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This year, the Judges have made a Special Award – the first since 2011 – to a company looking to take on the giants of the consumer electronics world.

GRAHAM PITCHER

GROUP EDITOR

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IMAGING INTENSITY

Once again, the BEEAs show how engineering is making a significant difference to people's lives.

t's a chilling statistic, but one in two people born in the UK after 1960 will be diagnosed with cancer at some point in their life, according to Cancer Research UK.

The good news is that survival rates for the disease have improved dramatically, due to a combination of new drug therapies and better surgical procedures.

In financial terms, cancer costs the European Union more than €120billion a year in healthcare and lost productivity. But that pales when compared to the human cost, which can include further surgery when the original procedure left cancerous tissue behind.

Our Grand Prix winner has developed an imaging system that helps surgeons to determine whether all affected tissue has been removed while the patient is still in the operating theatre. And this development has also won LightPath Medical the Electronic Product of the Year Award.

It's no surprise the Judges said: "It's inspiring to see a UK company bringing this kind of technology to market. LightPath has the potential to make a massive impact on cancer surgery."

This year, the Judges have made a Special Award – the first since 2011 – to a company looking to take on the giants of the consumer electronics world.

According to MQA, the ubiquitous MP3 format sacrifices quality for convenience, with 90% of the information discarded during compression. Its solution is an audio format that uses what it calls 'music origami' to make a large file compatible with any streaming service or playback device. Already, deals have been struck with leading equipment manufacturers and one global music group.

Once again, the BEEAs have shown that UK engineering is creating world class products and offering top quality services. Please join me in congratulating all those who entered this year's awards and the winners in particular. L' It's inspiring to see a UK company bringing this kind of technology to market. LightPath has the potential to make a massive impact on cancer surgery.



GRAHAM PITCHER

GROUP EDITOR





MAKING A DIFFERENCE IN PEOPLE'S LIVES

Academic research has been turned into a leading edge medical imaging system that promises a significant improvement in cancer surgery techniques

hile none of us wants to hear a consultant telling us we have cancer, recent advances in medical technology and surgical procedures have improved significantly the prospects of our overcoming many of the cancers deemed previously terminal.

Cancer is one of the leading public health challenges in Europe. More than 3million cases are diagnosed every year and it is the second most common cause of death across the continent. When taking into account healthcare costs and lost productivity, the disease currently costs the European Union some €126billion per year.

Despite the improvement in techniques, cancer surgery carries with it some significant risks; one of which is the failure of the surgeon to remove all the cancerous tissue. So what better winner of the British Engineering Excellence Awards Grand Prix than a system which holds in prospect a reduction in follow up operations, reduced healthcare costs and – most importantly – better peace of mind for the patient?

The LightPath Imaging System integrates imaging technology into a mobile device that can be used in busy operating theatres. It provides surgeons with an effective tool that can be used during surgery and which promises to reduce the repeat operation rate.

In 2009, academic papers reported low intensity light being emitted from patients administered with radiopharmaceuticals. Further research determined this was Cerenkov luminescence, generated as positrons – the decay products of the radiopharmaceuticals – travel through tissue.

Dr David Tuch, founder and CEO of Lightpoint Medical, recognised this could enable the development of a smaller, lower cost imaging system than a PET system, but would have comparable performance.

Meanwhile, the commercial availability of electron multiplying CCDs has enabled the low intensity levels of the Cerenkov luminescence to be detected.

Founded in 2012, Lightpoint has moved from initial concept to regulatory approval of the LightPath Imaging System, which received a CE Mark in October 2015. Innovation and fast paced growth has helped the company to attract more than £6million in grant funding, as well as £2.8m in equity funding. In 2015, the company secured a £1m development contract for its technology from the NHS and a €2.4m grant from the EU for a pivotal breast cancer trial.

Randomised clinical studies are

required to evaluate the effectiveness of the product in a clinical setting. Initial feasibility clinical studies undertaken in key UK hospitals have provided sufficient evidence and confidence in the technology for major grants to be awarded and a number of international surgeons are said to be keen to participate in these studies.

Designed, developed, verified and made in the UK, the LightPath Imaging System lets the surgeon examine the tumour that has just been removed. If cancer is located at or near the surface, the surgeon may remove tissue adjacent to such locations for subsequent imaging to ensure the disease is cleared before the patient's surgery is completed.

The system is being used initially for the intraoperative imaging of breast cancer patients. According to the company, it intends to evidence a reduction in the number of patients requiring repeat breast cancer surgery from 25% to 12.5%.

Additionally, those who have used the LightPath Imaging Systems during the pilot clinical studies were surveyed and the report concluded 'the responses to the user feedback questionnaire confirm the potential of the LightPath Imaging System for use during breast cancer surgery as a means of identifying and localising cancerous tissue'.







WHAT THE JUDGES SAID

"*LightPath* revolutionises cancer surgery, reduces the need for follow on surgery and brings peace of mind to patients. It is poised to make a big difference in people's lives."





CONSULTANCY POWERS AHEAD

Using a Formula One mindset, Williams Advanced Engineering is tackling challenging design projects.

Although Williams has participated in a range of projects outside of Formula One since the 1980s, its diversification started in 2008 with the hybridisation of Formula One. As the only team in F1 to develop a hybrid system entirely in house, it realised the commercial potential and created Williams Hybrid Power.

With growing expertise in hybrid propulsion systems, it was approached by Jaguar Land Rover in 2010 to help in the creation of the C-X75 hybrid supercar. This lead to the creation of Williams Advanced Engineering as an umbrella for projects outside of Formula One.

Since then, the company has grown exponentially and now represents 17% of Williams Group revenues. Opening a new facility in 2014, the company has handled 40 projects and plans to expand to 200 employees by the end of 2016. During the past 18 months, the business has expanded into the aerospace and defence sectors, working with leading companies such as Thales, General Dynamics and BAE Systems.

Combining cutting edge technology, the best engineers, precision and speed to market, the company works closely with its customers and partners, providing innovation, engineering, testing and manufacturing services.

It specialises in five areas: hybrid and EV systems; advanced lightweight materials; aerodynamics and thermodynamics; dynamics; and specialist low volume product delivery. These can all be grouped as 'energy efficient performance'.

Williams says it is full of problem solvers, tackling complex engineering challenges on a daily basis. As a prototype specialist, the company works faster than



many others and can provide proofs of concept as rapidly as possible.

Apart from working with manufacturers such as Jaguar and Aston-Martin, Williams was named as the sole supplier of batteries for Formula E, designing a battery that can propel a car at 225km/h, while remaining practical in terms of aerodynamics, range, recharging times and safety.

Initially designed to provide 133kW, with 40kw regeneration, the specification was changed by the FIA to 150kW with 100kW regeneration.

In Season 2, the power requirement increased to 170kW – nearly 30% more than the original design.

Only a company with a Formula One mindset could have achieved this, says Williams. Having built 40 batteries and a number of spares, the batteries have now completed two full seasons, with 760 race starts. So far, there have only been two battery failures during a race. Taking on the challenge of designing and making batteries for Formula E which worked reliably was an impressive performance. It was hard to ignore the engineering excellence involved.



ADVANCED ENGINEERING SPONSORED BY







CLEANING UP IN THE NORTH WEST

Specialist hydraulics and pneumatics supplier is now developing robots for nuclear decommissioning

Starting from the simple idea of making and supplying hoses to customer specifications, Forth Engineering has developed into a specialist manufacturer and independent distributor of hydraulics and pneumatics services.

The business has enjoyed successful progress, with revenues exceeding expectation. In particular, the introduction in 2007 of a maintenance and monitoring system meeting BS5244 standards strengthened its customer base significantly. The system records all hoses manufactured using a specially developed barcode system, making every hose fully traceable.

Forth has an ongoing R&D programme, as well as product development. This includes high level concept work and detailed development of existing innovations.

It has developed a range of design capabilities, with product designs ranging from components and sub-assemblies to rigs, instruments and systems. The company also combines new and existing technologies to produce a suite of tools which can be applied across a variety of disciplines.

Specialising in technical innovation, Forth is developing a range of remotely operated vehicles (ROVs), radiation tolerant cameras and remote tooling, used throughout the nuclear industry for the inspection and manipulation of spent fuel and active waste. It is also diversifying into other areas, including designing and supplying equipment for decommissioning in the oil and gas and renewables sectors.

A decision taken in 2012 to invest in a specialist area provided a safe environment to carry out trials and to investigate new technologies. The building also replicated the challenges of the Sellafield site, particularly the ponds.



A further 1200m² was added in 2014, including a 10 x 30 x 6m deep pond holding more than 1.2million litres of water and a 10tonne overhead crane. The first project undertaken in the facility in 2014 provided a significant step forward in the clean up of Sellafield's legacy facilities.

Forth is continually looking at how technology can be applied in difficult locations, reducing exposure to danger in all areas of industry. In particular, a Knowledge Transfer Partnership programme with Manchester University is looking to develop a robot that will allow equipment to be deployed in harsh environments.

Also under development are: a grapple crawler, for wind turbine inspection, cleaning and repair; and an ROV platform inspired by a mechatronic spider.

Forth says a joint venture with German company Visatec has allowed it to expand into Europe and notes that it has thrived, despite competition from larger organisations. Building on earlier success, Forth has expanded its business by moving from traditional products to the supply and development of novel technology.

WHAT THE JUDGES SAID

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FEELING WITHOUT TOUCHING

Ultrahaptics is looking to provide a way of interfacing with electronic products that doesn't require physical contact

The way in which we interface with a range of products has changed significantly over the years. From pushbuttons and switches, the interface of choice has moved to the touchscreen and is progressing towards touchless.

But one problem with touchless technology is the lack of feedback. Looking to solve this problem and to take advantage of a potentially massive market, Ultrahaptics has developed a haptic technology that it believes will disrupt the way in which people interface with their applications.

Ultrahaptics' technology uses ultrasound to enable 'feeling without touching'. Using a small array of ultrasound speakers, it can create the feeling of virtual objects, switches and dials which float in mid air, or track the user's fingertips to create a system that supports free space gesture recognition and control.

Development of the technology began in 2010, when CTO Tom Carter was an undergraduate at Bristol University. By 2013, the technology was attracting the attention of some global companies, so the technology was spun-out from the university.

Following attendance at the Consumer Electronics Show in January 2014, the company immediately received funding. Since then, Ultrahaptics has received a €1.496million Horizon 2020 grant and raised £10.1m in one of the UK's largest technology A rounds in 2015.

Originally with three employees, it grew to 20 by the end of 2014, supported by an experienced CEO and a former FTSE100 CEO as chairman. Rapid growth saw the employee base double in size in the second half of 2015.

Ultrahaptics is seeing significant demand for its technology and has received orders





from car makers, companies manufacturing gaming consoles and consumer electronics and computer manufacturers.

The company has developed a licencing model for its technology; initially supporting manufacturers through customer funded bespoke engineering projects, with the view to collecting royalties on released products. This model brings time to market advantages and minimises its financial outlay. As the market expands, it is likely that other avenues will be explored.

The team has identified markets that it believes will become viable using its technology and has developed innovative ways to engage with these markets. With significant engineering and license royalty revenues in prospect, sales have grown to \$2.5m, while the team has grown to 40. Ultrahaptics is engaging with customers in a range of markets, including automotive and white goods, and expects to see consumer products featuring its technology in mass production by 2018. Ultrahaptics has the potential to be a game changer in a number of markets. It has a sound business plan, significant backing, plus sales and orders in hand.

WHAT THE JUDGES SAID







SECURING ITS MARKET

Working with ByteSnap Design ensured Cocoon brought an innovative home security product to market on time and on budget

Developing consumer electronics products involves a range of considerations, with the main target often being an aggressive price point. But hardware is also important in providing the required functionality.

Cocoon, a technology company looking to transform the home security market, enlisted ByteSnap Design to provide electronics and software design expertise for its latest product. Working with Cocoon, ByteSnap helped the company to make the necessary hardware choices, develop prototypes, write software and obtain certification for the device in the EU and the US.

According to ByteSnap, the design presented particular challenges – it had to meet demanding video, Wi-Fi and audio performance targets at a commercial price point, whilst being tightly constrained mechanically.

These targets meant ByteSnap needed to bring together engineers with a range of experience and to work closely with Cocoon's mechanical and software teams.

The size and shape of the end product was one critical area, requiring ECAD and MCAD collaboration. Several iterations of the PCB – a 60mm diameter circular board – were offered to Cocoon's mechanical team before component locations were finalised.

ByteSnap helped to develop the product specification by selecting the transducers, SoC and Wi-Fi module, with cost, time and risk taken into consideration.

At the start of the project, several components were evaluated before selection for the initial prototype. The microphone is a critical component for this product and ByteSnap created a bespoke design, with performance exceeding expectations, according to Cocoon.



To address IoT security concerns, ByteSnap considered components with hardware level security features, allowing the customer to lock their device to prevent hacking.

The product was challenging in that it had to send and receive Wi-Fi signals, while preventing unwanted emissions and avoiding susceptibility to RF problems. So ByteSnap included solid ground planes on the PCB, avoided tracking antennas and buried all high speed nets.

In order to maintain quality, ByteSnap formed an independent test team, helping to maintain goals and avoid issues that could lead to project slip.

Cocoon scheduled a closed user trial in August 2015 with early backers and ByteSnap completed software and electronic design in good time. A tight, well scheduled design team with clearly outlined job descriptions and the expertise needed to deliver the design on time.

WHAT THE JUDGES SAID





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THE SHAPE OF THINGS TO COME

Shape memory alloys play a central role in unmanned ground vehicle design

While they are designed to cope with many things, military vehicles - whether manned or not - are susceptible to damage from landmines.

In designing the Highly Robust Ground Platform (HRGP) - a remotely controlled unmanned ground vehicle (UGV) capable of surviving a mine blast and remaining mission capable - BAE Systems turned to nature for inspiration.

According to the company, some insects resist predators because they have extremely hard bodies and flexible, lightweight legs. The HRGP has adopted this concept, with a highly protected hull containing all critical componentry and wheels connected to the hull via highly flexible suspension and drives.

The design brief was for a small, remotely controlled vehicle which could continue to function after experiencing a small explosive detonation. It should weigh no more than 50kg and be simple, guick and cheap to repair after damage.

The key issue was to identify a highly flexible material that could withstand a significant explosion and return to its original shape.

Several materials were considered for the suspension and driveline elements, including spring steel, titanium and shape memory alloys (SMA). Based on their super elastic properties, SMAs were selected for the final design.

During a mine blast, the pressures and forces experienced are extremely high and difficult to predict. Materials in the immediate vicinity tend to deform substantially and plastically. Use of materials with high strain rates, such as SMAs, were seen to give a substantial advantage in withstanding significant blast levels.

BAE SYSTEMS INSPIRED WORK



Although sustainability was not a primary selection parameter, the ability to 'reset' the material's shape using heat was a positive point, ensuring significant reuse.

The use of SMAs in suspension systems and drivelines is innovative and the effort required to make the SMAs manufacturable has resulted in two patent applications.

The SMA suspension and driveline components performed well under blast conditions and responded as predicted by deflecting significantly, then returning to their original shape.

The objective of the HRGP was to develop a prototype vehicle which was trialled with a number of different explosive detonations to understand the technologies used and the ability of the SMA used as suspension and driveline components to withstand blasts.

The vehicle met or exceeded its targets and the SMA material performed well under the extremely high forces and deflections of a mine blast event.

A novel application of materials in a challenging environment.

WHAT THE JUDGES SAID





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IMAGING SYSTEM IMPROVES OUTCOMES

A revolutionary imaging system is set to reduce the number of repeat cancer operations

Surgery remains a primary treatment option for cancer, yet it is frequently unsuccessful as surgeons can't accurately distinguish between diseased and healthy tissue. So patients frequently emerge from surgery with cancerous tissue left behind – for example, this affects one in four breast cancer patients.

However, by ensuring the removal of cancer in one operation, Lightpoint Medical's technology could reduce the number of repeat operations, improve patient outcomes and reduce healthcare costs.

The LightPath Imaging System – designed, developed, verified and made in the UK – integrates state of the art imaging technology in a mobile device that can be used in challenging operating theatre environments, allowing the surgeon to examine the tumour that has just been removed. If cancer is located at or near the surface, the surgeon may remove additional tissue (adjacent to such locations) for subsequent imaging to ensure the disease is cleared before the patient's surgery is completed.

One of the available diagnostic tools is the use radiopharmaceuticals, which collect in higher concentrations in cancerous tissue. These concentrations are detected using Positron Emission Tomography (PET) scanning, but this equipment is large, expensive and needs dedicated rooms and staff.

The LightPath, which provides surgeons with similar functionality at a lower price, is small enough to be used in the operating theatre and allows the surgeon to follow existing workflows with minimal disruption.

Cancer surgeons typically use 'feel' and sight to determine the tissue that is to be removed surgically. The LightPath Imaging System uses a new approach – Cerenkov



luminescence imaging – to provide the surgeon with an image showing the regions of an excised specimen that contain cancerous cells. The system is initially being used for the intraoperative imaging of breast cancer patients.

However, Cerenkov radiation emits light at a very low level and it wasn't until the introduction of electron multiplying charge coupled devices – EMCCDs – that it became possible to measure Cerenkov luminescence.

Lightpoint Medical was established in 2012 and LightPath started its regulated development in September 2014, receiving its CE Mark in October 2015. Since then, the LightPath Imaging System has been successfully used in three centres.

While major cancer centres in the UK and the Netherlands have committed to LightPath, full commercial release is not expected until the completion of randomised clinical studies. It's inspiring to see a UK company bringing this kind of technology to market. LightPath has the potential to make a massive impact on cancer surgery.

WHAT THE JUDGES SAID



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A GOOD VIEW OF THE MARKET

Designed from a blank sheet of paper, Hydradig is bringing new levels of innovation to urban work sites

Backhoe equipped diggers – known generically as JCBs – have been used in a range of sectors since the 1950s. As such, you might be inclined to believe that it would be close to impossible to bring anything new to the market. But that is what JCB has done with the Hydradig, described by the developer as a ground breaking digging, lifting, loading, placing and tool carrying machine for urban construction, highways maintenance, utilities, landscaping and municipal operations.

Hydradig brings new levels of innovation and engineering to the market, looking to address a growing need for a compact wheeled machine that offers stability, mobility, manoeuvrability and visibility.

Before asking 'Could there be a better solution?, JCB decided it needed to ask 'What are the problems that customers face when using wheeled excavators on job sites?'. To answer the question, JCB assembled a multidisciplined team from across the Group to analyse what customers really needed. It became clear to the team that a new and better solution could be achieved by rethinking machine design conventions.

The team took the design back to first principles, in particular moving the engine, tanks and ancillaries from the upper structure to the lower structure – something previously not thought possible. This reduced the centre of gravity, improved stability and mobility and ensured there was a 'cone of visibility' – the operator can see all four wheels plus a 1m



perimeter around the machine at ground level.

Stability was also an important design criterion, as such machines are now called upon to do an increasing amount of heavy lifting, as well as excavating.

Even in confined urban sites, the choice of four wheel steer, two wheel steer and crab steer makes operating easy, allowing the machine to work in tighter confines than ever before. A tight turning circle makes the JCB Hydradig suited to urban sites.

Just 60 days after announcing the Hydradig's price, JCB achieved the full year sales target. The machine's success has continued, with orders currently 50% more than the full year target. A great assessment of market need, with a novel top down design targeted at a traditional industry. JCB has exceeded its yearly sales target, with every other target nailed.

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Eureka!

WHAT THE JUDGES SAID





PUSHING DESIGN BOUNDARIES

Hitting the ground running and passionate about engineering

Graduate engineers represent a significant part of the future for UK industry. As employers look to refresh product lines and address new markets, graduate engineers have the opportunity to make an immediate impact with new design approaches and fresh thinking. It's a classic case of someone hitting the ground running – and exactly what the Judges were looking for in this category.

Throughout the graduate scheme and during his two years as a lead engineer at Jaguar Land Rover, Chris Bellamy has invented, designed and developed creative and novel solutions to customer problems, as well as being involved in advanced vehicle development and vehicle sustainability.

One of his main achievements has been the pioneering of a human-centric design process, a concept said to be 'very new' to JLR. Working closely with the company's consumer insight and human factors teams, Chris is said to have delivered 'outstanding results'.

Chris is a passionate engineer who puts the customer first. His creativity has seen him develop solutions which have the potential to revolutionise parts of the vehicle interior market previously believed to have been saturated.

Amongst Chris' innovative designs are a novel vehicle interior table system, which cuts weight by 50% and cost by 80%, while increasing by a factor of five the number of ways it can be used.

With self-belief and determination, he has overcome numerous hurdles and dealt with problems which many people believed could not be solved. Thorough, and always looking for the best solution, Chris holds himself to the highest standards and always goes 'one step beyond'. His technical prowess, combined with an ability to learn new systems or techniques quickly, means





he has the ability to deliver his ambitious product visions.

Apart from design engineering skills, he has a strong business understanding, which allows him to ensure there is a commercial basis for his ideas from the start. His charisma also ensures that colleagues 'buy into' his new ideas and concepts with a high level of confidence and trust.

Passionate about inspiring the next generation of engineers, Chris believes there is huge opportunity to improve engineering education in the UK by demonstrating real engineering challenges and by showing aspiring engineers how they can use their classroom knowledge to solve these problems. He mentors students through Arkwright scholarships, hosts work experience students and university projects to promote engineering as a career, and presents widely about engineering topics at public events. He has also been involved in the Engineering Education Scheme as judge, assessor and interviewer. WHAT THE JUDGES SAID

He has achieved a lot in a short career; it's not easy to make a mark in companies such as JLR at such a young age.

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WITHSTANDING THE PRESSURE OF VALVE DESIGN

Thinking `outside the box' brings commercial success

The role of the design engineer is changing rapidly. Once confined to the design office, successful design engineers today not only need to demonstrate practical skills, they also need to understand the markets for which they are designing products, work with customers and influence others.

Alex McDiarmid is an enthusiastic and innovative design engineer who has proved to be an outstanding member of Parker Bestobell's R&D and project design teams.

In the two years since joining the cryogenic valve manufacturer, he has designed a number of innovative products which have helped to secure major new contracts in the marine industry. Thinking 'outside the box' and applying himself diligently, he has challenged accepted wisdom and demonstrated true ingenuity.

One such challenge was to design a complete range of valves suitable for high pressure marine fuel applications – these needed to withstand temperatures of -196°C and pressures of 625bar. The result is said by Parker Bestobell to beyond anything it has previously manufactured. The challenge was even greater as the range had to be completed for launch at a prestigious exhibition.

According to Chris Brown, Parker Bestobell's engineering manager: "This was a highly innovative project that only an inventive mind could solve, taking proven valve technology and blending it with new ideas. Alex delivered the valve on time and on budget, providing a truly pioneering solution that opens up many great opportunities in the marine fuel gas sector.

"The pressure control valve has enabled the business to secure a number of key projects in the sector, with potential to contribute significantly to future growth."

Alex also ensured the components were



standardised, cost effective and designed to be easily and efficiently manufactured.

Alex has pioneered the use of standard calculations within the business to assist the design process, as well as introducing Best Practice Modelling.

An accomplished communicator, Alex has inspired a number of young engineers and apprentices, while helping to develop the skills and expertise of new staff.

He has taken part in engineering projects with schools and the local community, including Get up to Speed with Engineering and Manufacturing – a showcase event dedicated to raising the profile of Engineering and Manufacturing which is visited by more than 2000 students from the Sheffield region.

Alex has also mentored a team from Bradfield School on a recent technology challenge, with the team achieving first place amongst all the schools in South Yorkshire. Alex also spends time mentoring apprentices during their time in the engineering department. A driven young engineer who has moved his company's products forward. Alex is also enthusiastic in his encouragement of the next generation of engineers.

WHAT THE JUDGES SAID



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PASSIONATE ABOUT AUDIO QUALITY

A new audio format set to compete with MP3 sounds good to the Judges

Each year, the British Engineering Excellence Awards judges can make a Special Award, at their discretion, to a person or a company that, in their opinion, deserves particular recognition. There is no guarantee that such an award will be made, but this year, one company impressed the Judges by showing that British engineering excellence makes it possible to compete in the complex world of consumer electronics.

The MP3 format has not only changed the way in which we listen to music, but also where. Despite this, many people have significant reservations about the format.

According to start up MQA, since the MP3 format was adopted, sound quality has been sacrificed for convenience. Typically, it claims, 90% of the information is discarded during the MP3 compression process.

MQA founder and technology inventor Bob Stuart is passionate about preserving audio quality and was confident that labels, artists and music fans would appreciate an audio format that could not only deliver rich sound quality, but also do so using a convenient file size. That format is MQA.

Normally, when analogue sound is converted into a digital signal, temporal 'blurring' occurs, which means the listener can't tell where individual sounds are coming from. This makes recorded music sound 'flat' compared to 'live' music. According to MQA, it can clean up this distortion to create truly accurate 3D sound.

Once the recording has been deblurred, MQA uses a process called 'Music Origami' that makes a large audio file manageable and compatible with any service or playback device. On an ordinary device, MQA formatted music will play back at better than CD quality. However, with an MQA decoder, the full studio sound is unfolded



to deliver sound equivalent to the original performance.

Because MQA is an end to end process, quality and authenticity is guaranteed from source to delivery, ensuring you hear exactly what the artist recorded and approved in the studio.

The first MQA enabled devices were launched by Meridian Audio in December 2015, followed by partner announcements at the Consumer Electronics Show in January 2016, where HTC showcased a 'proof of concept' by playing MQA music on its One A9 smartphone.

Partnerships have also been reached with companies such as Mytek, Onkyo, Pioneer and Bluesound, along with a long term licensing deal with Warner Music Group. Meanwhile, the Recording Industry Association of America has approved MQA technology.

MQA is now finalising licensing agreements with major music labels, a move it believes will drive the delivery of MQA music in the US, Japan and Europe. Bob Stuart's development of the MQA audio codec – and its positive reception by leading consumer electronics brands – shows the UK is more than capable of holding its own in this highly competitive market.

WHAT THE JUDGES SAID







ERIC WILKINSON, CHAIRMAN

Chief operating officer for Cambridge Consultants, Eric has managed projects as diverse as the development of the latest in anti terrorism radar, a machine to produce premium frozen drinks and the world's most intelligent iron. A materials scientist by training, Eric is a regular speaker at international conferences



RICHARD POULTON

Hardware team leader and part of the senior management at Navtech Radar, Richard manages eight engineers in areas such as new product R&D, project management, customer project engineering and site work. He plays an active role in European regulatory groups and takes a personal interest in encouraging young people into engineering.



PETE LOMAS - TRUSTEE, RASPBERRY PI FOUNDATION

A trustee of the Raspberry Pi Foundation and director of systems engineering with Norcott Technologies, Pete has developed more than 100 electronic products containing some 280 PCBs during a 30 year career. He also designed the Raspberry Pi, with the remit to create a simple credit card sized PCB with a minimum component count.



PHIL MAYO

Phil founded Premier EDA Solutions and is a visiting industrial fellow at the University of Hertfordshire and a member of the University's Industrial Advisory Group and Industrial Certification Committee. Committed to the success of the UK electronics industry, Phil believes engineering skills should be high on the list of national priorities.



PHILIPPA OLDHAM

A chartered mechanical engineer, Philippa discovered her love of technology at her local garage. With a Master's degree in mechanical engineering, Philippa joined QinetiQ as a mechanical design engineer and rose to become product manager for its £150m aerospace business. In May 2011, Philippa became head of transport and manufacturing with the IMechE.

DR ANDY SELLARS



Following spells with Rolls Royce, Spirent and Abbott Diagnostics, Andy worked as an independent consultant before joining Innovate UK's High Value Manufacturing team, taking responsibility for advanced materials and electronics manufacturing. Andy has developed the business case for the Compound Semiconductor Applications Catapult.



GRAHAM PITCHER

An engineer by training, Graham has covered developments in the electronics industry for more than 35 years. He also has broad expertise in computer aided design, industrial automation and computing technologies. For the past 22 years, he has been involved with the development of New Electronics and has edited the magazine for most of that time.



TIM FRYER

Trained as a mining engineer and then an electronics engineer, Tim has spent the majority of his career writing about electronics.

He joined MA Business as Deputy Editor of New Electronics at the start of 2013 and became Editor of Eureka! at the end of 2014.



JUSTIN CUNNINGHAM

Justin has a first class honours degree in Aerospace Engineering and spent 15 months following graduation with Astrium Space, working on future concepts of spacecraft. Since then, he has worked as a technical journalist and is currently editor of Engineering Materials and deputy editor of Eureka!



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