

# IN BRIEF

## MORE THAN A BRIDGE



Merchant Square Footbridge in its upright 'fan' position © The Paddington Partnership

The regeneration of the Paddington Basin added another novel footbridge to its canal system in September 2014. The 'Fan Bridge' was designed by Knight Architects as part of a competition to replace a corkscrew bridge that

was no longer fit for purpose. The brief was to create a bridge that would allow pedestrians to cross the canal, but that could also be moved to let taller boats pass. When the blades are unfolded, the top blade reaches an angle of 70 degrees, and the

lowest one has a clearance of 2.5m above the canal.

For most of the week, the Merchant Square Footbridge at London's Paddington Basin is a 20m long, 3m wide pedestrian bridge crossing the Grand Union Canal, but on Wednesdays and Fridays at noon, the blades open and the fan unfolds into a five-bladed fan-shaped sculpture. Each stainless steel blade contains a hydraulic cylinder and is balanced by a counterweight 'fin' made of steel, filled with concrete, and labelled with the weight contained inside. The blades were fabricated by SH Structures in North Yorkshire, and floated down the canal to be assembled, with a

tolerance of no more than 3cm between blades.

The Paddington Basin is also home to the nearby rolling bridge by Heatherwick Studio, completed 10 years ago. This bridge, designed by Thomas Heatherwick, consists of eight triangular sections hinged at the walkway level and connected above by two-part links that can be curled up into an octagonal shape by hydraulic cylinders concealed in vertical posts in the bridge parapets. When extended, it resembles a conventional steel and timber footbridge, and is 12m long.

To see the Fan Bridge in action, visit the online version of this article at [www.ingenia.org.uk](http://www.ingenia.org.uk)



## A CALL TO ACTION



A new report was published in October by Engineering the Future, an alliance of leading engineering organisations. *The Universe of Engineering* details how engineering skills are now needed in an increasingly

diverse range of fields including brain imaging, airport security, drug delivery systems, materials science and prosthetic limb design.

In its call to action, the report urges the professional engineering institutions to adapt so that they better represent and develop engineers involved in these rapidly developing fields, and use this work as a springboard to attract more people into the profession.

The report, which follows on from a similar publication produced 15 years ago, says that the way government figures focus on output by sector, rather

than profession, means that the contribution of engineers is undervalued at all levels. This accentuates the difficulties in attracting people into the profession and contributes to the skills gap faced by industry. The report also estimates that there are 1.6 million 'hidden' engineers in the workforce, taking the amount of people in the profession to 4.3 million. The hidden figure consists of people with engineering qualifications using their knowledge and skills in the wider economy.

Analysis by the Royal Academy of Engineering

suggests the UK will need over a million new engineers and technicians by 2020, and EngineeringUK research shows this will require a doubling of the number of annual engineering graduates and apprentices.

The UK is facing an unprecedented skills crisis, says the report. This will require a step change in the effort to attract young people into engineering, and it must start with coordinated, inspiring messaging to the public that captures the real nature and breadth of engineering in the 21st century – see [www.engineeringthefuture.org.uk](http://www.engineeringthefuture.org.uk)

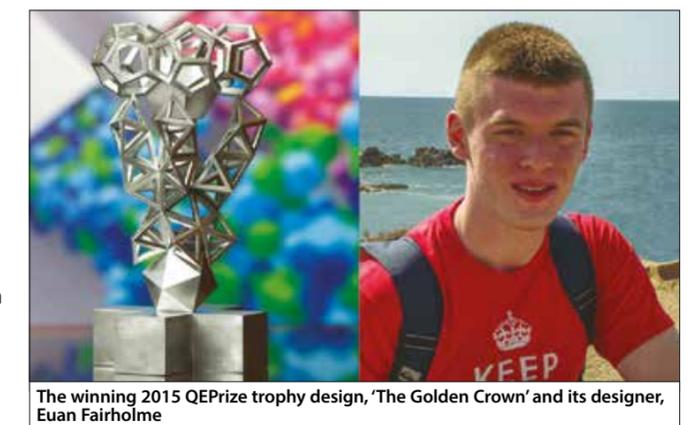
## CREATE THE TROPHY WINNER

Euan Fairholme, a fourth-year mechanical engineering student from the University of Glasgow, has won the competition to create the trophy for the 2015 Queen Elizabeth Prize for Engineering (QEPrize). His design, 'The Golden Crown', was chosen over hundreds of other entries, and will be presented by Her Majesty The Queen to the winners of the 2015 QEPrize at Buckingham Palace next year. Fairholme was also awarded £2,000, and will be invited to the prizegiving ceremony.

The competition was open to young people, aged 16-25, from the UK. To create the trophy, they used a 3D modelling app available on the QEPrize website. Designers were asked

to capture the creativity, power and importance of engineering, acknowledging the past and looking to the future; and clearly link their trophy designs to the Queen Elizabeth Prize for Engineering. Eight designs were shortlisted, and prototypes were 3D printed before the final judging.

Fairholme's design was chosen by a panel of judges including leaders in engineering and science, chaired by Ian Blatchford, Director of the Science Museum. This year, the public was also asked to vote for their favourite of the shortlisted designs on Facebook, and the people's vote was counted as the seventh vote in the Create the Trophy competition judging panel.



The winning 2015 QEPrize trophy design, 'The Golden Crown' and its designer, Euan Fairholme

The QEPrize is a global £1 million prize that celebrates the engineers responsible for a ground-breaking innovation that has been of global benefit to humanity, with the objective

of raising the public profile of engineering and inspiring young people to become engineers.

Visit [www.qeprize.org](http://www.qeprize.org) for more details about the trophy and the competition.

## ROSETTA MISSION



A picture of the comet's surface sent back by Philae © ESA/AP

The European Space Agency's Rosetta project, which launched in 2004, reached a significant milestone on 12 November when it deployed the Philae landing craft onto the surface of the comet 67P/Churyumov-Gerasimenko. The lander bounced several times before coming to rest in the shadow

of a cliff, from where it managed to transmit several streams of data before its power supplies ran down, forcing it into standby mode.

Engineering challenges for the mission included planning the ten-year trajectory of the mission. The comet's orbit lies between the orbits of the Earth

and Jupiter, 800 million and 185 million kilometres from the Sun. No launcher was capable of sending Rosetta into such an orbit, so the spacecraft used gravity boosts from three flybys of Earth and one of Mars to 'slingshot' into position, reaching the comet in May 2014.

Rosetta's industrial team involves more than 50 contractors from 14 European countries and the US, with over 2,000 people working on the project. While Airbus Defence and Space in Germany is the prime spacecraft contractor, several UK companies and institutions had a role in the project. Astrium UK was a subcontractor on the spacecraft platform, Logica developed the autonomous onboard software systems, AEA technologies

designed the orbiter's batteries, and BAE Systems (formerly MRC) contributed the craft's high-gain antenna and software defined radio system that allows communication with and control of the space probe from ESA ground stations.

Researchers from the Open University and Rutherford Laboratories developed the lander's gas analyser module; and the Rutherford team was also responsible for the thermal design and blanketing of the lander. Surrey Satellites Technology Ltd delivered the momentum wheel that provided gyroscopic stabilisation to the lander as it approached the comet's surface.

The Rosetta craft will continue to monitor the comet from orbit until the end of 2015.

## AFRICA PRIZE

Twelve entrepreneurs, affiliated with African universities and research institutions, have been selected to receive mentoring and support for their businesses as part of the first year of the Royal Academy of Engineering's Africa Prize for Engineering Innovation. The prize is the largest of its kind, and covers all engineering disciplines from mechanical, civil and computing to biomedical, oil and gas, mining and electronic.

Following six months of training and mentoring support from top business development and engineering experts, an overall winner will be selected to receive £25,000 along with

two runners-up who will be awarded £10,000 each. The projects chosen have come from Kenya, Nigeria, South Africa, Tanzania, Uganda, Zambia and Zimbabwe.

Some of the shortlisted projects include an Android app to teach children with learning disabilities to read; an environmentally friendly fertiliser applicator; systems to improve hygiene in urban sanitation; and a service that allows mobile phone users to switch between multiple mobile networks. Other innovations include a mobile payment application that allows merchants and customers to make and receive

card payments through their phones across multiple platforms; a low-cost sustainable water filter system to provide clean and safe drinking water; and a security alarm system that precisely detects tampering and breaches of perimeter fences.

The Africa Prize for Engineering Innovation was established to highlight the importance of engineering as an enabler of improved quality of life and economic development, and celebrate innovation. The prize is supported by the Shell Centenary Scholarship Fund, Consolidated Contractors Company, ConocoPhillips and



Africa Prize finalist Ian Mutamiri presenting the NatiV app to help children learn to read, at Intellectual Expo

the Mo Ibrahim Foundation. The winner and runners-up will be announced later in 2015 – see [www.raeng.org.uk/africaprize](http://www.raeng.org.uk/africaprize)

## INFLATABLE INCUBATORS

The 2014 James Dyson Award has been won by James Robert, a graduate from Loughborough University. The winning design was for a simple, low-cost, lightweight incubator. The elegant engineering of the design is attracting widespread attention from neonatal experts, and James will be spending his £30,000 prize money developing his current prototypes.

More than 10% of babies worldwide are born prematurely, and this figure increases significantly in developing nations. For many of these babies, particularly those born in regions where healthcare resources are limited and incubators insufficient or unavailable, cold is one of the biggest killers.

Replacing the normal aluminium and rigid glass or incubator with a plastic inflatable

body, the panels can be blown up manually. These are heated by a ceramic element that can run from a car battery for more than 24 hours when mains electricity is unavailable. Simple electronics keep the incubator's temperature stable, control humidity and manage a phototherapy lamp that can be used to treat jaundice – a common contributor to premature-baby mortality.

The low price of the unit, which would have an estimated cost of £250 to manufacture, test, and deliver to the desired location, gives it a significant advantage over conventional hospital incubators, which are designed for babies born very prematurely and who often need intensive care for weeks or even months. The inflatable incubator is designed as a no-frills, readily-available unit that could provide vital life-preserving services in



James Robert and Sir James Dyson CBE FREng with the award-winning incubators © Jim Tobias

harsh environments – refugee camps, for example.

James sold his car to help finance the project, and says he was inspired by a TV documentary that highlighted the plight of Syrian refugees and the severe shortage of baby

incubators. His award means he can continue development and, he hopes, bring the incubator to market by 2017.

The James Dyson Award will reopen next year. To find out more, visit: [www.jamesdysonaward.org](http://www.jamesdysonaward.org)

## INGENIA LIVE!



Milton Keynes LUTZ pod

On 10 March 2015, the first *Ingenia Live!* event, *Steering into the unknown: the new age of driverless cars*, will be held at the

Royal Academy of Engineering, London. It will take a further look at some of the technologies discussed in the article *When will cars drive themselves?* – on page 10 of this issue.

*Ingenia Live!* is a new series of early evening discussion events on topics where innovation, technology and society meet, hosted by *Ingenia* magazine. It aims to make engineering more appealing to younger audiences, in a relaxed setting. The target audiences are groups not traditionally targeted by the Academy's events programme – young people with an interest in

engineering, design and technology.

The event will see Professor Paul Newman FREng of the Oxford Mobile Robotics Group and Neil Fulton from the Transport Catapult discuss the impending arrival of autonomous vehicles on our streets including the Low Carbon Urban Transport Zone (LUTZ) pathfinder trial that is due to start in Milton Keynes in early 2015. This scheme will test a group of two-seater autonomous, electricity-powered pods, equipped with sensor and navigation technology.

Journeys in autonomous vehicles have the potential to be safer, more efficient and better for the environment than journeys made by human drivers. But they also raise concerns about liability in case of an accident, and drivers may find it psychologically difficult to give up control.

The audience will have the opportunity to discuss these developments with the expert speakers. Following the event, the film of the debate will be available on the [www.raeng.tv](http://www.raeng.tv) website for those who cannot attend in person.