Technology Strategy Board
Driving Innovation

Results of competition:
Technology-inspired innovation - January 2014 - Electronics, photonics and sensors - Feasibility study

Total available funding for this competition was £2m from the Technology Strategy Board.

Note: These proposals have succeeded in the assessment stage of this competition. All are subject to grant offer and conditions being met.

Participant organisation names	Project title	Proposed project costs	Proposed project grant
Anvil Semiconductors Limited	To demonstrate the feasibility of producing low cost, high intensity LEDs using Anvil's stress relief IP to grow high quality GaN on 3C-SiC on large diameter Si substrates.	£32,844	£24,632

Project description - provided by applicants

Anvil Semiconductors has developed technology that enables the growth of device quality 3C-SiC wafers on large diameter Si substrates for use in power devices, delivering the performance and efficiency benefits of SiC at the price of silicon. The IP resolves the problem of the stress which is inevitable when growing SiC on Si.

This feasibility study determines whether the IP has applicability to LEDs with 3C-SiC providing an effective buffer layer for GaN growth on large diameter Si wafers. The stress relief technology may also enable the growth of GaN with reduced dislocation density, leading to low cost, high intensity LEDs. Such a cost/performance improvement would have a disruptive effect on the LED market making replacement of incandescent lights and compact fluorescents with solid state lighting commercially viable, potentially reducing the world energy consumption by some 11%.

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Driving Innovation

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Participant organisation names	Project title	Proposed project costs	Proposed project grant
Applied Nanodetectors Limited	An investigation into the feasibility of fabrication of an exhaled gas acetone sensor array using inkjet printed nanomaterials for measuring diabetic ketoacidosis	£33,000	£24,750
Project description - provided by applicants			
Diabetic ketoacidosis (DKA) is a dangerous condition and the leading cause of hospitalization and the main cause of morbidity and death in children and adolescents with type 1 diabetes. Earlier diagnosis of blood ketones facilitates the prevention of ketoacidosis, as well as prompt treatment. Most ketone testing is routinely undertaken using dipstick test strips for urinalysis. Urine ketone strips are semi-quantitative and patients find it unpleasant and inconvenient to provide a urine sample. Quantitative exhaled acetone detection and analysis is an ideal alternative method. In this feasibility project we propose to investigate the feasibility of fabrication of an exhaled gas acetone sensor array using inkjet printed nanomaterials (nano-carbon or metal oxide based) and measure their initial performance. Our approach would be to use highly sensitive nanomaterials and proprietary organic polymer coatings which are highly selective and insensitive to humidity.			

Technology Strategy Board
Driving Innovation

Results of competition:
Technology-inspired innovation - January 2014 - Electronics, photonics and sensors - Feasibility study

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Participant organisation names	Project title	Proposed project costs	Proposed project grant
Aqua21 Ltd	Low Cost Dissolved Ozone Sensor using UV LED	£33,300	£24,975
Project description - provided by applicants			
Dissolved ozone is one of the most effective disinfectants available. The measurement of dissolved ozone is however either costly or only available offline. The capital cost of measurement currently outweighs the cost of ozone production. If an online, real-time system of measurement was available, the benefits of ozone disinfection would become available at much lower cost and therefore could be applied much more widely. Aqua21 have developed a low cost, low carbon ozone generator and are now exploring the potential for associated sensor technology with commiserate qualities for application to its core technology in progressing towards commercialisation and consistent with its approach to tackling the energy/carbon/water nexus.			

Technology Strategy Board
Driving Innovation

Results of competition:
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Participant organisation names	Project title	Proposed project costs	Proposed project grant
Cadscan Limited	Low-cost Mid-Range 3D Scanner	£33,300	£24,975
Project description - provided by applicants			
3D scanning is a fast and accurate way to measure and digitise physical objects. The market is growing quickly from $3.01 billion in 2013 to a projected $9.82 billion by 2018. Scanners that can capture larger objects and structures such are known as mid-range 3D scanners. These are used by professionals in a variety of fields such as construction, engineering, architecture and gaming to generate 3D assets. However, high accuracy devices are very expensive, ranging from £15,000 for static tripod mounted and handheld systems to over £100,000 for automatic systems mounted on robotic arms putting them out of reach of small companies and prosumers. We plan to assess the feasibility of developing an innovative mid-range scanner based on a low-cost structured-light imaging system that uses powerful LEDs to project a pattern over a range of 1-3 metres.			

Technology Strategy Board
Driving Innovation

Results of competition:
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Participant organisation names	Project title	Proposed project costs	Proposed project grant
Cadscan Limited	3D Photocopier	£33,300	£24,975
Project description - provided by applicants			
3D printers are now capable of producing high quality results from a range of materials for under £1,000, fuelling widespread uptake. The 3D printer market is currently projected to be worth $3.7b in 2015, growing to $6.5b in 2019. With a resolution of up to 25 microns they can fabricate almost anything, but to do so require 3D data that describes the shape of the object. However, there are no 3D printers today that can also scan objects with sufficient resolution and a high degree of automation to truly replicate a 3D object. Despite this lack of integration, 3D printing and 3D scanning have a synergistic relationship which makes this desirable from a practical and technical standpoint. We believe that almost all 3D printers will eventually include 3D scanning capabilities. This study will investigate the feasibility of integrating a compact, light structured-light system into a 3D printer, making the first true, high resolution 3D photocopier a reality.			

Technology Strategy Board
Driving Innovation

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Participant organisation names	Project title	Proposed project costs	Proposed project grant
Chromacity Limited	Modular picosecond seed lasers for industrial laser processing	£32,723	£24,542
Project description - provided by applicants			
Chromacity Ltd. is an ultrafast laser manufacturer servicing the scientific and industrial laser market. In this feasibility study the company will investigate a new flexible ps seed laser technology which offers a promising route to an OEM module suitable for direct integration into an existing high-average-power amplifier system.			

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Driving Innovation

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Participant organisation names	Project title	Proposed project costs	Proposed project grant
Cybula Limited	LOW COST SUPERCOMPUTING - LCS	£33,000	£24,750
Project description - provided by applicants			
The need for large amounts of computing is prevalent in many everyday problems, such as determining the best way to design the shape of your car, detecting the failures in nuclear power stations, to running great computer games. Current computers are difficult to scale from small experimental machines to large supercomputers and typically lack the ability to deliver the data fast enough to the machine to keep the computer busy, they are also large and very power inefficient. The project aims to demonstrate a unique computer that has the potential to solve all these problems. The machine is based on collections of plates containing embedded processors with contacts on each edge of the plates that can be used in water. To build a machine the plates have magnetic edges and link together and placed in a water tank for cooling. This revolutionary new concept will open up the ability to provide high powered computers to everyone.			

Technology Strategy Board
Driving Innovation

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Participant organisation names	Project title	Proposed project costs	Proposed project grant
Eyejusters Limited	Ultraprecise optical machining technology for next-generation lighting systems	£32,532	£24,399
Project description - provided by applicants			
We will develop an enabling technology for the application of ultraprecise diamond machining to the next generation of LED lighting systems, including automotive headlamps, office and commercial lighting systems and even domestic lighting. This technology will enable new designs with better functionality, better appearance, and which will process light energy more efficiently.			

Technology Strategy Board
Driving Innovation

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Participant organisation names	Project title	Proposed project costs	Proposed project grant
Folium Optics Limited (lead) Colour Synthesis Solutions Limited	plastic electronics for laser protection	£32,998	£24,748
Project description - provided by applicants			
The number of attacks with cheap, commercially available and high powered laser pointers on civil and commercial pilots has dramatically increased over recent years and now presents a real danger to public safety. We propose applying a plastic electronics displays technology to this problem, by developing active plastic eyewear that detect laser attacks and switch “on” to neutralise those wavelengths of high powered, dazzling light, while still allowing enough light through the eyewear to allow pilots to safely continue flying and avoid the hazard. This study will assess the feasibility of applying plastic electronics as an innovative solution to protecting pilots from these attacks.			

Technology Strategy Board
Driving Innovation

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Participant organisation names	Project title	Proposed project costs	Proposed project grant
GDE Technology Limited	Disruptive technology for motor encoders	£33,000	£25,000
Project description - provided by applicants			
GDE Technology will demonstrate the feasibility of implementing its recently developed advanced algorithms for inductive absolute rotary sensors in the latest generation of embedded microcontrollers such as the ARM Cortex M3. The results of the project will enable the development of inexpensive smart absolute sensors for rotary position measurement which can be used in industrial, robotics, automotive and aerospace applications. We aim to satisfy the unmet need for an inexpensive absolute rotary sensing platform combining fast update rates (~250kHz), resolution from 16 to 18 bits, and absolute accuracy in the region of 0.1°. This new 'smart sensor' platform technology will allow significant improvements in the performance of many existing industrial control loop systems and thus achieve new levels of efficiency, safety , and energy saving in a wide range of markets.			

Technology Strategy Board
Driving Innovation

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Technology-inspired innovation - January 2014 - Electronics, photonics and sensors - Feasibility study

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Participant organisation names	Project title	Proposed project costs	Proposed project grant
Glass Technology Services Ltd (GTS)	3D Clear Cut	£33,000	£25,000
Project description - provided by applicants			
GTS will develop a novel laser process, 3D Clear-Cut, to meet an industry need for low-cost, flexible manufacturing of glass components with complex, customised 3D shapes to high precision in short time-frames with minimal energy input and the option of controlling diffusing properties. 3D Clear Cut will enable several pieces to be 'cut' out of a single block of glass in a short time frame with high precision and minimal waste.			

Technology Strategy Board
Driving Innovation

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Technology-inspired innovation - January 2014 - Electronics, photonics and sensors - Feasibility study

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Participant organisation names	Project title	Proposed project costs	Proposed project grant
I3D Robotics Limited	3D stereo image enhancement using laser induced fibre speckle	£33,000	£24,750
Project description - provided by applicants			
3D measurement of featureless surfaces is difficult to achieve for existing 3D systems. When a featureless surface contains clues as to the state of corrosion due to the environmental conditions within a furnace, a solution is required to provide “just in time” warnings for prophylactic action to be taken. This can save process industries, millions of pounds in costs as well as reduce the amount of greenhouse gas emissions associated with heat generation. Lidars cannot be employed to provide sufficient spatial resolution and stereo imaging can’t be employed at present due to the lack of any image texture. Into this space, the laser speckle projection system can be deployed providing the needed features to allow real-time 3D imaging to monitor the state of the corrosion of the surface to ensure “just in time” maintenance. i3dr will develop the requirements for a proto -type system and provide a lab test for its efficacy and potential for the industrial process sector.			

Technology Strategy Board
Driving Innovation

Results of competition:
Technology-inspired innovation - January 2014 - Electronics, photonics and sensors - Feasibility study

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Participant organisation names	Project title	Proposed project costs	Proposed project grant
International Moisture Analysers Limited	Dew point Measurement Device	£32,609	£24,457
Project description - provided by applicants			
In this project we aim to show the feasibility a device to determine the dew point temperature of a high pressure gas.			

Technology Strategy Board
Driving Innovation

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Technology-inspired innovation - January 2014 - Electronics, photonics and sensors - Feasibility study

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Participant organisation names	Project title	Proposed project costs	Proposed project grant
International Moisture Analysers Limited	Measurement chamber for Raman spectrometry	£32,040	£24,030
Project description - provided by applicants			
A novel measurement cell for measurements by Raman spectrometers			

Technology Strategy Board
Driving Innovation

Results of competition:
Technology-inspired innovation - January 2014 - Electronics, photonics and sensors - Feasibility study

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Participant organisation names	Project title	Proposed project costs	Proposed project grant
IS Instruments Limited	Ultra low cost 3D printed wireless spectrometer for process control	£33,000	£24,750
Project description - provided by applicants			
Spectrometers are becoming an increasing common tool for analysing processes in a variety of sectors, including steel and glass manufacture. Typically these systems are used to make reflectance or flame spectroscopy measurements to determine the quantities of materials used in a given process. There is a desire to make wider use of these systems in a variety of applications in a network of sensors to monitor a given process. However good quality spectrometers are still expensive (> £2 K) and thus using multiple such systems is not practical. The target of this project is to investigate the feasibility of producing a good quality spectrometer using modern manufacturing techniques with an on board computer to provide wireless control, all for a target sale price of < £ 300. A demonstrator will be built during the programme to investigate directly the performance of the proposed device.			

Technology Strategy Board
Driving Innovation

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Participant organisation names	Project title	Proposed project costs	Proposed project grant
Optocap Limited	Development of a novel planar fibre coupling technique for Silicon Photonic devices	£33,300	£25,000
Project description - provided by applicants			
Silicon photonics is a growing area of photonics and is finding applications in markets such as telecommunications, data communications, Space, Military and Bio-Photonics/Medical. The current fibre align approaches have limitations in size and reliability. The study will explore a new method of fibre alignment which will provide benefits in size and reliability and will open up new high reliability applications.			

Technology Strategy Board
Driving Innovation

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Participant organisation names	Project title	Proposed project costs	Proposed project grant
Reliawind Limited	Study and assessment of technical and commercial feasibility of a new Silicon Carbide (SiC) Bipolar Junction Transistor (BJT) technology for High Voltage DC (HVDC) electricity transmission for offshore renewables	£33,027	£24,770
Project description - provided by applicants			
The project aims to study and assess the technical and commercial feasibility of a new Silicon Carbide (SiC) Bipolar Junction Transistor (BJT) technology for large-scale power electronics inverters used in High Voltage DC (HVDC) electricity transmission for offshore renewables. The new technology offers substantial improvement in reliability and efficiency and reduction in manufacturing cost of SiC BJT power semiconductor devices, enabling more widespread application of HVDC grids; its exploitation can potentially reduce the Levelised Cost of Energy (LCOE) from offshore wind by 5.3% when compared to existing Silicon (Si) based HVDC inverters.			

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Driving Innovation

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Ruskinn Technology Limited	ROSBA - Robust Oxygen Sensing for Biology Applications	£33,000	£24,750
Project description - provided by applicants			
Ruskinn's core business is the development and manufacture of sealed Hypoxic (low Oxygen) and Anaerobic (zero Oxygen) "glove port" workstations for cell biology and microbiology applications, including stem cell research. This Feasibility Study explores a new Oxygen sensing technology and related systems which will cause a disruptive performance shift in the workstation marketplace.			

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Driving Innovation

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Ventech Systems	Network of Accelerometers for Remote Monitoring	£22,179	£16,634
Project description - provided by applicants			
The project aims to produce a very flexible, low cost network of vibration sensors, which can be controlled and optimised in software to meet a range remote monitoring applications. It utilises a set of innovative approaches to develop a very powerful measurement capability at a fraction of the cost of competing technologies.			

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Zagres Limited	Feasibility assessment of a new low-cost Gallium Nitride (GaN) microinverter for domestic solar photovoltaic applications	£32,977	£24,732
Project description - provided by applicants			
The project aims to study, assess and quantify the technical and commercial feasibility of a laboratory-proven Gallium Nitride (GaN) Metal-Oxide Semiconductor Field Effect Transistor (MOSFET) technology for solar microinverters. The patented GaN device design enables 30% reduction in the fabrication cost of GaN MOSFET and 45% increase in device reliability. It can potentially reduce the Levelised Cost of Energy (LCOE) for domestic solar applications by 12% as compared to commercial Silicon (Si) based microinverters.			