Spring 2016 Funded Projects

The 3i Engineering Programme
The work-wise Foundation
Primary & secondary school and FE activity
Sheffield City

Industrial history has left The Sheffield City Region with a need to dispel dated perceptions about engineering and replace with the awe inspiring reality and significance of STEM today, both in life and the vast and varied work opportunities, as we have an aging workforce/skills shortage. This needs to be addressed not just with young people but those who influence their decisions - teachers and parents.

The 3i Engineering programme: INTRODUCE-INSPIRE- INFORM will help address these issues by providing engaging, interactive activities to transform awareness, attitudes and future ambitions.

1. INTRODUCING Engineering through road shows into schools and communities, with exhibits, quizzes, videos featuring local companies, apprentices and business leaders to raise awareness.

2. INSPIRING about Engineering through the 10x10x10 - 3i engineering challenge, matching 10 companies with 10 schools each with a team of 10 students who will use STEM based skills & knowledge to make, create and innovate finding solutions for a problem/opportunity the company sets. A competitive pitch will determine the winning team.

3. INFORMING about Engineering opportunities. Students design IMechE/IET Future Zone as part of Get Up To Speed careers event – employers, universities, apprenticeship providers, colleges - accessing information about careers and pathways into STEM jobs.

Five Minute Millions
Graphic Science Ltd
Secondary school & FE activity
Somerset, Wiltshire & Gloucestershire

Five Minute Millions is a dialogue-based activity for pupils in Years 9-13, developed and delivered by Graphic Science. Pupils are presented with a range of engineering innovations, pitched to them by real engineers who are competing for an imaginary £1 million investment in their innovation. The investment decision is taken by the pupils, who are encouraged to take in to account the anticipated social and environmental performance of each innovation, as well as its projected financial performance. They must decide where the investment should come from - the bank, the government or a charitable trust – so the pitches must take this into account. Ultimately, the pupils decide which innovation wins the biggest investment. It is Dragons' Den, but the pupils are the Dragons!

This project will take Five Minute Millions out to schools that have not had access to it before. It will develop the resources to enable the activity to support a range of related subject curricula / specifications, and enable them to be accessed via the internet. It will develop the communication and engagement skills of the engineers involved. It will evaluate the impact of participation in Five Minute Millions on the pupils, teachers and engineers involved.
Learning Engineering through Authentic Challenges
University of Cambridge
Secondary school activity
England

Designing Our Tomorrow (DOT) is a joint initiative between the Faculty of Education and the Engineering Department at the Cambridge University (www.education.designingourtomorrow.com). DOT develops teaching resources for STEM. These equip students with the “thinking tools” to creatively solve real-world problems with technology. Each resource set places a different authentic challenge at the heart of the learning experience. The DOT approach makes learning more meaningful and inspirational and bridges the gender gap in STEM subjects. DOT facilitates “learning with a purpose”. This particular project is in partnership with the Brain Injury Healthcare Technology Co-operative (https://brainhtc.org). The challenge is to address the needs of people who have restricted mobility as a result of brain injury, by designing inclusive kitchen implements. The aim is not only for students to learn through the resources provided but also that the most successful ideas will be taken forward to market. This will address the needs of people with brain injury and inspire students by highlighting the potential impact their ideas can have.

Cardboard Boats Go to Sea.
Victoria Road Primary School
Primary school activity
Plymouth

This boat building project is aimed at getting primary children enthused about STEM learning. It is designed to bring schools together to act as engineers and scientists and practically apply their science, technology, engineering and math skills. One of the project’s objectives is to inspire teachers to teach STEM by giving them guidance, confidence and training on how to embed STEM activities into their curriculum. It will be pitched to all local primary schools through the Plymouth Teaching Schools Alliance Science Hub. This STEM team has the experience to provide these practical workshops, having just completed a highly successful wind powered car project with local primary schools for NESW at Marjons University.

The main project objective is to build a cardboard boat that floats and carries 2 children from Commercial Wharf Slip to the finish by the Mayflower Steps. These activities will enable children to work with engineers, university students and scientists to learn about buoyancy, stability, product design, prototyping and materials. They will be working in collaborative teams and competing with other schools in a competition that will culminate in the Ocean Festival IMechEng Cardboard Boat Race in Plymouth in September 2016.

"I'm an Engineer, I can help here! - Flooding Emergency Challenge"
Scottish Council for Development and Industry
Primary school activity
Scotland

We apply for grant funding to support the roll-out of our new topical engineering project for primaries “I'm an Engineer, I can help here! - Flooding Emergency Challenge” which was successfully launched with 50 pilot schools in December.

The project uses flooding as a context for learning about engineering and is packed with practical, hands-on activities. It is designed to enthuse and inspire young people about different engineering careers and show them that the role of the engineer involves being creative, solving problems and helping people.

The project is split into three sections: Be Aware, Be Prepared and Know How to Act and is designed to be completed over a number of weeks with a whole class or at an extra-curricular club.

The project is fully curriculum-linked and was designed to fit the needs of the Curriculum for Excellence, particularly the delivery of technology learning outcomes which primary
teachers have reported to be the most challenging.

Participating schools are invited to send at least one teacher to attend a half day practical teacher training course to build confidence with the topic and using the equipment. Each school also receives a resource kit to run all the experiments although the use of recycled materials is also encouraged.

**Humanitarian Aid drop. Science and engineering challenge**

STEWorks Ltd  
Primary school activity  
Gloucestershire

STEWorks will develop and deliver fun and engaging workshops in 15 Gloucestershire primary schools. Students will be asked to design, test and modify a launching system that will safely deliver their precious cargo (an egg) to a target zone. During the workshops, students will learn about engineers, how engineers work and have the chance to meet IET member STEM Ambassadors. They will also develop their math, science, design and technology skills during the hands on and practical workshops, thereby enhancing the STEM curriculum.

STEWorks will also produce a teacher resource to accompany the workshop, providing a legacy for the project. These resources, in addition to the workshops, will help inspire not only the students, but also the teachers to use the materials with future classes. This combined approach aims to embed inspiring and engaging activities that will enthuse and foster the next generation of STEM professionals.

**Code Plus**  
Southampton Hub  
Primary school activity  
Southampton

With Code Plus, Southampton Hub student volunteers from the University of Southampton are connected to disadvantaged school-aged children for technology-focused outreach. Through the use of a range of fun online activities, children learn the fundamentals of coding and computational thinking with support from near-to-peer student mentors. Through this activity, they develop cross-curricular skills such as problem-solving, teamwork, creativity and time management which will help them to achieve their academic potential and prepare for careers in the digital age.


**Tame the swarm!**  
At-Bristol  
Primary school activity  
Bristol

Tame the Swarm! is an exciting hands-on workshop developed for both key stage 2 (KS2) school groups and families that will provide children aged 7 - 11 and their families with an opportunity to get under the bonnet of cutting-edge robotics research.

The workshop will take place in our new exhibition opening summer 2016, ‘The Tinkering Space’. It will be a space that inspires the next generation of technical innovators by making and creating all sorts of things – including robots.

Taking a bio-inspired approach to robotics, the hour-long workshop will provide an introduction to robot anatomy through an examination of the comparatively simple robots that make up swarms.
The workshop will provide an opportunity for participants to explore basic robotics. Participants will construct their own small insect-like robot and then will be able to work together collaboratively as part of a swarm.

We will work with the Bristol Robotics Laboratory to develop the content of the workshop. By building on tried and tested public engagement activities and educational robotics platforms we aim to create an experience that takes a multidisciplinary approach to robotics, using creative challenges to seed experiments with simple programming and control.

**STEAM Rollin': Free engineering workshops for schools in deprived areas**
The Experience (a subdivision of KibbleWorks)
Primary school activity
Renfrewshire and Glasgow

We plan to offer free, high quality engineering workshops to primary schools in Renfrewshire, Glasgow, and the surrounding area. Eligible primary schools will be located in the SIMD's most deprived quintile, and would otherwise struggle to afford such provision. In each of the ten schools we will work with in this pilot, we will provide a full day of workshops, allowing us to work with three classes in each school.

These workshops will be led by our Educational Resource Developer, who is a qualified primary teacher and manages our STEAM education programme, and two members of staff will provide support to individual pupils and groups. The 990 children who are estimated to participate will each complete one of our engineering projects, which could involve building a basic motor or a ‘scribbler machine’. They will then take their project home to show to friends and family and continue to experiment.

This project aims to spark an early interest in STEM among a socio-economic group which is underrepresented in STEM careers, by giving them a high quality learning experience at a crucial early stage in their education. This pilot would also help us to leverage further funding to ensure the project’s sustainability.

**Scarborough Engineering Week P1 Power Boat Challenge**
NYBEP Ltd
Primary & secondary school and FE activity
Scarborough Spa

Working in teams students aged 8-18 from across North Yorkshire are invited to take part in the Scarborough Engineering Week P1 Power Boat Challenge. Through FREE kits funded by IET and IMechE and match funded by P1 Power Boats and Scarborough Business Ambassadors, students will work together to design and build boats that are to be powered, use propellers, driven by a motor, use gears/worms and can be controlled and switched on and off and capable of completing the 15 metre race course. To accommodate the wide age range, the challenge activities will be varied levels of difficulties - 8-13 Year olds will be invited to construct a simple boat design, using only household containers that is capable of floating and travelling the furthest distance on the 15 metre race course. 14-19 year olds will be invited to construct either a single or multi-hull boat using materials to be decided by the student, be powered and capable of completing the 15 metre race course in the fastest time. Students in this age range will be encouraged to look at other methods of propulsion. Construction will take place in school or outside of school, with teams encouraged to be as creative as possible with their design, making their boat in readiness for the Scarborough Engineering Week P1 Power Boat Challenge which will take place at a final to be housed at Scarborough Engineering Week (SEW), an annual 3 day event dedicated to enthusing and engaging students in engineering. The event will take place 11th, 12th and 13th October at the Scarborough Spa. Our intention is to deliver a programme with a wide reach, capable of inspiring large numbers of young people whilst remaining flexible enough to target the harder to reach groups in, for example, areas of deprivation or where STEM engagement might be low.
KS2 STEM Lego Pilot Workshop
REME Museum
Primary school activity
Wiltshire

In partnership with Lyneham Primary School, the REME Museum will develop an exciting and engaging Science, Technology, Engineering and Math (STEM) workshop. The purpose of this workshop will be to support school children in creating their own solutions to engineering problems using the Lego Education Powered Machines package.

To achieve this, the Museum will work closely with Lyneham Primary School, and funding from The Engineering Education Grant Scheme will allow us to develop and implement the pilot project.

As a part of the project, pilot workshops will be run with Lyneham Primary School using their facilities. As well as using the Lego Education Powered Machines, school children will eventually work within the REME Museum, surrounded by a collection which represents the Corps of the Royal Electrical and Mechanical Engineers. Once the museum is open, this fully fledged and sustainable workshop will support schools from different settings to deliver the National Curriculum and inspire a generation of future engineers in the local area.

Launch into Engineering
Derby Museums Charitable Trust
Secondary school activity
Derby

“Launch into Engineering” is the pilot of a unique preventative programme designed to inspire young people (pre- NEETs), who are at risk of becoming “not in employment or education” (NEETS), to engage with Engineering. We aim to create a passion for engineering and to build personal aspirations to work within engineering.

We will do this by working with our partners, Pentaxia, D2ESB (Derby and Derbyshire Employment and Skills board), DEBP and SEMTA to run a three day project which will provide targeted young people with the chance to gain hands on experience in our state of the art workshops, real work place experience through visiting and using the facilities at Pentaxia and further knowledge, skills and passion for engineering through interactive learning sessions.

Although initially the first pilot group will be small, the IET funding we are applying for will grant us the ability to plan, evaluate and then disseminate the methodology of the project, therefore increasing the impact beyond the first group of young people. The evaluation aspect of this pilot programme will also enable us to apply to larger trusts, in order for us to extend the reach of the project.

Ballistics Workshop
Cambridge Science Centre
Primary & secondary school activity
East Anglia

Cambridge Science Centre’s (CSC) Ballistics Workshop is an exciting and innovative hands-on workshop for children and young people to explore engineering challenges in planning, designing and testing objects for flight. In particular it helps children and young people to understand the influence of gravity and forces on flight, whilst developing valuable practical skills around designing, conducting and evaluating experiments.

The workshop has been designed for use by Key Stages 2, 3 and 4. It is an especially valuable offering for Key Stage 3 and 4 pupils as they can develop an appreciation of the skills required for a wide range of engineering related jobs linked to successful industries such as aerospace technologies. The workshop draws on resources produced by the Association of Science and Discovery Centres to promote careers related to space flight too.
CSC will deliver the workshop in its Cambridge Centre for visiting schools from across the region and as part of its vibrant outreach offer. From July 2016 this activity will be focused on 12 of the most disadvantaged and underserved communities across East Anglia through CSC’s new outreach programme, COSMOS, working especially closely with six focus communities.

**Flashbang Science Activity Days**  
Flashbang Science  
Primary school activity  
Lancashire

This project will provide hands on science in Primary schools in the Blackpool and Fylde regions of Lancashire through an themed, tailor designed competition open to all schools, lab days for 5 winners from the competition and follow on Experiment packs to all competition entrant schools reaching up to 2000 children with the competition and 450 children in the Flashbang Science mobile lab. This project builds upon and further develops on our success with similar IET funded projects in 2014 and 2015 in other parts of Lancashire.

The programme will offer schools STEM activities based on engineering and technology areas with a competition focussed on the topic of Alternative Energies. The schools would all be based in Blackpool and Fylde, an area with historical strength in engineering, technology and manufacturing where there is a real need for more young people to consider a career in these subject areas. Experiment packs will also be developed and left with the entrant schools to maintain and sustain learning.

Activities, including the competition will involve a range of engineering and technology aspects (heat transfer/forces and electricity etc) and will cover alternative energies specifically. Workshops such as “Twisting Turbines”, “Wonderful Wind”, “Chip Shop Battery” will underpin the knowledge transferred and gained through the competition. Local IET and IMechE representatives and STEM ambassadors will be involved at the competition stage (judges and mentors) and in delivering the days in the schools.

**STEM for SEND - Control and Programming for Special Needs**  
Paternoster School  
Special needs school activity  
Gloucestershire

STEM for SEND is far-reaching ambitious project to bring STEM learning to children and young adults with special educational needs and disabilities. This project is a collaboration between special schools to develop the involvement and engagement in STEM activities for children and young adults with severe learning disabilities (SLD) and profound and multiple learning disabilities (PMLD). Our aim is to develop activities, in line with the new computing curriculum and with a focus on programming, which is accessible to learners with SEND. We further aim to disseminate the knowledge we have gained from this project to all special schools in Gloucestershire and, with the support of Barefoot Computing, to all special schools in the UK.

**BBC Micro-Bit Lancashire Hub**  
Preston's College  
Secondary school activity  
Lancashire

There is a significant demand for, and shortage of, skilled software engineers in the Lancashire area. This projects aims to excite and engage young people, and to ‘up-skill’ relevant school staff in this field.

The project exploits and builds upon the the recently launched BBC Micro:bit initiative. Although online resources will be available to schools, we are conscious that many schools will not fully engage with the potential of this technology without external guidance and
expertise. This project provides that via a series of Micro:bit workshops designed for Lancashire secondary schools, managed and hosted via Preston's College iSTEM Centre; augmented by a pool of peripheral devices that will be available for schools to loan. This aims to enthuse and inspire young people and provide confidence for their teaching staff, as well as providing a 'hub' of expertise for teachers to call on, if required.

**Lego Automotive STEM Activity (LASA)**  
Warwickshire College Group  
FE activity  
Warwickshire

To construct, simulate and evaluate Lego cars in order to understand the principles and concept behind every day automotive vehicles. Teams will design and build 3 real life model cars (scales 1:8) from 100% genuine Lego parts. The main aim of the project will be to link the activity to the BTEC theoretical and practical Engineering units taught for the Level 2 and Level 3 engineering courses.

LASA will initially be pitched to the students at Warwickshire College from this summer and to the local schools within the catchment area. This sustainable enriching STEM project will be ongoing every year as the Lego parts and cars will be reusable. By gathering IMechE and STEM Ambassadors from the college and Warwick University we endeavor to engage and inspire pupils to consider STEM careers. With advanced technological equipment such as 3D printers, students who design and build their cars can 3D print their components, further enhancing their understanding of design and manufacturing stages that engineering companies utilise. This will be one of many benefits that LASA will demonstrate to the pupils, in addition to how remote control cars work.

This will be an on-going programme and parts purchased will be re-used in subsequent years.

**Great Engineers’ School Challenge**  
Primary school activity  
North East

The Great Engineers School Challenge is an annual competition for primary schools, aimed at schools mainly in County Durham and Darlington. Schools are challenged to build Meccano models at school, in their lunch periods or in after school clubs.

The models are judged by members of the North East Meccano Society and the Institution of Mechanical Engineers at an event held at Locomotion, the Shildon branch of the National Railway Museum. As well as the competition and prize giving, pupils are able to take part in events organised by the Railway Museum and be exposed to other aspects of engineering provided by STEMNET, the IMechE and local companies.

The event has grown over three years from 3 schools to 14, including one special school, with high proportion of the pupils being girls.

The objective of the event is to inspire young people to consider engineering as a future career at all levels, as well as generating an interest in Meccano as a hobby.

There is a desire from other schools to take part and it is hoped to expand next year to 20 schools. Some schools have expressed an interest in incorporating the competition into their curriculum.
Student Air Race
University of the Highlands and Islands
Primary & secondary school activity
Highlands and Islands of Scotland

This application is to seek funding to develop further a pilot school-level student competition for aeronautics that addresses broader employability skills, including problem solving, team working and multi-disciplinary challenges. The proposed competition will involve the design, manufacture and operation of various levels of remotely-controlled aircraft models. It will present to students a multi-level, formula-based project incorporating significant real-world design and performance challenges together with the opportunity to apply theoretical and practical understanding and ability at increasing levels of complexity. It will thus provide an affordable and accessible challenge to illustrate and develop the broad skill set required to solve an ostensibly engineering problem but with broader curriculum engagement, including STEM, Business, Creative Industries, and Enterprise. Additionally it will illustrate that multi-point design is compromise and will provide mentoring opportunities for students. The proposal combines the best elements from the IET Greenpower F24 and IMechE Formula Student competitions while removing the two main obstacles to participation: cost; and, especially for remote and rural schools, location.

Continuous STEM Outreach Scheme
Hereford Cathedral School
Primary school activity
Herefordshire

A Royal Society report shows only 3% of primary school teachers have a degree in science and finds they lack confidence in teaching this core curriculum subject, especially STEM related subjects. In Herefordshire, this issue is exacerbated by the highly rural nature of the County with small primary schools, often teaching vertical class groups with mixed ability, age, gender and increasing ethnic diversity.

We aim to increase levels of interest and engagement in STEM related subjects in pupils; to increase the confidence of KS 1 and 2 teachers and show teachers how they can cheaply and easily resource their lessons.

Dr Simon Rhodes, Head of Physics at Hereford Cathedral School (HCS) and an engineer turned teacher has partnered with a number of primary schools to provide weekly, free of charge outreach session around a choice of activities to support the STEM content of the KS1 and 2 programme, followed by STEM enrichment days at HCS. Simon aims to cover 1 school per week over 35 weeks and see approx. 60 pupils per school. To build teacher confidence Simon will hold INSET days as well as advise on inexpensive, readily accessible items that can be purchased to build resources for lessons.

Engineering a Future Day at Winchester Science Centre
Winchester Science Centre
Secondary school activity
Winchester

Winchester Science Centre and Planetarium, located close to Winchester in Hampshire, is a leading hands-on science and discovery centre dedicated to engaging, enthusing and inspiring people about science, technology, engineering and mathematics. The Science Centre plans to hold a one day event to promote engineering to male students from schools in disadvantaged circumstances, to coincide with International Men's Day. Through participation in fun, hands on activities the 11-14 year old students will have the opportunity to put engineering theory into practice, whilst being mentored by male STEM Ambassador role models with a background in engineering. The event will be supported by these volunteers who work in engineering roles, and all students will take part in a speed networking session with them so that they can gain an understanding of engineering in the workplace and career options available. All students will also be able to achieve a CREST Discovery Award by participating in the event, and will be given the resources required to extend their involvement after the event by working towards a Bronze Award.