



2013 *Ingenious* awardees, by region and nation

Nationwide

Sing London

How British Engineering Changed the World (as part of The Travelling Museum of British Invention)

British engineers have transformed the world. From the steam engine to the jet engine, the Underground to the Internet, Britain's contribution to the world of engineering has been immense. The Travelling Museum of British Invention will highlight these contributions, along with contributions in science, biomedics and social innovation. It will use fun, surprise and narrative to create an unusual and wide reaching user experience for people who love engineering - and people who didn't know they did. The Museum will be housed on a converted Routemaster bus and one of the key ways we will engage audiences will be through a series of Bus Conductor tours, led by scientists and engineers from a range of disciplines. We will also include an accompanying series of informal talks and workshops, called the Innovations Café. Within each strand of the project, we will engage engineers and engineering students to inspire the public with their knowledge, experience and enthusiasm. In order to support this process, we will provide a communications training programme for engineers, designed to help participants blow the trumpet for British engineering and let people know How British Engineering Changed the World.

Colette Hiller, colette@singlondon.org

Space Science and Engineering Foundation

UK Space Settlement Design Competition

The UK Space Settlement Design Competition (UKSSDC) provides school students with the opportunity to take part in a design simulation that exposes them to the joys and challenges of working in a large industrial team (~40 students). Students develop a space-based infrastructure that requires challenging and imaginative thinking whilst increasing their interest in and awareness of science and engineering. By using the excitement of space exploration in a real-future world context, UKSSDC aims to inspire the next generation of scientists and engineers. The simulated companies have one day to design a space settlement for up to 10,000 inhabitants, taking several factors into account, from structural engineering and communications to entertainment, food production, construction timelines and cost. The companies present their design proposals to a panel of expert judges including local teachers, scientists, engineers and business specialists.

Dr Fiona Larner, f.larner@uksdc.org

TeenTech CIC

TeenTech CIC – Engineers Upfront

TeenTech CIC run interactive events which help young people, their teachers and parents understand the real opportunities in Science, Technology, Engineering and Maths (STEM) careers and the skills needed to take advantage of them. We will build on this framework to provide a powerful sustainable training opportunity for engineers, working closely with a broad range of companies from global to regional, helping them provide engaging activities to demonstrate the diversity of careers related to engineering which are relevant to each region and its economy.

TeenTech® is an immersive, carefully timetabled experience. Surveys show it has a powerful effect on students, teachers and community leaders, changing pre-conceptions about STEM. We support enthusiasm generated with CPD seminars for teachers and an aspirational student competition. We have successfully run 9 events across the UK in 2012 to overwhelmingly positive feedback, 100% of schools asking to attend further events. 10 events are planned for 2013.

Ms Maggie Philbin, Maggie@teentechevent.com

South West

At-Bristol

Take Off! - Design your own helicopter special theme day

The South West has the biggest single cluster of aerospace companies in the UK. Through an exciting collaboration, At-Bristol Science Centre and AgustaWestland will work together to create an inspirational and immersive special theme day for Key Stage 3 students called 'Take Off! - Design your own helicopter'. The theme day, based in At-Bristol, will provide a unique insight into helicopter design and engineering and will celebrate the South West's aerospace industry. Using the stories and expertise of AgustaWestland engineers, the project team will create a narrative for the theme day. AgustaWestland helicopter engineers will boost their public engagement skills by taking a mentoring role during the theme day, supporting students in their challenge to design a helicopter with the greatest lift to weight ratio. A series of action packed activities will require students to solve real engineering problems and apply creative thinking to tackle their challenge.

Mrs Katy Nehammer, katy.nehammer@at-bristol.org.uk

Zenotech Ltd

SPEED – Schools Project: E-Engineering for Design

Online tools tap into the massive interest in online gaming and so provide a new and exciting way for students to get an insight into engineering projects and the opportunity to design and model their own projects. The SPEED project creates the opportunity for engineers to work alongside students to take part in a competition that addresses an engineering design challenge. The project leverages the high-profile and exciting technical challenge of the Bloodhound SSC 1000mph car to engage engineers, teachers and students with a practical hands-on design competition, using the latest in online engineering software from Zenotech Ltd running on state-of-the-art computing from Bristol University.

During the project, engineers can share their stories, insights and experiences – and inspire a next generation of young technologists. This project provides an outstanding training opportunity for both engineers and teachers, with both formal training events and hands-on sessions with STEM Club students.

Dr David Standingford, david.standingford@zenotech.com

South East

University of Southampton

Marine Engineering Connections

Marine engineers are at the heart of the safety, security and sustainability of our maritime environments. A partnership in the Solent region between Southampton Marine and Maritime Institute (SMMI) and Lloyd's Register is set to maximise marine engineering connections across academia and industry. This project invites engineers from that major partnership to engage with regional ferry passengers, to showcase the significance of their work, and to raise awareness of engineering's place in the wider contexts of global ocean use. The engineers will be trained in science-busking techniques and will work with a marine engineering

toolkit to entertain, educate and start informal dialogues with holiday travellers on Wightlink's most popular routes. The engineers will be working on the full range of current and future maritime challenges (e.g. climate change, energy, coastal habitats, trade and transport), so we aim to turn a routine 40-minute sea crossing into an exciting engineering journey.

Kevin Forshaw, K.A.Forshaw@soton.ac.uk

London

STRUCTURALLY FOUND

STRUCTURALLY FOUND

STRUCTURALLY FOUND is a photo-based scavenger hunt that invites the public to delve beyond the skin of London's buildings to learn about the structural skeleton that lies beneath. Running during the 2013 Open House London weekend, participants are given a list of structural elements to identify and photograph with smartphones around the capital. Photos are tweeted in, and a winner is drawn from those who've ticked off their whole list. The use of Twitter is designed to promote conversation between engineers and the public about the structures they see, with engineers (at all stages in their career) manning the Twitter desks ready to answer questions. In addition there will be engineers stationed around the city, as well as the STRUCTURALLY FOUND headquarters being open with more engineers on hand. This event takes learning away from the classroom and into real life, encouraging the public to interact with real structures and engineers.

Miss Niri Arambepola, niri.arambepola@wspgroup.com

British Science Association

Engineers: engage!

Engineers: engage! challenges private sector engineers from across the UK to develop and deliver an engaging event about their work for non-specialist audiences with training and support from experienced science communicators. The engineers will reflect on engineering in society, develop their public speaking, creative and planning skills and take their new skills back to their organisations to raise the standard of engineering public dialogue. The main aims of Engineers: engage! are to increase the awareness and quality of public engagement in the private sector and challenge stereotypes around engineering.

Monica Lobo, Monica.lobo@britishscienceassociation.org

Maths Busking

Ingenious Busking

Ingenious Busking will comprise a series of short street theatre shows themed around STEM topics present in the work of engineers and aspects of their careers. Maths Busking and the Inspirational Science Theatre Company will develop the shows, recruit, train and support engineers to perform the shows in the street, shopping centres, festivals and other events organised by Maths Busking.

Maths Busking and the Inspirational Science Theatre Company will equip the engineer of today with the skills and experience to sensibilise the harder-to-reach audiences both on the importance and thrill of Engineering.

Dr Sara Santos, sara@mathsbusking.com

Children's Radio UK Ltd

Inspiring Engineering!

Fun Kids, the UK's only radio station for children, are going to take engineers back to their childhood in order to inspire the next generation! Through 10 media training workshops, young engineers will be taught the basics of broadcasting, and will then create audio and video features to capture the coolest

demonstrations of engineering for kids. The premise of these broadcast-quality 'how to' features is to inspire children using an example that would have inspired the engineers when they were kids. The features will be broadcast on Fun Kids radio, and available to download for free online and through iTunes and YouTube.

Mr Gregory Watson, Gregory@funkidslive.com

West Midlands

School of Metallurgy and Materials, University of Birmingham.

The Protium Project: Hydrogen, magnets, sustainability, and industrial heritage: the Ross Barlow canal boat

The Ross Barlow hydrogen hybrid canal boat has been designed and built at the University of Birmingham. It is driven by a permanent magnet motor, which is powered by a battery pack and a hydrogen fuel cell system. The hydrogen is stored in a metal hydride store. The aim is to demonstrate the boat and its constituent technologies around the canals of the West Midlands. The project will communicate: the exciting potential of hydrogen as a sustainable fuel; how hydrogen can also be used to manufacture rare earth permanent magnets; how these magnets are used in highly efficient electric motors, and how hydrogen can be employed to recycle the magnets. To complete the picture, the historical development of hydrogen as a fuel will be considered, with the backdrop of the canal-side factories which were the first to use coal gas (60 volume% H₂) during the industrial revolution.

Professor Rex Harris, I.R.Harris@bham.ac.uk

Coventry University

The Global Humanitarian Engineering Workshops

This project will work with practising humanitarian field workers to develop a set of workshops for delivery to 15-17 year olds based on key global engineering issues. These workshops will be designed to show the students the importance of appropriate technology selection, practical engineering in the field and will encourage them to see engineering in a more global and social light. In addition to this the workshops will be delivered by practising specialised industrialists who will be able to demonstrate the importance and relevance of the global context to UK engineering.

Dr Elizabeth Miles, aa7679@coventry.ac.uk

East of England

University of Cambridge

Designing Our Tomorrow (DOT) – Using Authentic Problems to Improve Engagement

Designing Our Tomorrow (DOT) started as a successful research project funded by the UK Research Council to develop resources to teach inclusive design in UK secondary schools. The aim of DOT is to equip pupils with the skills and knowledge to design a better future. Underpinning the DOT approach is the use of authentic problems (real world needs) in teaching of D&T. Authenticity has been shown to significantly raise motivation and improve the relevance of learning. The aim of this project is to mentor 6 engineers in the DOT approach. This will be done by developing a new 'DOT in a Box' resource set with the engineers. These resources will be tested and refined by the engineers, in pilot schools and then made available nationally via the DOT website. The project will finish with a public debate with a wider audience of engineers about the value of this approach.

Professor John Clarkson, pjc10@eng.cam.ac.uk

Corpus Christi College, University of Cambridge

Cambridge Hands-On Science (CHaOS) Summer Science Roadshow 2013

The CHaOS Roadshow aims to bring fun, interactive science experiments to children around the country. Our experiments are demonstrated by enthusiastic engineering and science students from the University of Cambridge, who want to help spread the excitement of science to a wider audience. We run a large public event in Cambridge that is open to the public as part of the Cambridge Science Festival, but are able to reach people from much further afield with our Summer Roadshow. This is a month long tour across the UK, visiting schools and public venues such as town halls, leisure centres and county shows. We make science directly applicable to the children we meet, while seeing and learning about the fascinating effects our experiments demonstrate. In kind, our volunteers quickly learn invaluable communication skills and a real delight in teaching their subjects.

Mr Philip Garsed, pjg47@cam.ac.uk

Yorkshire and the Humber

Action For Involvement

Engineering – reaching out and out on the street

This project will use innovative interventions to engage with over 300 people in Sheffield City Region including significant numbers in our target groups; young people, women, people from disadvantaged areas and BME communities. Our key project aims are to:

1. Promote interest in engineering as a career;
2. Raise awareness of the importance and value of engineering, how it impacts on our lives in the 21st Century;
3. Equip engineers with expertise to engage with lay-people particularly our target groups;

To achieve these objectives we will

1. Deliver 2 x 1 day training courses on facilitation process and community engagement techniques for engineers recruited to participate in the RAE Ingenious Grant Programme
2. Deliver 10 events around Sheffield City Region including schools, colleges, shopping centres, major travel hubs and disadvantaged areas
3. Use tools, methods and techniques, with interactive pop up street events, interactive workshops, structured interviews, surveys and 'world café' forums

We will design and create 10 engagement experience events for 50+ engineers at all levels of academia, private practice and public sector for public engagement. Project partners confirm they will assist in recruiting engineers including at least 5 women engineers.

Miss Wendy Stern, info@actionforinvolvement.org.uk

University of Leeds

Dreams of a low carbon future

Bridging the divide between art and science/engineering, this project will feature early career engineers working collaboratively with schoolchildren and professional artists to produce a 'graphic novel' (comic) that explores the children's visions of a sustainable 'low carbon' future society through creative writing and images. This will be achieved by training the engineers to mentor children through an informed process of exploration of potential future technologies, including workshops where children have the opportunity to produce artworks of their visions supported by engineering input. The resulting artworks will be collated and further interpreted by the engineers to form the

graphic novel entitled 'Dreams of a Low Carbon Future', to be published and circulated to schools and museums throughout the UK. The graphic novel will be launched in parallel at the Leeds Science Festival and at 'Thought Bubble', a leading UK comics festival, and publicly exhibited at the Cartoon Museum, London.

Professor Paul Williams, p.t.williams@leeds.ac.uk

North East

University of Newcastle

Decision Theatre for creative engagement

This project will develop a socio-informatics 'toolkit' (multi-screen interactive computer displays accompanied by narrative and the experience of collective decision-making). This toolkit will be developed through collaboration between practising and research engineers, and socio-informatics experts. It will be used to engage the public in consensus building and decision-making around adaption of the built environment to climate risks, principally flooding. The events will be designed to enable members of the public to discuss (e.g.) flooding and its impact on their daily lives, and to highlight how their personal choices also have a far-reaching impact on its consequences (societal, ethical and cultural aspects). The process will be beneficial to engineers' ability to communicate and engage with the public, creating a legacy of skilled people. The toolkit will be rolled out more widely via a web interface so that it can be used by engineers in other public engagement activities such as Public Consultations.

Professor Stephanie Glendinning, Stephanie.glendinning@ncl.ac.uk

The Great Debate

ETUDE: Engineering Transmission Using Deliberative Events

Engineers from industry and academia will be mentored in public engagement skills, and will deliver five public events over 15 months. The programme will include four days of intensive training for 20-23 engineers during British Science Festival culminating in an event devised and delivered by participants and four sets of training workshops leading up to events of two types: consensus-building discussions and panel debates. Events will be part of Great North Festival, National Science and Engineering Week and the ICE president's visit to the North East. Workshops will provide participants with the opportunity to develop public engagement skills and increase confidence in delivering events. Evaluation will focus on which types of training and events worked best for engineers and public. The project will provide 35-42 engineers with practical experience of public engagement activities involving 300-400 members of the public in discussing engineering and its impact on our daily lives.

Dr Caspar Hewett, thegreatdebate@live.co.uk

Northern Architecture

BRIDGE: Engineering Education

Northern Architecture is the Architecture Centre for North East of England. We create opportunities for people to learn about and engage with the built environment to achieve the highest standards of development and design.

Bridge: Engineering Education is an innovative and practical bridge building and heritage project designed to encourage young people to experience the science of structural engineering within the context of the bridge building heritage of the North East. Harnessing and utilising the enthusiasm and expertise of some of the region's structural and steel manufacturing engineers, BRIDGE will applaud the region's significant contribution to national and international bridge design and construction, structural engineering concepts as well highlighting engineering as a career option through school and university based workshops, community

engagement and resource development. A reciprocal learning project, BRIDGE will identify and develop methods for engineers, school pupils and communities to actively learn about engineering projects through engagement and participation.
Emma Kench-Porter, emma@northernarchitecture.com

North West

The School of Materials, The University of Manchester

The LATEST2 Ultimate Car Challenge

A competition for schools across Greater Manchester, in which pupils compete in groups to design and build the best model car. The cars will be judged on factors such as cost, design, environmental impact and speed. Each competing school will be assigned an engineering PhD student or postdoctoral researcher from The University of Manchester, who will act as a mentor, offering practical advice and guidance. As well as mentoring, the engineers will be responsible for developing and delivering workshops in schools, creating resources and contributing to the project website. Each school will be invited to visit the University to see the research facilities and learn about some of the work taking place on environmentally sustainable transport. The competition will culminate in a two-day residential event, where cars will be judged by a panel of experts. This event will also include talks from academics and industry professionals about careers in engineering.

Dr João Fonseca, joao.fonseca@manchester.ac.uk

University of Central Lancashire

HeroLab: Engineer Your Own Superhero

Do we have the scientific know-how and engineering prowess to design and build our own superhero? This project will introduce young audiences to cutting-edge engineering research that could enable us to become 'super', through an interactive, web-based game. Test your knowledge of engineering and maths to take on each supervillain- will the good guys win?

Dr Joanna Heaton-Marriott, JHeaton@uclan.ac.uk

Wales

science made simple

Making The Future

Making The Future will give students the opportunity to see how engineers tackle the issues that are shaping our society. After warming up with a lateral thinking activity, the class will look at several real life issues and debate the merits, flaws and ethics involved in an engineering solution. Students will have an opportunity to express and discuss their ideas and opinions on different engineering projects. A practising engineer will help the students by offering insight into the realities of engineering projects, as well as exploring issues related to their own work with the students. At the end, a Q&A session with the engineer will allow students to find out anything burning questions they have about the engineer, their career or engineering as a whole.

Ms Wendy Sadler, wendy@sciencemadesimple.co.uk

Scotland

Edinburgh International Science Festival

Mini Maker Faire

Mini Maker Faire is an interactive showcase of invention, creativity and resourcefulness. A day-long celebration of the burgeoning worldwide Maker

movement, it's a place where people will show what they are making, and share what they are learning. The Faire will bring together scientists, engineers, garden shed enthusiasts, tinkerers, craftspeople, hackers and geeks to celebrate the current renaissance of maker culture. Encompassing an exciting and diverse variety of DIY engineering projects, accessible technologies, artistic works and surprising inventions the event will be a chance for local Makers to showcase their work and interact with interested people of all ages and backgrounds. We are targeting the widest possible public audience, fostering a hands-on do-it-yourself attitude towards science, technology and the arts. The Faire will be filled with novel gadgets, ingenious inventions, interactive experiments, works in progress and installations, as well as discussions, demonstrations and performances as Makers from across the country take centre stage.

Dr Simon Gage, simon@scifest.co.uk

DEPARTMENT OF CHEMICAL AND PROCESS ENGINEERING, University of Strathclyde

Bionanoengineering: or how molecules make me and you

'Bionanoengineering' is engineering at the scale of atoms and molecules, inspired by biology. It is set to become the key new technology of the 21st century, as we translate advances in bio- and nano-science into applications in health (nanoengineered drugs, new ways of delivering drugs into the body), energy (new devices to store fuels and remove carbon dioxide from the air), and materials (for transport, information technology, food and clothing). In this project a team of 'bionanoengineers' will be trained through an innovative team workshop to turn their research into activities that take novel bionanoscale engineering 'out of the lab and into the world'. The team and their activities will contribute a vital engineering component to major biology-themed events at Glasgow Science Centre planned for 2013. The team training workshop format will be refined into a 'standalone' module that is easily adaptable to teams from other engineering or science areas.

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