Innovate UK

Results of Competition: January 2018 Sector Competition: Strand 2, Emerging and Enabling Technologies
Competition Code: 1801_EE_R4

Total available funding is £9,536, 508

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
BUTTON BRAND DESIGNS LTD	Graphene Grow Lights	£60,500	£42,350
GRAPHENE LIGHTING PLC		£22,711	£15,898
STC Research Foundation		£15,339	£15,339

Project description - provided by applicants
Graphene is a form of carbon consisting of a single layer of carbon atoms arranged is a hexagonal lattice. It is the basic structural element of many other forms of carbon such as graphite, diamond and charcoal. Graphene has many unusual properties. It is the strongest material ever tested, conducts heat and electricity extremely efficiently and is nearly transparent. Such features make graphene an ideal lighting material when used in conjunction with Light Emitting Diodes (LEDs). Products have been developed for domestic use, office use, street lighting and decorative applications, but as yet, not for horticulture. This project will develop ultra-light and efficient graphene based LED lighting to be installed in indoor farms and even standard greenhouses. The radical light design and reduced costs will be facilitated by the use of graphene as a thermal dissipation mechanism. It's near transparent nature enables LEDs to be coated with graphene to facilitate a more even distribution of light. Lighter weight while retaining strength will facilitate products that are easier to install and so reduce labour costs.

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Participant organisation names	Project title	Proposed project costs	Proposed project grant
KIROKU LIMITED	A research and development study of automated clinical note generation	£100,000	£70,000

Note: you can see all Innovate UK-funded projects here   https://www.gov.uk/government/publications/innovate-uk-funded-projects
Use the Competition Code given above to search for this competition's results

Project description - provided by applicants

Our vision is to create technology that is able to listen to the conversation between a healthcare professional (HCP) and a patient, and automatically generate the clinical notes. Our innovation lies not in the speech recognition, but in the novel natural language understanding of this dialogue, combined with an innovative expert translation system. The first use case will be generating clinical records in dentistry.

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Participant organisation names	Project title	Proposed project costs	Proposed project grant
CADSCAN LIMITED	3D perfusion mapping for diabetic foot ulcer assessment	£134,902	£94,431
Staffordshire University		£55,759	£55,759

Project description - provided by applicants

3.7m people in the UK and 422m worldwide have diabetes. Diabetic Foot Ulceration (DFU) is the most common complication, with over 60,000 people having an ulcer at any time, costing the NHS £650m annually. 40% of patients reulcerate within 1 year and 60% within 3 years. In the UK this results in 7,300 amputations per year, 20 every day. Patients who have achieved wound closure are generally in remission rather than healed. NICE recommends monthly monitoring of high-risk patients with those at the highest risk (pre/post-ulceration) monitored weekly. We propose a new system to reduce costs significantly by enabling at-risk patients to monitor their feet at home, sharing data remotely with their clinician.

Our objective is to establish proof of concept for a first-of-a-kind, non-invasive imaging system for the diabetic foot designed to assess tissue viability, monitor healing and predict the likelihood of ulceration. Imaging PPG (IPPG) is an emerging, non-contact method that can detect heart-generated pulse waves by means of peripheral blood perfusion measurements. It can capture spatial information from multiple sites simultaneously, enabling the derivation and mapping of physiological parameters. The project will develop a novel 3D-IPPG system that illuminates the foot with a specific wavelength, measuring light reflectance over a short time period with a high-sensitivity camera. This will create an image of blood flow and soft tissue perfusion in the foot which we will combine with 3D surface data to improve robustness and visualisation. It has many other applications including monitoring of pressure ulcers, burns, dermatology, reconstructive surgery and other trauma.

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INNOVATIVE MATERIALS LIMITED	HI-PRESTEGE Hot Isosatic Pressing of Thermoelectric Generators for energy harvesting	£70,313	£49,219
Manufacturing Technology Centre		£29,072	£29,072

Project description - provided by applicants
HI-PRESTEGE will deliver novel sintering technologies capable of producing a range of thermoelectric sintered materials with zero porosity at industrial scale. These will be applied to manufacture the next generation of thermoelectric energy harvesting devices and thermoelectric generators.

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Participant organisation names	Project title	Proposed project costs	Proposed project grant
LIQUID VISION INNOVATION LIMITED	Development of a low-cost and portable optical sensor for the instantaneous indication of pathogens in drinking water	£79,999	£55,999
NERC British Geological Survey		£14,990	£14,990
TRACE2O LIMITED		£4,753	£3,327

Project description - provided by applicants
Worldwide, 1.8 billion people still drink faecally contaminated water and there are 502,000 deaths per year from diarrhoea caused by inadequate water supply, particularly affecting children under five years old. Faecal contamination of drinking water remains the major cause of infant mortality in developing countries. There is currently an urgent requirement for the development of a rapid method for the detection of faecal contamination in drinking water, which may be performed by non-specialists in urban and rural environments lacking services. In this project, disruptive optical sensor technology suitable for the rapid assessment of drinking water quality will be developed by a sensor developer and manufacturer, Liquid Vision Innovation, in collaboration with the British Geological Survey, a research organisation with significant experience in field surveys of drinking water quality, and Trace2o, a manufacturer and global supplier of environmental-testing technologies. The innovative optical sensor will be tested in the laboratory and field-validated in the UK. The project outcomes, including a low-cost, easy-to-use sensor prototype, will ultimately be a tool for monitoring water quality in both developing and developed countries. In developed countries, contaminated water outbreaks are still a regular occurrence as a result of limitations in currently applied infrequent grab sampling, which cannot provide a sufficiently rapid or real-time contamination alert. A cryptosporidium outbreak that left 700,000 people in Lancashire unable to drink tap water for three weeks in August 2015 could have been avoided if United Utilities had detected the contamination earlier, before the water entered public supply. In developing countries, the project outcomes will enable larger scale surveys of water quality, providing immediate feedback on water quality for end users, and empowering long-term improvements in global water, sanitation and hygiene. These improvements are necessitated by the United Nations Sustainable Development Goals (SDGs).

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Participant organisation names	Project title	Proposed project costs	Proposed project grant
Saffron	Enabling Distributed Ledger Technology in Existing Chain of Custody Businesses	£87,553	£61,287

Project description - provided by applicants
This project will establish the foundations of a leading British distributed ledger technology business, specifically focussed on providing enabling technologies to existing businesses with chain of custody operations in international supply chains. Unlike other distributed ledger businesses in the marketplace, this business will seek to enable (and profit from) existing businesses with chain of custody operations by implementing distributed ledger technology into their businesses to drive efficacy, leverage existing investments, and increase the rate of growth of their user bases. The project has the potential to demonstrate early customer success by implementing its output with one of the world's largest traceability platforms, with whom a contract has already been agreed.

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Participant organisation names	Project title	Proposed project costs	Proposed project grant
CARBONCHAIN.IO LIMITED	CarbonChain: Blockchain solutions for the diamond supply chain and beyond	£100,000	£70,000

Project description - provided by applicants

CarbonChain's project is to develop a blockchain platform with smart contract solutions that enable industrial resources companies to solve asset authentication and supply chain challenges.

Blockchain technology & smart contracts are increasingly being utilized in a wide array of industries to revolutionize their supply chains. Shipping company UPS is utilizing blockchain technology & smart contracts to increase transparency in their shipping supply chain. Food giants Nestle and Unilever use blockchain to increase visibility in tracking produce as it moves through the supply chain. Even the World Food Programme is using blockchain technology to improve food aid distribution efficiency to refugees across the globe.
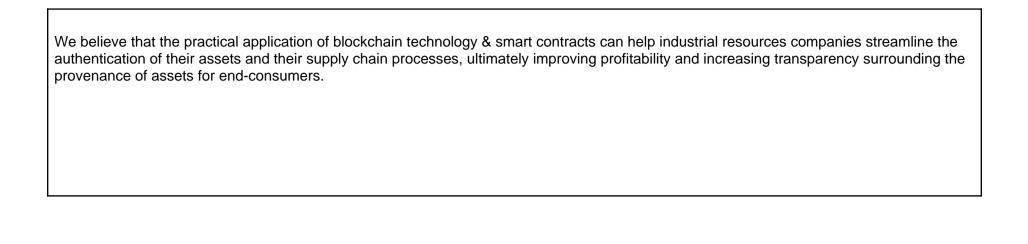
However, companies in the industrial resources sector (mining, oil & gas, construction materials, etc) have yet to embrace blockchain technology on a large scale. Most of them have not changed their asset authentication and supply chain management procedures in decades. This is becoming a growing problem for them, as they are under increasing pressure from both government regulators and end-consumers to prove the origin and sourcing of their products. Examples include:

* Mining companies needing to demonstrate to customers that precious stones and metals have been mined in an ethical manner in compliance with all laws (i.e., blood diamonds or conflict stones)
* Construction material companies responding to increased customer demand for products that meet green building standards (i.e., BREEAM, LEED, Green Star)
* Pulp, paper and wood manufacturers ensuring raw materials are sourced from sustainably-managed forests (i.e. FSC Chain of Custody certification)

Given the increasing urgency of this problem, we have identified an opportunity for the industrial resources sector to utilise the game-changing technology of blockchain and smart contracts to innovate their supply chains:

* Improving visibility and quality of real-time information to increase the efficiency of auditing, monitoring and reporting
* Satisfying greater pressure to reduce transport time & bottlenecks and to streamline shipping processes as global shipping costs increase and margins shrink
* Creating transparency for supply chain participants to showcase their people, places, and processes behind the products

We believe that the practical application of blockchain technology & smart contracts can help industrial resources companies streamline the authentication of their assets and their supply chain processes, ultimately improving profitability and increasing transparency surrounding the provenance of assets for end-consumers.

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Participant organisation names	Project title	Proposed project costs	Proposed project grant
KNOWLEDGE CAPITAL LTD	Project WorkTOP (Work Transparency & Optimisation Platform)	£99,680	£69,776

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Funders Panel Date: 19/06/2018

Project description - provided by applicants

Small Businesses, Large Corporates and Public sector organisations in the UK spend over £22B a year on 'generic' consulting activities. This figure, while large, does not include the type of work covered by top end strategy houses and work offered from firms such as McKinsey, or technically oriented service delivery from the likes of IBM.

The 'bulky middle' of management consulting includes a wide range of domain expertise and topics delivered in the portfolio, from cost reduction initiatives or revenue increasing advice, delivered across a number of functions (operations, HR, Finance, Technology and Supply Chain) and to the entire breadth of British industry.

However, the consumers of such consulting services suffer from what many authors and scholars call 'information asymmetry'; knowing that a problem needs to be solved but lacking the data to be able to make decisions about how such a solution should be delivered. From our research, we know this leads to over specification, higher costs and a less satisfied customer as a result.

Leveraging the insights from the Design Foundations grant awarded to us in August 2017, we are building a data led platform to bring transparency to the consulting industry; using big data and a remarkable human centred design interface to support SME's, public bodies and corporates to be empowered to make better decisions. Collectively, a data driven platform that supports customers to author their own work, leveraging bleeding edge technology in Machine Learning and A.I. means that everyone has the same easy access to high quality information. We can save small business (in particular) billions per year in lost revenues and higher costs, ensure targeted and efficient use of taxpayer money in the public sector, and limit wastage by corporate organisations.

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Participant organisation names	Project title	Proposed project costs	Proposed project grant
ENVIRONMENTAL MONITORING SOLUTIONS LIMITED	IRONMAN - Iron Removal Of Nutrients by Modular AutomatoN	£99,294	£69,506

Note: you can see all Innovate UK-funded projects here   https://www.gov.uk/government/publications/innovate-uk-funded-projects
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Project description - provided by applicants

IRONMAN is a new waste water treatment control technology based on artificial intelligence. It is used to control the addition of iron additives to remove phosphate before water is returned to rivers. It will be much cheaper and much easier to deploy that existing technologies. It will be particularly applicable on smaller waste water treatment sites, where more expensive conventional control isn't viable.

Current treatment control is often wasteful. The worst possible conditions are assumed and enough additive is used to cope with these conditions even if this isn't required. IRONMAN will save around 40% of additives. On a site serving 50,000 people, the cost of IRONMAN would be paid for in less than 6 months by the reduced cost of additives alone. The over-addition of chemicals is also wasteful in terms of the energy used to produce the chemicals and the overall carbon-footprint of the treatment process.

In England and Wales, the progress on reducing river pollution has stalled in recent years. This is heavily influenced by the level of nutrients, such as phosphate, in rivers; waste water treatment works are a major source. In response to this, the EA is driving permit levels down and treatment processes are reaching their limits, so-much-so that the level of iron additives is leading to very high iron levels in effluent. IRONMAN is also a response to this problem.

IRONMAN is autonomous, based on a type of artificial intelligence called fuzzy logic, which mimics human reasoning. Autonomous infrastructure can take away the need for expensive and, in the case of this particular application, often unreliable or ineffective human intervention. For fairly narrow tasks, AIs such as fuzzy logic can be very effectively specialised. They can provide pronounced improvements on current processes and systems.

IRONMAN will be an adaptation of another technology which is successfully used for autonomous urban flood risk reduction. The technology has outstanding potential for repurposing in other applications ripe for autonomous systems. This project will be a first venture into this repurposing and will form a bridge-head into a world of similar autonomous systems.

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Participant organisation names	Project title	Proposed project costs	Proposed project grant
SECURIUM LIMITED	Systems for Internet Safety: Counteracting Online Predators (SIS:COP)	£99,707	£69,795

Project description - provided by applicants

In 2016, NSPCC reported a 50% increase in cases of online grooming. The proposed 12-month project - SIS:COP intends to demonstrate the potential for a system embodying advanced approaches for detecting and preventing online grooming as could help to reduce this.

The project will develop several key technical components for detection and prevention, and integrate these into a sophisticated prototype for real-time grooming detection. The prototype will be based around three main innovations:

(i) developing our peer-reviewed and award-winning predator detection approach, independently evaluated in international competition and grounded in the Cycle of Entrapment (CoE) in Luring Communication Theory, from an offline approach into a real-time component;

(ii) practical exploration of the ability of deep learning (AI) approaches to automate maintenance of detection capabilities, leading to enhancement of the existing approach; and

(iii) an integration with an existing enterprise system offering for exploration and demonstration of inter-operation with state-of-the-art monitoring capabilities.

We anticipate resulting systems that can demonstrate significant improvement over the present state-of-the-art in which reliance on simple lists of keywords prevails but results in high rates of false alarms and the significant risk of missed detections. By contrast, our approach evaluates the contribution of phraseological patterns over time to the emergence of predatory activities, with classification by CoE stages. CoE addresses the stages of entrapment - such as 'Isolation' and 'Deceptive Trust' - involved when predators lure victims into on-going abuse; without such classification, some interactions can seem entirely innocent. Use of CoE reduces rates of both false alarms and missed detections. A measure of success for SIS:COP would be outperforming our existing detection approach on the basis of newly discovered patterns.

The project will act as a precursor to developing, and subsequently selling through licensing and partnering agreements, pluggable systems and services that detect and prevent online grooming, and provide a concrete basis for further developments for a safer internet. Key target markets that this project will support us to reach are Safeguarding/Monitoring systems (e.g. schools, chatrooms and safeguarding apps) and Enterprises - private network providers.

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Participant organisation names	Project title	Proposed project costs	Proposed project grant
TRUE 212 LIMITED	NLP and neural network tools to help digital content creators; deployed through a simple plugin/agnostic platform	£99,715	£65,812

Note: you can see all Innovate UK-funded projects here   https://www.gov.uk/government/publications/innovate-uk-funded-projects
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Project description - provided by applicants

TRUE212 Limited is a content marketing and content solutions provider. In this project we are researching a new approach, using semantic analysis, machine learning including neural networks, to analyse a website's content, and provide breaking news and social media assets to journalists, editors, bloggers and other enterprise content creators. This will take manual and repetitive tasks away from the journalist and inspire them on what to write about, giving them more time to engage audiences. This means that the user will effectively have at their disposal their own Editorial assistant team, accessible through an easy to deploy plugin for use within all the most commonly used content management systems, including WordPress.

Our approach will support plugin users, with added machine learning features and improved capabilities, but we will also create for the first time, an agnostic architecture and scalability that can be more flexible. Flexibility is sought so that additional scenarios can deliver end-user value, by seamlessly and continuously delivering innovation in this space. This project is meeting an urgent demand, with 86% of marketing teams believing Ai will make them more efficient and effective, and 79% believing it will change the role of marketers towards more strategic work.

This novel platform system will enable writers to gain faster access to insights on what to write about, and alert them to the most relevant breaking news stories, based on their audience's preferences, plus easy access to relevant social media content as they write articles. Our USP is that we help writers create a more engaging story as they are actually writing -- not just ideas within the planning process. We are about efficiencies, engagement and inspiration as they write and edit. Focus groups from our network of journalists and writers have defined what users want from this challenging new project, and how success will be measured.

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Participant organisation names	Project title	Proposed project costs	Proposed project grant
CAMBRIDGE SPARK LIMITED	Developing a novel machine learning approach to construct effective personalised learning pathways in data science tuition	£432,447	£302,713
University of Oxford		£116,287	£116,287

Project description - provided by applicants
Cambridge Spark Ltd and University of Oxford are pioneering the use of technology to transform data-science tuition. The project seeks to meet the market demand for innovative products and services that can address current deficiencies in the supply of industry-relevant, efficient data-science education and training. The company anticipates that the resulting product will rapidly expand its UK market share and enter global markets, driving profit growth and further investment in technology development and commercialisation. Cambridge Spark also expects that the resultant product will catalyse profitability and growth for UK digital industry, supporting further investment in UK R&D. University of Oxford will utilise outputs to increase its research capabilities and further its research goals.

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Participant organisation names	Project title	Proposed project costs	Proposed project grant
ZENOTECH LTD	AI-Mesh	£49,954	£34,968
ALGOLIB LTD		£49,956	£34,969

Project description - provided by applicants
The most commonly referenced bottleneck and process impediment in computational engineering is mesh generation -- defining the discrete elements, lines and points around a geometry (car, aeroplane, turbine) that are required before a solver (computational fluid dynamics, computational structural mechanics or electromagnetics) can be run. AI-Mesh brings together specialist SMEs AlgoLib (AI and machine learning technology) and Zenotech (computational engineering and cloud computing) to create a prototype AI-based meshing system - replacing manual human operations in mesh generation with automation informed by feedback from the quality metrics of each mesh generated.

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Participant organisation names	Project title	Proposed project costs	Proposed project grant
DYNISMO LTD	High fidelity, low cost, sensory immersion system for VR	£95,893	£67,125

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Project description - provided by applicants
A prototype of a high performance, low cost, sensory immersion system for use with VR headsets will be built and tested. The objective of the project is to validate and demonstrate its use in VR entertainment and training application, such that a commercial product may then be developed and marketed.

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Participant organisation names	Project title	Proposed project costs	Proposed project grant
LURTIS LIMITED	Artificial intelligence assistant to support multiscale 3D virtual scenario modelling	£91,933	£64,353

Project description - provided by applicants

Lurtis technology allows professional and amateur creators to produce digital contents in the most cost-efficient way. This mission, in the case of this project, is concreted into tools and services that assist game designers, modellers and artists in **the creation of complete 3D scenarios in few minutes** and they are particularly useful for fast prototyping with professional quality.

This project extends the existing _HouseBuilder_ technology, which is able to **procedurally generate** building and their interiors, with two additional modules _CityPlanner_ (that generates cities and districts, including roads, terrains, and building layouts), and _InteriorDecorator_ (that procedurally generates furniture and decoration elements and arrange them inside a room).

The whole pipeline provides tools for the users to produce a broad range of scenarios, with a dynamic definition of the level of detail from cities to building to decoration and furniture all of them in a coherent and automatic way. _Lurtis_ tools are cloud-based services that are configured by the user with high-level constraints and characteristics and interactively iterate to refine a model, **increasing professional users efficiently and allowing an amateur user to produce high-quality contents with minimal effort**.

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Participant organisation names	Project title	Proposed project costs	Proposed project grant
MMT TEXTILES LIMITED	Fashioning and ageing population: smart non-woven textiles for adaptive insulation	£84,063	£58,844

Note: you can see all Innovate UK-funded projects here   https://www.gov.uk/government/publications/innovate-uk-funded-projects
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Project description - provided by applicants

A global ageing population presents significant opportunities and challenges to individuals and society; design interventions coupled with advances in medical and assistive technologies are expected to make a significant contribution that will support full and active lives for this demographic.

The creative industries are set to play a critical role in the implementation of government policy in preparation for the demographic shift brought about by a growing ageing population. Strategic priorities such as novel health care systems and social, physical, technological connectivity draw upon design, in its broadest sense, to ensure capitalisation of opportunities from new technologies by addressing barriers to uptake, sensitivity and privacy (source: Future of an Ageing Population, 2016).

Within this context, design of the build environment is positioned to maximise physical mobility and lead to increased physical activity levels, better health and quality of life through the intersection of human centred design methods and advances in material/digital technologies. For example, we imagine rooms that can autonomously sense and alter their climatic and physical conditions in response to the needs of the occupants to ensure priorities such as comfort and mobility; this project widens this proposition to include garment and fashion design.

This work addresses physiological discomfort caused by moisture buildup in the wearer's microclimate where current behavioural strategies for airflow and insulation adjustment (such as adding or remove layers and handling fasteners during work rest cycles) present significant challenges to individuals with limited mobility due to age or disability. Thermal and airflow properties of conventional clothing systems rely on the wearer for adjustment; the ambition is to create a new class of smart non-woven textile, significantly distinct from electronic textiles, to enhance the experience of physical activity.This project will develop a novel non woven textile capable of autonomous, physical adaptation of thermal and airflow resistance using InotekTM, a biomimetic hygroscopic staple fibre which reversibly alters its length in response to levels of moisture vapour concentration in the environment.

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Participant organisation names	Project title	Proposed project costs	Proposed project grant
BOTSANDUS LTD.	Robot:Group Social Interaction	£99,922	£69,945

Today's consumer and service robots have been designed for 1:1 interaction, but the majority of interactions in public spaces such as shopping centres and airports involve groups of people, which robots are currently unable to deal with effectively. BotsAndUs is a UK based robotics start-up developing state of the art consumer robots. This project aims to demonstrate the technical viability of extended and repeated human-robot interaction with groups, in public spaces. The goal is to create technology that equips robots with the ability to adapt to a variety of situations in public spaces, supporting their wide adoption across customer service roles, leading to more efficient businesses and increased customer satisfaction.

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Participant organisation names	Project title	Proposed project costs	Proposed project grant
Terry Nelson Enterprises Ltd	Development of water-resistant biometric, positioning and kinetic sensors: Enabling intelligent rehabilitation, training and remote monitoring in water	£98,813	£69,169

Project description - provided by applicants

Aqua Running are a Liverpool based, innovative sport science company and world leaders in the development of advanced in water training technology, including the patented hydro buoyancy suit (HBS) to aid in medical rehabilitation, performance and injury prevention.

It is medically accepted that aquatic exercise and therapy (aqua aerobics, aquatic fitness, aquafitness, aquafit) improves recovery from injury by reducing the stress on joints caused by body weight by up 90%.

Despite there being advances and rapid growth in biometric sensors and wearable technology, there has been no sensor system developed to monitor and track detailed biometrics, movement and kinetics data in water - primarily due to challenge of electronics in water and the sensors gathering accurate performance data.

To address this, we intend to overcome the technical challenges and develop a range of water resistant sensor that can be embedded in and around wetsuit neoprene material (including our HBS suit). The technology has two primary applications;

1. Enabling the kinetic and biometric monitoring in aqua exercising to aid recovery, rehabilitation and performance;
2. Monitoring the vital signs of people engaged in high risk aquatic activity -- such as scuba diving (when at the surface) or commercial fishing -- where the ability to locate people in water in can be life-saving.Both hospitals and elite sports teams (our target customers) require advanced analytics and data to develop stratified rehabilitation care and personalised performance plans; the project is therefore crucial to us accessing these markets.

The market for enterprise physiological wearables will reach £9.6bn by 2018 (56.1% CAGR) and we see this as an £32m opportunity for us by Y5 and we already have trial partners (Sanitas and Real Madrid Medical Services) and customers in place once the technology is developed.

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Participant organisation names	Project title	Proposed project costs	Proposed project grant
FOURTH STATE MEDICINE LTD	Development and application of a new technology for the targeted management of biofilms in human chronic wounds	£70,000	£49,000
University of Hull		£29,897	£29,897

Note: you can see all Innovate UK-funded projects here   https://www.gov.uk/government/publications/innovate-uk-funded-projects
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Project description - provided by applicants

Wounds to the skin normally heal quickly and efficiently, but this is not always the case. In fact, across Europe over 80 million people are currently suffering with a range of wounds that fail to heal. These chronic wounds can remain unhealed for many years, significantly decreasing quality of life and increasing the chance of developing major complications, including death. While there are many different causes of chronic wounds, recent studies have revealed the important role of bacteria and biofilms.

Biofilms are complex and challenging, broadly defined as a group of microorganisms (usually bacteria) which come together to form a community, surrounded by a sticky matrix of sugars, proteins and DNA. Biofilms are surprisingly common in the environment, found in rivers, soil, inside pipes, on boat hulls and covering almost any moist surface. Our bodies are also home to biofilms, the dental plaque on your teeth, the bacteria living in your gut and more. While these are generally harmless, biofilms in chronic wounds can become a major clinical problem, impeding the body's natural ability to repair. Crucially, bacteria in wound biofilms can be up to 1000 times more resistant to current treatments.

Fourth State medicine have developed an innovative new technology for the management of wound biofilms. Using a mixture of gases and electricity we will develop a new advanced wound dressing able to selectively target problematic biofilm bacteria. A key aspect of this proposal will be ensuring selectivity to manage these biofilm bacteria, while supporting the presence of beneficial bacteria. This is essential as at least 400 different types of bacteria, many of which are beneficial, cover our bodies. Our new technology will easily integrate into existing wound devices, ensuring rapid translation into wound care clinics across the world.

Innovate UK

Results of Competition: January 2018 Sector Competition: Strand 2, Emerging and Enabling Technologies
Competition Code: 1801_EE_R4

Total available funding is £9,536, 508

Participant organisation names	Project title	Proposed project costs	Proposed project grant
PARKSIDE FLEXIBLES (EUROPE) LIMITED	Graphene Compostable Barrier Packaging (GraCoPack)	£90,958	£54,575
Bangor University		£55,991	£55,991
SCITECH ADHESIVE SYSTEMS LIMITED		£39,932	£27,952

Project description - provided by applicants

GraCoPack is a collaboration between industry and academia to develop technology that will assist in the reduction of plastics entering the waterways, oceans and other unfriendly disposal routes, thereby reducing the toxic effect on marine life and eliminating the need for landfill and incineration.

Presently plastic films, many used in the packaging of food products find themselves polluting the environment. Even those materials designated recyclable are rarely recycled. This is due to both the lack of collection of plastic films by county councils and the difficulty in using recycled plastics back in the supply chain. Even if a recycling scheme was introduced many plastic films are in fact several films (not always the same polymers) adhered together and as such are not recyclable.

There are a number of sustainable materials available for the packaging of food items, such as paper, both recyclable and compostable and cellulose materials that are compostable. Both however, suffer in that they do not have inherent barrier properties that are required for both the preservation of food in the supply chain and the safety of food. Food can be adversely affected by the ingress of water vapour and oxygen both of which have an adverse effect on food safety and shelf life. Compostable laminated barrier structures are available but are three times more expensive than present structures and therefore have not been adopted by major clients.

GraCoPack's objective is to develop and manufacture a coating from Graphene that can be applied to paper or cellulose materials that when applied will give the same or better barrier properties than laminated non-recyclable polymer structures. This coating is capable for being applied using specific coating technology that will allow the substitution of environmentally harmful plastics for sustainable or recycled alternatives.

Once in production food or indeed pharmaceutical packaging would have the necessary barriers to ensure food / medical quality, enhance shelf life and maintain product safety whilst remaining cost effective. However, the huge difference against existing plastic structures is that these new packages will be fully recyclable / compostable and thus will make a significant difference to the environment.

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Participant organisation names	Project title	Proposed project costs	Proposed project grant
MOTION ROBOTICS LIMITED	STAR - a Sky Transport Autonomous Robot	£99,584	£69,709

Project description - provided by applicants
The STAR project proposes a heavy lift transportation aerial drone for high value timely delivery services specifically aimed at countries with poor transportation infrastructure or comprising multi island archipelagos. It therefore has the potential for a massive UK export opportunity but can also contribute to certain situations in the UK. Technical innovations include a new type of electric motor that out performs exisiting 3 phase brushless DC motors and a new approach to beyond visual line of sight autonomous and semi-autonomous flight that will boost safety and help deliver CAA certification. This feasibility project will aim to determine if the overall solution can meet the identified needs of three real life situations where such a drone would be welcome aiming for the the commercialization of transport services in the UK (isle to mainland rapid delivery transport), Zimbabwe (in support of tourism) and Nigeria (in support of the postal service).

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RYELORE LIMITED	Deep learning products from limited satellite image training data	£97,600	£65,392

Project description - provided by applicants

Deep learning algorithms require a large amount of training data to be successful. This so far has limited the commercial impact that deep learning can have. We want to tackle a key commercial challenge that is to address satellite image use-cases where training data is hard to come by. In this project, we will build an advanced artificial intelligence platform that can analyse satellite imagery at scale with limited training data and apply to an important use case.

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Participant organisation names	Project title	Proposed project costs	Proposed project grant
ISOTROPIC SYSTEMS LTD	Isotropic Systems: A SATCOM terminal utilising unique Optical Beam Forming techniques that will disrupt the COTP Satellite market, specialised for the needs of the emergency services	£630,535	£441,374
AVANTI COMMUNICATIONS LIMITED		£260,952	£130,476

Note: you can see all Innovate UK-funded projects here   https://www.gov.uk/government/publications/innovate-uk-funded-projects
Use the Competition Code given above to search for this competition's results

Project description - provided by applicants

A major challenge facing emergency vehicles both in the UK and worldwide is the need for a near instant connection to a communications network so responders have vital, up-to-date information. In the UK only 86% of landmass has access to terrestrial 4g data signals (Ofcom,2016). Satellite networks can provide voice and data connectivity to public safety officials in these remote areas enabling them to effectively do their job where terrestrial cellular and Land Mobile Radio networks don't reach. However current leading 'comms-on-the-move' (COTM) satellite communications devices are prohibitively expensive to be adopted by emergency vehicle fleets. This leads to emergency vehicles often relying on 'comms-on-the-pause' (COTP) solutions which require the vehicle to stop moving and trained users to set up and position the satellite device, often taking up to twenty minutes to connect to the network.

For COTP use on emergency vehicles, a simple, reliable option is required having very short installation and setup time. Existing COTP terminal options are either manually pointed, require motor-driven mechanisms to deploy at each relocation or are prohibitively expensive. This is unacceptable in terms of one or more of the following - setup time, reliability, form-factor, weight, power consumption and cost.

To address the business opportunity, Isotropic Systems seek to develop an affordable, off-the-shelf COTP communications device that can acquire the satellite connection without requiring movement of either the platform or the terminal as a whole. The solution will be easily installed and be suited to either a simplified permanent installation on a vehicle or as a standalone solution with potential for temporary, deployable installations. This reduces all major barriers to entry for emergency vehicles and allows emergency workers to receive vital communications signals in all scenarios, without having to rely on an unreliable and incomplete terrestrial network.

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Participant organisation names	Project title	Proposed project costs	Proposed project grant
TRADE IN SPACE LIMITED	Integration Methods for Satellite Generated Data in Commercial Distributed Ledger Systems	£112,243	£78,570
CRAFT PROSPECT LTD		£40,695	£28,486

Project description - provided by applicants

The value proposition which satellite applications bring to any commercial or societal problem is focussed around two core themes: 'telecommunication' and 'tele-observation'. Furthermore, by enabling long distance communication and long distance observational capabilities, satellites and especially modern satellite constellations, enable highly scalable networks, and ever faster information distribution -- one-to-many mass communication and observation; i.e. global telecommunication through cellular networks; global tele-observation of events.

In 2017 alone major investments were made in start-ups in the field of earth observation data analytics; USD 50M was invested in Orbital Insight, and in the UK, GBP 2M invested in both Bird.i and Rezatec GBP 2M respectively; whilst established Earth imagery providers such as Planet, and Airbus, and DigitalGlobe have repositioned their offering towards value added analytics and information products as well as imagery alone.

New telecommunication systems based on low-earth-orbiting mega-constellations such as those being developed by OneWeb, Sky and Space Global, SpaceX and Thales Alenia Space, offer new connectivity solutions to meet growing demand for data from any position on the globe, at any time of day, either in broadband, or narrowband to support the 'Internet of Things':

In parallel to the market-led redefinition of satellite systems, the growth in terrestrial blockchain applications beyond secure payment and digital asset transfer alone, especially the development of open-access distributed application platforms is giving rise to new ways to create, store, and transfer information and digitally immutable assets. Blockchain applications and associated cryptographic digital asset recording methods, enable new ways to position satellites as near real-time commodity brokers, land-registrars, and legal dispute arbitrators where geolocational information is key.

This Innovate UK funded project will enable Trade in Space and our partners -- Craft Prospect, a UK based Satellite Artificial Intelligence developer; to assess the feasibility of satellite generated datasets in smart contract blockchain applications, to create new ways of commercialising satellite data which were implausible until recently.

For example, following capture of real-world user requirements, we will write prototype smart contracts in the following areas:

* Digital Asset Generation, supporting peer-to-peer exchange based on Satellite 'Proof of Observation.

* Automated Illegal Trespass Prosecution based on space verified communication signals

* Micro-leasing of satellite capacity to meet satellite network objectives.

The value of the global market in each of these areas is expected to approximately double in the next 5 years, and our team intent to capture useful IP in this area on behalf of the UK taxpayer.

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Participant organisation names	Project title	Proposed project costs	Proposed project grant
ATOMIC MECHANICS LIMITED	2D-MEMS: Embedded 2D Material MEMS pressure sensor for tyre applicaion	£134,731	£94,312
SILENT SENSORS LIMITED		£73,508	£51,456

Project description - provided by applicants

Vision: Atomic Mechanics and Silent Sensors are developing a platform technology to exploit 2D materials applied to create a flexible pressure sensor that can be embedded in a tyre pressure monitoring systems (TPMS).

Innovation: The tyre pressure sensor will consist of a flexible and conductive film with 2D material membranes such as graphene, freely suspended across an array of cavities. As the pressure is changed, the membranes deform causing a change in electrical signal. The sensor is laminated between two rubber sheets of a tyre, before the tyre molding process. Due to the superior strength, elasticity and resistance to harsh environments of the 2D material, and the extreme conditions during the rubber molding process, this device is the first sensor of its kind, as current silicon technology fails in these conditions.

Project Focus: The project aims to build a prototype unit that comprises a 2D material pressure sensor embedded inside a tyre and that is connected to complimentary power and read-out technologies. Atomic Mechanics has the expertise in 2D material device engineering and will manufacture samples to test in a high pressure and high temperature vessel which emulates the tyre molding process. Project partner Silent Sensors is developing the complementary technologies to power the sensor and to wirelessly transmit the pressure signal. Silent Sensors also have expertise in integrating flexible electronics into rubber products. The outcome of this collaboration will be a portable unit that can wirelessly sense the pressure inside a tyre that can be shown to tyre manufacturers to gain further market interest and raise investment to bring this product to market.

Impact: The pressure sensor will increase driver safety, reduce fuel and tyre costs, lessen environmental impact of tyre manufacture and enable a fully autonomous Intelligent Tyre. This will allow Atomic Mechanics to validate its 2D material sensor technology in the market and create a direct route to market via its application partner Silent Sensors.

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Participant organisation names	Project title	Proposed project costs	Proposed project grant
SITECHNICS LIMITED	Ground Penetrating Radar (GPR) for localisation of Autonomous Vehicles	£69,852	£48,896
University of Surrey		£29,919	£29,919

Project description - provided by applicants
An accurate, robust and reliable localisation system is essential for the widespread adoption of autonomous vehicles. The performance of localisation systems depends highly on the information sources utilised, however the current on-board sensing of autonomous vehicles, using LiDAR and camera-based techniques suffers from different issues, such as cost, and accuracy in all-weather and all-light conditions. To address these issues, and to start to develop a solution utilising Ground Penetrating Radar (GPR) technology for autonomous vehicle localisation, Innovate UK is supporting an initial project involving Technics Group and the University of Surrey. Jaguar Land Rover and Ordnance Survey are participating as part of an Advisory Panel.

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Participant organisation names	Project title	Proposed project costs	Proposed project grant
DESIGN LED PRODUCTS LIMITED	MULTIPLY – Multi-wavelength ULtra-Thin uniformly Illuminating Photonic materiaLs	£114,562	£80,193
University of Strathclyde		£41,545	£41,545

Project description - provided by applicants

The MULTIPLY project supports a feasibility study, bringing together DesignLED Products Ltd. (DLED) and the Institute of Photonics (IoP) at the University of Strathclyde to evaluate the potential integration of the materials under development at the IoP with the market driven Innovation at DLED.

The goal is evaluation of the materials under R&D at the IoP and integration of those materials in demonstrator(s) targeting the emerging needs of DLED's commercial customers.

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Participant organisation names	Project title	Proposed project costs	Proposed project grant
PARAGRAF LIMITED	Energy Harvesting from Salt in Seawater: A New Source of Graphene-enabled Power	£99,918	£69,943

Project description - provided by applicants

This project aims to demonstrate a completely new energy harvesting technology based on the wonder material graphene, exploiting the as yet unlocked electronic energy stored within salt in seawater.

While many energy harvesting solutions exist already (solar, thermoelectric, piezoelectric, etc.), none are capable of generating power directly from charged fluids such as seawater, and very few are capable of operating and thriving in the harsh conditions typically found at sea. Our proprietary technology is based on functionalised graphene which capitalises on the tremendous mechanical strength inherent to graphene (and thus its ability to withstand harsh environments) to extract ionic charge from the sea. Devices such as those which will be developed here can be exploited in many applications, such as being attached to any sea vessel (buoys, boats, oil platforms, etc.) to charge battery packs or directly energise low power electronic devices. We are in a strong position to exploit major commercial outcomes of this feasibility study, due to links already made within Cambridge and in the broader UK community.Paragraf's 9 month £99,918 feasibility study will develop a new way of generating electricity from seawater by developing and exploiting the principal properties of graphene. It responds to the challenge to explore the potential of bringing a completely transformative marine renewable technology to market.

No other companies or research groups are attempting to produce functionalized graphene with an electrical charge. Paragraf will significantly improve on current state of the art by using its proprietary technique to functionalize graphene with extra carriers without impacting on its electrical conductivity, to enable accelerated desorption and absorption of electrons from the ionic fluid, thus improving on previous experiments and offering the potential of real-world applications for this technology. By using its proprietary functionalised graphene, Paragraf will be able to generate much-increased voltages from ordinary saltwater, unlike previous experiments, enabling the company to do something that was impossible before and offering the potential of real world applications for this technology.

Project outputs will be applicable in multiple global export markets for marine Internet of Things, and also have potential in other markets that ionic fluids are present, for example chemical manufacturing processes or effluent disposal. The project will also improve business growth for the marine renewables supply chain, as well as for UK nanotechnology materials and device production manufacturers.

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Participant organisation names	Project title	Proposed project costs	Proposed project grant
CREWTRAK LIMITED	Highly-accurate Geofence Positioning in a Maritime Environment	£98,546	£68,982

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Project description - provided by applicants
The project is to produce a prototype system that will prove new long-range tracking and positioning technology that has a consistent accuracy tolerance of <30Cm. This is much better than GPS systems which usually have an accuracy of circa 8M. The technology will be used at the core of a new intelligent Marine Man Overboard (MOB) rescue system that uses wristworn and/or lifejacket compatible wearable personnel devices. The new MOB rescue system will be able to instantly detect when a person falls overboard and will very accurately live-track the position of the person relative to the separated vessel (without using GPS). The purpose is to make MOB rescues faster and more efficient than what can be achieved with current state of the art devices. Faster rescue times will mean reduced personnel time in the water -- thus saving more lives at sea. This is the first time technology more accurate than GPS will be deployed at sea for positioning.

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BEINN BIKE LTD	Development of cycle routing application for testing	£99,839	£69,887

Project description - provided by applicants

Beinn Bike is the Skyscanner of mountain biking / road cycling / hiking / running. You specify your preferences (start/end location, distance, time available, elevation gain and max gradient) and our algorithm returns routes that perfectly meet your needs. This saves you time and allows you to discover routes that would otherwise be missed.

Imagine yourself on holiday, in an unfamiliar area. You have 2 hours to spare and you would like to go on a bike ride - how do you find a route that is good, fun and challenging for your ability? Beinn Bike provides the answer.

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Participant organisation names	Project title	Proposed project costs	Proposed project grant
VIBTEK LTD	Artificial intelligence based digital prescriptive maintenance of ships(DiMOS)	£461,899	£323,329
Brunel University London		£244,389	£244,389
ICON RESEARCH LIMITED		£212,913	£149,039
KINGSTON COMPUTER CONSULTANCY LIMITED		£384,400	£269,080
RELMAR LTD.		£290,751	£203,526

TWI LIMITED		£285,350	£285,350

Project description - provided by applicants

With the advent of new emerging and enabling technologies e.g. big data analytics, machine learning, internet of things, intelligent sensors and cloud computing, the approach to maintenance of assets is changing. The advanced augmented approach offers the possibility of performing prescriptive maintenance that offers significant advantages over using traditional (descriptive), preventive, or predictive models individually. Traditional maintenance tends to be reactive-responding to failures in equipment or devices after the fact. This traditional, reactive approach of describing failures after they've occurred is the worst-case scenario for maintenance: reacting to failures in equipment or devices after the fact. Preventive maintenance empowers operators to carry out continuous maintenance.

Prescriptive maintenance goes beyond the realm of descriptive, preventive, and predictive maintenance. Descriptive focuses on what happened in the past. Preventive maintenance is time based. Predictive analytics discovers potential options for the future. Prescriptive maintenance leverages all these approaches and capabilities. The realm of what should happen and the execution of optimized maintenance strategies is precisely the realm of prescriptive maintenance.
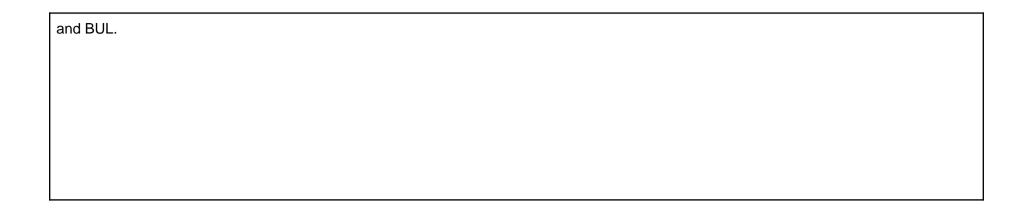
The DiMOS project proposes a prescriptive maintenance digital platform for condition monitoring and maintenance planning of ship's structure, engine machinery and auxiliary system by real-time sensor data and AI-based models to prescribe maintenance based on monitored condition and taking into account risk level, maintenance timing and associated cost.

The main application of the DiMOS platform will include (1) Real-time continuous condition monitoring, diagnostic and failure analysis of ships engine machinery, structure and auxiliary systems. (2) Risk-based inspection analysis and provision of critical parts identification of ships components, 3) Detailed prescriptive maintenance of ships components based on condition, time, risk and cost etc.

The proposed platform will; (1) reduce reliance on experienced and expert inspection engineers to process condition monitoring data and devise a maintenance plan(2) it will reduce interpretation time in devising and implementing maintenance actions reducing maintenance hours by 70% (3) it will automate safety or maintenance operations to the extent where maintenance operations don't require human intervention (4)it will reduce assets unscheduled downtime by 25%, cost by 35% and will improve performance and efficiency of asset (5) it will allow operators to perform cost-effective maintenance on the basis of risk profile of faults detected.

The DiMOS project development is being done based on the collaboration of different partners including Vibtek, ICON, Relmar, KCC, TWI,

and BUL.

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ZINERGY UK LIMITED	Graphene-enhanced, thin, flexible printed battery for electronic wearable and IoT devices - (FLEXIBAT)	£463,531	£324,472
CAMBRIDGE GRAPHENE LTD.		£243,043	£145,826
CIRCUIT ENGINEERING MARKETING COMPANY LIMITED		£207,433	£145,203
PRAGMATIC PRINTING LIMITED		£164,088	£114,862

TWI LIMITED		£161,972	£161,972
University of Leicester		£294,712	£294,712

Project description - provided by applicants

The recent boom in wearable and Internet of Things technology, such as smart sensors, fitness watches, has not yet reached its full potential due to one component restricting further development: the battery source. As a result, devices often have bulky batteries, must be plugged in frequently or use workarounds such as spare batteries, fast charging or smart software.

State-of-the-art flexible batteries, such as lithium-ion, vacuum-deposited lithium, or zinc batteries each have their advantages and disadvantages. Lithium-ion batteries are cheap to produce, but relatively thick and do not have high power suitable for some wearable or smart packaging applications. Lithium batteries can be very thin, but are more expensive, and have even less energy capacity than lithium-ion. Zinc batteries are very cheap, have a higher energy capacity than lithium-ion, but are only suitable for low power. These constraints all limit the flexibility and form-factor (shape) of batteries for devices.

Furthermore, lithium-ion, lithium and zinc batteries utilise carbon collectors and electrodes which, although contributing to the batteries' light weight, limits their electrical conductivity. Replacing the carbon parts with metal would increase the conductivity (and hence power) but crucially increases corrosion that results from the chemical reactions within the battery. This limits the battery power and life time.

The **FLEXIBAT** project will develop a novel single-use battery for electronic wearables and Internet of Things devices, based on zinc-carbon chemistry and metal collectors. The focus of the development is on a special corrosion protective layer for the metal collectors and electrodes using graphene, which will enable a thinner, more flexible and a higher energy battery. We will ultimately develop a technology demonstrator prototype of the full battery system and test it in a controlled environment.

To successfully achieve this, the project consortium features the relevant expertise for making the battery, including battery manufacture, materials development, graphene coating, and flexible integrated circuit development and manufacture.

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Participant organisation names	Project title	Proposed project costs	Proposed project grant
MAGWAY LIMITED	Magway	£268,297	£187,808
FORCE ENGINEERING LIMITED		£187,471	£131,230
OCADO INNOVATION LIMITED		£25,676	£12,838
Old Oak and Park Royal Development Corporation		£12,857	£9,000
SPACE SYNTAX LIMITED		£106,706	£74,694

Funders Panel Date: 19/06/2018

TRANSPORT RESEARCH LABORATORY LIMITED		£52,991	£52,991

Project description - provided by applicants
The UK road network carries 73% of all freight journeys, and the rapid changes in distribution of goods due to growth in online retailing places new strains on road transport infrastructure. Road congestion is a major concern, especially in urban environments, and emissions from motor vehicles are a major cause of air pollution. Moreover, the existing transport system is not sustainable, as road haulage is almost exclusively powered by fossil fuels, especially for larger vans and HGVs, where electric vehicles are not feasible due to the excessive mass and cost of the batteries that would be required.   We are creating a next-generation transport link for e-commerce and light freight, which will take traffic off the roads, easing congestion, and which produces zero emissions and can exploit renewable resources.

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Participant organisation names	Project title	Proposed project costs	Proposed project grant
SCANTRON INDUSTRIAL PRODUCTS LIMITED	Development of a smart system to enable calibration of bearing condition monitoring	£237,766	£166,436
PERPETUUM LIMITED		£53,501	£37,451
University of Southampton		£103,981	£103,981

Project description - provided by applicants

Bearings are in all moving parts from automobiles and trains to aircraft, production machinery and wind turbines. Bearings deteriorate with time and usage through rolling contact fatigue (RCF). Currently bearings are replaced during maintenance schedules (on-time) or when a bearing has failed.

Condition monitoring (CM) has been applied for years in many industries to avoid unexpected failures and machinery down-time (on-condition). CM is capable of flagging a change in condition in-service, but not yet capable of quantifying the severity of that damage, sometimes leading to premature extraction. This project will develop a tool (the BEARING-EYE system) able to map and interpret the surface damage observed in failing bearings based on the RCF expertise of the University of Southampton.

An innovative and intelligent software based on fractographic analysis - the examination of failed bearings - will be developed to interpret the damage severity and report this as a simple numeric output. Ultimately, the BEARING-EYE will be fleshed-out as an easy-to-use bench-top system that could be operated by maintenance staff to correlate the damage found in bearings with the associated CM data.The BEARING-EYE will provide the other half of the picture to understand the relationship between the outputs of a CM system and the corresponding RCF damage to determine how long bearings could be left running safely thus avoiding unexpected failure and machinery down-time. This will also change maintenance programs from 'on-time' to 'on-condition'.

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THE FOUNDRY VISIONMONGERS LTD.	ColorwayAR	£422,311	£253,387
THE FOOT SOLDIERS DESIGN CONSULTANCY LIMITED		£185,380	£111,228

Project description - provided by applicants

ColorwayAR is a 21month Industrial Research Project lead by creative application maker, Foundry, and with creative consultancy The Footsoldiers as a partner. Together they will create a disruptive platform for designers to drastically reduce physical product sampling. Interactive 3D objects allow designers to appreciate proportion, scale and shape without having to wait up to 18 months for a sample to be built. Communicating concepts in an augmented reality environment allows designers and their audience to iterate faster, reduce waste and accelerate their design process, remaining competitive.

The product designer will be able to create an interactive AR environment inside the general Colorway application with no real need to understand a traditional 3D design application or complex 3D modelling. Using an extension of the work Foundry completed on the FAME and FAME 2 projects, the product designer's AR environment is made accessible to internal and external stakeholders who can interact and collaborate in an iterative space, the 'tech pack' that was traditionally 2D can be automatically transformed into a projected, interactive image on a flat surface while the DCI item can reference a 3D model that will display as a 3D object.

Designers will create their presentation on a normal desktop computer (MacBook or PC) as this provides a fluid transition from their current workflow. External stakeholders will be able to view and interact with the Colorway project on their phone or tablet. Vendors/ manufacturers will use the AR presentations during manufacturing to understand concepts and details.

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Participant organisation names	Project title	Proposed project costs	Proposed project grant
EARTH-I LTD	Insights from Satellite Video using Artificial Intelligence	£759,314	£531,520
SATELLITE APPLICATIONS CATAPULT LIMITED		£133,491	£133,491

Project description - provided by applicants

Earth-i and the Satellite Applications Catapult, supported by Roke Manor Research, will collaborate to explore the use of artificial intelligence (AI) techniques to perform analytics and extract insights in near-real-time from ultra-high-definition video from space, focusing on insights that can be derived from satellite video of road traffic and maritime vessel movements.

The background to the project is Earth-i's investment in a UK constellation of satellites -- to be called Vivid-i -- capable of producing ultra-high-definition videos. The constellation will be launched in in annual batches of five from late 2019, building up to a constellation of at least 15 satellites. A prototype, VividX2, was launched in January 2018 and is providing high-resolution videos, which will be used for this project. The full constellation will be able to revisit any area of interest at least three times per day, providing excellent opportunities for cloud-free videos of points of interest anywhere in the world.

The project will (i) detect and identify moving objects in the videos, (ii) perform analytics on those objects to derive insights, and (iii) relate the insights to use cases. Much of the insight to be derived requires human intuition to discern different types of features and behaviour from the videos, which adds delay and would make commercial applications impractical.

The core of the project is to research AI techniques to extract insights from satellite video without needing human involvement. Techniques such as Machine Learning (ML) should make it possible to extract insights intuitively in an automated processing chain. The research will build from generic aspects such as the identification of objects to deriving more complex insights related to defined use cases. Space video has the potential to provide unique insights to a wide range of customers, and this approach will provide reusable techniques that can be adapted for alternative applications in future.

The project will build, test and demonstrate a processing workflow chain that is able to ingest satellite video data streams and output a range of information products highlighting features of interest. Outputs will include the identification and classification of vehicles and maritime vessels, their speeds and directions, the identification of normal movement characteristics, and derived insights such as anomalous behaviour or traffic predictions.

A number of potential customers have expressed interest and the project will engage with them to refine the required insights and use cases, as well as pursuing wider research into market exploitation.

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Participant organisation names	Project title	Proposed project costs	Proposed project grant
EFFECT PHOTONICS LTD	Advanced PACKaging EnABLing FuturE Technologies (PACKABLE)	£741,052	£518,736
BAY PHOTONICS LTD		£273,196	£191,237
Manufacturing Technology Centre		£255,000	£255,000
OPTEK LIMITED		£289,858	£202,901
OPTOSCRIBE LIMITED		£432,096	£302,467

Project description - provided by applicants

Technological advances in communication and data transfer are increasingly visible all around us, at home, at work and in the businesses and organisations that we all depend on. In the last 5 years we have started to take our smartphones, tablets, video calling, Smart TVs, social media, and cloud storage for granted. With our rapidly increasing use of existing Internet technology and the emerging Internet of Things (IoT), we are experiencing unprecedented bandwidth growth. In their 12th annual VNI report (2016), Cisco forecast that by 2021, there will be 4.6 billion internet users and 27.1 billion networked devices and connections across the globe.

Bandwidth growth is constrained by the cost and performance of the optical communication devices that interconnect datacenters. Current datacenter interconnect solutions sustain 100 Gigabits per second (Gbps) per wavelength, which is not adequate for future demand. The industry has identified a target of 1000Gbps (1Terabit per second) to satisfy demand in 2021 and beyond (http://ethernetalliance.org/roadmap).

Photonic Integrated Circuits (PICs) with Digital Signal Processing (DSP) is the leading bandwidth solution, demonstrating great potential to deliver data throughput of 1 Terabit per second (Tbps).
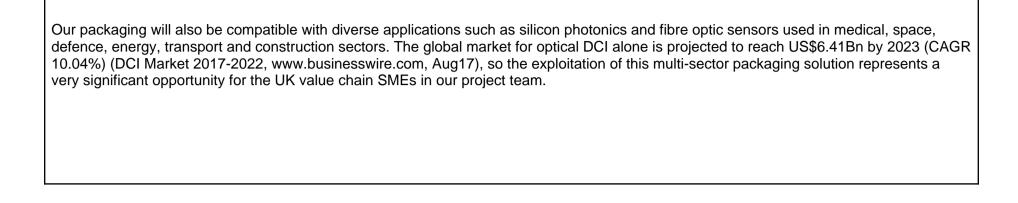
However, the commercial viability of new solutions is largely dependent on cost. This includes the cost of the technology itself, and its compatibility with existing infrastructure. New solutions must comply with stringent size criteria to allow products to be used with existing infrastructure.

Current state of the art device packaging will not meet the DCI market's future cost, performance, and size requirements. Our project, "Advanced PACKaging EnABLing FuturE Technologies" (PACKABLE), will deliver a novel, cost-effective and compact packaging solution which will enable \>1Tbps data throughput.

We will meet future cost, performance and size criteria using our patented compact packaging technology, which is 15X cheaper than existing packaging solutions.

Moreover, we will exploit UK technical expertise and IP to develop innovative techniques to adapt the packaging manufacturing process for high temperature processing, enabling us to use existing lower cost, high volume, semiconductor IC manufacturing lines.

Our packaging will also be compatible with diverse applications such as silicon photonics and fibre optic sensors used in medical, space, defence, energy, transport and construction sectors. The global market for optical DCI alone is projected to reach US$6.41Bn by 2023 (CAGR 10.04%) (DCI Market 2017-2022, www.businesswire.com, Aug17), so the exploitation of this multi-sector packaging solution represents a very significant opportunity for the UK value chain SMEs in our project team.

Innovate UK

Results of Competition: January 2018 Sector Competition: Strand 2, Emerging and Enabling Technologies
Competition Code: 1801_EE_R4

Total available funding is £9,536, 508

Participant organisation names	Project title	Proposed project costs	Proposed project grant
NANOFLEX LIMITED	A System to Measure the Therapeutic Efficacy of Wound Dressings	£264,895	£185,426
5D HEALTH PROTECTION GROUP LTD		£222,054	£155,438

Project description - provided by applicants
This project is a collaboration between NanoFlex Ltd and the 5D Health Protection Group Ltd. The research and development collaboration will develop and prove the feasibility and relevance of the sensor data generated in the context of managing wounds. It is believed that with the appropriate information of those suffering from chronic wounds individuals can be cared for more effectively bringing benefits to the patient in terms of greater comfort and more rapid recovery and to the health service in terms of reduced burden on community care and in terms of direct and indirect costs due to biofilms. Once the _in vitro_ relevance has been established it will significantly de-risk the approach and it is believed this will enable the technology to be rolled out as a commercial product either through joint ventures with existing companies in this space or through the raising of venture finance. Presently such technologies do not exist in the market so this innovation will create a smart detection and responsive innovative antibiofilm technology for the treatment of biofilms in non-healing wounds.