

Results of competition: Enabling the internet of sensors – Feasibility study

Total available funding for this competition was £1.5m from the Technology Strategy Board.

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

Participant organisation names	Project title	Proposed project costs	Proposed project grant
Aralia Systems Limited (lead) Engineering Modelling and Simulation Research Group	Autonomous decision-making for maximising security in defence sensor networks	£100,000	£82,070
Project description - provided by applicants			
<p>This project will enable Aralia Systems to develop a Physical Security Information Management (PSIM) threat response system, which will tie security sensors together to form one unified network of sensors.</p> <p>This development will allow security sensor devices to cooperatively process information that can be accessed by connected sensors, and autonomously respond to a possible threat with minimal human intervention. For example, if an access control point is breached, then mobile sensors will be able to respond to this by automatic reconfiguration of the network so that some sensors can navigate to that point. This response development program will apply to both static and mobile devices, and will handle the communication of multiple sensors processing at any one time.</p>			

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Audio Analytic Limited (lead) Queen Mary, University of London	Advanced Smart Microphone	£119,998	£98,999
Project description - provided by applicants			
<p>The Advanced Smart Microphone project is a collaboration between Audio Analytics Ltd. and the Centre for Digital Music & Centre for Intelligent Sensing at Queen Mary, University of London (QMUL).</p> <p>The project aims at developing a wirelessly connected, small, portable and battery operated audio sensor able to run the intelligent detection of sounds and the automatic analysis of audio scenes directly on board the device. Commercially viable applications include the home security market, and can be built on top of business cases proven in the professional security market, such as the automatic detection of glass breaks, smoke alarms, baby cries, aggressions and many other sounds of interest for the customers.</p> <p>New applications can be envisioned in the domain of home security, safe cities, environmental noise monitoring, the safety of elderly people, visual sound descriptors for the deaf and more.</p> <p>The Advanced Smart Microphone aims at becoming the leading smart sensor platform for the design, evaluation and commercialisation of innovative sound recognition applications for the Internet of Sensors consumer market.</p>			

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Blue Maestro (lead) Alpha Micro Components Ltd I O Electronics Limited	Feasibility of developing innovative Bluetooth Smart devices for solving the "last 100 metres" problem	£91,104	£68,328
Project description - provided by applicants			
<p>The feasibility of developing innovative devices that</p> <ul style="list-style-type: none"> (i) are sensor that operate indefinitely without human intervention through harvesting solar power, (ii) can extend the range of other short range sensor devices by way of receiving and then forwarding on data packets such that limitations of range of the sensors can be overcome and (iii) relay low energy sensor information to the Cloud through cellular technology and could be battery powered. 			

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Chronos Technology Limited (lead) University of Bath	AJR - Automatic Jamming Recognition	£147,590	£118,398
Project description - provided by applicants			
<p>Chronos Technology Ltd and The University of Bath have teamed up to create the Automatic Jamming Recognition (AJR) Project. AJR is a feasibility study to research the concept of miniaturising and networking sensor technology for GNSS and mobile phone jamming detection with data available via the cloud.</p> <p>Networks of small energy efficient sensors can be deployed near critical infrastructure or co-located with other sensor technology to provide fast accurate, reliable and unambiguous actionable intelligence for law enforcement and security agencies and industrial organisations with interests in the reliable operations of critical infrastructure.</p> <p>Jamming event data alerts from the M2M sensors can be pushed by email and available for users over a secure internet enabled interface to their mobile phones, tablets or PCs. The sensor system will also explore the feasibility of comparing data from other connected platforms to enhance the overall actionable intelligence available from the individual systems.</p>			

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Clearview Traffic Group Limited (lead) University of Bedfordshire	Novel algorithms for solar-powered in-road sensors to measure speed and classify vehicles to inform intelligent traffic management decisions	£116,627	£94,970
Project description - provided by applicants			
<p>The primary objective of our consortium, which is comprised of a UK based technology SME and an English University, is to investigate the capabilities of solar-powered, in-road, autonomous sensor systems to collect accurate and reliable traffic data, including speed and vehicle classification.</p> <p>This data will inform intelligent decision-making by transport managers and road network operators in order to minimise congestion and the associated emissions, reduce accidents, and lower the costs of installation and maintenance traditionally linked to in-road traffic data collection systems.</p> <p>In order to measure the speed of vehicles passing with appropriate accuracy, two detectors must be placed some distance apart. Wireless communications negates the need for costly and problematic cables linking the sensors. However, it is impractical to send all the data collected from one sensor to another due to the size, power and capacity limitations. Thus, the key challenge is to develop a set of algorithms capable of compressing vital data to enable it to be sent wirelessly to another sensor in the network to create actionable information and inform intelligent traffic management decision-making.</p>			

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Continuum Bridge Limited (lead) Designability University of West of England	A secure, multi-application network of shared sensors for assisted living, energy efficiency and home security	£113,743	£93,828
Project description - provided by applicants			
<p>Most sensor systems today are single purpose, come with their own proprietary devices, are difficult to use and have low security. e.g. a connected burglar alarm has no other use, shares no data or sensors with any other service and may do little to protect the sensitive data leaving the home. Several allow people to monitor and control things in the home via a smartphone, which is rather nerdy for the mass market.</p> <p>The majority want useful services without constant interaction. Using three example services, this project will show a novel secure, multi-application network of shared sensors that could easily be used by many more services (including lots we haven't yet thought of), and is simple to install and use and expand with off-the-shelf sensors.</p> <p>Also novel is that fact that all the intelligence resides in the home. This makes it much easier to secure, eliminates the constant interaction and means that service can usually be maintained even when sensors or the internet fail. The project will also show how users are in control of who can access and control their devices, and a Home-App store where they can browse for services and service providers and manufacturers can advertise.</p>			

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Gas Sensing Solutions Limited (lead) Glasgow Caledonian University Traceall Global Limited	Feasibility of random neural networks as an intelligent self-learning platform for cost effective deployment of energy harvesting compatible wireless sensors applied to building management systems	£149,626	£123,445
Project description - provided by applicants			
<p>This project addresses the need for energy harvesting compatible combined carbon dioxide / temperature /humidity wireless smart sensors, enabling people occupancy and indoor air quality (IAQ) monitoring in buildings and deployed within an intelligent self learning (ISL) network. Project output provides automated adaptive management of air conditioning systems to achieve required IAQ and minimise energy usage.</p> <p>The project focuses on establishing feasibility of using intelligent self learning networks based on a random neural network (RNN) approach, providing a control platform for simultaneous measurement of multiple wireless CO2/temperature/humidity sensor inputs.</p> <p>The project combines unique patented energy harvesting compatible CO₂/temperature/humidity wireless sensors, developed by project lead Gas Sensing Solutions, combined with innovative patented ISL network capability from Glasgow Caledonian University.</p> <p>The RNN wireless network methodology provides potential for low cost “fit and forget” deployment of CO₂/humidity/ temperature wireless sensor ISL networks into existing and new buildings. The consortium includes non-funded end user assessment.</p>			

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Meggitt PLC (lead) Advanced Manufacturing Research Centre Visio Ingenii Limited	Closed Loop Adaptive Assembly Workbench	£114,435	£85,626
Project description - provided by applicants			
<p>Meggitt PLC manufactures high value complex parts for the aerospace market. Key to the manufacture of these parts is the assembly of sub-components. Low production volumes mean that it is uneconomical to automate this process and as such the process is conducted by a pool of skilled factory operators.</p> <p>The Advanced Manufacturing Research Centre (AMRC) has previously conducted research into Intelligent Workbench technology, capable of interactively guiding an operator through an assembly process using display screens and projection mapping. This technology currently requires a labour intensive study to ensure omniscient knowledge of the assembly process: an open loop approach.</p> <p>This project delivers innovation by augmenting existing workbench technology with new sensors, tooling, fixtures and bespoke software capable of generating actionable information in relation to the performance of the assembly process and recommendations for the optimisation of steps in the assembly process.</p> <p>Such optimisations can then be recorded by an operator on a workbench, closing the loop and eliminating the need for labour intensive pre-emptive studies.</p>			

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Plessey Semiconductors Limited (lead) Nottingham Trent University	Remote knitted Electrodes for use with electrical potential sensors for automotive driver alertness	£139,720	£111,947
Project description - provided by applicants			
<p>The objective of this project is to enhance vehicle safety systems through the creation of an automotive driver heart-rate sensor system that produces data of sufficient quality and consistency that it can be used to monitor driver alertness and well-being.</p> <p>Real time analysis of such data will enable the monitoring system to take early action to prevent a driver from falling asleep at the wheel and in the case of commercial vehicle operations, transmit the data over a wireless network to a control centre for automated monitoring of driver well-being.</p> <p>Based on a technology acquired from the University of Sussex, Plessey Semiconductors has developed a fully patented Electrical Potential Integrated Circuit (EPIC) Sensor which can measure electrophysiology signals without direct skin contact, skin preparation or conductive gels.</p> <p>Nottingham Trent University has developed a number of material technologies which allow the creation of conductive and non-conductive patches and connections within a piece of knitted fabric. These materials can form part of a remote electrode for the EPIC sensor, and thus provide a unique form factor for enhanced data acquisition and vehicle design.</p>			

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Super Enterprise Associates Limited (lead) University of Greenwich	Interactive Self Health-Monitoring Embedded System	£149,572	£123,428
Project description - provided by applicants			
This project will investigate the technical feasibility for an interactive self health-monitoring embedded system. The concept is based on utilising a number of innovative technologies, each cutting-edge in their own way, and then combining them in a way that has not been done before.			

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Zynaptic Limited (lead) Silicon Infusion Limited	Extending the Internet of Sensors to Remote Locations Using Flexible, Intelligent and Autonomous Satellite Gateways	£141,182	£105,886
Project description - provided by applicants			
<p>This project is intended to investigate the technical feasibility of extending the Internet of Sensors to remote locations where cheap and ubiquitous Internet connectivity is not already available, enabling a range of infrastructure, land management and environmental monitoring applications. Our proposed solution is to connect remote wireless mesh networks of sensor and actuator nodes to the wider Internet via existing satellite data services.</p> <p>The technical solution involves embedding intelligent data processing and autonomous operation into the remote sensor networks in order to minimise the amount of data transferred over the expensive, low bandwidth satellite connections. In addition, the satellite uplink will be implemented using software defined radio techniques so that a common hardware platform can be used to support the widest possible range of current and future satellite communications protocols.</p>			