Scientists & Engineers Fair is the largest celebration of STEM for young people held in the UK this year.

A UNIVERSITY CHALLENGE 31

Warwick University 31
MACE, Manchester 32
Southampton University 34
Portsmouth University 36
Christ Church Canterbury 38
Sussex University 40
Liverpool Hope University 41
Huddersfield University 42
Lincoln University 43
Chester University 44
EEE, Manchester 45

NATIONAL APPRENTICESHIPS WEEK 2019 46

"Blaze A Trail" will be the theme for this years' National Apprenticeships Week. Seven days of exploring new careers opportunities.

EMPLOYMENT FOCUS

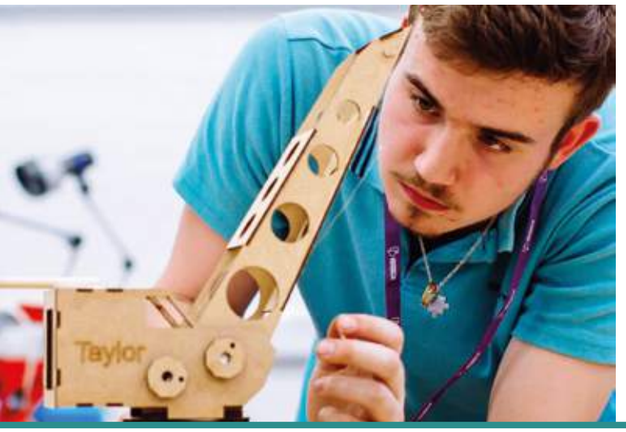
Framework 17
Cundall 29
Mercedes Vans 53
Freightliner 56
MBDA 58
Babcock 65
RAF 67
Bombardier 68

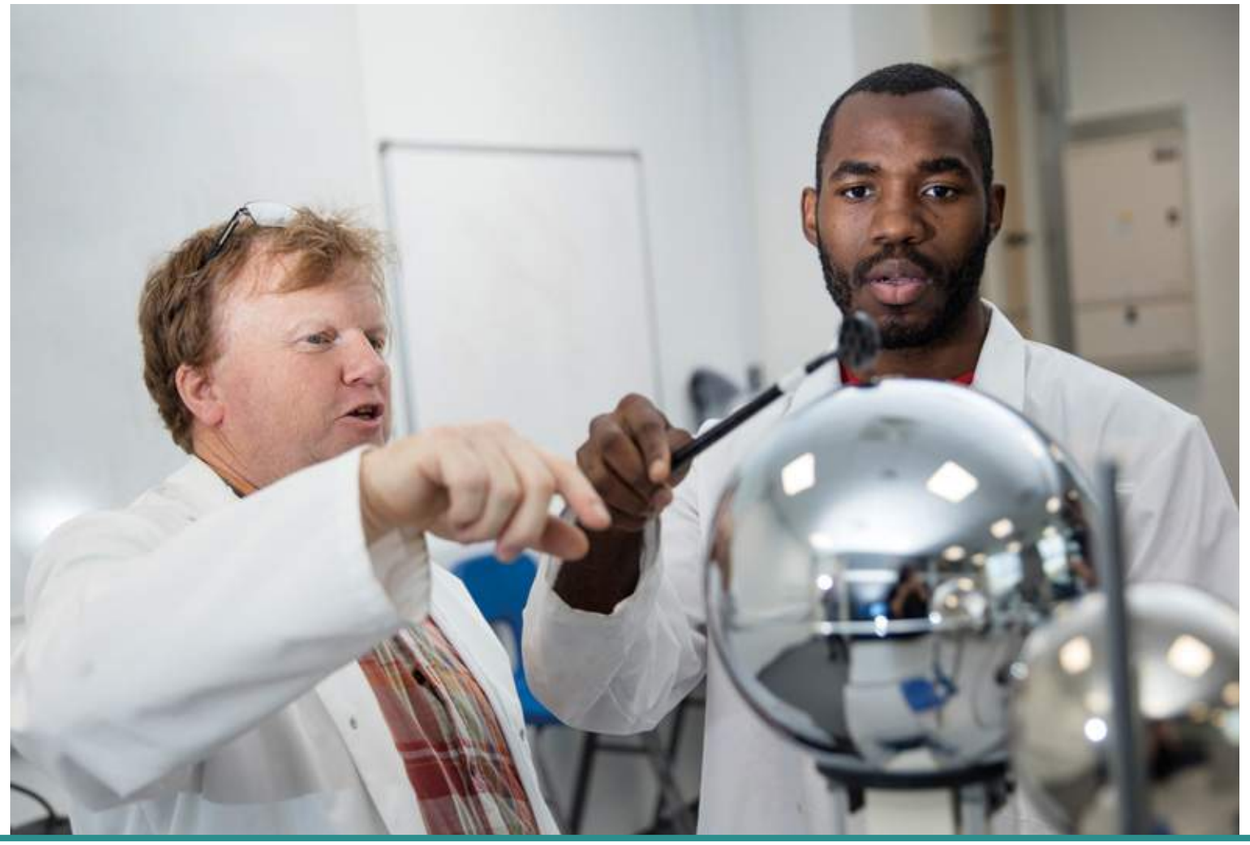
THE STEM SKILLS GAP 60

Raise your SCIENCE CAPITAL and learn to ENTHUSE.

ENGINEERING UK 62

Tomorrow's Engineers – a more diverse workforce.





Published by West Argyll Technical Publications Ltd,
16 Robertson Street, Glasgow G2 8DU
www.westargyll.org
All enquiries to: admin@westargyll.org

Publisher – Arthur Moore
Managing Editor – Robert McCall
Administration – Lynsey Moore
Design – Megan Raine

Advertising Sales – Phil Campbell, Libby Galbraith, Allan McCarthy, John Huss.

Follow what you love –

INTO ENGINEERING

This is Engineering is a multi-year, multi-faceted campaign led by the Royal Academy of Engineering in partnership with EngineeringUK and twelve major engineering organisations to encourage more young people, from all backgrounds, to consider engineering careers.

Engineering is an exciting, varied and rewarding career, and yet the UK has a shortage of young people applying for engineering courses and engineering jobs. One of the prime reasons for this shortage is that many people hold outdated views of what engineering is, and what engineers do.

This is Engineering challenges those misconceptions, by presenting a positive image of modern engineering. Through real young engineers it illustrates how engineering is behind many of the things they are already interested in – sport, fashion and tech for example – and that they can follow what they love into engineering, and in doing so help shape the future.

At the heart of **This is Engineering** are a series of short videos, each profiling a young engineer who is doing something remarkable.

Why not visit the This is Engineering website or follow @ThisisEng on Twitter?

This is Engineering is successfully changing the perceptions of engineering for young people. A survey of GCSE and A Level students following the first year of the campaign revealed that **consideration of engineering as a career option has now almost doubled among those teenagers surveyed, and the increase is even more significant among females and BAME students.**

The survey also shows that:

- 23% of students recalled seeing the campaign, with almost three-quarters of those going on to talk about it with others, share it on social media, or explore more online.
- The campaign improved knowledge about what engineers do, and raised the status of careers in engineering among young people.
- 72% of teens would now consider a career in engineering – a significant increase on 39% of those surveyed before the launch of the campaign.

In the first year of **This is Engineering:**

- Videos were watched over **28 million times** in total.
- The campaign received over **800,000 additional engagements** on social media (including likes, retweets, and comments).
- 90% of video views were from 13-17 year olds, and 95% from 13-24 year olds. 50% of the audience was female.

The campaign launched in 2018, the Year of Engineering, with bold advertising on social media platforms to challenge young people (13-18) to reconsider what engineering really looks like. 2019 builds on the proven strengths of **This is Engineering** with the release of further films while growing reach and engagement with audiences on social media.

Supporting PR will encourage parents and teachers to talk about engineering in positive ways with young people, and also communicate the skills and diversity challenge to policy makers and business leaders. They are also working on plans to build a **This is Engineering** image bank and to expand how **This is Engineering** is used for events and engagement activities.

It is a multi-faceted solution to a complex problem

This is Engineering is part of a wider programme of Academy work to address the engineering skills crisis. This includes working with engineering employers to improve diversity and inclusion, and the development of policy advice to address barriers in the education system to young people pursuing engineering careers. As part of this policy work, they developed a 10-point action plan, informed by young people, to help inspire future generations of engineers. The plan contains recommendations for schools, employers and policymakers on careers, work experience, and further education.

Above all, **This is Engineering** is a campaign to bring engineering to life for young people, and give more people the opportunity to pursue a career that is rewarding, future-shaping, varied, well-paid and in-demand.

Engineering is at the cutting edge: from robotics, machine learning and artificial intelligence, to mobile phones, medical technology, advanced sports equipment and driverless cars, engineering is shaping the future all around us. Engineering is for everyone: whatever your background and whatever you love – whether it's fashion, film, sport, music or technology.

The aim is to show more young people what engineering really looks like, and how it could be an exciting and rewarding path for them in the future.

If you have a question or comment, whether you're a student, parent, teacher or engineer, **please get in touch.**

If you are a parent or teacher looking for advice and resources for your children or students, take a look at the **Tomorrow's Engineers website, Royal Academy of Engineering resources,** or the **Year of Engineering website** for events near you. You can also follow on Twitter at **@ThisIsEng.**

This is Engineering is led by the Royal Academy of Engineering, in collaboration with EngineeringUK, and with the generous support of their partners: BAE Systems, National Grid, Anglo American, BP, Centrica, Rolls-Royce, Shell UK, Siemens and BT; and sponsors MBDA, Mott MacDonald and WSP. The scoping phase of the project was supported by Airbus, Atkins, Babcock, BAE Systems, GKN, Jaguar Land Rover and National Grid.

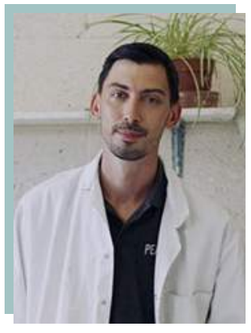
DANIELA PAREDES FUENTES

Daniela is a creative, an engineer, an innovator and a business woman. She has a degree in engineering and has started up her own engineering business, but she actually never thought she would become an engineer... it just happened. Problem solving, art and design were Daniela's passions, and she realised she could bring her art and design ideas into reality through engineering, and solve challenges with those ideas along the way. Daniela now runs Gravity Sketch, her own company, which empowers designers to create in the most intuitive way by sketching in 3D using Virtual Reality (VR).

When she was younger, Daniela had a passion for what she called 'art'. She loved taking things apart and collecting rubbish from around the house to build things with. As she grew up, she moved on from drawing pictures and building things with rubbish to designing furniture. She thought that to make things you had to be an artist, and didn't realise that she was edging towards engineering. She soon found she had a passion for design, as it allowed her to use her creativity to create tangible and useful things that still look stunning. Very soon she realised she was missing the last piece of the puzzle: engineering. By understanding how things were built and how they worked, she could make her ideas come to life and, importantly, could challenge how they were made. Engineering opened the door for her to come up with crazier and more innovative ideas for the world.

Throughout school, Daniela's relationship with STEM subjects was shaky at best. One year she would have a teacher that made her love maths or physics, and the very next year she'd have the opposite experience. Daniela still finds these subjects tricky, but over the course of her studies, she realised these subjects could be learnt in a more practical and fun way. She went on to take a master's degree in Innovation Design Engineering and no longer feels overwhelmed by STEM subjects because she knows she can create magic with them.

Daniela has managed to combine her love of art, science and engineering to create software that is now widely used for 3D design in VR. This innovation - an easy-to-use multi-platform tool for creating 3D models, scenes, and art work - allowed her to start her own business, Gravity Sketch, at just 29 years old. The business originally started as a university project, but already has big-name customers, including Ford and Disney, and is changing how people design by imagining a new future and using engineering to make it happen.



ALAN PROUD

Alan, from Newcastle, didn't want to sit in a classroom or behind a computer. He likes working with his hands and being creative and so his job making custom braces and splints is perfect for him.

Alan joined Peacocks to do an apprenticeship in Industrial Applications because he wanted to learn skills while doing a job. After completing his apprenticeship, and with two Level 2 NVQs under his belt, he is now a senior orthotic technician and makes braces and surgical splints for people that need them with conditions like spina bifida, cerebral palsy or stroke.

These braces and splints help people either walk or be pain-free. Because every person is different, Alan needs to be able to make every item unique for the user, and he likes knowing that something he has made is going to help make someone's life better.

DR ENASS ABO-HAMED

Enass, from Palestine, is an activist, business woman and entrepreneur. She co-founded H2GO, an engineering company developing new ways to store clean energy at the age of just 28. She completed a PhD at Cambridge University, after taking undergraduate and postgraduate degrees in applied chemistry at the Hebrew University of Jerusalem.

Enass has always been an activist at heart. From a young age, she has thought about air pollution, climate change and the effects of burning oil and gas for energy on the environment. It was only during a trip to Africa when studying for her PhD, that Enass realised how much of a luxury electricity was, with some hospitals only receiving power for 12 hours of the day, and households rushing to do all their cooking and reading while the electricity lasts.

Enass saw this as a problem that engineering could fix, and in the process, help save lives and the environment too. She founded her own company straight out of Cambridge University - focussing on developing a hydrogen battery that would be able to store clean and renewable energy in countries without an electrical grid.

For Enass, engineering is simply about wanting to solve a problem and having the passion and the imagination to create a solution. It's a combination of being creative and solving problems, and applying those two skills, while working in a team, to address some of the biggest problems humanity faces.

JOSHUA MACABUAG

Josh, from Romford in Essex, didn't know much about engineering when he chose to study it at university. This started him on a journey that would take him to earthquake and tsunami zones around the world, to use his skills as a structural engineer to help people affected by natural disasters.

It was a series of small but significant steps that Josh took to become a structural vulnerability specialist and volunteer search and rescue engineer. He got a Masters degree in engineering science, then volunteered for a year in rural South Africa in a government engineering department. That year was an eye-opener for Josh, and he saw how crucial engineering was to provide the roads and buildings that make living, working and travelling possible.

Taking part in an engineering investigation after the Japan tsunami inspired him to research how to help buildings survive tsunamis, and he now models the impact on buildings and infrastructure of natural disasters and other catastrophes such as hurricanes, earthquakes and floods.

His driving passion is to use his engineering skills to help make a difference. He spends his free time training as a volunteer search and rescue engineer and has been deployed by urban search and rescue charity SARAID to provide support in the aftermath of disasters like the earthquake in Nepal, and Hurricane Irma in the Caribbean.

COULD THIS BE YOU?

SOPHIE HARKER

When Sophie was 16 she got to visit Kennedy Space Centre, where she fell in love with the idea of becoming an astronaut, but didn't know how to get there. It was only when she met the astronaut Dr Helen Sharman, the first British person in space, that she realised that becoming an engineer was the way to get to space. Sophie now works at BAE Systems, where she helps to develop the planes of the future, that could revolutionise our speed of travel.

Growing up Sophie had no idea what she wanted to do as a job. Careers advisors suggested all sorts of jobs like accountant, teacher and even costume designer! Her family don't have a science background and she didn't know any engineers, or really know what engineering was, thinking it was something that involved spanners and hammers. But speaking to the astronaut Dr Helen Sharman, the first British person in space, Sophie learnt that you could become an astronaut through engineering.

Sophie did a degree in Mathematics at the University of Nottingham, and then joined BAE Systems on their graduate scheme. She is now an Aerodynamics and Performance Engineer and experiments with future concept military aircraft. This means that she uses maths to work out whether designs for future aircraft will fly, and if they do, how fast, how far, and what can she do to improve them.

Sophie loves knowing that there are aircraft flying in the sky that have her designs she has worked on, and that the incredible technologies she works with could help make holidays in space a reality.

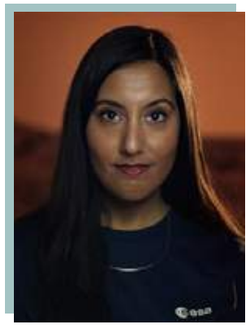
For Sophie, engineering is all about being part of a team that shares a goal to build something amazing for the future, and leave a legacy. She loves that engineering is open to everybody no matter their background.

CHRIS CAULRICK

Chris was captivated by robots, gadgets and technology from a young age, but did not know how his passion could be turned into a career that he'd enjoy. He decided to study a degree course in Mechanical Engineering because it offered him enough variety to keep his options open, and soon found himself drawn to robotics. Chris is now a researcher at Imperial College, developing robotic exoskeletons, which combines his passion for cutting edge tech and gadgets with his desire to help people.

Chris didn't know exactly what he wanted to be growing up. He didn't even know what engineering was. He loved sci-fi films and was fascinated by the futuristic technology and gadgets in them. At school, he was good at maths and science but he could not decide on a career to aim for. After doing some independent research, Chris found that he could pursue several of his interests in gadgets and how they work by studying engineering, and from that do something meaningful for a career.

Chris started a degree in Mechanical Engineering, still unsure what he wanted to do. As he advanced through the course, he found himself drawn to projects involving robotics and programming, and which suited his love of futuristic gadgets. As his degree progressed, Chris was able to combine a passion for helping people with his skills working with technology to pursue research in medical robotics. For his final year project Chris worked on a robotic hand and saw directly how his work could change the lives of amputees. Chris has continued to develop robotic exoskeletons that are responsive and give amputees and people recovering from strokes a better quality of life.



VINITA MARWAHA MADILL

Vinita dreamed about being an astronaut from a young age. She went on to design a space suit to stop astronauts' bodies from growing too much in zero gravity and now she is a space operations engineer, helping to develop spacewalk training for astronauts, and prepare a new type of robotic arm that will help astronauts with their tasks onboard the International Space Station.

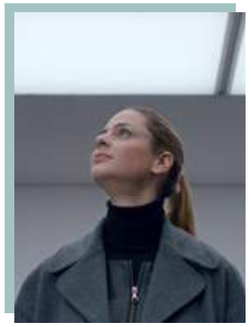
When Vinita saw pictures of astronauts in her library books when she was five years old, she was immediately hooked on all things space. Her parents and teachers encouraged this fascination by encouraging her to tinker with things and to learn about technology. Her dad even helped her to take apart the TV!

At 11 years old, she printed out the NASA astronaut candidate requirements, stuck them in the front of her school folder, and told her physics teacher she was going to work in Mission Control. Now Vinita has fulfilled her dream by studying and working in the space industry in Spain, America, Russia, France, Germany and the UK.

First, she went to King's College London to study Mathematics and Physics with Astrophysics. Then she completed the Space Studies Programme at the International Space University and gained a master's degree in Space Management. She also has a master's degree in Astronautics and Space Engineering from Cranfield University.

One of Vinita's favourite space projects so far was working on a space suit design to protect astronauts from muscle and bone loss in space. It is called the SkinSuit and was designed to mimic the effects of gravity by squeezing an astronaut's body, preventing their spine from painfully stretching by between five and seven centimetres. This European Space Agency space suit took almost 10 years to research and develop and has been worn onboard the station by astronauts since 2015.

She is now a space operations engineer based at the European Space Agency in the Netherlands, working on future human spaceflight projects. She works with colleagues in Russia developing training for astronauts to learn how to spacewalk and operate the new robotic arm, which will be launched into space soon.



PAVLINA AKRITAS

Pavlina is a globe trotter who is passionate about fashion and expressing her own style. She grew up in Cyprus before studying in America and the UK. Now she is a lighting engineer working for Arup, and has designed lighting for fashion shows, museums and art galleries.

When she was growing up Pavlina wanted to be a dentist, and then a mathematician. But she was always very curious about the world around her, asked questions all the time, and loved art classes. This creativity and curiosity eventually led her to study for a degree in engineering in America, where she also played competitive tennis.

After graduating she moved to the UK to follow her new-found passion for engineering and completed a master's degree in lighting. She then joined Arup - a company that brings together designers, planners, engineers, and consultants to work on the built environment - because she wanted to see how different disciplines come together to create the buildings and other structures around her.

When she was asked to light a fashion show it opened the door to a completely different industry, and gave her another way to express her love of art and creativity. Now she collaborates with fashion designers to create lighting effects for their shows at events, such as Paris Fashion Week, as well as working with museums and art galleries to create the perfect environments for their exhibitions.

HALVARD GRIMSTAD

Halvard grew up in Norway surrounded by farms and playing with Lego. As a Robotics Engineer, he combines his love for nature and putting things together to create robots that will revolutionise farming.

As a child, Halvard loved the outdoors as well as making things, whether that was a den in the garden or building something with Lego. Halvard decided to study mechanical engineering so he could invent and create his own robots. He finds it rewarding to see the robot use tools he designed working in the field. He designs sensors and gadgets and gets to build them in the workshop before they go for testing. Halvard works for Saga Robotics creating agricultural robots, that do everything from ploughing and weeding, to picking strawberries and testing the soil.

For Halvard, feeding the planet is important. With the world population growing, more food and crops will be needed. The better we are at using the land, keeping plants and fields healthy and sustainable, the more people we can feed. By using robots that can measure the soil and water precisely, crops can be farmed in the most effective and sustainable way. Halvard's robots are a bit like the Lego he used to play with – their parts can be swapped for different tasks so they are more efficient than one big tractor.

As a robotics engineer, the days are varied for Halvard. He may be designing on a computer, testing robots in the field or technology in the lab, or going to schools to talk to children about robots! He gets to work with a variety of people, from farmers to tech geniuses. He also gets to travel around the world to show what his robots can do.

Halvard's engineering is creative and practical, making a difference in how we produce food. He likes to solve problems and loves that mechanical engineering can be anything from making toys to aeroplanes – to robots that can help feed the world.

TODD DOWNS

At age 10, Todd from Coventry switched on the TV and started watching Top Gear. He thought supercars were super cool, read up more about them and became a bit of a car geek. Now, at 21, he looks after the body panels on Aston Martins, and makes sure they're top quality, including on his dream car, the DBS Superleggera.

Nobody else in Todd's family was interested in cars, so they didn't understand why he liked them so much. For Todd, it was just a hobby, and he didn't think it could become a job, so he focused on drama, art and music at school. Then he met someone from Aston Martin at a careers fair, and they invited him in for work experience. He loved it straight away. He spoke to graduates and apprentices in the business and that helped him decide what he wanted to do.

At the age of 16, he joined the apprentice scheme at Aston Martin and got to work in every area of production. He finished his apprenticeship with a BTEC Level Three in Manufacturing Engineering and an NVQ Level 3 in Engineering. One of the things he really liked about the engineering apprenticeship was the amount of responsibility he was given, which gave him opportunities to hold meetings with directors, take on new challenges such as leading large teams, and sometimes even drive the cars...!

COULD THIS BE YOU?

OLIVIA SWEENEY

Olivia, from Reading, has always been interested in sustainability and wanted to work for a company passionate about the environment. Sick of feeling small compared to the size of the global sustainability challenge, Olivia decided that being an engineer was the best way to make an impact. Working for Lush and sourcing and creating their chemicals in a sustainable way has given Olivia the power to make a difference.

Reduce, reuse, recycle - Olivia grew up hearing these words since primary school and is passionate about creating a waste-free world. Her house was a blend of science and art thanks to her parents, and Olivia did A-Levels in Music and English Literature as well as Maths and Chemistry. Doing a degree in Chemical Engineering allowed Olivia to follow her passion for sustainable choices in a tangible way. Her degree also helped her travel, doing internships in Sweden and Pakistan and helping a Scottish company become energy neutral. After completing her degree, Olivia started working for Lush.

Olivia is now an Aroma Chemicals Creative Buyer, sourcing and creating the natural and synthetic chemicals for fragrances of Lush's soaps, bath bombs, shampoo bars... and everything else! She still gets to travel abroad, across Europe, Brazil and the USA to find the best materials and ingredients.

One of her projects is figuring out the best way to process waste banana skins, not only getting the perfect banana smell, but in a sustainable and responsible way. She has helped to created a banana facial cleanser that will now be on shelves worldwide! She looks for ways to save energy and water in the making process while also making sure that the ingredients she works with are ethically sourced and cruelty free.

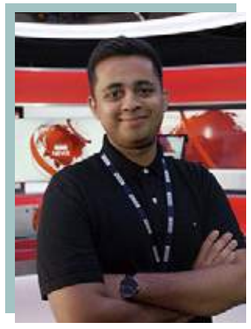
Music is still one of her hobbies, and Olivia continues to play alongside her studies and now her job. For Olivia, chemical engineering means you can end up creating anything based on your own curiosity. Engineers are part of the modern world and help make dreams become reality with their problem-solving skills.

ALA HAMMAD

Ala is a Civil and Tunnelling Engineer with a passion for the vast buildings and structures we use every day, and...for all things beauty too. Not what you might imagine when you hear the word 'engineer', Ala applies her creativity to both areas, working on incredible infrastructure projects, like Crossrail and High Speed 2.

Ala, an Irish-Palestinian, has been fascinated by transport, tunnels and large infrastructure from an early age. She enjoyed learning about designing and making from her grandfather, who was a carpenter. This led to a natural curiosity about how other things like buildings and tunnels are made, and inspired her to pursue a future in engineering. She completed a Structural Engineering degree followed by a Masters degree in Transport Planning.

Having been given advice at school that didn't reflect her interests, she wants everyone to know that they can follow their interests into engineering and that it's accessible to everyone.



JAHANGIR SHAH

Jahangir grew up making cardboard cameras and pretending he was behind the scenes. Now he works for the BBC as a Broadcast Engineer, keeping the programmes on air. From music festivals to political debates, Jahangir is there with the action and makes sure everyone watching doesn't miss a moment.

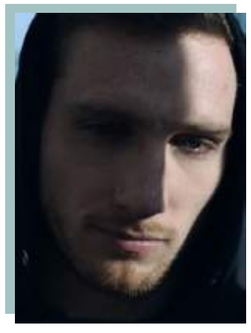
Growing up, Jahangir liked to break things apart... and then fix them. When he was 10 years old, he fixed the microphones for his school play and was always known as the 'techie' one. When thinking about future jobs, Jahangir knew he wanted to get hands on straight away and so did a sponsored degree in broadcast engineering, applying for the BBC Academy scheme. This meant he could earn while he learned, splitting his time between university and doing placements at places like the BBC, ITV and CNN.

As part of his role as a broadcast engineer for the BBC, no two days are the same. He could be working with cameras, lighting, sound, graphics – or even seeing how TV can be made more immersive with Virtual Reality. A big part of the job is working as a team to bring the shows together successfully and every new show brings a whole new team of different people to learn from.

His training allowed him to travel the country, especially for live events such as BBC's Big Weekend where he helps build versatile outdoor studios, ready to cope with the weather, the music, and internet difficulties. Sharing backstage access with some of his favourite actors and artists, like Ed Sheeran, is an amazing part of the job!

Jahangir loves the adrenaline of a live show, knowing that millions of people are watching can be stressful but he thrives under pressure. As a broadcast engineer, Jahangir has to problem-proof the programmes, making sure that if one part fails, the whole show doesn't collapse.

From designing new TV facilities with the latest technology, to making sure equipment works perfectly, Jahangir loves that engineering is hands-on.



CHARLES BURR

Charles is an entrepreneur and an app designer. To him, engineering is about finding solutions to real world problems. His natural analytical mind led him to study a degree in engineering at university, and while there, the 2012 Olympics and boxing sensation Anthony Joshua inspired him to get into boxing. It was not long before he combined his passion for problem solving, technology and engineering with his love of boxing. He designed Corner, an app that captures key data on a boxer's movement and skill set and provides highly detailed analytics that allow them to improve their performance.

Growing up Charles had no idea what he wanted to do. He didn't even know much about engineering before he went to study it. He knew the clichés about engines, hard hats and gears, but at university he found out that it was so much more than that: he was starting to learn skills that could be used to solve anything. He realised engineering was a building block he could use to build his passions into a career. For Charles, that passion was boxing. The Olympics had inspired him and he joined his university boxing gym. He soon found himself constantly talking about boxing, while also following all the latest technology trends. That's when he got the idea to combine boxing with technology and take a step towards becoming an entrepreneur.

Since then, Charles has gone on to develop his business with his cofounder Jerry Krylov. His app has seen him working with established boxing stars as well as many of the up and coming stars in the Team GB Olympic team. His life as an entrepreneur has also taken him to Las Vegas to launch the app, and he has been able to travel to Cuba, Mexico and all around Europe testing the product and going to fight nights.

COULD THIS BE YOU?

SONYA TEICH

Sonya loved drawing and making up stories as a child, and she also loved maths. Bringing together these two interests seemed impossible until she completed a degree in Engineering and Computer Science, and landed her first job working for Disney Animation as a Visual Effects artist.

Sonya grew up creating her own films and storylines with her sisters, using her toys as a character cast, and creating effects with everyday objects and things around the house, like pouring water to create a waterfall. As she got older however, the idea of working in film seemed less and less likely until she realised she could combine her skills in maths, and her interest in storytelling by going into engineering.

After she completed her degree in Engineering and Computer Science, Sonya joined Disney, where she was surprised by how much she was using both sides of her brain, the creative and the technical, to bring stories to life.

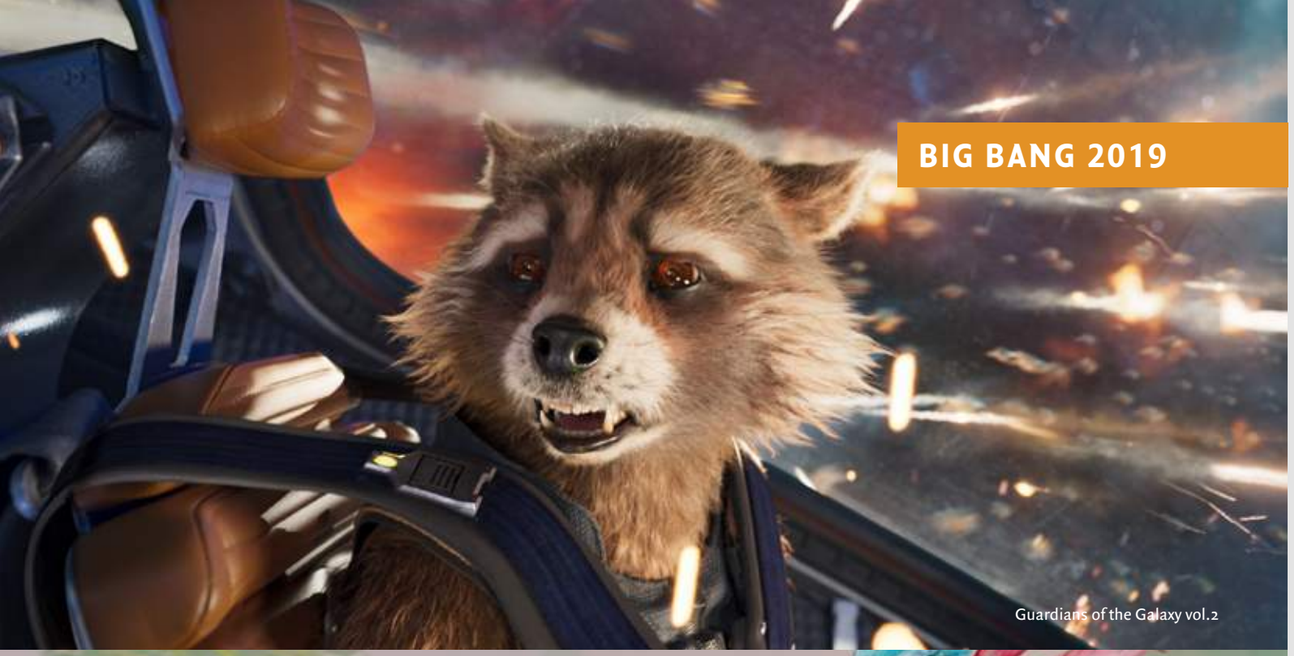
Now, Sonya works as a Lead Effects Technical Director at Framestore in London, managing a team of visual effects artists. Every day, she is presented with seemingly simple problems like how to create digital fires, or water that looks realistic but is actually animated. Using creativity, technical skills and attention to detail, she brings ideas like these to life on the screen. Over the course of her career, she has put these skills to work on films including her childhood favourite Beauty and the Beast, Guardians of the Galaxy and the box office smash, Avatar.

BETHAN MURRAY

Bethan is 25 years old and grew up in Manchester. She left home at 19 to start an engineering degree apprenticeship with Rolls-Royce in Derby. She then became a Production Manager, responsible for the team that strips down and rebuilds aircraft engines, helping make flying safe for thousands of people. Her hero is Beyoncé, who she admires for her work ethic.

Bethan was scared of flying until she went to space camp in Alabama and fell in love with engineering. Her experience there with flight jet simulators and replica space shuttles helped her to understand flight, so she wasn't scared, and she wanted to learn more.

Bethan switched her focus from law to join Rolls-Royce on the engineering apprenticeship scheme and now has an MSc in Engineering Business Management. As part of her apprenticeship she worked on building nuclear submarines and aircraft engines in Derby. She then led a large team of fitters and inspectors, taking aircraft engines apart and fixing them. Every day at Rolls-Royce she'd see huge aircraft engines - the ones that might take people on holiday - and understand how they work. In five years, she'd like to have learned from the best and be running her own factory.



Guardians of the Galaxy vol.2


Mary Poppins Returns

OSCAR WINNING ENGINEERS WANTED!

Science and technology are hot right now. You can't move for articles, videos, presentations and news stories about how STEM skills are the skills of the future. But almost none of the reports talk about the huge variety of jobs that STEM skills can take you into - even to ones that can see you rubbing shoulders with your favourite film stars on the red carpet.

We are Framestore. We are a digital content studio producing films, TV shows, commercials, VR experiences and theme park rides for clients around the globe. You may not have heard our name but you have definitely seen our work. From Fantastic Beasts: The Crimes of Grindewald to Black Mirror, we work with brands, studios, artists and organisations to tell stories and to bring experiences to audiences.

Let us introduce you to some of our team!

18 years ago Chris graduated from a BEng at UCL. Since then he has worked around the world on projects such as WALL-E, Harry Potter and Christopher Robin. Chris has been nominated for three Oscars, winning for his work on 2013's Gravity. For Gravity we had to engineer not only a whole new film-making process but actually a whole new way to film actors and actresses. We created new camera and lighting technology, virtual production techniques and worked alongside astronauts and astrophysicists to ensure that everything in the film was scientifically accurate (well... almost all!).

And then there's Eugenie. Eugenie loves roller coasters. Eugenie loves roller coasters so much that she has an entire sleeve tattoo dedicated to them! Having graduated from an MEng at Oxford, she began working on visual effects for film projects. Eugenie's experience led her to co authoring a paper with Nobel Prize winner Kip Thorpe based on her work on the Oscar winning Interstellar. That already sounds like a dream job to many but not for Eugenie. Eugenie is now the visual effects supervisor for Framestore's theme park ride division, developing immersive VR and AR experiences for audiences all over the world. Her love of rollercoasters, engineering education and visual effects experience have combined in a role that didn't even exist just five years ago!


Guardians of the Galaxy vol.2


Gravity


Fantastic Beasts: The Crimes of Grindelwald

Of course Chris and Eugenie don't work alone to create these amazing projects; at Framestore we combine artists, producers, directors, writers, animators, scientists, engineers and software developers in order to produce the huge variety of work we do. It is vital to us that engineers are in that mix because of their eye for design, for structure and for their problem-solving capabilities. Skills that we use here on a daily basis. So if you thought that your love of Netflix, games or the movies couldn't be combined with your love of maths, physics and technology then think again. There could be an Oscar with your name on one day!

80,000 visitors attend The Big Bang Fair 2018

The Big Bang UK Young Scientists & Engineers Fair last year welcomed almost 80,000 visitors over 4 days, with an equal split between girls and boys. Visitors found out about STEM careers, got hands-on through activities and workshops offered by over 100 inspirational exhibitors and the new 'festival-style' format meant more visitors could enjoy the 12 amazing shows on offer.

The school days, Wednesday to Friday, hosted 4,200 teachers and students from 882 schools. Across the event young people attending were predominantly Key Stage 3 (aged 11 to 14), with over a quarter from primary.

The Fair hosted the UK finals of The Big Bang Competition, which saw just under 500 talented young people showcase their project work and compete for awards in engineering and science. Josh Mitchell was crowned UK Young Engineer of the Year for his low-cost, flat-pack 3D printer and Emily Xu became the GSK UK Young Scientist of the Year after impressing the judges with her project on new ways of separating mirror image molecules.

All the young finalists impressed with their hard work, insight and enthusiasm and many featured in the extensive national and regional broadcast coverage. This included a BBC Breakfast sofa interview with Josh and Emily as well as Baran Korkmaz, who won the Junior engineering category with his Grenfell-inspired emergency evacuation app.

The UK fair returns to the NEC Birmingham 13-16 March 2019 and regional fairs are taking place across the UK over the next few months. These will aim to inspire even more young people to consider a career in STEM and will host the regional heats of The Big Bang Competition, identifying some of the incredible young people who will compete in the finals next year.

The Big Bang
UK Young Scientists & Engineers Fair

THE BIG BANG FAIR

There are thousands of exciting job opportunities for engineers and scientists and equipping young people with skills in science, technology, engineering and maths (STEM) is key to their future employability. The Big Bang is a wide-ranging programme, exploring the exciting opportunities out there and the routes into these rewarding careers.

The Big Bang UK Young Scientists & Engineers Fair is the largest celebration of STEM for young people in the UK, bringing together an award-winning combination of exciting theatre shows, hands-on activities, interactive workshops and careers information from STEM professionals. This year's Fair will be held at The NEC in **Birmingham, 13-16 March 2019.**

The Big Bang Fair hosts the UK finals of **The Big Bang UK Young Scientists & Engineers** Competition where finalists compete for lots of exciting prizes, including the coveted titles of GSK UK Young Engineer of the Year and GSK UK Young Scientist of the Year.

The Big Bang Competition looks for the very best projects from every area of science, technology, engineering and maths and aims to celebrate and raise the profile of young people's achievements and provide them with the opportunity to build their skills and confidence in project-based work. The 200 finalists get to showcase their projects at The Fair, where they show off all their hard work to thousands of visitors.

All UK residents in full-time education or training (year groups 7-13 and Scottish/NI equivalent) can apply with their engineering or science projects online or through a regional heat at a **Big Bang Near Me Fair.**

For anyone who can't make it to Birmingham in March there are other opportunities to experience the Big Bang. The UK Fair is complemented by a series of **Near Me Fairs**, regional, local or school-based events that take place across the country and are an important part of the programme. These Fairs help 11-18 year olds from all backgrounds to discover close to home the exciting and rewarding engineering and science careers that their science and maths subjects can lead to. They are free to attend but you need to register.

www.thebigbangfair.co.uk

Tomorrow's Engineers free careers resources cover a range of areas, including a 'Save lives as an engineer' poster and activity and an interactive presentation exploring the range of engineering careers and where the jobs will be in the next 10 years. Teachers and careers advisers can get the full suite of printed materials by ordering a **free resource pack.**

There are also a variety of **online case studies** available, which explores what it's like to be an engineer, highlights some of the exciting engineering career options available and outlines how to get into engineering.

www.tomorrowsengineers.org.uk

Dishing Up Bite-Size Science

Food technology takes on a new meaning as school offers 3D-printed school dinners in a bid to inspire pupils into STEM careers.

School dinners have gone through many transformations over the years but none quite like this; St Helen's Primary in Canning Town, London decided to use lunchtime to whet young people's appetites for STEM (science, technology, engineering and maths) careers, by 3d printing pupils lunches.

If new research by The Big Bang Fair, the UK's largest event aimed at inspiring young people into STEM, is anything to go on, pupils would very much prefer geometric fish & chips, and cauliflower cogs and gears to the usual fare. A study conducted into their opinions of the cutting edge technology found 71% of 11-16 year-olds think it's crucial to have access to this kind of technology at school – not just in science labs and classrooms, but the school gym, playground and even the canteen, with 40% believing it will enable them to learn something while they eat.

The study into youngsters' attitudes to 3D printing also revealed their open-mindedness and optimism about the vast possibilities this technology holds: one fifth (20%) believe we will all have 3D printers in our homes as the norm within 3-4 years, and two thirds (67%) of kids believe it will be the norm within 10 years.

Hence the dinner ladies worked alongside engineers to serve up a vision of the (possible) school dinners of the not-too-distant future.

Interestingly, the majority (71%) believe it's important to access cutting edge technology such as 3D printing as part of daily life at school, partly as it'd be them using the equipment or software in the future, but also because 41% believe making it part of school life is the fairest way for all children, regardless of their social, economic or personal circumstances to experience important technologies.

Claire O'Sullivan from St. Helen's Primary School, commented:

"We were delighted when The Big Bang Fair approached us to be part of the 3D printed school dinners project. Demonstrating STEM in this way is a fantastic opportunity to allow our pupils to see innovative technology first-hand and there is nothing that gets them more excited than bringing classroom learning to life."

Beth Elgood, Director of Communications at EngineeringUK, organisers of The Big Bang Fair and Competition, said:

"Our research and this trial show just how big an appetite there is amongst young people to experience new technologies. Indeed, the 2018 UK Young Engineer of the Year, Josh Mitchell, developed a flat-pack printer that he hopes will make 3D printing more accessible to everyone. Building on young people's curiosity about how they might shape the world in the future and inspiring them to think about where their science, technology, engineering and maths studies might take them, is what The Big Bang Fair and Competition are all about."

Brenda Yearsley, UK Schools and Education Development Manager, Global Social Innovation Team at Siemens, a long term supporter of The Fair added,

"3D printing is fast becoming a mainstream technology but that makes it no less ground-breaking and exciting, with a vast number of applications across sectors, from medicine to motor sports, improving lives across the board and enabling STEM specialists to make ever bigger leaps and bounds in their fields. At Siemens we are investing £27million in a new, state-of-the-art manufacturing facility that enables us to increase our fleet of 3D printing machines from 15 to 50 over the next five years, so to see The Big Bang Fair working with young people, which we look forward to having on our teams in years to come, is fantastic."

AI think it's all over

Non-league Wingate & Finchley FC employs AI football coach to inspire kids through STEM.

Whether it's managing your home, recommending TV programmes, automating driving or diagnosing diseases and assisting surgery, artificial intelligence (AI) is a game changer that is embedded in our everyday lives. As AI develops, it is being used in ways never previously imagined. Now, we can add coaching a football team to that list. Indeed, football minnows Wingate & Finchley FC, who currently play in the Isthmian Premier League, have partnered with The Big Bang Fair to install the kind of technology that might normally only be associated with the world's richest clubs: they have appointed an AI as a football coach. In what is believed to be the first time in English football that a team has been set-up for a match by an AI, The AI coach has recommended the club's starting eleven formation and tactics for a competitive league fixture.

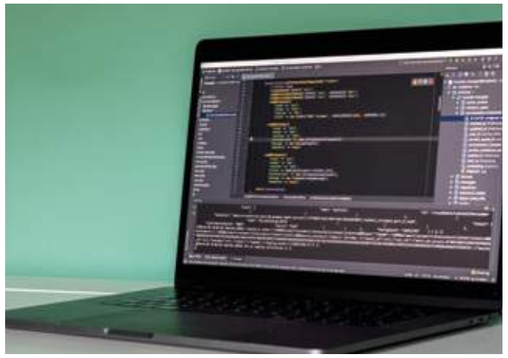
Dave Norman, manager of Wingate & Finchley FC, said: "The fundamentals of football are exactly the same whether they come from a virtual coach or a human one. As a teacher as well as a football manager I'm a big supporter of The Big Bang Fair's goal to get more kids into STEM, so I was more than happy to add an AI to the coaching team here at Wingate & Finchley."

Beth Elgood, Director of Communications at EngineeringUK, added: "At The Big Bang Fair we are always looking at ways to inspire young people and demonstrate to them, their teachers and their parents the many surprising applications of STEM. It's clear that AI already plays a significant role in all our lives and many future jobs are likely to need artificial intelligence skills. We wanted to combine the possibilities of AI with something we know a lot of young people enjoy – sport - to inspire young people. We hope the AI football coach can excite football-loving children and shine a light on the many ways STEM plays a role in our lives."

In addition to its role at Wingate & Finchley, the intention for The AI football coach is to be released as an Alexa Skill that anyone can download and interact with, whether they are professional football managers looking for a bit of AI assistance, a teacher who runs a school team or youngsters inspired by the exciting possibilities of STEM.

Tim Deeson, of Greenshoot Labs, concluded: "We're eager to see what happens when you introduce AI into an environment which is typically not used to having access to it, in this case a non-league football club. This project demonstrates just how easy it is to do that in this day and age: in just a few short weeks we have been able to develop an AI system for a team that they can easily query and interact with that helps them dig deeper into what sort of playing approach they could have. Over time the AI will learn from the data it gathers and can become an even more insightful tactical aid.

Recent advancements in AI have made it more and more accessible and the upshot of that is we're seeing artificial intelligence being applied in all sorts of innovative and interesting ways. It's a really exciting time to be part of the AI industry, but we've only just scratched the surface of what is possible. For the next generation of AI professionals, it's only going to get more exciting."



UK success across the pond

Three winners from the 2018 Big Bang Competition were given the opportunity to represent the UK in Pittsburgh.

UK Young Engineer of the Year 2018, Josh Mitchell and Senior Science Winner Krtin Nithiyanandam were chosen to compete at ISEF (International Science and Engineering Fair), while Junior Engineering Runner-Up, Nicole Hirst was invited to participate in the companion Broadcom MASTERS programme.

ISEF is the world's largest pre-college science competition. Approximately 1,700 winners of local, regional, state, and national competitions are invited to participate in the week-long celebration of science, technology, engineering, and maths. At the event, these young innovators share ideas, showcase cutting-edge research and compete for more than $4million in awards and scholarships. Broadcom MASTERS brings together rising stars from across the world to represent their nations for this international exchange. The students attend a range of activities at ISEF as well as participating in a programme of fun and engaging hands-on science & engineering activities.

Given the prizes on offer it's no surprise ISEF is a hugely competitive fair. The talented young UK winners each scooped a prize while they were there. Josh Mitchell won 4th place in the world in the Robotics and Intelligent Machines category for his flat-pack 3D printer, Plybot and Krtin won 3rd place in the world in the Material Science category for his work on bioplastic bottles with antibacterial and toxicity-reducing properties to purify drinking water.

The journey for each of these Big Bang Competition winners started with an idea for a project. Big Bang are proud of what they have achieved already but are equally sure there's more to come from them and all the other amazing young scientists and engineers who take part in The Big Bang Competition.

Flat pack success

The Holmes Chapel Comprehensive student who became UK Young Engineer of the Year 2018.

Josh Mitchell (centre) receives UK Young Engineer of the Year 2018 Award

It hardly seems a year since 18 year old Josh Mitchell was awarded the UK Young Engineer of the Year title at The Big Bang UK Young Scientists & Engineers Competition, for his ground-breaking project that centres the development of an affordable 3D printer prototype called 'The Plybot'.

In his project, Josh aimed to prove that it was possible to build a 3D printer for a fraction of the commercial cost, which was easy to assemble at home and didn't compromise on print quality. His final creation, which fits inside two 13-inch pizza boxes (unassembled), snaps together using just 18 bolts and produces print-quality that was indistinguishable from commercial printers, costs £49.

Josh reached the UK finals of The Competition having won a place in the online heats.

Over 500 finalists from across the country were selected to show their ideas at The Big Bang Fair 2018 where ten were then shortlisted to pitch Dragon's Den-style to a panel of VIP judges - Andrew Smyth (Rolls-Royce aerospace engineer and former Great British Bake-Off contestant), Jessica Jones (engineer and astrophysicist) and Alex Deakin (Met Office meteorologist and weather presenter).

The Big Bang Competition is an annual contest designed to recognise and reward young people's achievements in all areas of science, technology, engineering and maths (STEM), as well as helping them build skills and confidence in project-based work.

Winners of The Big Bang Competition in 2017 have since gone on to enjoy a range of other achievements on the back of their successes at The Fair – including winning international awards; appearing on Springwatch; getting other young people involved in their citizen science project, taking part in conference presentations to industry professionals.

Congratulating the winner, Mark Titterington, Chief Executive of EngineeringUK which organises The Big Bang Competition said:

"The winner stunned judges with the insight, creativity and hard work that went into their brilliant entry.This innovative project was an extremely impressive piece of engineering that makes Josh a worthy winner of this year's award.

"While it's easy to see why this project was a hit with judges, I have been blown away by the quality of entries from all of our finalists - both in terms of the work that went into them and the way they showcased that work with such confidence at The Fair. It certainly bodes well for the future that the scientists, engineers and inventors of tomorrow are already producing such astute and creative project work."

Josh added with enthusiasm:

> "The Big Bang Competition has been brilliant - I had such a fantastic time last year that I wanted to return in 2018 with my project 'The Plybot'. I'm delighted to have won and I hope the success continues into my Kickstarter campaign for The Plybot to get these low cost 3D printers into people's hands."

"One of the pieces of advice I give to any young researcher given this type of opportunity is – don't be afraid to say yes even if it is something totally out of your comfort zone. Give it a go, or else someone else will."

– Dr Elspeth Keating

Material Girl

Elspeth Keating has never been afraid to challenge gender stereotypes.

"I designed my first car when I was eight," explains Dr Keating who is a research fellow in the materials and manufacturing group at WMG, University of Warwick.

"It had wheels that could go in any direction. I was really proud of it.

"I remember really shunning the toys which were supposed to be for girls, and thinking – I want to be a boy because the toys are better!"

Now, as a materials engineer working as research academic on a number of high profile projects, she is still a trailblazer.

"I can often walk into a room to find I'm the only female engineer there. I notice every time. But things are changing."

Dr Keating works on some very prestigious projects which will have a huge impact on the region, including the Very Light Rail project, a £6m research and development scheme to connect Coventry via state-of-the-art, lightweight, battery-operated, driverless rail vehicles on a low cost track.

She explains: "I am proud to be doing this job. To be working at WMG on something like the Coventry VLR is really exciting. I've been on board from the very start of the project and thinking about what this will deliver for the city, and for the University, is thrilling."

Dr Keating wasn't always destined for a career in engineering, but always had huge ambition – and a little bit of a rebellious nature.

She explains: "I don't remember knowing any engineers when I was growing up. I come from a family of academics. Both my parents have PhDs and we knew a few people with Nobel prizes.

"I went through a teenage phase of loving dolphins and ecology and wanting to save the world. At one point I was on course to study natural sciences at Cambridge or Oxford, but in a fit of rebellion I told my mum I wasn't going – I'd changed my mind. When she asked what I was going to do instead, I plucked something out of thin air – and it was naval architecture!"

After choosing a course somewhat at random, Dr Keating did indeed study naval architecture, a joint degree from Glasgow and Strathclyde Universities, after which she went to Limerick to study advanced materials. After six years of studying she did consider applying for a job, but found a PhD at WMG and applied for that instead. The PhD, looking at automotive materials, was sponsored by Tata Steel. This industry link to her research was something which Dr Keating had been looking for.

She explains: "There were other PhDs that I considered, but the opportunity at WMG struck me as a perfect combination of academic research but with an industry focus, where I could have hands on experience with real life engineering projects

"My PhD led to a research fellowship position in the materials and manufacturing group, and now I am working on a ground-breaking project for the region – one which will put a new rail transport system on the ground in Coventry

"I have had the opportunity to work on this important project very early in my career. The team here are very proactive at getting young researchers on board with these prestigious schemes with huge responsibilities and where your opinion weighs the same as someone with 30 years in the industry. It's all about innovation and championing new ways.

"One of the pieces of advice I give to any young researcher given this type of opportunity is – don't be afraid to say yes even if it is something totally out of your comfort zone. Give it a go, or else someone else will."

Now, what about the car which has wheels which could go in any direction?

"I might revisit that design," says Keating, "or someone else will."

Taught by women,
inspired by women

MANCHESTER 1824
The University of Manchester

At the school of Mechanical, Aerospace and Civil Engineering

Professor Alice Larkin, the Head of School of Mechanical, Aerospace and Civil Engineering at The University of Manchester

I was very keen on star gazing as a child, and also liked to fix things, or think about how things worked. This led me to study a degree in Physics with Astrophysics and I then went on to do a PhD in Atmospheric Physics and Climate Modelling. My research focussed on trying to understand the degree to which climate change is due to natural phenomenon, such as the sunspot cycle. After completing my PhD I worked in science communication at the Institute of Physics and later in a medical school.

I then joined the department of Mechanical Engineering at UMIST (now The University of Manchester) where a research group called the 'Tyndall Centre' was advertising for a 'physicist with communication skills' – which struck an immediate chord! The Tyndall Centre has a specific remit to conduct policy-relevant research, and encouraged me to engage with policymakers and submit evidence to government inquiries. In doing so I managed to influence the development of the UK's Climate Change Act, as well as airport expansion in the UK, on the grounds of climate change concerns. After several years I became a lecturer in the School of Mechanical, Aerospace & Civil Engineering, and was eventually made a Professor of Climate Science & Energy Policy in 2015. Leading projects on decarbonising the energy system, particularly focusing on aviation and shipping, and working in an interdisciplinary way had been my focus for many years. However, in 2017 I was given the opportunity to lead our School of MACE – a challenge that is exceptionally rewarding – although very hard work! Looking ahead I'm taking up the role of Head of Engineering and look forward to leading Engineering at the University of Manchester.

We caught up with Alice to hear more about the School and what the future holds for women in engineering.

Very few engineering departments around the world are led by a female academic who holds diversity and equality as central values. Under the direction of Professor Alice Larkin, our School is driving forward rapidly with a huge range of initiatives to improve diversity and representation of female staff and students. We are ensuring that students are taught and inspired by our female staff and we run award winning peer-to-peer mentor schemes where gender balance is a critical part of ensuring a positive experience for all our students.

"The School of Mechanical, Aerospace and Civil Engineering at The University of Manchester has a tremendous breadth of expertise and areas of research interest. Our academics are from diverse backgrounds and span engineering disciplines. We are surrounded by bright, creative and ingenious minds who are keen to put their skills to the benefit of others, be that through imparting knowledge and understanding to our students, supervising student projects or running world-leading research endeavour. There is never a dull moment in the School, and the variety and scope of what our engineering has to offer never ceases to amaze me.

Engineering in the School of MACE creates a natural drive to collaborate and many colleagues seek to develop and support others, and understand that sharing an idea can spawn innovation. Our academics and researchers are also well connected to industry and other stakeholders that help to ground our research in real-world applications. These applications are brought into our teaching and learning, helping to inspire and upskill students for their working lives. We also have industrial advisory boards which help us keep our material in line with accrediting bodies, whilst keeping it up-to-date with the state-of-the-art. They push us to ensure that as well as challenging our students to learn core engineering concepts, we are providing softer skills to really ensure that our graduates can provide what industry needs.

I love finding out about all the amazing research that is going on here, and seeing the research-inspired ideas going into our teaching, by talking to staff around the School, or seeing the great work students put together in their posters based on their individual projects, on poster day. Our engineering creativity knows no bounds, and gives new optimism that we can develop creative and impactful solutions, that are not only important technical innovations, but draw in expertise on how we, as humans and communities, interact with those technologies. The interdisciplinary nature of much of what we do in the School is a wonderful thing of which to be part.

Making a difference in the world inspires engineers. Engineers often focus on applying physical science understanding to challenging problems, seeking solutions to those problems with innovation and creativity. They are inspired by finding neat solutions to complicated problems, and even more inspired if they can see those solutions benefiting people – be that through healthcare innovation, avoiding environmental damage, making things work more effectively to make people's lives easier, helping to make things cheaper so that they can be more readily accessed by those in poorer communities both close to home and in other countries.

Engineering impacts society in so many ways – our modelling and simulation work can have applications in healthcare – such as improving cardiovascular implants by better understanding fluid flow. It can also help us to understand flooding and coastal erosion, improving decisions around construction. Our mechanical engineering experiments can show how renewable technology can deliver more energy from the wind, waves and tides using the hydraulics facilities we have available which helps to deliver commitments as laid out in the Paris Climate Agreement. Without engineering, we wouldn't be able to fully understand how materials function in nuclear reactors, to ensure that investment in low-carbon power can have a long lifetime. Understanding the spread of fire, and how to improve buildings

to resist fire is underpinned by structural and civil engineering research. Combining computation with mechanical engineering is leading to new innovation in robotics, and couple that with 3-D printing, we are able to design new types of bone implants, or prosthetic devices, to improve the lives of people with disabilities; whilst our aerospace engineers explore the use of UAV's to help in disaster zones.

Engineering needs a diverse range of creative people, people with open minds, people with a 'can-do' mentality. If you like making things, and are innovative, engineering could be for you.

If you are interested in pursuing a career in Engineering, make sure you choose some maths and physical science subjects both at GCSE and A-level. Engineering, especially in a Russell Group research-intensive University such as Manchester, is a technical and mathematical topic, as well as being hands-on and creative. Having a strong mathematical and physical sciences background is very important.

Misconceptions you may hear about women in engineering might include 'They won't find it interesting. They won't be so good at the creative and practical elements. They won't be physically strong enough to conduct activities in workshops and with machinery'. All nonsense!

The future looks bright for Women in Engineering. We are increasing in number, and our female engineers often perform better than their male counter parts, both as undergraduates, and post-graduate students. The workplace is changing rapidly, and increasingly engineering organisations are recognising the huge value in having a diverse workforce. Furthermore, the societal importance of engineering, and ensuring that there are clear opportunities to make a difference, is helping to inspire more women to take up this exciting and impactful career path.

Diversity is a great thing – and one that can only benefit engineering and help to solve societal challenges. At the moment, men dominate engineering graduates – but it doesn't have to be that way. Come to Manchester and be a part of that change!"

At Southampton, we are pushing the boundaries of what's possible, from using invisible sound waves and nano-scale electronics, to designing and powering spacecraft that are out of this world.

Our research is helping to fight cybercrime, developing smart fabrics to revolutionise clothing, protecting the planet from space debris and asteroids, designing sensors to rehabilitate stroke patients, optimising our athletes' performance and developing solutions to the world's growing energy demands.

Our engineers are looking deep below the Earth's crust, exploring materials at the quantum level, reaching into space and encompassing everything in between. They are working at the forefront of engineering, helping to solve the major challenges facing society now and in the future.

Studying a degree in engineering can open up a world of opportunities, with engineers playing a pivotal global role that is changing the way we live. As an engineer you could:

- design and manufacture some of the world's largest maritime vehicles
- build complex electronic systems for aircraft
- develop the software so that UAVs (drones) can deliver packages
- create 'smart' GPS systems and car cruise controls that can make their own decisions
- develop new medical technologies for patients
- see inside the body using high frequency soundwaves

At Southampton, our world-class facilities provide the foundations for our research, education and enterprise activities and are key to our engineering success. We are proud that our engineering programmes rank in the top 10 in the UK (Guardian University Guide, 2019), and we offer a wide range of degrees that can set you on the first step to a rewarding career, including:

- Acoustical Engineering
- Aeronautical and Astronautical Engineering
- Aerospace Electronic Engineering
- Biomedical Electronic Engineering
- Civil Engineering
- Computer Science and Software Engineering
- Electrical and Electronic Engineering
- Mechanical Engineering
- Mechatronic Engineering
- Ship Science and Maritime Engineering.

As a Southampton engineering student, you will gain so much more than what you are taught in the lecture theatre. You will take part in a wide range of exciting practical projects to prepare you for working in real-life situations. Our students are working on projects to design, build or optimise:

- quieter drones
- warning sound systems for electric cars
- a satellite that will be launched from the International Space Station
- aircraft suitable for humanitarian aid missions
- digital intervention platform for sufferers of chronic pain
- deep sea robots for mapping
- algorithms to enhance the 3D printing of smart fabrics
- a hydro-powered system for water purification and electricity generation in developing countries
- a Mars Rover.

Join us at Southampton and discover a team of like-minded people who are aiming high and striving to engineer a new world.

UNIVERSITY OF Southampton

THINK BIG

We do. But we also think small, very small.

OPEN DAYS

6 and 7 July
7 and 8 September
12 October

Discover what it's like to be a Southampton engineer and push the boundaries of what's possible.

Book your place:
www.southampton.ac.uk/opendays19

Discover a world of possibilities:
www.southampton.ac.uk/thinkbig

Image shows a metal surface at the quantum level, seen as a lattice of positive metal ions in a sea of electrons

UNIVERSITY OF PORTSMOUTH

GIVE ME AN ENGINEERING DEGREE THAT GIVES ME THE EDGE

A place where horizons are broader

THE UNIVERSITY OF PORTSMOUTH HAS BEEN PROUD TO SUPPORT THE YEAR OF ENGINEERING THROUGH OUR INNOVATIVE RESEARCH, INSPIRATIONAL STAFF AND FORWARD-LOOKING STUDENT ACTIVITIES.

We want to help shape the future and know it takes more than words to make a difference. That's exactly what our research aims to do.

Researchers from our Advanced Materials and Manufacturing (AMM) Research Group led a project to develop composite materials made from agricultural waste that could be used to produce sustainable, lightweight and low-cost applications in the automotive and marine industries.

The date palm fibre polycaprolactone (PCL) bio-composite is made using date palm fibre biomass (biomass is a term that includes waste material from plants, food waste and sewage) that can be used in non-structural parts, such as car bumpers and door linings. It is completely biodegradable, renewable, sustainable and recyclable, unlike synthetic composites reinforced by glass and carbon fibres.

Dr Hom Dhakal, who leads the AMM Group, said: 'The impact of this work would be extremely significant because these lightweight alternatives could help reduce the weight of vehicles, contributing to less fuel consumption and fewer C02 emissions. The sustainable materials can be produced using less energy than glass and carbon fibres and are biodegradable, therefore easier to recycle.'

One of our core aims is to promote the advancement of women in engineering and technology and to increase the number of female students in engineering education, research and in the engineering industry.

As part of Tomorrow's Engineers Week, Engineering PhD student Serena Cunsolo helped to inspire young people and parents as one of a number of engineers from across the UK all working on exciting projects that make a positive difference to the world. Serena was part of the Ocean Cleanup team, which is providing vital evidence about the Great Pacific Garbage Patch (GPGP), located halfway between Hawaii and California and the largest accumulation zone for ocean plastics on Earth. She is now looking at how plastics can be prevented from entering our rivers and oceans.

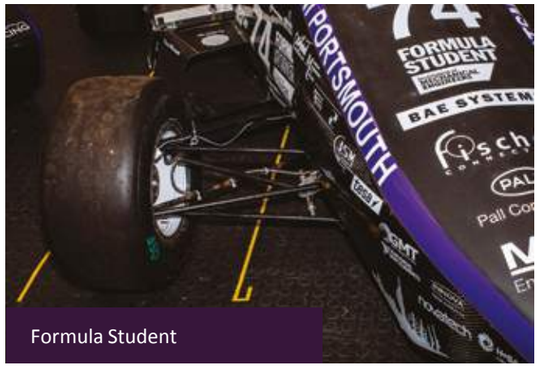
Serena said: 'There is an urgent need for action to prevent microplastics particles from entering our oceans. Once these tiny fragments of plastics end up in the marine environment, they represent a potential harm to sea life. Hopefully, the results of my research will promote innovation in technologies and the implementation of reduction measures to preserve the aquatic environment.'

Date palm biocomposite

Our students have access to state-of-the-art experimental and computational facilities, as well as expert technical support staff, so that they can put the knowledge they gain from our courses into practice.

UPRacing Electric, our student racing car design team, celebrated excellent results at the international motorsport contest Formula Student.

The competition doesn't just focus on the engineering of the car - students also develop other enterprising and innovative skills needed in industry such as planning, project management, financial management and team work.



Formula Student

The team, who designed an electric racing car and were entering the annual competition for the first time, came second out of 40 Class 2 teams for the costing of their car in the competition, which tests teams on business elements as well as design. The UPRacing Electric team also came eighth out of 40 teams in design and ninth in business.

Team leader Oliver Plucknett said: 'I couldn't be prouder of what the team has achieved in such a small space of time. I very much looking forward to working with everyone again soon. Thank you to everyone that has supported us of the last year we couldn't have done it without you.'

Find out more about Engineering at the University of Portsmouth at:

port.ac.uk/school-of-engineering

The School of Mechanical and Design Engineering

Undergraduate and postgraduate degrees in mechanical and manufacturing engineering, as well as product design, industrial design and our unique and creative courses in innovation engineering.

The School of Energy and Electronic Engineering

Undergraduate and postgraduate electronic engineering courses, plus, gas and energy engineering degrees.

The School of Civil Engineering and Surveying

Undergraduate degree courses in construction engineering management and civil engineering with geotechnical, environmental and structural engineering postgraduate specialisms.

TEF Gold
Teaching Excellence Framework

NO.1
IN THE UK FOR BOOSTING GRADUATE SALARIES
(The Economist 2017)

TOP 25
UNIVERSITY
(Guardian University Guide 2019)

97.5%
OF GRADUATES WORKING OR IN FURTHER STUDY
(DLHE 2017)

DYNAMIC COURSES IN ENGINEERING AT CHRIST CHURCH

If you have the creativity, desire and interest to make a difference, then we have a course for you. You can choose from our degrees in:

- Biomedical Engineering
- Chemical Engineering
- Product Design Engineering
- Mechanical Engineering
- Software Engineering

Read more about our Engineering courses:
www.canterbury.ac.uk/study-engineering

Canterbury Christ Church University

SHAPE THE WORLD'S FUTURE

We are living in an age of rapid technological change where so much of what affects our lives has been engineered:

/ From designing the world's most thrilling rollercoaster to developing software to extend smartphone battery life.

/ From turning recycled plastic bottles into high-end fabrics to creating clothes for Antarctic temperatures.

/ From providing clean drinking water for the developing world to extending the shelf life of the food in your fridge.

If you are looking for a career where you can use your creativity to design global, real-world solutions, choose engineering.

We are offering a truly immersive learning experience
Our courses and professional placements are designed with specialist engineering and technology businesses to unlock your creative potential and build your technical expertise, so you become a highly-skilled, work-ready engineering graduate.

You will benefit from a new multi-million pound facility for Engineering, Technology and Health, planned to open during academic year 2020, and will be able to take advantage of our strong links with industry and employers to put your skills into practice.

A pioneering approach to your learning
We can help your natural creativity and thirst for problem-solving flourish as you learn. We are one of only a handful of universities in the UK to offer the pioneering CDIO international engineering education model, developed by the world-renowned Massachusetts Institute of Technology (MIT) in collaboration with business.

CONCEIVE
look at the problem and think of possible solutions

DESIGN
plan how to create your solutions

IMPLEMENT
bring your solutions to life

OPERATE
see if your solutions work and are fit for purpose

Come and visit us at an Open Day:
www.canterbury.ac.uk/opendays

Canterbury Christ Church University

From racing cars to medical sensors:

Celebrating our female engineers

In the University of Sussex School of Engineering and Informatics, we're proud to support the achievements of our female engineers. We recognise that, in the context of an engineering workforce that is 89% male, female engineers benefit from targeted support. We're delighted to take this opportunity to support the valuable work of the Women's Engineering Society, to recognise the contributions of all female engineers, and, in particular the achievements of our own students and academics.

In 2019, we will be hosting the Robogals annual conference here at Sussex. Our own chapter of Robogals was recently reinvigorated by one of our engineering students and leader of Robogals group, Emma Fox. Under Emma's leadership, and with our support, the Sussex chapter of Robogals has worked with local school children to teach basic engineering principles, making engineering fun and encouraging young girls to consider engineering as a profession.

Another of our outstanding students, Abigail Berhane, recently set up the Equality in Engineering group here at Sussex, and we're proud to support the group's work. Abigail's mission, and that of her group, is to create a network of young female engineers, and to undertake outreach work in local schools, delivering exciting and enjoyable engineering-focused sessions.

Our Formula Student racing car team, along with our Widening Participation team, enjoy a close working relationship with a number of local schools. The Formula Student team recently delivered an assembly at a local girls' school in Burgess Hill, on the engineering opportunities in higher education. The team is keen to help increase the diversity of people studying engineering, and they recently ran a 'Design a Racing Car' day for local school children to try out Computer Aided Design and soldering circuit boards.

We recognise that sometimes those best suited to solving technological problems specific to women, are women themselves. Dr Elizabeth Rendon-Morales, lecturer in Electrical and Electronic Engineering, and her research team have developed a highly-sensitive sensor to measure the unborn babies' heartbeat more accurately and without needing to visit a hospital. The potential of the technology to be adapted for human mothers and babies was recently recognised by Dr Heike Rabe, a consultant neonatologist at Brighton and Sussex Medical School.

At Sussex, we celebrate the achievements of all of our engineering students and academics. We're encouraged by the upward trend of young women embarking on engineering degrees across the Higher Education sector. We continue to work to support our female engineers, and look forward to the day when women are as likely as men to study and work in engineering, and one in which there are enough engineers to meet a growing demand.

University of
HUDDERSFIELD
Inspiring tomorrow's professionals

School of Computing & Engineering

Engineering Taster Day

Wednesday 27 March
& Tuesday 2 July
12.00 Noon – 3.30pm
(followed by optional tour until 4.30pm)

Engineering has the power to improve people's lives and change the world we live in. Taster Days are designed to give a real flavour of what it's like to study a particular subject at University, allowing students to develop a practical understanding of a specific subject area and the range of courses available.

Suitable for Level 3/Year 12-13/ adult learners.

What to expect:

- Explore our engineering pathways
- Meet our talented teaching staff and current undergraduate students
- Find out what studying at University is really like
- Take part in two interactive workshops of your choice
- Learn about placement opportunities on offer during our courses
- Tour our facilities

HEA Global Teaching Excellence Award

TEF Gold Teaching Excellence Framework

The University of Huddersfield School of Computing & Engineering offers an extensive range of BEng and MEng courses, in areas covering Electronic, Electrical, Energy, Software, Audio, Mechanical and Automotive Engineering.

To book your place and find out more visit: www.hud.ac.uk/engineering-success

The School of Engineering at the University of Lincoln combines state-of-the-art R&D and teaching facilities with research informed teaching and industrial links.

As the first new Engineering school in the UK for more than 20 years, we recognise the importance of engineering to the future of the UK economy. The School was part of a £37 million development in collaboration with Siemens Industrial Turbomachinery Limited.

Students on our innovative and exciting engineering degree programmes can benefit from numerous opportunities to work directly with industry to develop important engineering knowledge and skills.

The School has been listed as a Global Principal Partner of Siemens who share our vision of producing graduates who are career-ready and academically excellent. Siemens have transferred their Global Training Institute to our Engineering Hub, alongside relocating their training team.

UNIVERSITY OF LINCOLN
SCHOOL OF ENGINEERING

Discover your future – apply to study Engineering at Lincoln

T: 01522 837 930
E: engineering@lincoln.ac.uk
W: lincoln.ac.uk/home/engineering
UoLSoE @UoLEngineering

The University of Chester
Thornton Science Park

The University of Chester's Thornton Science Park features purpose-built laboratories and industrial facilities to provide the best practical experience and learning opportunities. Thornton is built around the triple helix model where academia, industry and government interact closely, leading to innovation, collaboration and knowledge transfer. The Faculty has over 700 students across three years in a number of scientific and engineering disciplines. Commercially the Park focuses on the energy, environment, advanced manufacturing and automotive sectors. The park is also now home to over 400 commercial tenants from over 40 companies.

Thornton Science Park presents the University of Chester, the region and the UK with an opportunity to develop a fundamentally new way to engage academia and industry to the benefit of all. We, at Thornton, are developing a unique business innovation ecosystem with the University at its core. This is enabling a very strong link between academia and industry. The link allows graduates to gain degree level engineering knowledge with skills and business understanding. In addition to training, the Faculty is undertaking industrial R&D that businesses desperately need. These opportunities allow students to work within fast moving innovative SME businesses during their degree studies resulting in 'industry ready graduates'.

The following courses are delivered at Thornton Science Park:-

- Chemical Engineering
- Chemistry
- Computer Science
- Cybersecurity
- Electrical and Electronic Engineering
- Games Development
- Mathematics
- Mechanical Engineering
- Physics
- Software Engineering

For more details see :
www1.chester.ac.uk/departments/science-and-engineering

MANCHESTER 1824
The University of Manchester

SCHOOL OF ELECTRICAL AND ELECTRONIC ENGINEERING

We offer courses in Electrical and Electronic Engineering, Electronic Engineering and Mechatronic Engineering.

Our courses can be studied as a BEng (3 years) or MEng (4 years) and all have the option to include an industrial experience year.

All of our BEng and MEng courses are accredited by IET, the institute of engineering and technology.

ELECTRICAL AND ELECTRONIC ENGINEERING

Combine maths knowledge with creativity to solve energy challenges. Develop electronics, sensors and communication systems to power homes and industry.

ELECTRONIC ENGINEERING

What other engineers build electronic engineers make intelligent. Learn to design analogue and digital circuits to create smart devices.

MECHATRONIC

Explore the world of robotics and automation by learning how to incorporate an electronics nervous system into other engineering systems and devices.

THE EEE SUCCESS SCHOLARSHIP

The EEE Success Scholarship is open to all home and European Union students who achieve exceptional entry grades. Students are automatically considered and awarded £1,000 during their first year.

THE BEATRICE SHILLING SCHOLARSHIP

The Beatrice Shilling Scholarship is a bursary of £6,000 per annum open to high achieving home and European Union students who have identified as female when applying for undergraduate degree level study. To qualify for the scholarship appropriate applicants need to meet certain criteria, upon entry and during their studies, which can be found on our website.

Telephone: 0161 306 4700
Email: ug-eee@manchester.ac.uk
Web: www.manchester.ac.uk/eee
Blog: http://www.mub.eps.manchester.ac.uk/eee/

For a full list of our scholarships and more information:
http://www.eee.manchester.ac.uk/study/undergraduate/scholarships/

Blazing a Trail with

National Apprenticeship Week 2019

'Blaze a Trail' will be the theme for National Apprenticeship Week 2019 (NAW 2019), Apprenticeships and Skills minister Anne Milton announced recently.

Anne Milton
Apprenticeships & Skills Minister

The 12th annual National Apprenticeship Week, which will run from 4 to 8 March 2019, is a great opportunity to highlight the fantastic opportunities that an apprenticeship brings to employers, individuals and the economy.

The 'Blaze a Trail' theme will feature throughout the week to highlight the benefits of apprenticeships to employers, individuals, local communities and the economy.

As in previous years NAW2019 will see a range of activities and events being hosted across the country. We want to change the perceptions people have on what an apprenticeship is and who takes them up to encourage people of all ages and backgrounds to take up an apprenticeship.

The week will also show the number of high quality of apprenticeships opportunities available at all levels around the country in a huge variety of sectors such as aviation engineering, finance and policing.

Apprenticeships and Skills Minister Anne Milton said:

"Blazing a trail is what being an apprentice is all about and will be our theme for National Apprenticeship Week 2019. Because that's what's happening up and down the country – apprentices and employers blazing a trail."

"I want everyone to recognise the change that apprenticeships can bring - for employers blazing a trail to new markets, apprentices to new career opportunities and for colleges and training providers raising the skills levels for everyone."

Keith Smith, Director, Education and Skills Funding Agency added:

"I want the 12th annual National Apprenticeship Week to be the biggest and most successful, yet.

The theme for this year: Blaze a Trail is at the heart of what apprenticeships are all about. I really hope our partners feel as excited about it as we do and, like previous years, they will can get fully behind the Week.

We want everyone to consider hosting an event or activity so more people get to see and hear about the huge benefits apprenticeships can bring to employers, individuals and local communities."

National Apprenticeship Week 2018 was record-breaking, with 780 events taking place across England. The ambition of delivering a 10,000 talks movement - #10kTalks - to inspire the next generation of apprentices was exceeded, reaching over 33,500 people in over 300 schools across the country.

A further 130 schools hosted teacher-to-teacher talks, reaching an additional 2,300 adults, to support them to talk to their students about apprenticeships. The Big Assembly reached 20,000 young people with a live video stream, showcasing apprentices and employers sharing their apprenticeships stories.

Events also took place to celebrate International Women's Day, apprenticeships diversity and a launch event with the BBC and Sutton Trust included the announcement of a new ground-breaking apprenticeship programme.

Richard Hamer, Education & Skills Director, BAE Systems commented:

"We have always supported National Apprenticeship Week. It's a great, focussed way to showcase the many benefits of apprenticeships. For National Apprenticeship Week 2019 we will be celebrating our apprentices' achievements through our own internal apprenticeship awards.

We've been a 'trailblazer' in developing new standards across the engineering sector and were delighted to hear that the theme for this year is 'Blaze a Trail'. We have 2000 apprentices in learning and for 2019 will be recruiting more advanced, higher and degree apprenticeships across a wide variety of apprenticeship standards."

More information on National Apprenticeship Week 2019 will be available from @Apprenticeships on Twitter and National Apprenticeship Service on LinkedIn to keep up to date.

Unprecedent support for NAW last year

National Apprenticeship Week 2018 showcased 5 days of celebratory events that demonstrated how apprenticeships work for individuals, employers, local communities and the wider economy.

Last year saw the most successful National Apprenticeship Week yet; with unprecedented support received for the week from the apprenticeships community, in the number of events delivered and coverage achieved, both online and in social media.

The ambition of delivering a 10,000 talks movement - #10kTalks – to inspire the next generation of apprentices in schools across the country has been exceeded, reaching over 33,500 people. Over 300 schools joined the 10,000 talks movement and a further 130 schools also hosted teacher-to-teacher talks - reaching an additional 2,300 individuals. The Big Assembly, which tool place on Thursday, reached an additional 20,000 people with a live video stream - showcasing apprentices and employers sharing their apprenticeships stories.

The week kicked off on Monday, 5 March with a launch event at the BBC in London with news of a new ground-breaking apprenticeship programme, developed with the Sutton Trust, to support 50 school leavers from socially diverse backgrounds, to apply for apprenticeships.

Secretary of State for Education, Damian Hinds recognised the ambitions of the BBC and Sutton Trust in his address, whilst reaffirming the crucial role apprenticeships play in helping people realise their potential as they learn and earn.

Also on launch day, Minister for Skills and Apprenticeships Anne Milton visited Manchester, where she had breakfast with apprentices from Kelloggs, before attending a 10K Talk at St Ambrose RC High School in Wardley, Manchester. Social media activity saw #NAW2018 and National Apprenticeship Week 2018 trend on social media (Twitter) on launch day – trending top in the UK.

On Tuesday the Minister visited Yorkshire Building Society in Leeds for a Northern PowerHouse event, before a visit to Asda House to meet apprentices. The Minister then moved to Askham Bryan College in York to meet more apprentices from the college. Meanwhile Sue Husband, Director of the National Apprenticeship Service took time to work shadow some apprentices and spent time with Fathima Alim and Christina Janse Van Rensburg, Level 3 business administration apprentices in the Policy Curriculum division at the Department for Education.

Wednesday saw the Apprenticeship Diversity Champions Network (ADCN) celebrate its first year with an event dedicated to recognising the achievements of its 50 members – who are all committed to championing apprenticeships and diversity amongst employers. New members, including Channel 4, Buckinghamshire Fire and Rescue Service, and ITV were welcomed to the network by Minister for Skills and Apprenticeships Anne Milton and Helen Grant, MP and Chair of the network, who acknowledged members commitment to ensuring that their workforce includes apprentices, from all backgrounds.

International Women's Day on Thursday was a fantastic opportunity to celebrate how 'Apprenticeships Work for Women' and highlighted and celebrated the positive impact of female apprentices in workplaces across the country.

The event, taking place on the penultimate day of National Apprenticeship Week 2018, saw Minister for Skills and Apprenticeships Anne Milton and high profile names in business, politics and society address an audience of teachers, apprentices and female business leaders at the National Gallery, London, whilst leading art historian introduced some of the artwork created by women and on show in the Gallery's collection.

A fitting end to National Apprenticeship Week 2018 involved 250 apprentices – from across a variety of sectors and job roles – in 'Class of 2018' graduation ceremonies, taking place in six prestigious venues across England. Apprentices that have completed their apprenticeship in the last 12 months were recognised and celebrated; whilst showcasing why more people should choose an apprenticeship as a pathway to a great career.

Sue Husband, Director of the National Apprenticeship Service said:

"The 11th annual National Apprenticeship Week has shown me how apprenticeships continue to be seen as a brilliant career path for individuals and also a great opportunity for employers to shape the workforce they need to deliver.

I have attended many events over the course of the week and the message I get is that apprenticeships work. From celebrating the new apprenticeship programme with the BBC, to meeting inspiring employers committed to diversity whilst seeing so many apprentices receive the recognition they deserve at class of 2018 graduation ceremonies I am satisfied that the whole apprenticeships community values the opportunities apprenticeships present.

We need to build on this momentum, to encourage individuals – regardless of age or background – to find an apprenticeship and get on the path to a brilliant future. National Apprenticeship Week wouldn't happen if it wasn't for all the supporters of apprenticeships so I thank them all for their dedication to National Apprenticeship Week and to apprenticeships and the difference they are making to the lives of individuals."

Birthday celebrations for the Apprenticeship Diversity Champions Network

The ADCN celebrated its first year with an event dedicated to recognising the achievements of its members – who are all committed to championing apprenticeships and diversity amongst employers.

The event, held during National Apprenticeship Week 2018 at the House of Commons, welcomed Helen Grant MP and Chair of the Apprenticeship Diversity Champions Network (ADCN) along with existing and new member employers and apprentices. Addressing the audience alongside Helen Grant were Neil Bentley from WorldSkills, Jodie Williams from Yorkshire Water, Gp Capt Steve Dharamraj from the Royal Air Force and Mike Thompson from Barclays, Elaine Billington from United Utilities and Claire Paul from the BBC, alongside Sue Husband, Director of the National Apprenticeship Service.

Speaking at the event, and discussing the impact of the network since its launch during National Apprenticeship Week 2017, Helen Grant MP said:

"It is wonderful to celebrate the impact of the Apprenticeship Diversity Champions Network over the past 12 months. We now have over 50 employers in the network who are all committed to ensuring that their workforce includes apprentices, from all backgrounds, as well as pledging to tell other employers about the powerful impact apprentices can bring.

I am delighted that the hard work we have undertaken to increase the number of apprentices from diverse backgrounds is making a difference and our impact report, launched today, highlights this success.

Having so many ADCN members in the room, alongside new members, is great for the network and for apprenticeships and it's great to celebrate our success as part of National Apprenticeship Week 2018."

National Apprenticeship Week 2018 - themed 'Apprenticeships Work' - was the 11th annual week-long celebration of apprenticeships and during the week employers and apprentices from across England came together to showcase the success of apprenticeships whilst encouraging even more people to choose apprenticeships as a pathway to a great career.

New members of the ADCN were also announced at the event – including Channel 4, Buckinghamshire Fire and Rescue Service, and ITV.

Gp Capt S J Dharamraj from Commandant Royal Air Force Central Training School said:

Gp Capt S J Dharamraj

"Diversity is of absolute paramount importance to the RAF, and indeed to our apprenticeship programme.

Greater Diversity in our workforce allows us to draw on a range of different experiences, select the best recruits, irrespective of gender, ethnicity, religion or sexual orientation, and better reflect the society we seek to protect. Improving diversity and inclusion is in itself a challenge but are working hard through our outreach programmes and our own diversity champions to ensure we inform communities of what an apprenticeship provides to the RAF and the benefits that apprenticeships can bring to them - in sum, what it means to be an RAF apprentice.

We are proud to stand up as a champion, and work with other members of the network to ensure we deliver lasting and positive change."

The event brought news that the parent's apprenticeship information leaflets are now being produced in Polish and Punjabi. It also highlighted developments to show the Disability Confident logo on apprenticeship vacancies on find an apprenticeship, the service for searching and applying for apprenticeships. This will help support Learners with Learning Difficulties and Disabilities (LLDD) by giving them the facility to search for appropriate apprenticeship opportunities.

Sue Husband, Director of the National Apprenticeship Service concluded:

"The 11th National Apprenticeship Week was a great success and it is magnificent that we can recognise the employers committed to apprenticeships diversity as part of our week long celebration of all things apprenticeships.

It is important that workforces reflect the community they serve and these employers are working to ensure that the reach of apprenticeships is extended to diverse groups. Apprenticeships work - for individuals, employers, for local communities and for the economy - and the Apprenticeship Diversity Champions Network is working hard to make sure this message is being spread to secure a more diverse workforce for the future."


Class of Cambridge 2018

Class of 2018 celebrated across the country

As the 11th National Apprenticeship Week drew to a close, over 250 apprentices celebrated completing their apprenticeship in the 'class of 2018' graduation ceremonies.

At events held in London, Brighton, Weston-Super-Mare, Leeds and Cambridge apprentices from across a number of sectors and job roles were recognised for successfully completing their apprenticeship in the last 12 months.

The 'class of 2018' graduation ceremonies were held as part of the 'Apprenticeships Work' themed week bringing employers and apprentices from across England together to celebrate the success of apprenticeships, whilst encouraging even more people to choose apprenticeships as a pathway to a great career.

Sue Husband, Director, National Apprenticeship Service added:

"Apprenticeships hold the same prestige as university and events like these graduation ceremonies taking place across England today have given apprentice graduates the recognition they deserve for completing their apprenticeship.

Whether apprentices are moving onto the next level of their apprenticeship or if they are now in full time positions with their employer, they have shown that apprenticeships truly do work to get individuals onto their chosen career path and on the road to success.

As an apprentice myself I know the hard work that goes in to completing an apprenticeship. I take my hat off to the class of 2018 and thank them and their employers for supporting apprenticeships and the benefits they bring to individuals, employers, local communities and the wider economy."

Apprentices at the special graduation ceremonies came from wide ranging sectors, representing dedicated apprentice employers, including BT, Lloyds Bank, Troup, Bywaters + Anders, HMRC, the Royal Navy, Channel 4, the NHS, MOD and Halifax – amongst others.

Graduating Charlotte Brandom, IT Support Engineer and former BT Higher Apprentice said:

"I am so pleased that I did my apprenticeship. I had started off on the university route, studying Psychology, but I realised it wasn't working for me and switched paths to do an IT and Networks apprenticeship with BT. I have been able to rotate roles, so have experience from several parts of the business. I now work in a job I really enjoy - technical support for cloud services – and it's all thanks to the skills my apprenticeship gave me."

Young Apprenticeship Ambassador Networks from across England supported the National Apprenticeship Service in encouraging apprentices to attend a ceremony today.

Charlotte Hughes, Chair of the Young Apprenticeships Ambassador Network in the East of England added:

The apprentice graduation ceremonies have created quite a buzz amongst the apprentice community and it's great that they are happening during National Apprenticeship Week.

Graduation ceremonies are an amazing opportunity to celebrate all the apprentices and their achievements. It's also a great time to talk to those graduating to build a greater network of apprentice ambassadors in England. I hope that everyone attending the events enjoys their moment in the limelight – it's well deserved.

Apprenticeships and Skills Minister "on tour" as part of National Apprenticeship Week 2018

To mark last years National Apprenticeship Week, Apprenticeships and Skills Minister Anne Milton took part in a tour across England to meet apprentices, local businesses, schools and colleges to talk about the benefits of apprenticeships. On the tour the Minister saw first-hand the benefits that apprenticeships are bringing to employers, and also heard from apprentices about how apprenticeships are transforming their lives.

Apprenticeships and Skills Minister Anne Milton explained:

"Last National Apprenticeship Week I travelled to Manchester, Leeds, London, York and Gloucester and have heard incredibly inspiring stories from apprentices working across a huge range of sectors and at all levels.

And from such different backgrounds - women with children returning to part-time work doing degree apprenticeships, people who started university and decided it wasn't for them, and young people who didn't do well at school but for whom an apprenticeship has opened a new world of work and learning, building not only their skill but also their confidence and self-esteem.

I've also met businesses and employers in the retail, agricultural, banking and digital sectors who are really positive about the benefits taking on apprentices can bring them. Many of them have already kicked off new apprenticeship programmes following the introduction of the apprenticeship levy and I'm excited to see where these go - and to see more businesses take advantage of this chance to invest in training and see their business grow.

All of these stories show that apprenticeships change lives, lead to rewarding jobs, and change businesses for the better. National Apprenticeship Week is important but every week needs to be about apprentices. We will continue to make sure everyone knows how amazing apprenticeships can be. Whatever your background and wherever you come from they change lives and change business for the better."

On the first Monday, Minister Anne Milton visited employers and schools in Manchester. She met with food manufacturing apprentices at Kellogg's head office to hear from them about their experiences and to taste test breakfast products. She also met with staff, apprentices and students at St Ambrose Barlow RC High and Sixth Form in Greater Manchester as part of the National Apprenticeship Week #10ktalk campaign - which aimed to speak to 10,000 people about the opportunities apprenticeships can offer. Over 300 schools joined in the campaign, and reached over 33,500 people with stories about apprenticeships.

Later that day she then attended an apprentice roundtable hosted by WhiteHat, a company which matches talented non-graduates with apprenticeships in companies including Google and Just Eat.

This was followed by a visit to Leeds on Tuesday for an 'Apprenticeships Work' business forum, hosted by the Northern Powerhouse and the Yorkshire Building Society, targeting non-engaged businesses with apprenticeships messaging. The Minister gave a speech on why apprenticeships work for the wider economy. She then visited ASDA's head office in Leeds where she met a group of newly recruited higher level and degree apprentices working in the retailer's IT and food science teams, and to hear about how the newly developed courses are helping women build their careers in STEM.

Later on she also visited Askham Bryan College in York, which specialises in land-based education and has more than 800 apprentices studying a range of subjects including veterinary nursing, agriculture and land-based engineering. The Minister met students and staff busy with lambing, visited the Agri-Tech building to meet engineering students and saw students caring for a range of species including snakes and bearded dragons in the Animal Management Centre.

On the Wednesday, the Minister celebrated the first anniversary of the Apprenticeship Diversity Champions Network and met apprentices from the Royal Mail. On the Thursday, she spoke at an event held at the National Gallery to celebrate the positive impact of female apprentices in the workplace on International Woman's Day.

Finally, she travelled to Gloucester and spoke to staff and apprentices at Gloucestershire College, presenting them with the Association of Colleges Beacon Award for the Promotion and Delivery of Successful Apprenticeships. This was followed by a tour of the college during which she met engineering apprentices, as well as a visit to the Festival of Manufacturing and Engineering Apprenticeship Show.

Advance your career **here.**

“When I started in engineering it was a ‘man’s world’, but at Freightliner, I’m part of a diverse workforce which looks out for each other. Ultimately, I’m challenged every day and it’s the responsibility I’m given which keeps my role interesting. No matter the task, I feel safe and supported when I come to work.”

– Terri-Ann Westerman, Mechanical and Electrical Fitter, Freightliner.

@RailFreight Freightliner Group Ltd Freightliner Group Ltd enquiries@freightliner.co.uk

www.freightliner.co.uk +44 (0) 207 200 3974

Freightliner, a subsidiary of Genesee & Wyoming Inc., is a leading Rail Freight operator and the largest haulier of maritime transport containers in the UK, transporting over 700,000 containers every year. Essential to maintaining our success is the effective and efficient maintenance of our locomotive and wagon fleet to ensure safety, reliability, and punctuality.

That is why we employ the doers, the thinkers and the perfectionists of their trade. We have a highly respected and leading engineering team within the UK rail industry, and as part of a global operation, a role within Freightliner can also offer you the potential to gain experience on an international scale.

We know that a strong future is a sustainable future. That is why, at Freightliner, we always seek to minimise our footprint on the environment and the communities we work in. With each freight train removing up to 76 lorries from our busy roads, we play an important role in helping to reduce road congestion.

Sustainability goes hand-in-hand with adaptability and innovation, which is why we are proud to be at the forefront of new technologies, having designed and developed over 15 new wagon types and one new locomotive in the last 15 years. The competitive commercial environment and the backing from our world renowned parent company means investment in new talent and staff development is a priority.

To make history requires an outstanding team, which we are proud to say we have curated over the last 50+ years of operation. At Freightliner, we have the highest concentration of chartered engineers in the UK freight operating industry, and we continuously invest in training and learning and development opportunities for new and current staff.

So where do you fit in? If you join Freightliner, you will not just be a number. Each role we offer provides immediate exposure to real-life problems and challenging opportunities, where you will have significant autonomy in decision making and influence. Perhaps most importantly of all, you will be working in a safe, supportive environment with a friendly, diverse team to offer you encouragement and guidance every step of the way.

MBDA is a global leader in the defence industry, providing vital capabilities to the British army, navy and air force. Voted as a Sunday Times Top 25 Big Company To Work For 2019, they offer a fantastic platform to start your career.

Engineering at MBDA provides an abundance of opportunities to develop yourself in your area of interest and gives you the opportunity to make a real difference to our military personnel on the front line. Whether it's one of our award winning apprenticeships or a graduate scheme, we offer competitive salaries, benefits to support a healthy work-life balance and the chance to work on some of the most advanced engineering of its kind.

As a company we are excited for the future generation to build on what we've already created and think engineering is not just about maths and science. We are innovators and designers so if you have a creative mind, you might be surprised at how rewarding an engineering career could be. Our culture is friendly, supportive and people-focused so whether you think a career teaching our military how to use our products could be for you or designing the next world-class defence capability for a fighter jet, we want to hear from you!

> Engineering has allowed me to use creativity in a way that I didn't think was imaginable. I can combine my love of arts and my skills in engineering to approach my work with an openness to new solutions that may at first have seemed impossible.

Jamie D'Ath

Integration and Systems Validation Engineer and former apprentice

LAUNCH YOUR CAREER WITH MBDA

www.mbdacareers.co.uk

MBDA MISSILE SYSTEMS

or follow us on Twitter: **@MBDAcareers**

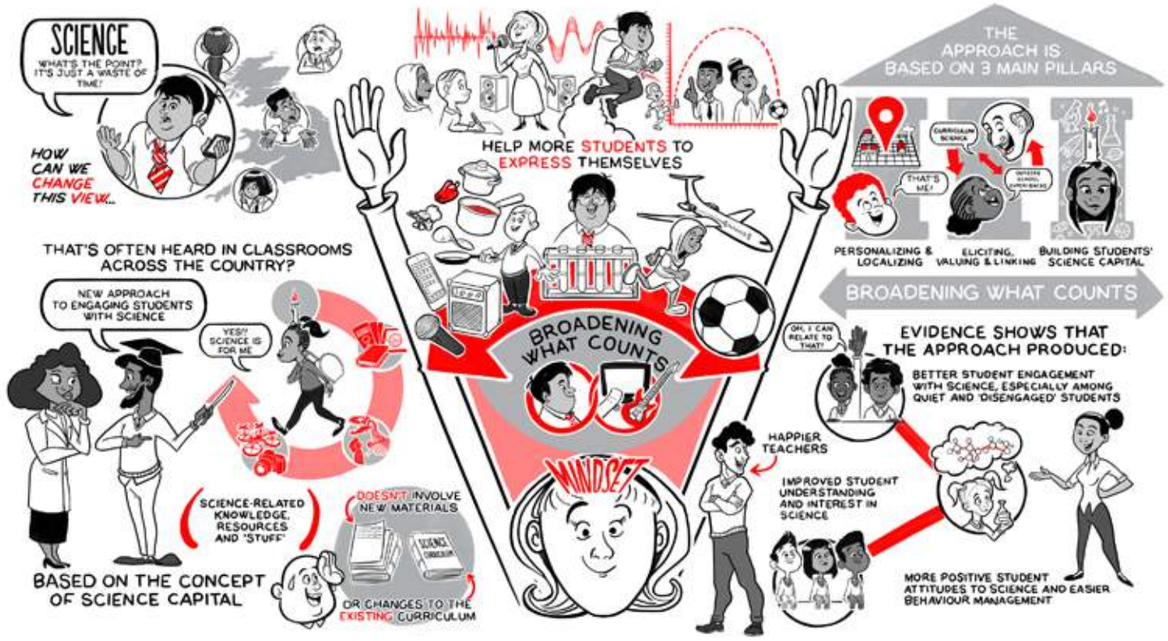
Join our LinkedIn Group: **Engineering UK (Defence)**

Science capital and the STEM skills gap

When was the last time you discussed science at home in a way that didn't involve physics homework? What about when you were younger? Perhaps your family were as comfortable discussing how clouds are made as your favourite television show. Or perhaps you felt like science simply wasn't 'for you'.

As a long-standing supporter of STEM education in the UK, and a partner to the Year of Engineering 2018, BP wanted to understand why there is a STEM skills gap in the UK and what needs to be done to close it.

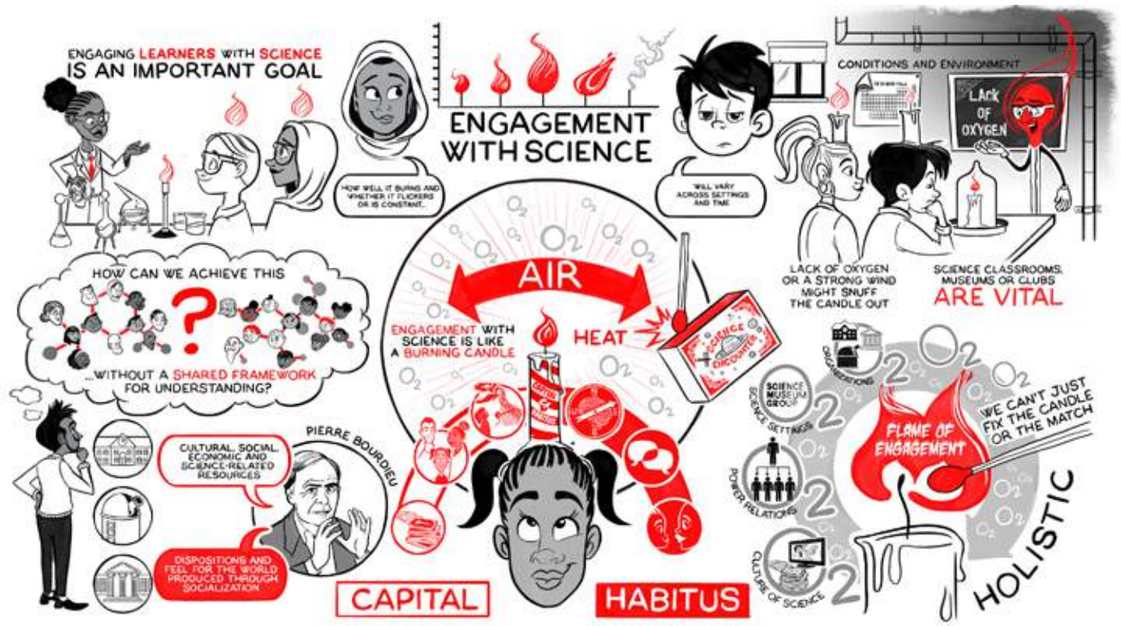
We partnered with King's College London, University College London Institute of Education and the Science Museum Group on a major collaborative research and development programme for science education. It's called Enterprising Science.



Enterprising Science and the concept of science capital

The academic research has found a clear relationship between a student's level of science capital and their future aspirations in STEM subjects. Science capital is determined by an individual's science-related qualifications, their understanding and knowledge about science and knowing someone who works in a science-related job. The higher an individual's science capital, the higher the likelihood they will aspire to continue with STEM after the age of 16.

Working with secondary science teachers from schools in four cities, researchers co-developed a 'science capital teaching approach' that can be applied to an existing curriculum. Evidence shows that this approach produces significant increases in student science capital, attitudes to science and post-16 aspirations. We have also developed courses for schools and resources for science organisations to use science capital to build engagement with STEM and to raise levels of science capital amongst young people.



Our partners in Enterprising Science

Enterprising Science is a BP-funded partnership of academics and practitioners working together to support schools and other professionals in engaging more young people with science. Our approach aims to highlight the relevance of science to young people's futures and find ways to connect school science with students' diverse identities and lives. It involves collaboration between schools, young people and their families, and museums and science centres.

University College London and King's College London
Enterprising Science is underpinned by the rigorous and evidence-based research carried out by teams at University College London Institute of Education (UCL IOE) and King's College London. Their academic teams originated the concept of science capital and developed the science capital teaching approach. You can find out more about their work at **ucl.ac.uk/ioe-sciencecapital**

Science Museum
The Science Museum is applying and delivering the research in practice by supporting teachers, designing resources, developing a CPD programme and providing practitioner-based expertise about museum learning. You can find out more about their work at **sciencemuseum.org.uk/sciencecapital**

How BP is raising young people's science capital

The insights from the Enterprising Science research inform all of BP's work with schools, from employee volunteering to production of teaching resources.

BP is working with young people, their families, their teachers and museum educators to help them understand how to inspire, engage and support many more young people in their science education, including supporting young people to understand the careers possibilities within and from STEM subjects.

We want to help teachers to become more skilled and confident to use museums and science centres to support their teaching. We are developing tools and techniques for them to engage all young people with science and sharing these through the professional development courses at the Science Museum and through Project ENTHUSE at the National STEM Learning Centre and Network.

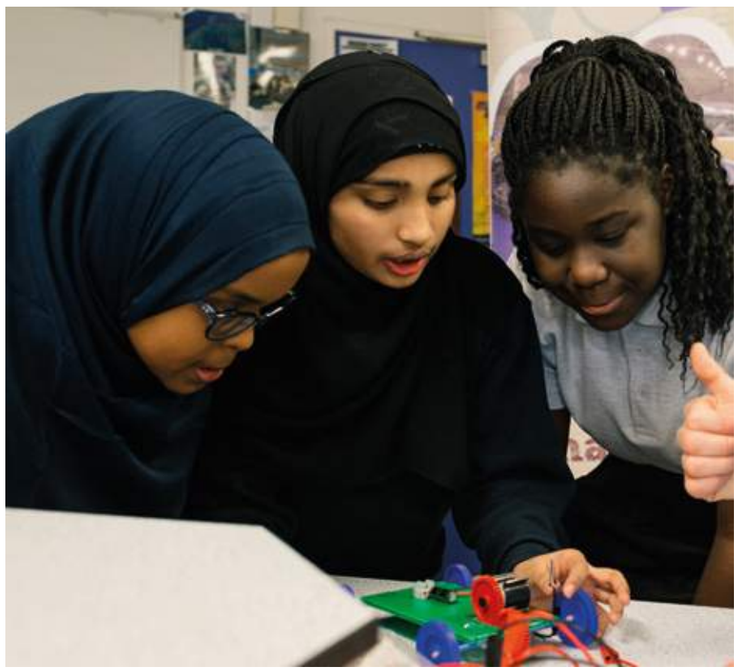
You can find out more at
bp.com/stem and bp.com/sciencecapital

Tomorrow's Engineers - A More Diverse Workforce

Engineering is everywhere and the people that work in engineering are responsible for helping us to meet some of the world's biggest challenges. From improving energy efficiency and tackling climate change, to providing clean water and better food, more sustainable housing and transportation, and enabling us to communicate better with each other, as well as helping to keep us safe and well.

Yet, while perceptions of engineering are improving, many people have an outdated, narrow and stereotypical idea of engineering and are unaware of the breadth of the industry and the enormous range of career opportunities within in.

The Engineering UK 2018: State of Engineering report indicated that between 2014 and 2024 there will be 2.5 million jobs in engineering companies and across the workforce overall, demand for engineering roles are projected to reach 2 million. Over the past year, the engineering sector grew by 6%, which means it now equates to 27% of UK industry.



Engineering employs 19% of the workforce and generates 23% of total turnover in the UK. However, for it to continue to grow and contribute to the economy in this way, it's vital that the long-standing skills shortage is addressed.

We need more young people continuing to study maths and science at A level (and equivalent), this keeps their options open as the routes into engineering are largely based around these subjects. Design and technology, computing, electronics and construction and the built environment are also useful for engineering careers.

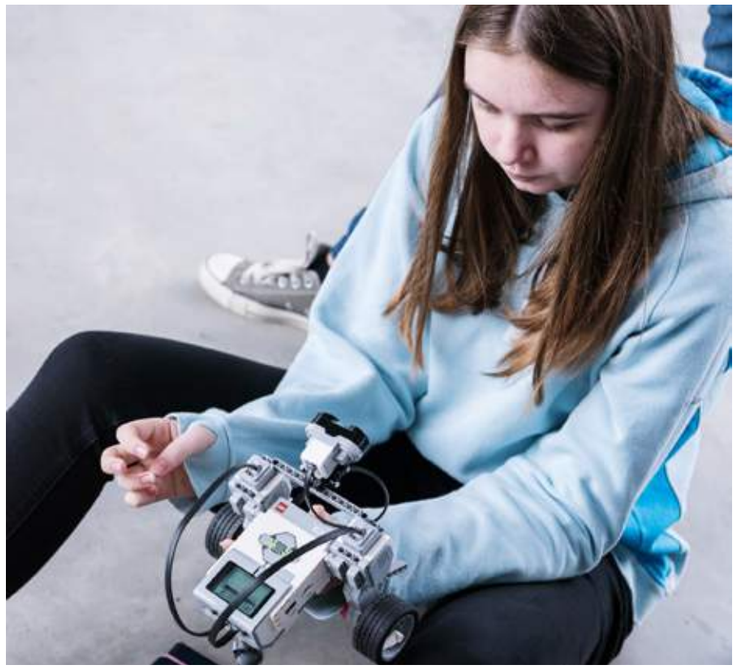
An apprenticeship is an appealing route into engineering for many people and over the past year, there has been an increase both in the number of workplaces offering apprenticeships and the number of engineering apprentices starting their training across the UK. The number of engineering and technology graduates is also on the rise, which is particularly notable given the decline in overall student numbers.

Importantly, engineering needs to attract a more diverse workforce, both in terms of gender and ethnicity. The industry is working to inspire young people of both genders and all ethnic backgrounds to consider a career in engineering. Failing to do so means potentially missing out on some of the country's best talent.

Engineering is a solid career with great earning potential and good employment prospects. Like doctors and lawyers, professional engineers are well respected and professional registration is recognised around the world, demonstrating academic ability, expertise and competence developed by workplace experience. We want more people to understand the role of engineers, how to get into the industry and the career options and benefits.

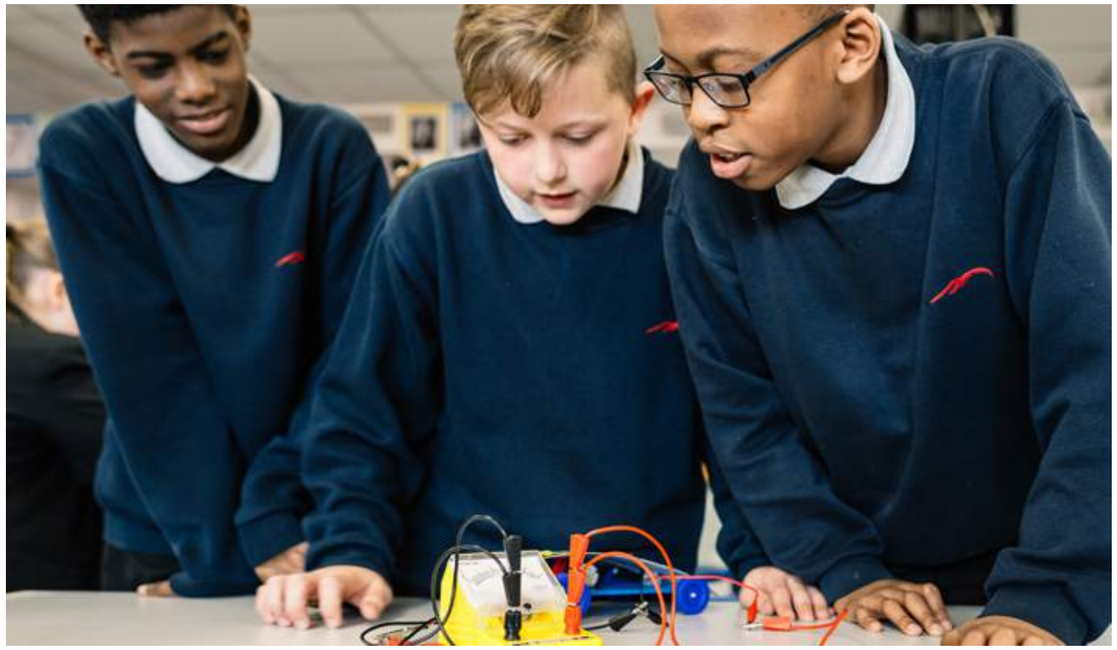
Through Tomorrow's Engineers and The Big Bang programme, EngineeringUK works with employers, educators and professional institutions to inform and inspire young people (and those who advise them) about careers in engineering.

This includes Tomorrow's Engineers EEP Robotics Challenge where teams learn how to build, program and control autonomous LEGO robots to complete a series of short, exciting aviation missions, competing against other schools. Tomorrow's Engineers Energy Quest, funded by Shell, is a free schools programme that encourages young people to find out all about sustainable energy and learn about associated engineering careers.



Showcasing the incredible things engineers achieve can be truly inspiring and helps to create a more accurate image of modern engineering. Engineers are at the forefront of shaping the world we live in, helping to solve our biggest challenges.

Tomorrow's Engineers Week, held in early November each year, has a focus on "engineers on a mission" and invariably profiles some incredible engineers, all working to make a difference. These included Thilo, whose work brought together his two loves (engineering and animals) in a job helping horses with mobility issues. Other examples included engineers creating fully functional starter housing from shipping containers to



help the homeless, teams building bridges across the world to connect remote communities and two talented teenagers who have created an epileptic fit detection vest. Research shows that 90% of young people are interested in a career that makes a difference to the world and that 67% of them would consider a career in engineering if it made that possible. An engineering career really can give you the opportunity to achieve your life goals.

EngineeringUK works with schools and employers to inspire and inform young people and those who advise them. That includes through direct contact with STEM (science, technology, engineering and maths) professionals, engaging hands-on activities and up-to-date careers information.

Continuing to study science and maths keeps open the door to careers in engineering and so raising interest and attainment in those subjects is an important consideration. Through the Tomorrow's Engineers programme employers are developing a tailored, strategic approach to local outreach to drive home that message and work with schools to give young people engaging interactions with engineering.

If we are to address the skills gap, we need more young people from all backgrounds to understand 21st century engineering and for more of them to understand how what they learn at school is used in the real world. The opportunity to speak to industry professionals and to discover different roles via case studies and films helps that understanding.

2018 was named the Year of Engineering, bringing with it the opportunity to focus on the range of ways in which engineering shapes the world we live in. That year also saw the launch of This is Engineering - a high profile promotional campaign that brings into sharp focus the creativity and innovation of 21st century engineering. Tomorrow's Engineers free careers resources, the inspirational case studies and accurate, up-to-date information will give the young people (and their parents and teachers) inspired by the campaign further insights into the industry and how to get into it.

From strong employment prospects and competitive salaries to a varied career at the cutting edge of technological advances, engineering has a lot to offer. We owe it to the potential engineers of the future to give them every opportunity to understand that and encourage them to study the subjects that allow them to be part of that.

www.tomorrowsengineers.org.uk
www.engineeringuk.com

Success is all about the right attitude for award-winning apprentice Leigh Worsdale

"A successful apprenticeship is about having the right attitude; I always take any opportunity the AMRC Training Centre has given me." – Leigh Worsdale.

Since winning the University of Sheffield AMRC Training Centre's 2017 Apprentice of the Year award, life for Leigh Worsdale has been a whirlwind of media appearances, job offers from around the world and becoming a young apprentice ambassador.

The highlight of the heavy duty diesel engine builders year , and what gives her the most satisfaction, is knowing she is contributing to the success of her employers, Chesterfield company Foxwood Diesel:

"Seeing my company grow and the changes I've been able to make to a small developing business has been my highlight, I feel like I've played a big part in building the business up.

"I started off improving health and safety standards and went onto change manufacturing systems to make them more efficient and effective; cutting cost, reducing waste, improving stock control and time management. Employing these kinds of process improvements really affects not just the working life of the staff, but productivity as well."

It is this kind of forward-thinking and dedication to her workplace that landed Leigh the coveted title of 'Apprentice of the Year'. Leigh's achievements also led to her being awarded 'Chesterfield's Apprentice of the Year' in the North Midlands and South Yorkshire Apprentice Awards and 'Highly Commended Advanced Apprentice of the Year for the East Midlands' in the National Apprenticeship Awards.

"I was also invited to demonstrate Industry 4.0 technologies to Members of Parliament at a High Value Manufacturing Catapult event at the House of Commons; it's a big honour to be seen as a representative for the AMRC Training Centre," said Leigh.

Leigh Worsdale, AMRC 'Apprentice of the Year' 2017 on her trip to Boeing in the USA.

Leigh Worsdale, AMRC 'Apprentice of the Year' 2017.

Leigh is now a figurehead of successful apprenticeship training in the Sheffield City Region, appearing throughout print and broadcast media and sharing her passion for engineering with the Young Apprentice Ambassadors Network

She has attended many events aimed at raising awareness of careers within science, technology, engineering and mathematics and hosted a table at one event for manufacturing leaders focused on Women and Diversity in Engineering.

"These events are a great opportunity to share the benefits of apprenticeships with businesses and speak to women in STEM careers about what barriers they faced when entering the field.

"I think a lot of women feel they weren't aware of the variety or diversity of careers open to them when studying engineering, whereas some were unprepared for the reality of academic courses and would have preferred the practical nature of an apprenticeship.

"This gives us really good areas where we as ambassadors, can work with schools to break down misconceptions about engineering apprenticeships, to make sure young women can see just how far you can go with an apprenticeship."

Her apprenticeship has given Leigh grand plans for the future and she is now furthering her higher education by completing her Level 4 HNC studies. She is also pursuing training opportunities to diversify her skills and knowledge of modern engine technologies.

"A successful apprenticeship is about having the right attitude; I always take any opportunity the AMRC Training Centre has given me, any extra training I sign up for. I tell people that the AMRC will give you the skills to go as far as you want to go in life. I wouldn't be the person I am today without my apprenticeship."

To see where an engineering apprenticeship could take you, visit the AMRC Training Centre online at www.amrctraining.co.uk or call them on 0114 222 9958.

WE MOVE BRITAIN

Our new *BOMBARDIER AVENTRA* trains for the Elizabeth line, London Overground and the East Anglia, South Western, West Midlands and Essex Thameside rail franchises are designed and built here in Britain.

The trains our Service teams maintain keep Britain moving on one of the busiest and most complex networks in the world, travelling a distance equivalent to 4,000 times around the world every year.

#WeMoveCities

BOMBARDIER