



2014 *Ingenious* awardees, by region and nation

London

The Royal Institution

Robotics in Engineering

This project will design, deliver and evaluate a set of hands-on educational modules introducing engineering to young people through the theme of robotics. The modules will be developed by STEM outreach specialists at the Royal Institution with consultant support from robotics experts, and will be delivered by a team of young engineers. They will aim to inspire children to pursue STEM (Science Technology Engineering and Mathematics) courses and careers through hands-on activities with robots which are both fun and expand knowledge. The modules will make use of simple and accessible materials, including the popular LEGO robotics kits and other materials. Engineering doctoral students and young engineers will be recruited and trained as volunteers, giving them valuable experience in public communication of their subject, following which they will be invited to give talks to Ri members, students and their families and teachers based on the material used in the modules.

LASTheatre

The Enlightenment Café: New Atlantis

'The Enlightenment Café: New Atlantis' is the HQ of an international organisation charged with monitoring and providing solutions to the tempestuous relationship between humanity and water.

Alongside UCL, Pennine Water Group and the British Library, LASTheatre is bringing its own brand of theatre and science to a subterranean space in London, looking at how science and society are dealing with some of the most pressing issues of the 21st Century.

The show will involve engineers from biochemistry, naval architecture and civil engineering providing the audience with an opportunity to interact with experts on a range of topics, including London's waterways, Climate Change and Conflict. Combined with schools outreach, a series of short films about each engineer and an online space that can engage audiences through social media and digital research, The Enlightenment Café: New Atlantis will celebrate the work of engineers and artists alike, bringing their work to new and diverse audiences.

Open-City

'Structure Rocks' at Archikids Festival

Direct experience of the city's built environment is fundamental to inspiring and engaging the younger generation of the value of engineering. 'Structure Rocks' is the innovative programme of Open-City's Archikids Festival. It is a programme of informative yet fun and free activity workshops hosted in the iconic buildings and spaces of the City of London's Square Mile. Thousands of budding engineers and their families will learn from leading engineers and artists on how the urban fabric is held together, through workshops such as Beneath the City's Skin, Bridge the Gap, or Architecture from All Sides. 'Structure Rocks' provides an excellent opportunity for all engineers to engage with the next generation of Londoners and help create a fresh dialogue on the significance of the city's infrastructure.

South West

The Architecture Centre

Bridge150! Festival

Bridge150! is an inspirational festival of bridge design and construction - celebrating the ingenuity and innovation behind some of today's most fascinating structures. December 2014 marks the 150th anniversary of Bristol's world-famous Clifton Suspension Bridge - one of Brunel's greatest engineering achievements. Inspired by this anniversary, Bridge150! presents 150 days of exciting activities that will inspire, inform and involve people in the art and science of engineering. Structural engineers will work with the Architecture Centre team to co-curate the Festival, sharing their passion, creativity and expertise and inspiring the Brunels of tomorrow.

Family activities, walks, talks and a Festival blog will be complemented by schools activities and resources. An interactive exhibition will reveal the personal stories behind some of today's most innovative structures.

As Bristol prepares for European Green Capital 2015, the Festival will also encourage debate about the contribution engineering can make to creating a more sustainable future.

University of Bath

The Futures of Cultured Meat

Following the milestone cell-cultured hamburger tasting in August of 2013, cultured meat technology finds itself under pressure to move from lab-scale to mass-scale production as humanity is faced with feeding a growing population in a challenging environmental context.

How does a new technology make its way from the quiet of the lab into the chaos of everyday life? When the technical trajectory collides with the real-world and all its complexity, factors such as public-opinion, policy, economics and culture become crucial elements of the story.

The Futures of Cultured Meat program brings together engineers, designers, and the cultured meat NGO New Harvest to encourage engineers as well as the wider public to imagine and question the possible, probable, and preferable futures for cultured meat through speculative design workshops and exhibitions. The goal is to provide a platform for engineers to question and discuss the wider social, ethical and aesthetic implications of their work.

Gallomanor Communications Ltd

I'm an Engineer, Get me out of here!

I'm an Engineer, Get me out of here! is an engineering enrichment and engagement activity where Maths, D&T and Science school students talk to engineers for 2 weeks, online at imanengineer.org.uk. It's an X Factor-style competition for engineers, where school students are the judges. Students ASK the engineers questions, have live text CHATs with them and VOTE for one engineer to win £500 to spend on further engagement work.

Engineers develop their communication skills, gain a fresh perspective on their work, and find out what young people think about engineering and the role of engineers. Students discover what engineering is actually about and see that engineers are normal people.

As one engineer says "this has been the most rewarding outreach event I have been part of and would thoroughly recommend it to both engineers and teachers - it was a great pleasure to be part of it"

University of the West of England

Robots vs. Animals: Learning from the ingenuity of nature

'Robots vs. Animals' is a creative collaboration between engineers and zoologists, exploring the ingenuity of both nature and humankind. Over millennia of evolution, animals have developed senses way beyond human capabilities to adapt to their environment. Now in the age of high-tech robotic engineering, the science of biomimetics seeks to copy and improve these skills to develop futuristic robots. In this project we will reveal the stories of the design process taken by Bristol Robotics Laboratory engineers to create biologically inspired robots; ranging from active touch with whiskers, power generation from urine to working together in cooperative societies. The interactive sessions at Bristol Zoo and other public events will feature engineers and zoologists explaining the superhuman powers of their respective charges. With audiences ranging from schoolchildren to adults, learning will be continued through an interactive website and design competition. But which are better, robots or animals? The public will decide!

Cheltenham Festivals

Supporting FameLab engineers: helping today's engineers to inspire tomorrow's engineers

Following the success of Ingenious' "FameLab Engineering" in attracting more engineers to the FameLab STEM communications competition, this project sees engineers engaged in the new "FameLab Academy" programme. It will provide FameLab Engineering Alumni and new contestants with 1) with further STEM communications and engagement training so that, 2) they can work with FameLab Academy contestants to inspire and mentor the engineers of tomorrow, while 3) simultaneously providing them with new outreach and engagement opportunities.

We will deliver bespoke training to 14 engineers who are previous participants, winners or outstanding competitors of the 2013-2014 FameLab UK competition and partner them with schools participating in the FameLab Academy program.

FameLab is one of the UK's leading competitions to find, develop and mentor science and engineering communicators. FameLab Academy is a new outreach initiative which aims to bring the format of FameLab into a secondary schools environment and offer the same impact and source of inspiration to children fascinated by science and engineering. Following a successful pilot program with 10 schools in London in 2013 we are aiming to roll this out to 40 schools in Autumn 2014.

South East

Science Oxford

Creative Computing

As a response to the increasing demand for engineers with skills in software engineering, Science Oxford proposes to create a series of Creative Computing Clubs where children can learn to program an open-source microcontroller (Arduino) to complete practical engineering projects. These clubs would either take place within a school as an after-school club or during the holidays.

Science Oxford will recruit engineers from a range of local organisations, such as Oxford Brookes University, Rutherford Appleton Laboratory and Cisco systems. Engineers will then be trained and supported to either run or assist with a Creative Computing Club. In addition, a small group of engineers who have worked on similar projects will work closely with Science Oxford to inform and develop the content of the clubs.

Engineers and schools will be able to use resources developed during the project to continue to run Creative Computing Clubs after July 2015.

4science

Champion the researchers

Researchers engage with school children at university events: pupils learn about life as a researcher, and about engineering options within education and beyond. Researchers must articulate their work to a lay audience. And then the real fun starts:

After each event, pupils choose one researcher to investigate further. They explain their choices and teams are selected to create short case study films.

Teams then compete for the 'Maximum Exposure' award – which team can show their film to the most people? Pupils gather data and evaluate the impact of their film. By the project's end, these humble videos exalting and explaining the work of researchers will have reached an audience of tens of thousands ... more if they go viral! The films, each with related classroom activities and teacher guidance to introduce research-based activities into school, will be housed online.

East of England

Women's Engineering Society (WES)

Magnificent Women and Their Flying Machines

This schools outreach project highlights and celebrates the achievements of technical women during the First World War by allowing today's students to mirror the work that women carried out to built aircraft wings. The students will go on to learn how aviation and the aerospace industry has progressed over the past 100 years through first hand research, accompanied by a presentation from a practicing woman engineer outlining her current work. Students will work together to build small scale replica aircraft wing structure using Stixx technology (rolled up newspaper batons zip-tied together), simultaneously learning about engineering structures, early manufacturing technologies and the importance of team work. They will be able to link this work in a historical context to World War One, the Suffrage movement, and the progress of women in engineering, right through to the present day which will be outlined by a practicing woman engineer.

The Naked Scientists

Broadcast Internships in Engineering

The Naked Scientists will "buy out" 6 engineering PhD students drawn from institutions nationally, for a period of two months each. These candidates will be embedded them within the Naked Scientists award-winning team where they will receive hands-on training and supervision in broadcasting, radio and podcast production and online publishing. From day one, each intern will be contributing to live and pre-recorded radio programmes and podcasts. By the time they complete their placements with us, each candidate will be competent and capable of presenting their own live BBC episode of the Naked Scientists, which will be dedicated to their research area.

East Midlands

De Montfort University

The Festival Roadshow

Up to 50 young engineers will be recruited and trained in public engagement and peer education techniques, giving them the skills required to communicate and raise awareness of the impact that engineering has on the delivery of safe, fun and sustainable temporary outdoor events. The aim is to bring to life the role of engineering at these events. They will develop imaginative, interactive display

materials and games, and organise exciting presentations and debates around relevant topics such as smart electricity grids, power supply and energy efficiency of equipment at events. This will include including visualising real time energy data from the festival (stages, lighting, audio, video, traders, car park lights, etc.). Social media and web based materials will be developed that will encourage continuing discussion and engagement with the project. The concepts will be initially tested at Latitude 2014, the success of which will inform the approach at subsequent festivals.

Market Bosworth School

#InLoveWithEngineering

Eight shortlisted engineers from the ScienceGrrl network and 32 pupils from The Market Bosworth School will receive training in broadcasting and communication skills. They will collaborate with now>press>play on writing scripts for immersive-experience workshops that plunge primary and secondary school pupils into the world of engineering. Immersed in sound, pupils become the engineers, meeting people, discovering places and solving problems on an unforgettable adventure. Workshops will be trialled by pupils and parents attending TMBS and over 10 rural feeder primary schools, evaluated, then rolled out to museums and festivals via the ScienceGrrl network.

TMBS will arrange bespoke INSET training for engineers and organise all visits to and from the school. Engineers will work alongside four scriptwriting pupils. TMBS will facilitate sessions for scriptwriters to liaise with engineers and now>press>play. Tablet touchpad-based technology will help widen access and provide the opportunity of successful participation for every pupil that stands to benefit.

Yorkshire and the Humber

Magna Science Adventure Centre

It's a Rubbish Adventure

Black bag rubbish is symbolic of our relationship with the environment as society tries to move from disposability to sustainability. 'It's a Rubbish Adventure' is the story of rubbish moving through a waste recovery plant. Working in partnership with 3SE and BDR, Magna will jointly deliver workshop activities targeting schools and families, at the science centre and as an outreach programme. 3SE and BDR will provide engineering and waste recovery expertise; Magna will provide public engagement training for 3SE and BDR. The project will model the engineering processes involved in moving, sorting, separating, reusing and recycling the materials at the Manvers Waste Recovery Facility. This plant will begin operation in early 2015. The project will provide plant engineers with experience in modelling and communicating their work. Post-project this will be used to enhance the accompanying visitor centre by building a long-term public engagement programme dedicated to sustainability and technology.

University of Leeds

Engineering the Tour de France: From Body to Bicycle

The Tour de France departs from Leeds in 2014, providing outstanding opportunities to engage the public with engineering through interactive exhibits and practical demonstrations– from the tribology of brakes, power conversion from cyclist to bike, to bioengineering for fixing broken bones. Forty engineers from a variety of academic and industry backgrounds will come together to undertake specific public engagement training. Recognising not all engineers are natural performers, the training will encourage individuals to identify activities they would like to engage with, and provide opportunities to participate in school

workshops, exhibits or science café talks. Following the training, the engineers will collaborate to deliver new activities (under the guidance of a professional science communicator) including workshops and interactive displays to be showcased. Members of the public will have the opportunity to get hands-on experience and talk to engineers through local science fairs, café talks and schools workshops.

Wales

Cardiff University

Putting the 'spark' back in to Electrical Engineering

This project comprises three distinct phases that will ultimately form an efficient, long-lasting and transferable framework to train degree-qualified engineers (i.e. academic engineers, post-graduates engineers, industrial-based engineers) in the art of inspiring school students to follow an engineering career pathway. The first phase will develop a series of inspirational, practical-based demonstrations that will ultimately serve to engage and enthuse school students – and teachers. These practicals will be aligned to the appropriate syllabi – a critical stage in ensuring the attractiveness of these events to schools. Concurrently, a second phase will be developed to train engineers in engaging with primary, GCSE and A-Level students. Combining these two phases, a series of off-site events will be performed to school students, with the aim both of increasing their academic understanding and inspiring the next generation of electrical engineers.

Scotland

University of Glasgow

Three Minute Engineering

3ml is an online learning platform, developed by a team of writers, educators, engineers, scientists and engagement experts. It has been enthusiastically received by teachers of English in proof of concept trials.

The resource presents users with short stories, designed to be highly readable, combined with a set of activities known to improve understanding and recall. In essence it is a way of smuggling science and engineering into classes across the curriculum, generating genuine engagement and improving literacy and learning.

We will make 3ml available to engineering researchers, across Scotland initially, training them through its use and working with them to develop short articles and talks on their work that will then be exposed to the concentrated attention of large numbers of learners in schools and local communities.

A key feature of 3ml, unusual in engagement activities, is that the effect on users can be measured and the impact quantified.

Edinburgh International Science Festival

Bridging the Divide

Bridging the Divide will offer a broad spectrum of public engagement opportunities, which enthuse and inspire members of the public about the creative nature of engineering. Engineers will be provided with training opportunities which equip them with the confidence and skills to communicate the benefits of their work. This will be followed by an events programme which explores engineering and which engineers will help us deliver, providing a platform for them to actively engage with members of the public.

Our diverse events programme will engage people with very limited engineering knowledge whilst providing more in-depth activities for those with an established interest. 'Making It' introduces engineering concepts to a large public audience via an interactive series of exhibits and hands-on workshops; 'Mini Maker Faire'

provides a fantastic showcase for all aspects of 'making things'; and 'Bend the Ear of an Engineer' creates a dialogue between engineers and the public.

Glasgow Science Centre

Primary Engineering

Prompted by requests from primary teachers and Quality Improvement Officers for help with the engineering outcomes from the Curriculum for Excellence, Glasgow Science Centre will provide Continuing Professional Development (CPD) workshops for primary teachers and hands on, skills based workshops for pupils. The CPD workshops will take place in Local Authority areas, where clusters of schools will bring their teachers together for the event. Teachers will then be able to bring their class to Glasgow Science Centre for a free interactive engineering workshop in Winter 2015.

To enrich all events with a real life context the events will be supported by Engineers, to act as inspirational figures for teachers and pupils alike while highlighting the many resources available to teachers. We will work with Science Connects, our local STEMNET contract holder, to achieve this.

Heriot-Watt University

Small plumbing! Empowering the next generation of microfluidic engineers

"Small plumbing!" empowers girls and boys to investigate engineering and discover the enabling power of microfluidic technology. Microfluidics, the precise manipulation of fluids at the microscale has been recognised as a key enabling technology for a number of life science challenges. It is highly likely that microfluidics will be at the forefront of the medical revolution in the 21st century. The project is lead by 2 female engineers, both research fellows of the Royal Academy of Engineering who want to share their passion for small-scale engineering and inspire young people to tackle tomorrow's challenges in innovative ways. This project will help pupils to develop their engineering skills and challenges them to create a chip for everyday use or resource-scarce settings. Engineers from research and industrial background, students to professional will acquire public engagement experience with a diverse range of activities.

Lambda Jam

First Lego League in Scotland: Growing a Passion for Engineering in Children

This project aims to establish a network of engineer mentors to facilitate a sustainable footing for the First Lego League (FLL) in Scotland. This is a fun and creative competition where teams of children design and program autonomous robots to complete challenging missions.

We will reach out to a diverse range of engineers, encouraging them to engage with children on this exciting project and help them to use the profile of FLL to promote their field to the wider public. It will allow the development of a strong partnership between Lambda Jam, the Young Academy of Scotland and associated partners on which we will build foundations for further activities in the future.

Northern Ireland

W5

Ultimate Farming

Engineers working in an industry which is central to Northern Ireland's economy will gain training which utilises W5's expert knowledge on engaging with students and the public. This programme focuses on building engineers' practical experience and knowledge while also highlighting to students and the public the engineering involved in the latest technology used in daily practices in agriculture.

Engineers will complete a three day training programme, during which, each engineer will use their new skills, knowledge and public engagement practice to develop one eye-catching, hands-on activity for use in schools and with the public. They will also be prepped with the tools required for mentoring, trialling their hands-on activity and engaging with students through an Ultimate Livestock Farming design project. Student's projects will be critiqued by a panel of judges from the engineering world. As well as in schools, engineers' hands-on activities will be showcased at a W5 exhibit during one of Northern Ireland's biggest agricultural shows.