

Spring 2017 Funded Projects

PUZZLE-PANELS

Lews Castle College – University of Highlands and Islands
Highlands & Islands
Primary, Secondary & FE College Activity

The project will develop a series of 5 linked stand-alone panels, each with two STEM puzzles or activities which students/pupils (individually or in teams) will work through sequentially within a set time. The boards are WiFi connected and if all the puzzles are completed before the game timer reaches zero, a box on the last panel opens to reveal a prize.

The activities will be a mixture of physics, engineering, mathematics, and computing, and are all hands-on. All are under automated control - so is reconfigurable to vary the activities to encourage participants to repeat the experience and can be easily made easier or harder to suit the ages of participants since the boards are controlled by Arduino microcontrollers.

The boards will make STEM subjects fun but encourage participants to participate by doing calculations rather than relying on trial-and error.

The proposal is both to fund the construction of the panels and then trial the system with 200 school pupils. A proof-of-concept has already been demonstrated.

Once developed into a "professional" set of STEM challenges, these activities can be replicated and will be offered to all schools in the Western Isles.

Eco Engineers Primary Schools Project

UTC Reading
UTC Reading and local primary schools
Primary School Activity

Eco Engineers will focus on introducing engineering as a career to 7-11 year-old pupils, and to encourage young females to become interested in STEM careers.

Classes of primary school students will be shown how an eco home is constructed in an introductory workshop at their school, using prebuilt kits. This will be delivered by members and/or STEM Ambassadors alongside UTC teachers and UTC student volunteers. The pupils will then undertake a term of activities with worksheets that are provided in a pack to the teacher. These activities may be considered as a lesson by the primary school, or as an after school club. The activities will culminate in a presentation day where students bring their work to UTC Reading to present to an IET panel for judging.

The equipment provided by the funding will enable us to deliver the workshops to 12 x schools per year, over 3 years.

STEM Bus

Tablet Academy Ltd
Midlands (50 mile radius from RAF Cosford)
Primary & Secondary School Activity

Tablet Academy, RAF Cosford and RAF Museum Cosford are partnering to create a STEM Bus. This standard double decker bus will house 4 unique learning spaces to facilitate the delivery of a series of STEM focused Learning Festivals at a number of schools and local communities throughout the Midlands.

Each Learning Festival will provide a series of hands-on activities for up to 60 children aged 5-14 and 12 teachers from 11 schools. Starting with Aeronautical Engineering Festivals in April 2017 each festival will follow a STEM focus and will be delivered by experienced teachers from Tablet Academy or trained educators from the RAF STEM Ambassadors programme.

The STEM Bus will also be used for public events at RAF Museum Cosford and around the Midlands at smaller community events where children and their parents/carers will be invited on-board to participate in short STEM focused educational activities.

The programme is initially planned to last three years and the focus of this funding application is to subsidise some of the conversion work and the first year of 40 learning festivals and other events. The project will also be match funded by in-kind services and some sponsorship from educational technology partners.

Design, Build, Race & Take Solar Powered Electric Car (Race with Shine)

London South Bank University

London

Secondary School & FE College Activity

This project is planned for two years (four sessions per year) to encourage and motivate students' aged 11-19, especially females, in developing their enthusiasm and encouraging them to contemplate possible future career in the area of Electrical, Electronic & Mechanical Engineering. Groups of young students from local London schools and FE colleges will construct the solar-powered-electric-car by developing the experiences of design, build, test and race learning electrical, electronic and mechanical skills.

Our team of academics (IET/IMechE members) and volunteers based in our School of Engineering London South Bank University will engage students and school/college teachers in developing their enthusiasm, knowledge and passion to Engineering. Students along with teachers will take hand-made cars to their homes as a motivational symbol of Engineering. Also, students and teachers will be invited to visit our in-house high-spec Electrical, Electronic and Mechanical labs and meet our skilled Engineers/technicians with the motivational-demonstration of facilities to the real world applications.

The project funding by EEGS will enable us to engage local London Schools and FE colleges with the addition of giving motivational lectures on Electricity and publicity to young students in choosing career paths in Engineering and continue long after the completion date as a contribution to enhance our UK's expertise in Engineering to our young generation.

Fair Game: Engineering the Future of Sport

Camouflaged Learning

Norfolk

Secondary School Activity

'Fair Game: Engineering the Future of Sport' tasks groups of students to research, design, demonstrate, and create a new human - interface prototype device, that will enable all participants to compete in a new futuristic sport based purely on skill, not physical ability, namely 'Fair Game'.

The student-created devices will be designed to be used by anyone - regardless of age or ability - and should be engineered so that they eliminate all personal differences in strength, size and agility. The overall remit of the device is to ensure that no one player has a singular biological advantage, creating the worlds first truly Fair Game, that can only be won on the engineering excellence of the interface & the expertise of the user.

Students will research the engineering necessary to emulate and enhance biological design, then carefully chose which materials to purchase, based on their inherent and applied properties. To do this they will utilise a procurement budget that allows for both consultation with experts from all fields of engineering (CL staff & IMECHE members), and the purchase of a wide variety of materials on offer.

From these materials student participants will create a device that can enhance human abilities to meet new levels of strength, agility and accuracy. The prototype device will be presented, demonstrated and tested at the conclusion of the day to a panel of engineering experts, and measured and assessed against a number of real-world engineering criteria.

TGS STIXX

Tonbridge Grammar School
Kent
Primary & Secondary School Activity

TGS STIXX is a fun and innovative project to engage, enthuse and increase the understanding of primary and secondary school students in STEM subjects through “hands-on” mechanical engineering experiences. A STIXX machine, which works like a mangle, tightly rolls sheets of newspaper to form rods which when joined together with cable ties create very strong, simple or complex, small or large structures - strong enough to stand on and large enough to stand under.

Tonbridge Grammar School has been, and continues to be, successful in encouraging girls to engage in STEM subjects. As an integral element of the TGS STEM programme and outreach work, TGS STIXX will operate through Sixth Form led STEM clubs for local primary schools, TGS students, and for adults and children with learning difficulties.

In the longer term, TGS STIXX has the potential to engage corporate partners as sponsors and to form the basis of workshops aimed at increasing the knowledge and confidence of primary school teachers in STEM subjects.

Engineering Flight with the BBC Microbit

theSKYLAB
East Ayrshire, South Ayrshire, South Lanarkshire and East Renfrewshire
Primary & Secondary School Activity

The project aims to integrate the BBC microbit within a series of exciting interactive STEM expert guided model aircraft design and building workshops. It will result in an “all in the one box kit” prototype for use in the class room and community outreach engagement. It may then be developed into a scalable and sustainable UK wide platform to allow expert interaction with young people towards STEM career employability and serve as a lasting legacy of the project.

Specifically the EFGS will support a pilot project outreaching to 1080 pupils (ages 11-13) and 36 teachers. With STEM expert and teacher input established engagement activities based on existing activities carried out by theSKYLAB, a new programme of linked workshops covering engineering principles of flight leading to pupils design and building of model aircraft will be created. Importantly, the workshops will utilise the BBC Microbit as a method to quantify and understand what effect their engineering has on their model aircraft flight characteristics and will enable them to modify their aircraft and understand the principles of experimental design. STEM expert involvement will be in the design of the programme and also in the evaluation of presentations given by pupils of their experiment findings.

Wiltshire Safe Train Challenge

IET Swindon Community
STEAM Railway Museum, Swindon
Secondary School Activity

The Project will aim to develop computer coding skills and the principles of real world control systems in pupils aged eleven to sixteen to enhance their understanding of the importance of computer controls in transportation systems (specifically trains). Teams of six children will be given the opportunity to develop their own SCRATCH based programs to control a section of train tracks and the trains that are within the area. The ability to create code and develop their understanding of how it interacts with the real world will encourage the children to experiment and develop further within the STEM subjects, seeing things happen as a result of their own coding will be used to motivate pupils and to encourage them to take greater interest in modern engineering. Utilising the STEAM venue, will allow the children to broaden their knowledge and understanding of technology as well as appreciate the history and developments that have allowed the progress made to date.

The equipment provided by the funding for this project will enable us to continue to carry out these all-day activities in other locations and invite groups of children to other engaging locations like REME's training facilities at Lyneham, RAF Fairford and the MOD's Defence Academy at Shrivenham.

The IET Local Network along with the IMechE will provide 100% of the staff to deliver the project.
The expected legacy will be:

The activities will continue for several years utilising the equipment purchased with this funding. Training and development can be offered to Teachers to allow them to gain the skills and knowledge to continue activities and further expand within their schools, and to build on the 1 million BBC Micro:bit project.

Demonstrating the Social Impact of Engineering to Young People

Engineers Without Borders UK

Across the UK, including 3 major events in Birmingham, London and Glasgow.

Primary & Secondary School Activity

The UK needs more young people to become engineers. Engineers Without Borders UK explicitly promotes the social purpose of engineering because of a simple premise; if we can successfully demonstrate the difference that engineers can make to people, the communities they live in and the world we all share, then more young people, and more diverse young people, will choose engineering careers.

We reach young people in the UK through delivery of our interactive, hands-on workshops in the classroom by our enthusiastic volunteer Ambassadors as part of the National STEM Ambassador Programme. Our Ambassadors stand out. Their passion for portraying the real difference engineers make to people everywhere increases positive attitudes towards STEM careers. However, it is vital they are properly trained to ensure quality delivery. Support from the IMechE and IET will enable us to pilot a new approach so we can efficiently and sustainably transform and scale up our training model. We will kickstart the Train the Trainer scheme, implement regional training events and produce online training resources. These online resources will increase access for Ambassadors and teachers alike to top-up, familiarise and refresh their knowledge of our resources in preparation for delivering a unique classroom experience.

The Greater Manchester Engineering Challenge

The Science & Engineering Education Research and Innovation Hub (SEERIH)

Greater Manchester

Primary & Secondary School Activity

The 'Greater Manchester Engineering Challenge' (GMEC) is an ambitious project, focused on engaging primary and secondary pupils and their teachers in the engineering design process and developing engineering habits of mind. By attempting to set a record for the longest marble run created in Manchester (or beyond!) pupils, teachers, and professional engineers will work collaboratively to exploit the approaches of tinkering within the primary and secondary curriculum.

The project will build on learning from three years curriculum development with teachers exploring the relevance and resonance of primary engineering in the English mainstream curriculum. The Tinker Tailor Robot Pi (TTRP) projects have identified, trialled and evaluated approaches to primary engineering (Bianchi & Chippindall, 2016). This project will exploit the principles for primary engineering education to offer a series of masterclasses for teachers, and hands-on maker sessions with KS1 and 2 children, both in collaboration with University and Industry-based Engineers (mechanical, electrical and digital). A team of teachers from the TTRP projects will be supported as lead practitioners, offering a sustainable approach in which they become first-influencers for their colleagues; connecting and coaching teachers who are new to engineering in primary settings. Through a record setting attempt children will be inspired and learn about engineering practice, as teachers and engineers forge partnerships within Greater Manchester that will last well beyond the project. This project will act as a model for annual challenge attempts.

A Taste of Engineering

Institution of Civil Engineers

Swansea

Secondary School Activity

A Taste of Engineering is aimed at generating an interest in engineering among 14-15 year olds. This will be done by working in mixed teams to carry out 3 hands-on practical experiments using basic engineering principals. Each of the 3 challenges is a competition among teams, thus motivating pupils to work harder.

By holding the event in Swansea University's new campus, the pupils will be able to see engineering equipment displayed such as the flight simulator and where possible be given a tour of the Engineering department.

In addition the pupils will gain an understanding of the various routes into engineering as they will be speakers discussing their routes into engineering by covering apprenticeships after GCSE, apprenticeships after A-levels and university routes into Engineering. The STEM ambassadors from a wide range of backgrounds gives the opportunity of pupils questions being answered as there will likely be an engineer from most fields.

The funding provided by Engineering Education Grant Scheme will enable materials to be purchased to carry out these experiments.

The legacy of these experiments is that as the materials are readily available from local supermarkets and hardware stores, the experiments will be repeated by teachers in classrooms and after-school clubs.

STEM Pods 3

Pontefract Academies Trust

Wakefield

Primary & Secondary School Activity

To continue and extend the success of the STEM Pods project in the Wakefield District, we would like to produce a further 7 STEM activities that cover as many National Curriculum subjects as possible, to create a full cross-curricular STEM package for KS2 & KS3 students, to include:

8 existing STEM Pod activities.

- 4 further STEM Pod activities, focusing on links with 1 STEM area and 1 other subject area (Science & Drama, Technology & Music, Engineering & Geography, Maths & History).
- 3 additional STEM Mini-Pod activities, focusing on links with holistic STEM and 1 other subject area.

Each Pod houses the resources required for delivery of a tailored 90 minute KS2 and KS3 activity to a group of up to 30 students. High quality resources are provided by subject specialists, and resources replenished between use of each Pod. The Pods are housed in a STEM base at the lead secondary school (The King's School), to be transported to other schools or used on site.

It is anticipated that the activities can be delivered individually, as small packages, or as a whole over the course of a full week, this would be negotiated with each school involved.