

Innovate UK

Results of Competition: December 2017 Sector Competition: Open - 13 to 24 Months

Competition Code: 1712_EE_OPEN_R4_24M

Total available funding is £19 million

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
ENTOMICS BIOSYSTEMS LIMITED	GENESIS: Modular Insect Bioconversion System for On-site Animal Feed Production	£565,750	£396,025
GRESSINGHAM FOODS LIMITED		£3,154	£1,577
MOY PARK LIMITED		£1,820	£637
STONEGATE FARMERS LIMITED		£4,494	£2,247
University of Bristol		£47,571	£47,571
University of Cambridge		£123,110	£123,110
Project description - provided by applicants			
<p>There is increasing concern around the sustainability of the UK poultry feed supply chain, with a growing industry trend of moving away from soy as well as enhancing overall bird health & welfare. Insects have been demonstrated to be an excellent nutritional alternative, and are already a natural part of free-range poultry diets in the UK today. But insects cannot be cheaply and safely produced, stored and distributed as a commercial feed using existing engineering solutions and logistics infrastructure. Entomics' innovation enables insects to become a nutritious, sustainable feed ingredient for the UK poultry market, using a smart, modular insect production system. Overall, the project will expedite and de-risk system development, bringing it closer to commercial readiness whilst consolidating Entomics' position as an engineering leader in a global insect industry growing at 102.5% CAGR.</p>			

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SHELTON MACHINES LIMITED	Novel real-time algorithms and system architecture for defect detection on patterned textiles	£352,889	£247,022
BURBERRY GROUP PLC		£51,266	£25,633
Loughborough University		£148,827	£148,827

Project description - provided by applicants

The global textile industry produces >170 billion metres of fabric generating a market value of >£640 Billion. >25, resulting in costly customer claims and downstream production delays impacting on retailer stock management. Poor defect management is also a major source of industrial waste. Traditional methods for defect detection rely on human inspection which is ineffective (<65, the project will develop novel recursive template matching algorithms for the resolution of complex pattern deformations, enabling efficient pattern subtraction and thereby revealing underlying defects. The vision system will offer: i) camera and lighting system for optimum image capture at high speed (>100m/min); ii) self-training software utilising statistical analysis to automate system configuration for new textile products; iii) advanced image analysis for detection of >95, for optimised textile cut plan (increased yield), improved downstream processing, and quality assurance. No vision system on the market offers these features for patterned textiles. The main areas of project focus lie in development of the novel recursive template matching algorithms. These will be integrated into the existing vision system platform and validated through factory trials with leading textile and clothing manufacturer Burberry. An important milestone in the project will be demonstration of a prototype system at the leading sector exhibition (ITMA - Barcelona). The potential addressable market for patterned textile vision systems is ~£1 billion. The partnership targets ~£8.48 million business growth within a 5 year period (~£16.9 million cumulative sales) thereby creating >42 new jobs and generating a >30-fold ROI.

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PERVASID LIMITED	Passive IoT Platform using 99%+ Accurate RFID Technology	£531,764	£239,294
HARLAND SIMON PUBLIC LIMITED COMPANY		£93,010	£41,855

Project description - provided by applicants

To date, the tracking of individual products and components in applications such as retail, healthcare and manufacturing has been challenging to achieve in a commercially viable way. Active (battery powered) tags, although allowing a long-read range, are expensive, while reliably detecting cheap compact and ultrathin passive tags is difficult, particularly over a distance of more than 2-3 metres. PervasID, a Cambridge University spin-out, has developed a robustly patented product (patent numbers: EP2564467 A1, EP2564229 A2, US9384376 B2 and US9367785 B2) that enables highly reliable reading of standard off-the-shelf passive RFID tags over wide areas, using a fixed infrastructure [1]. The PervasID technology has been tested more than 20 times by major UK/European Retailers, EU/US/Asian integrators and healthcare providers (including Harland Simon and the NHS) around the Globe and has been found to outperform all other passive systems on the market, including that from technology giants, such as Intel. [99], various technological and economical challenges remain to be overcome if the technology is to have wide commercial potential. This project therefore aims to develop a low-cost next generation novel system architecture, with an accurate location capability and novel antenna technology allowing an 85, which will be sold to end customers and system integrators along with other services such as installed system design, installation support, service and operational support. [1] S. Sabesan, M. Crisp, R. V. Penty and I. H. White, Wide Area Passive UHF RFID System using Antenna Diversity Combined with Phase and Frequency Hopping," IEEE Transactions on Antennas."

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KOKOON TECHNOLOGY LTD	Sleep Sage - a personalised intelligent sleep aid platform	£753,011	£338,855

Project description - provided by applicants

Sleep is critical for health and wellbeing; however, two thirds of adults worldwide achieve less than the recommended 7-9 hours' sleep a night. Sleep deprivation costs the UK economy £40billion/year (\$262billion in EU) in lost productivity and work absence and is strongly linked to increased risk of obesity, heart disease, diabetes, cancer, depression and anxiety. It is now declared a 'public health problem', predicted to rise significantly due to modern lifestyles including psychosocial stress, unbalanced diet, lack of exercise, electronic devices overuse. The global sleep aids market is dominated by pharmaceutical solutions, fitness trackers and sleep/meditation apps however these are limited by accuracy, usefulness and only provide a general approach to a problem which is multi-factorial. There is a clear unmet need for a personalised solution that can generate measurable benefits in terms of improved quality/quantity of sleep. The proposed project seeks to develop 'Sleep Sage' -- a personalised intelligent sleep aid platform, designed to help users fall asleep easier and better manage and understand their sleep. Unlike competing solutions which monitor activity and present this information back to a user to make their own behavioural changes, Sleep Sage (comprising smart headphones and a sophisticated software platform) utilises audio, sensors and Artificial Intelligence which together form a 'feedback loop' where the effect of audio can be measured and the audio is adjusted in response, delivering measurable benefits (better and more sleep) and generating significant socio-economic impacts e.g. improving health and wellbeing, quality of life, reducing costly health complications related to sleep deprivation, and improving productivity. Work to date has focused on developing the headphones and validating the concept (as an MVP) with a basic software platform using limited available audio content. Kokoon have already generated pre-sales orders for their MVP product and have gained strong market interest from distributors, retailers and e-commerce -- placing them in a strong position to commercialise Sleep Sage. Proof of Concept has demonstrated positive results; however, to become a fully viable commercial offering (moving beyond competing in the established headphone market), it is now critical that Kokoon technically advance the functionality and accuracy of the software platform to ensure mass adoption. This project focuses on advancing the platform to TRL7, and validating its performance in a user trial, to aid and support rapid adoption. The project will deliver significant export led growth for Kokoon, a substantial ROI, increased employment and further opportunity for R&D investment.

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FIBERIGHT LIMITED	OPTOMS - Optimising the production of thermoset resins from MSW-derived sugars	£699,910	£489,937
Aberystwyth University		£105,920	£105,920
KNAUF INSULATION LIMITED		£1,938	£0
University of Leeds		£128,452	£128,452
Project description - provided by applicants			
<p>This project will demonstrate the use of sugars produced from residual waste (MSW) in the manufacture of thermoset resins. Fiberight Ltd and Knauf Insulation will collaborate, with academic expertise from the University of Leeds and Aberystwyth University, to undertake pilot and demonstration scale manufacturing trials of thermoset resins for insulation products. Fiberight has developed an innovative circular economy solution to create value-added products from 'black bag' or residual waste, which is typically sent to landfill or incinerated. The process treats and washes the waste material and recovers the cellulose from the paper fraction of the waste stream, which is then treated with enzymes to generate waste-derived sugars. This project will demonstrate a high-value use for the waste-derived sugars with a range of environmental benefits, including diverting waste from landfill or incineration, recovering valuable resources from waste and using the materials to manufacture sustainable insulation products, which in turn will provide further environmental benefits through energy conservation in homes and buildings.</p>			

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BARRIER EX LIMITED	Advanced Zone 1 Hazardous Area Floodlight	£358,214	£214,928
Project description - provided by applicants			
The 'World Leading Zone 1 Hazardous Area Floodlight' project aims to research, engineer and evaluate at a prototype level, a floodlight for use in environments classified as hazardous areas, such as oil & gas rigs, petrochemical plants and many other industrial sectors. Barrier-Ex aim to evaluate and incorporate a number of technical innovations that will enhance performance, meet safety criteria, reduce cost and be suitable for use across a wide variety of fixed and portable applications.			

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ZAPGO LTD	Zap&Go - Next Generation fast-charging energy storage cell	£999,227	£699,459
Project description - provided by applicants			
Zap&Go has developed a new class of energy storage device as an innovative solution to the slow charging problems encountered by all current lead-acid or lithium powered appliances, devices and vehicles. Zap&Go's new cell technology, dubbed Carbon-Ion (C-Ion(r)), exploits the properties of novel carbon nano-materials and electrolytes to underpin industry-leading performance, including ultra-fast charging and a vastly increased life span when compared to lithium batteries.			

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SECC OIL AND GAS LIMITED	An emergency disconnection technology enabling safe and intelligent access to sustainable deepwater subsea oil and gas assets	£575,232	£345,139

Project description - provided by applicants

Optimised extraction of subsea oil/gas underpins a smooth transition to a largely-renewable energy balance by 2060, with assets increasingly located in complex deepwater/ultra-deepwater, for which operation at 15kpsi system pressures is becoming essential for sustainable extraction efficiency and well integrity. However, the challenge of accessing these assets in a commercially/risk-acceptable way is unmet, restricting vital subsea-operations over the full-lifecycle to less than 5, using small dynamically-positioned vessels and flexible open-water downlines, can therefore be transformational, but rely on failsafe Emergency-Quick-Disconnection (EQD) technology to prevent damage to the downline, vessel or well-integrity in the event of dynamic-positioning-failure/drift-off. However, this technology does not exist at 15kpsi, rendering these operations in deep/ultra-deepwater too high-risk. In response, Secc are developing game-changing mechanically pressure-balanced venting architectures, to realise reconnectable weak-links for failsafe EQD. First-generation devices have been 3rd-party-validated for 10kpsi operations, and building on these concepts, Secc now targets the technological step-change required to realise a 15kpsi EQD-connector. R&D focusses on a fundamental redesign/development of the pressure-retaining architecture, seal geometry and actuation, supporting new industry standards.

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METAIL LIMITED	Project Ava	£172,466	£103,480
Project description - provided by applicants			
<p>As e-commerce is a requirement for all apparel brands and retailers, demand for high-quality 2D clothing imagery has skyrocketed as it is a must-have" step in order to sell clothes online. Metail's new digitisation product "Composed Photography" (CP) provides retailers with compelling synthetic e-commerce model photography that replaces their arduous conventional model photography process. Whilst this early-stage product has received good feedback and in good demand, it suffers from cost and scalability challenges due to the high-quality threshold and manual-efforts-intensive bottleneck steps in the operation process. The project aims to address the above challenges and demands in scalability. In the project, we will create a proof of concept demonstrator for an automated and low-cost 2D high-quality synthetic model imaging solution using the state-of-the-art computer vision and deep learning technologies. If successful this will help significantly accelerate Metail's growth by enabling scope for working with a wide range retailer partners as well as boosting garment coverage for Metail virtual try-on products. Scientifically, Ava will represent a good challenge for Metail's garment digitisation and computer vision expertise built up over 10 years of R&D.</p>			

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LANDFILL SYSTEMS MAINTENANCE LIMITED	Generating renewable energy from flared low calorific value landfill gas	£146,506	£65,928
Project description - provided by applicants			
<p>A project focusing on the delivery of a modular cost-effective energy generation system that exploits the thermal value of gas emissions, such as those found in the landfill industry. Landfill gas (LFG) contains methane, which is a potent greenhouse gas requiring safe disposal through flaring or power generation. To date, there has been no effective way of generating power at closed landfill sites, where gas levels are depleting. With 20,000 such sites in the UK alone and LFG generation lasting circa 70 years, this provides a significant renewable energy resource. LSL's novel system will combine leading flaring and Stirling engine technologies to effectively convert heat generated from LFG combustion into power. Key areas of focus will be the heat capture and distribution across the system and ensuring safe and continued flaring operations. A prototype will be design, built and demonstrated at a landfill in the UK. This is one of many operators that are eager to see the technical and financial viability of the system proven. System benefits include environmental sustainability, as well as reduced site maintenance costs through offsetting electricity imports. Wider market applications also exist across onshore oil and gas exploration, as well as other large heat emitting industries.</p>			

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SRJ TECHNOLOGY LIMITED	Smart Snap Ring Joint Connector: Enabling Remote Condition Monitoring of Topside and Subsea Pipelines	£705,054	£493,538
Project description - provided by applicants			
This project will empower SRJ-Technologies to augment their existing Snap Ring Joint Connector (SRJC; used for weld-free joining of high-pressure pipelines) to enable it to become an 'Internet of Things' asset that is capable of remote condition monitoring of pipeline integrity above land, as well as in harsh marine environments (ultra-deep installations over 5,000 ft).			

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CDE GLOBAL LIMITED	Novel Counter Flow Classification System for the sustainable grading of high value industrial sands- RICHSAND	£500,417	£250,209

Project description - provided by applicants

Sand is the second most used natural commodity on the planet after water. It is also a non-renewable resource over human timescale. The RICHSAND project tackles the _urgent need_ to develop a more efficient, cost effective and sustainable material recovery of tightly specified grades of general and recycled sands needed to meet the demands of growing populations and high value manufacturing markets. The project is focused on the development of a new, large scale, innovative industrial equipment and process, which uses flowing water, under highly controlled conditions, to efficiently segregate and classify the grain size of industrial volumes of sand. Examples of such high value market are sands are those needed in construction(e.g. Cement) of our basic infrastructure (e.g. bridges,housing), manufacturing (e.g. glass, ceramics) water filtration and our leisure industries (golf,equestrian,landscaping). CDEGlobal Ltd. the lead applicant has completed preliminary research on this new process and now together with key consultants will meet the technical challenges of building and testing an industrial-scale system to ensure that the advanced sorting or classification of the sand is functional, efficient, safe and economic while reducing environmental impact.This project supports the UK circular economy in the reuse, recycling and remediation of valuable natural resources while ensuring a sustainable supply chain for manufacturing industries.

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EVOLUTION ARTIFICIAL INTELLIGENCE LTD	Evolution AI, WMG Data Science Group, Dun & Bradstreet: Artificial Intelligence-Driven Information Extraction from Documents	£620,582	£434,407
DUN & BRADSTREET LIMITED		£79,321	£39,661
University of Warwick		£190,311	£190,311

Project description - provided by applicants

Many businesses hold vast volumes of semi-structured information in the form of business documents (e.g. contracts, invoices, delivery notes, payslips) and financial documents (e.g. compliance statements, regulatory filings, accounts) as scanned images or pdfs. These complex documents are not easily processed or 'understood' by technologies available today, including Natural Language Processing (NLP), a type of machine learning, and Optical Character Recognition (OCR). In this project we propose to develop a product to extract information accurately from semi-structured documents containing forms and tables, obviating the need for manual keying by human beings. Accuracy rates for such use-cases are currently very low, ~87, well below human cognitive capability. The partners propose to solve this problem using a disruptive 'big data' approach exploiting a new class of algorithms which has recently emerged from the research base. Our project is a highly innovative industrial R&D collaboration. It is led by between Evolution AI, a UK SME which provides products that read and understand human language autonomously; backed by Evolution's customer (Dun & Bradstreet), the global market information and data solutions provider; and a world-leading university (University of Warwick, WMG Data Science Group). We will build on Evolution AI's capability in NLP and its proprietary big data processing architecture, along with WMG's expertise in deep learning and computer vision and Dun & Bradstreet's data, to develop new algorithms based on deep artificial neural networks, culminating in a market-ready product. Our innovation provides dramatic opportunities to make efficiencies in back-office processing, introduce automation and improve productivity; and also to capture new, intelligent knowledge at scale. We expect our product to create significant productivity gains for Evolution AI's customers and to help accelerate its growth into an export market worth \$3.4 - \$4.5Bn by 2023 growing at an estimated 16, running on our high-performance compute architecture. Its clients are major blue-chip organisations in banking, insurance, professional services, government, health, retail and media.

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CITY SCIENCE CORPORATION LIMITED	Rapid Calibration for Operational and Strategic Digital Twins	£696,681	£418,009
HOARE LEA LLP		£39,859	£19,930
University of Exeter		£262,482	£262,482

Project description - provided by applicants

Digital Twins offer a compelling opportunity to improve the life-time efficiency of assets and systems enabling flexibility in design, up-front risk minimisation and in-use performance enhancement through techniques such as predictive analytics and machine learning. A number of critical gaps exist that currently prevent the wide-spread use and adoption of digital twins in game-changing contexts such as large-scale infrastructure systems or within the enterprise. With applications at scale currently out of reach, many strategic, cost, efficiency, operational performance and risk management benefits are not being realised. The UK has the opportunity to lead this disruptive sector, exploiting emerging technology from our world-class research base. The research identified within this project enables the rapid calibration and validation of large-scale Digital Twin models across a range of contexts. Our project uses these game-changing, disruptive approaches and access to large-scale, real-time data sets to create a new "System of Intelligence" capable of rapidly calibrating and validating real-world models, delivering incredible levels of efficiency, productivity and insights. This System of Intelligence will enable vast improvements to predictive capability over both a strategic and operational time-horizon with applications in any situation where advanced mathematical modelling is required. It will therefore put advanced mathematical modelling into the hands of those who need it when they need it vastly reducing the need for complicated design and calibration. The system will enable us to learn more about critical feedback loops, developing models that are more accurate and more dynamic. This system will provide a globally game-changing proposition within Enterprise software applications, as well as revolutionising the way we model infrastructure systems, supply chains and manufacturing environments driving radical improvements to productivity. As such it will propel the UK and the consortium to a position of global leadership within this fast-growing new market, anchor critical IP within the UK and create significant additionality, including 795 new jobs by 2023

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ULTRATEC LIMITED	UltraErase - Hard Disc Drive Repair and Erasure	£500,460	£350,322
Project description - provided by applicants			
<p>Hard Disc Drives (HDD) and increasingly Solid-State Drives (SSD/NVMe) are widely used for data storage; However, the preferred long-term storage medium is HDD particularly for enterprise applications. HDD's are ubiquitous but they eventually fail and given that IT equipment is often developed around them, a failed and obsolete HDD can make the whole machine obsolete requiring its replacement. For e.g. some ATM's still run on Windows XP and require a specific HDD which are no longer manufactured. The disposal of failed HDD has other issues including the erasure of their stored data and their physical disposal in the EU under the WEEE regulations to recycle, reuse and minimise landfill. Ultratec is a specialist in the HDD refurbishment market, and has recently developed technology that can rapidly identify the failed sectors on a HDD and in addition to clearing the disc of data can refurbish the disc and certify it for reuse by the client or offer it for resale. There are surprisingly few companies that offer this service and the majority of HDD's are fragmented for scrap. Ultratec proposes to develop a fully integrated system to refurbish and erase HDD's to reduce costs and increase productivity.</p>			

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NOTO TECHNOLOGIES LIMITED	Integrated voice communications system for personal protective equipment (PPE) for safe and seamless communication in harsh working environments	£245,307	£171,715

Project description - provided by applicants

NOTO Technologies Limited "NOTO", trading under the name of Mobilus Labs, is a business that is focused on developing products that enable people to talk to each other regardless of their setting. NOTO's ambition is to create personal communicator or "wearable walkie talkie" style product that can be integrated into clothing and/or equipment to provide seamless voice communication. NOTO's first product, outside the scope of this project, is the OCTOtalk system that is built into diving/snorkelling mask and enables divers and snorkelers to talk underwater and share their experiences in real-time. A critical aspect of NOTO's technology is to carefully design the speaker and microphone and electronics to enable two people to have a clear conversation regardless of the noisy or unusual sounds in their immediate vicinity. NOTO's objective, and focus of this project, is to translate their technology from the above aquatic application into system that can be used to integrate voice communications into the clothing used by people working in industrial environments, commonly referred to as personal protective equipment or PPE. NOTO's vision proved a voice communicator, built into a hard hat, that will enable two construction workers to have a normal conversation while operating noisy machinery (i.e. jackhammer). To make his product possible, the research and development team have set a technical objective of enabling two workers, separated by at least 200 metres, to conduct a normal conversation while stood next to a noisy piece of machinery. If this is possible, this project enables NOTO to launch their technology into a market that is worth \$20 billion globally.

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FINSEN TECHNOLOGIES LIMITED	Thor - Effective Decontamination of Sensitive Electronic Equipment to prevent Hospital Acquired Infections	£271,584	£190,109
Project description - provided by applicants			
<p>Hospital acquired infections (HAIs) are a growing problem, with hospitals struggling as common bacteria such as MRSA and C.Dif are increasingly resistant to existing decontamination methods. There are currently two methods of decontamination: Manual cleaning which leaves 50, and hydrogen peroxide gas which is time consuming, requires deep clean beforehand and requires rooms to be offline to air post decontamination. Of particular importance is the challenge cleaning staff have to effectively decontaminate complex shaped electronic devices. This type of equipment (high touch surfaces) is increasingly prevalent in hospital wards and there is an urgent need for an effective automated decontamination method. Finsen is an SME established to commercialise the use of short wavelength high-energy ultraviolet light for pathogen decontamination. We have developed the concept of a UVc decontamination cabinet for processing portable medical equipment which promises to reduce the time it takes to decontaminate such objects and improve patient safety. The key advantages of the technology are; up to 5 times quicker than existing best methods such as manual cleaning; Repeatable and validated process with feedback and cycle logging; Reduction in hospital acquired infections and deaths.</p>			

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Innovate UK

Results of Competition: December 2017 Sector Competition: Open - 13 to 24 Months

Competition Code: 1712_EE_OPEN_R4_24M

Total available funding is £19 million

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
VECOTECH LIMITED	VECOLure: Novel Aggregation Pheromone Bed Bug Lure	£314,334	£220,034

Project description - provided by applicants

The common bed bug, *Cimex lectularius*, is a small, blood-sucking insect that feeds on humans. Bed bugs can't fly or jump, but they are skilled hitchhikers that spread by hiding in your belongings until you get to your destination. Here, the apple pip-sized pests find a new hiding spot until they get hungry. Their bites cause reactions ranging from minor irritation to severe allergic hypersensitivity and infestations can cause extreme psychosocial stress. They are a pest of significant public health importance and a major global economic problem, widely infesting homes, hospitals and dormitories and damaging the hospitality industry through infestation of hotels, cinemas and transport. Bed bug control remains one of the most lucrative and growing markets in the pest management industry globally, being particularly strong in the US, where the bed bug problem is well established. Bed bug numbers are also reported to be increasing rapidly in Canada, Australia and UK in a range of properties. Detection of small numbers of bed bugs is problematic; they are active only at night, tend to harbour in cracks and crevices, and can go without feeding for long periods of time. There are a few bed bug detection methods and monitoring devices available, but there are no established products with proven reliability and efficacy for detecting low level infestations quickly. The London School of Hygiene & Tropical Medicine has identified a new bed bug aggregation pheromone, which acts as a powerful lure. There is potential to develop this into an effective commercial product and the rights to do this have been secured by Vecotech Limited, a spin-out company founded to capitalise on the School's expertise in novel methods for surveillance and control of a wide range of medically important insects. The objective of this project is to develop an effective test prototype of this powerful lure, to be used in a bed bug-specific trap, capable of detecting early stage infestations, typically comprising <5 bugs within a 1 to 3-day period. The components of the lure are inexpensive and readily available, enabling Vecotech to develop a product that is effective, sensitive, long lasting, safe, affordable and discrete. There are currently no products available that match these requirements. A successful development of a prototype, underpinned by robust IP protection, will see Vecotech quickly secure significant market penetration and sales, and kindle development and commercialisation of other advances to pest detection, prevention and control.

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Participant organisation names	Project title	Proposed project costs	Proposed project grant
AIR CONTROL ENTECH LIMITED	ASSAI - Development of an unmanned Aerial SyStem for Advanced contact Inspection of civil structures	£599,316	£419,521
Brunel University London		£148,351	£148,351
JAMES FISHER TESTING SERVICES LIMITED		£6,480	£3,240
JR DYNAMICS LIMITED		£99,267	£69,487
TWI LIMITED		£143,329	£143,329

Project description - provided by applicants

Unmanned aerial systems (UAS) offer companies a potential reliable and safe solution to support their operations by accessing areas that are otherwise too difficult, without extensive manpower and support. Although rapid gains have been made in this field of technology, there remains the need to carry out advanced contact non-destructive testing (NDT) in order for UAS systems to truly become the primary method of facility inspection and monitoring of large civil infrastructure. Currently, the sensor equipment being produced for use with UAS are limited to a range of imaging equipment such as video cameras through to thermal imaging cameras, surveying and mapping technology. As a result, human inspections coupled with advanced sensing systems are still required in parallel with the UAS system, especially for critical infrastructure inspections. As a result, UAS inspection systems are not realising their performance potential, and therefore unable to deliver productivity increases and cost savings. To address this problem, the project consortium will develop an unmanned Aerial SyStem for Advanced contact Inspection (ASSAI). The ASSAI system will be initially tailored of civil structures, in particular bridges, but can be considered a platform technology with a wide range of potential future applications. The project will deliver significant productivity increases for our customers, and provide exciting growth to the industrial partners in the project.

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Participant organisation names	Project title	Proposed project costs	Proposed project grant
SOFANT TECHNOLOGIES LTD	Development a novel phased array antenna technology for millimetre wave 5G applications	£333,864	£233,705
GARFIELD MICROELECTRONICS LIMITED		£433,016	£303,111

Project description - provided by applicants

Future 5G networks will offer significantly higher data rates through increased channel bandwidths to meet growing demand for new mobile and internet of things (IoT) applications and high-resolution multimedia user experiences. Whilst initial commercial 5G networks will operate within spectrum that is either already in use by current cellular systems or new spectrum in similar frequencies, the huge potential of 5G will only be realised when systems start to use the mmWave bands at much higher frequencies. Such solutions could utilise huge throughputs but the trade-off is shorter distances and far more unpredictable and demanding propagation characteristics. Sophisticated antenna arrays are therefore required for mmWave 5G applications as the 5G market rapidly evolves towards commercial roll out over the next 3-5 years. Phased array antennas use electronic circuits to change the phase of the radio signal to a multiplicity of antennas to steer the radio signal in a specific direction. Conventional phased array antennas use active semiconductor components to steer the radio signal. The high cost of semiconductor components, and the complexity and high-power consumption are the primary impediments to their deployment in large-scale commercial applications. This project aims to develop an advanced phased array antenna for mmWave 5G applications, integrating Sofant's highly-innovative, radio frequency microelectromechanical system (RF MEMS) technology and a custom-built controller circuit. In collaboration with GarField/Matrices, this project will help Sofant to develop key components required for fully integrated antenna/RF MEMS designs. When compared to current semiconductor designs, the RF MEMS device is much cheaper per square mm to manufacture, uses less than half the area and fewer radio components, thereby reducing the overall antenna cost by up to 50, creating a significant opportunity for Sofant and contributing to the UK's economy over the next 5 years through the export-led growth of a leading-edge technology SME in the highly competitive global mmWave 5G market. A scalable development platform and supply chain will be established for high volume production to generate economies of scale and drive down costs to support wide market adoption. New knowledge gained during this project will help Sofant and GarField/Matrices to develop the next level of control circuits for integrating the devices into much larger mmWave antenna arrays for future 5G infrastructure applications.

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Participant organisation names	Project title	Proposed project costs	Proposed project grant
DIREK LTD	PIPS: Platform independent Indoor Positioning System	£343,940	£233,408
AWTG LIMITED		£306,924	£214,847
University of Surrey		£121,894	£121,894

Project description - provided by applicants

The main motivation for this project is to address the significant market opportunity in Indoor Positioning Systems (IPS) which is forecast to grow at a magnificent CAGR of 58.90, that is provide in 3D to locate users when travelling between different levels of a building. Also, the total costs should not significantly increase with number of users and the area of operation (scalability). However, the existing solutions only partially fulfil this requirements. We have developed the first Platform independent IPS technology (PIPS) that is more accurate, scalable and cheaper from the state of the art approaches. Our approach takes advantage of a recently patented technology from the University of Surrey ; which utilises only the readily available sensors on user's smartphones. Our solution does not require any infrastructure deployment, prior training or any additional hardware. However, to unleash the potentials of this solution and address the market needs and we should resolve three major shortcomings of the existing implementation including: dependency on quality of the INS sensors, tracking only in 2D and inaccuracy due to error accumulation. ****Our key objectives are: first, to address the PIPS shortcomings and second, to ensure its commercial success once it is delivered to the market.**** In doing so, we propose to develop three novel technologies that resolve the aforementioned shortcomings by 1) enabling an auto device adaptation 2) providing an error accumulation control mechanism and 3) enabling 3D tracking. As a result of these improvements, PIPS the first platform-independent and 3D, INS based solution that gives the same level of accuracy as Beacons, and Geomagnetic at a significantly lower cost and as scalable as Wi-Fi but more accurate. To ****ensure the commercial success of this project,**** we take advantage of a well established technology re-seller partner (i.e. AWTG) to perform an extensive market validation with potential consumers. In doing so, the output algorithms and methods will be integrated to our existing IPS product and further developed as a PoC of an LBS app in Android platform. The provided PoC will showcase three major features including proximity marketing, way-finding, and search and will be used for field experiments with potential consumers .

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Participant organisation names	Project title	Proposed project costs	Proposed project grant
FOCAL INTERNATIONAL LTD.	QUEMAT: QUERy-adaptive Media Asset Tracking	£130,304	£91,213
DITHEN LIMITED		£142,200	£99,540
MEDIA RESEARCH PARTNERS LIMITED		£136,144	£95,301

Project description - provided by applicants

FOCAL International (FOCAL) is the leading global trade association facilitating use of commercial footage and other content in all forms of media production, with over 300 international members comprising content libraries, archives, production researchers and service providers. The company has offered a popular "Footage Finder" service for many years, generating sales leads and routing these to members. The QUEMAT project creates novel deep learning technology (via technology partners Dithen and The Media Institute) to innovate a high-impact new "Footage Finder" service, leveraging the established footprint of FOCAL International, and in turn generating an abundance of learning and training data through adoption to continuously improve the project's deep learning performance. The QUEMAT sustainable ecosystem delivers 'network effects' inside and outside the project, yielding high-precision and commercially relevant results to visual search queries within Footage Finder and across an abundance of applications. The project is ideally timed as inflection points have been reached concurrently in three disparate arenas: a) film and television production is burgeoning with new routes to market (e.g. Netflix now invest more in original production than CBS); b) deep neural network (DNN) technology has reached a level of maturity allowing investments in machine learning to deliver unprecedented returns; and c) technology to perform 'video signature extraction' (i.e., allowing for rapid search of video without the need to process pixels) has been validated by new MPEG standards activity: 'Compact Descriptors for Video Analysis' (CDVA), creating a foundation for widespread adoption. The project will innovate the novel DNN (Deep Neural Network) -based media asset processing and discovery capabilities with the following unique features: i) it will allow for the continuous production of compact signatures per query type while remaining standards-compliant; ii) it will be specifically trained to be repurposed for various query types with an automated query-driven customization stage that can be performed offline; and iii) the operational complexity will be tunable and the entire software pipeline will be portable to any public cloud provider for easy scaling and adoption across media enterprises. Overall, QUEMAT technology will deliver increased revenues to content owners and increase operational efficiencies at a time when content producers and footage libraries are struggling to reconfigure traditional value chains to benefit from new monetization opportunities. The project's three partners: FOCAL, The Media Institute and Dithen -- bringing together media industry presence and leading technology expertise in deep learning and media processing, and a record of successful collaboration.

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Participant organisation names	Project title	Proposed project costs	Proposed project grant
VENTIVE LTD	Homes as Virtual Power Stations (HasVPS)	£239,299	£167,509
THEENERGY LTD		£103,754	£72,628
Project description - provided by applicants			
Ventive Homes as Virtual Power Stations (HasVPS) project proposes to use natural ventilation of dwellings not just to ensure good indoor air quality or reduce the risk of damp and mould but to generate the required thermal comfort (both heating the home in winter and passively cooling it in the summer) as well as supplying hot water, intelligently. By integrating all of the required building services into one, Ventive HasVPS will significantly reduce the capital and installation costs while optimising performance in real time through permanent online accessibility and engaging user applications. In addition, by intelligent use of electricity of multiple systems working in aggregate Ventive HasVPS will enable frequency response load shifting, helping to match electricity demand with supply.			

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Participant organisation names	Project title	Proposed project costs	Proposed project grant
O2NRG LTD	Oxfiniti OxBox	£377,382	£264,167

Project description - provided by applicants

The 10 billion litres of sewage processed daily in England & Wales is becoming more concentrated as people try to save water. Processors are struggling to meet legal discharge limits without further expensive offsite treatment. Activated Sludge Processing (ASP), the UK's most widely used treatment process, uses beneficial micro-organisms to digest waste in water, but they need oxygen to eat, digest, grow and breed. Aeration systems provide this by injecting air bubbles into the water, they consume 60, of no benefit for ASP), which surface and burst within seconds, wasting 90, greatly improving the effectiveness of sewage treatment. However, UFB can currently only be generated by lab devices at around 5, patented process that generates ultrafine bubbles using a shear jet venturi system based on advanced aerospace fuel injection systems. It can oxygenate 6814 litres of flow p/h with a 30, which has generated great industry interest. However, the range of applications for OxBox means it must be highly scalable, from small-scale 'top-up' systems to high throughput emergency treatment. Scaling our prototype is extremely challenging as the key components are highly bespoke and any change in the dimensions of components will lead to unpredictable changes in bubble size and hence oxygenation performance. This project will use computer modelling to compare simulated bubble generation to empirical data from our existing prototype. We will then virtually "rescale" OxBox using the model before a physical, scaled prototype is produced. This will be used to demonstrate the accuracy of the virtual model and validate the significant improvements in efficiency and energy reduction OxBox can provide. Successful exploitation of OxBox will generate 5 year sales & service returns to the UK of £65 million, reduce sewage waste, make treatment less costly and reduce energy consumption.

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Participant organisation names	Project title	Proposed project costs	Proposed project grant
DIGIROBOTICS LTD	Autonomous cost effective utility robotics for seamless personalised responsible mobility-as-a-service (TOUR-MATE)	£699,986	£489,990
University of Surrey		£299,993	£299,993

Project description - provided by applicants

The demand for air travel is projected to double in coming years. For instance, over 75million passengers have traversed through London Heathrow in 2016\ . Similarly, Dubai airport has facilitated over 85million people in 2016\ . However, the airports often fail to cater for this increasing demand due to their lack of infrastructure and human resources. This results in longer check-in and luggage drop ques, traffic and parking congestions requiring passengers to arrive at the airport 2-3 hours prior to the departure. Such delays in airport ground operations incur additional ground-time costs for the airlines and result in higher taxes for the passengers. Furthermore, airports around the world have seen an increase number of air travellers with mobility restrictions (over 3million in UK in 2016). However, most airports fail to cater for the needs of the disabled people mainly due to the lack of human resources and cost factors. Airport Accessibility Report in 2016 recognises significant proportion of major UK airports with poor accessibility and customer service (e.g., London-Heathrow). Thus, there is a significant demand/market opportunity to increase the efficiency of airport ground operations while providing personalised and responsible mobility to improve the quality of life of all air passengers. In this context, autonomous cost-effective utility robotics for seamless personalised responsible mobility-as-a-service (TOUR-MATE) proposes fully autonomous cost-effective utility robotics to enhance the efficiency of airport ground operations. A fully autonomous smart trolley and a utility vehicle will be developed to provide seamless personalised and responsible mobility of goods and air passengers. TOUR-MATE constitutes an autonomous engine that utilises novel computer vision and sensor data fusion algorithms for accurate obstacle detection. Furthermore, information exchanged via V2X communication is used for cloud-based scene understanding and dynamic map updates. Fully vision based localisation algorithms are expected to reduce the unit cost of TOUR-MATE significantly compared to the state-of-the-art. TOUR-MATE's Fleet Management System(FMS) controls the mobility units (reservation, deployment etc.), keeps track of their location/operational status and manages the coordination of connected users, trolleys and wheelchairs. The fully connected end-to-end mobility of people and goods in airports that results with TOUR-MATE will increase the efficiency and capacity of the airports, reduce airport congestion, save time of the air passengers leading to major economic benefits for the UK airports. Furthermore, the project also addresses a crucial social challenge by providing fair and equal access to transport for people in all sectors thereby enhancing individual's quality of life.

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Participant organisation names	Project title	Proposed project costs	Proposed project grant
COGNITIV+ LTD	DeepRev Using artificial intelligence to prevent revenue leakage and fraud	£577,707	£404,395

Project description - provided by applicants

Regardless of sector, size of business or nature of services, revenue leakage (incorrect billing and collection of revenue and expenditure) is a common challenge. Due to a combination of contract complexity often involving thousands of documents (contracts and invoices), complex business models with extensive contractual and billing systems coupled with hundreds of different promotions, discounts, and modified pricing, poor administrative practices and a reliance on manual auditing practice, it is widely accepted that losses from leakage can impact an organisation by up to 10, > 1/3 of all operators estimate that at least 1, billing software, data aggregation and more recently AI based analytics still rely on manual input to extract the required data from customer contracts, Statement of Work (SOW's) and pricing amendments, with limited accuracy and scalability particularly across more complex service models/markets Cognitiv+ aim to address this market gap through the development of DeepRev -- a unique solution that combines advanced techniques in natural language processing (NLP) for clause mining (both text and figures), machine and deep learning with vision AI that will fully automate payment assurance management practices by accurately matching payments with contractual clauses to ensure compliance in real time. With application across all industry sector regardless of contractual and billing complexity, the solution will reduce leakage (by >60, a 18-month programme of Industrial Research is required to deliver a prototype which will be validated in a user trial. If successful, this combined functionality has the potential to truly disrupt the Revenue Assurance market with future opportunity to improve hospital management, PPP contracts.

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Participant organisation names	Project title	Proposed project costs	Proposed project grant
TRAYDSTREAM LIMITED	Trade Finance Fraud Detection Project in Dual Use Goods with Machine Learning and Visual Analytics	£342,450	£239,715
Swansea University		£137,997	£137,997
Project description - provided by applicants			
Traydstream has developed three core technology solutions that are set to disrupt global trade finance. A Trade Finance document review by an expert typically takes between 2-3 hours or as much as between 10 and 45 days between the four involved parties i.e. a buyer, a seller and a bank representing each of these. Traydstream has reduced (currently) a single review to less than 20 minutes. If all four parties used the Traydstream Platform concurrently, then such a saving, even if rounded up to 1 hour and calculated against a 10 day timeframe, would amount to 99.6, in pursuit of war or terrorist activities. This project brings together our experience in trade finance and Swansea's expertise in deep learning and visualisation to tackle a complex issue, particularly in face of the trade and regulatory uncertainties associated with Brexit. A successful outcome from this project has a real potential to disrupt this global practice and place the region and the UK at the forefront of trade finance fraud detection and prevention.			

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Participant organisation names	Project title	Proposed project costs	Proposed project grant
DEPIXUS	COmplete Nucleic acid ANalysis (CONAN) at genome scale with ultra-high throughput	£862,900	£604,030

Project description - provided by applicants

Depixus, a small start-up incubating in Cambridge, is developing an innovative new biotechnology for 'complete nucleic acid analysis' called SIMDEQ (Single molecule Magnetic DEtection and Quantification). SIMDEQ is a game-changing technology that is being developed not only for standard DNA sequencing, but to also reveal previously undecipherable layers of information contained within the many subtle chemical signatures (epigenetic base modifications) that are found on both DNA and RNA. The emerging picture is that these base modifications form a 'second genome' that plays many vital roles in biology -- from early embryonic development, to pathogenic defence mechanisms, and the evolution of many cancers. Epigenetics has also been shown to be a critical factor in plants, including many crop varieties, and thus has great impact on agriculture. Current sequencing technologies have very limited abilities to read these modifications. Our revolutionary SIMDEQ technology can analyse individual nucleic acid molecules (DNA or RNA) with unprecedented precision and accuracy. Our current prototype instruments are highly robust and can be used to generate highly detailed genetic and epigenetic data, but have limited sample throughput. This ambitious project focuses on the development of a compact, high-throughput system, known as 'SIMDEQ Digital', based on a CMOS chip (like those in digital cameras) on which many millions of electronically addressable micron-scale sensors are fabricated. Much as digital cameras have revolutionized the field of photography, the release of SIMDEQ Digital technology represents a discontinuous innovation in the world of DNA analysis. SIMDEQ Digital will not only allow Depixus to compete in the existing \$20 billion DNA analysis industry, but also to open new markets for genetic and epigenetic analysis, UK-wide and globally. Early access to this technology will provide great business opportunities especially for British SMEs, who will help pioneer an entirely new complete genomics ecosystem.

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Participant organisation names	Project title	Proposed project costs	Proposed project grant
JUMP STAFF LTD	Jump.Work - Big Data & AI In the Labour Market	£765,712	£344,570
Project description - provided by applicants			
Despite the increasing demand and evidence for making the right hires based on soft-skills, personality and cultural fit, UK businesses and the recruitment industry remain fairly archaic in their hiring process. Traditional screening techniques are largely based on intuition and are influenced by biases, and perceptions of the ideal candidate. The use of employment agencies is expensive and does not solve this problem as they rely only on anecdotal experience to make better" decisions. To address this, Jump Staff aim to develop an advanced, novel screening and job matching algorithm as part of an online recruitment platform. The algorithm will go deeper and understand candidates based on their behaviour, psychometric profile, skills & experience and uses feedback from users to generate accurate predictions for success. The resulting faster and better matches have large potential to improve employee retention and productivity -- a recent study involving 300k hires showed that employees selected by an algorithm stayed 8, and ramp up their business to meet new economic opportunities, reducing unemployment time.			

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