

Find out more about the projects that have received funding from Cranfield's EPSRC IAA from 2022 onwards.

Project Holder	Project Title	Awarded (£)	Status
Steve James	Next generation optical fibre pressure sensor	£36,829	Open
<p>Steve James (project holder), Ralph Tatam, James Barrington, Stephen Staines.</p> <p>The construction of a technology demonstrator for a novel approach to the interrogation of optical fiber pressure sensors, which will facilitate a step change in the utility of a sensing technology that has significant potential for deployment in sectors including aerospace, renewable energy and healthcare. The particular attractions of optical fibre-based approaches include their lightweight, small dimensions, immunity to electromagnetic interference and their suitability for use in hazardous, explosive environments as there is no requirement for an electrical connection to the sensor.</p>			
Tom Charrett	Mobile robot platform for demonstration of laser speckle instrumentation	£39,609.34	Open
<p>Tom Charrett (Project Holder), Ralph Tatam, Sam Gibson - in collaboration with The Manufacturing Technology Centre (MTC).</p> <p>Mobile robots are of increasing importance in multiple areas of manufacturing for example to move materials between production cells or more recently for moving robotic manufacturing and inspection tools around large workpieces such as aerospace components and wind turbine blades.</p> <p>However, navigation and high-accuracy repositioning of these robots can still be challenging, requiring time-consuming and expensive equipment such as laser trackers to ensure correct positioning. An area of current research in the Centre for Engineering Photonics at Cranfield, is laser speckle instrumentation which has the potential to provide improved navigation and repositioning for mobile robots using the distinct patterns formed by laser light scattering of floor surfaces to determine the robots' motion.</p> <p>The aim of this project is to construct a demonstrator system consisting of a mobile robot with integrated laser speckle sensor to allow demonstration of the approach for high accuracy navigation and repositioning in realistic environments.</p>			
John Erkoyuncu	Dynamic Digital Twin for Gas Turbine Assets (DDT4GTA)	£39,860.23	Open
<p>John Erkoyuncu (Project Holder) Sam Court, Bernadin Namooano, Christina Latsou in collaboration with Siemens Energy Ltd</p> <p>Siemens Energy Ltd specialise in providing high efficiency gas turbine assets for power generation. Their power generation designs are record breaking for efficiency and power output, with the capability for each gas turbine to quickly respond to the demands of a dynamic energy market. To operate at these levels of efficiency, Siemens require high-fidelity controls to accurately monitor the changing state of an asset. This project focuses on delivering Siemens with a set of tools that will enable a comprehensive understanding of assets (e.g. diagnosis, repair) through Digital Twin technology, which can provide a complete dynamic virtual representation of the real-world physical asset. An integrated set of tools will be developed through a digital twin proof-of-concept for a gas turbine asset. With live data from the physical engine and its surroundings fed to the virtual twin, it will enable the association of expert knowledge and machine learning capabilities to better detect, diagnose and predict any fault arising in the system.</p>			
Patrick Luk	Bio-Inspired Thermal Management System	£37,746.39	Open
<p>Patrick Luk (Project Holder), Jerry Luo, Luofeng Huang, Khalifa Aliyu Ibrahim, Fergus Crawley in collaboration with cdo2 and Hydrogen Waves.</p> <p>Conventional active thermal management (TM) methods in applications such as battery and semiconductor cooling are invariably based on a steady flow of coolant, in which heat removal rate is controlled entirely by the coolant's flow rate. There is intrinsic inefficiency in this 'one-dimension' cooling method solely dependent on the coolant flow rate, where the coolant inlet area will always be overcooled while the outlet area overheated, resulting in inefficient cooling manifested in uneven temperature distribution, and in extreme cases, destructive hot spots. A new generation of cooling methods that embody a 'multi-dimension' approach will be key to addressing new thermal challenges e.g. demands for rapid or superfast electric vehicle (EV) battery charging technologies. This project will explore a novel bio-inspired TM concept reminiscent of the human body's complex pulsatile flow, a radical departure from advanced state-of-art cooling methods. The project aims to build and test a scaled proof-of-concept (PoC) technology demonstrator to showcase the technology to the superfast EV charging battery market, and the semiconductor market.</p>			

Kevin Mullaney	Thermal camera demonstrator development for additive manufacture (WAAMcam)	£36,280	Open
<p>Kevin Mullaney (Project Holder), Ralph Tatam in collaboration with WAAM3D.</p> <p>This projects aims to develop a prototype thermal camera demonstrator for wire and arc additive manufacture (WAAM). The demonstrator will be tested at the Welding Engineering and Laser Processing Centre (Cranfield) and designed and evaluated in collaboration with our industrial partner WAAM3D.</p> <p>The prototype demonstrator will use a custom borescope attached to a filter and camera, which can operate in various deposition environments. The system will provide temperature images of the WAAM process and will improve the thermal control of the process. In turn, this will result in high quality WAAM parts and improved productivity via quality control enhancement. There are no commercial cameras currently available which are suitable for this application.</p>			
Jane Hodgkinson	Oxygen monitor for additive manufacturing	£39,402	Open
<p>Jane Hodgkinson (project holder), Kevin Mullaney and Ralph P Tatam in collaboration with WAAM3D.</p> <p>This project aims to develop a demonstrator of a real-time oxygen monitor for wire and arc additive manufacturing (WAAM). Welding processes in additive manufacturing require control of the level of oxygen to ensure high quality deposited material. At present, there is no method capable of monitoring the oxygen concentration in the region directly around the weld pool. The technology to be developed in this project has the unique potential to meet this need and could be applied to a range of welding processes. The aims of this IAA project will be to bring the technology from TRL 1-2 to TRL 3-4, producing a real-time demonstrator.</p>			
Jane Hodgkinson	Hospital trial of instrument for breath analysis of ventilated patients in intensive care: Phase 3	£38,398	Open
<p>Jane Hodgkinson (project holder), Chris Walton and Ralph P Tatam in collaboration with Bedford Hospital</p> <p>This project supports a novel instrument on a clinical trial at Bedford Hospital, based on the adaptation of existing Cranfield technology (hollow silica waveguide based gas cell) to work as a medical device, working in collaboration with Cascade Technologies (Emerson). This novel gas cell technology has been patented by Cranfield. The new instrument is designed to measure gases that are known biomarkers of inflammation in the sidestream exhaled breath of patients on ventilators. The advantage would be rapid and early (i.e. prior to the appearance of overt symptoms) of infections at point-of-care in patients who are at significant risk. The ongoing hospital trial of the instrument aims to provide evidence for the clinical significance of the measurements made. A successful trial will provide the evidence base needed for larger scale clinical trials, instrument commercialisation, and future innovative development of the underlying technology.</p>			
May Sule	Integrated water infrastructure development policy for schistosomiasis control	£28,254	Open
<p>May Sule - in collaboration with The African Ministers' Council on Water (AMCOW) and the Global Schistosomiasis Alliance (GSA).</p> <p>Schistosomiasis is a water-borne disease and is a public health problem in tropical and subtropical regions of Africa, Asia, the Caribbean and South America, killing an estimated 280,000 people annually and ranking second only to malaria as the most common parasitic disease. It is prevalent where people use contaminated water sources, including rivers and lakes, where Schistosoma parasites are endemic. Through regular engagement and a secondment with AMCOW, and in collaboration with the GSA, this project aims to influence policy across 55 African countries and produce guidelines on <u>integrated water management systems with the aim of reducing cases of Schistosomiasis.</u></p>			
Nico Avdelidis	Defects measurement tool from visual UAV inspections	£35,574	Open
<p>Nico Avdelidis (Project Holder), Ip-Shing Fan, Argyrios Zolotas, Angelos Plastropoulos in collaboration with Boeing and TUI.</p> <p>Inspection, during MRO (maintenance, repair and overhaul) checks of any aircraft, requires a downtime of several days to 3 or more weeks. The testing of structures to quantify the identified damage from the visual manual inspection is very challenging. Each day an aircraft is not in use costs an estimated £200,000. Maintenance overall is estimated to make up 10% of airline costs. A rapid and effective quantitative inspection tool would unlock the huge aviation market enabling reduced downtime of aircraft. This project aims to increase the accuracy of defect recognition and classification to more than 85% and target to develop a quantitative tool for measuring the size of the detected and classified defects from visual UAV inspections on real aircraft structures. The developed measurement approach will be an important and credible decision-making tool for maintenance engineering of aircraft structures. This is an innovative idea for ultra-low maintenance, by increasing autonomy and AI decision making, reducing operational costs, and above all achieving these <u>without minimizing aircraft safety.</u></p>			
John Erkoyuncu	Proof of Concept Evaluation and Dissemination of the Forecast and Resource Planning Toolset	£32,704.39	Open

[John Erkoyuncu](#) (project holder), Christina Latsou in collaboration with Ministry of Defence (lead partner), Babcock International, Sopra Steria, Rolls-Royce, and Vendigital.

There is a lack of consistency within MoD and in industry to provide and utilise Support focused data sets for application of forecasting and resource planning within a through-life engineering perspective for complex engineered assets. This creates challenges with a variety of methods creating inaccuracy or highly uncertain predictions. The MoD have developed a set of toolsets, with input from academia, and the ambition is to improve Support data sets that feed these, test and demonstrate the improvements, make further improvements and where appropriate educate and train relevant personnel within MoD and in industry. The overall ambition is to have a commonly agreed data focus approach between MoD and Industry on forecasting and resource planning in a through-life perspective.

Nazmiye Ozkan	Prototype planning tool for Green Hydrogen Generation and Use in UK Agriculture	£40,302	Open
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[Nazmiye Ozkan](#) (project holder), Jerry Knox, Da Huo, Pegah Mirzania, Niranjana Panigrahi in collaboration with Cator&Co.

The aim of this project is to develop a proof of concept for implementing and operationalising green hydrogen generation to meet agrifood business expansion needs (including primary production, farm mechanisation and processing demands) in Eastern England at varying scales. The project will contribute to achieving a more sustainable balance between food and energy production, supporting the objectives of the 25-Year Environment Plan and Net Zero Carbon. Specifically, the project will develop a prototype tool that provides a robust business orientated framework to evaluate the engineering design characteristics and techno-economic feasibility for the implementation of green hydrogen production and use within selected agribusiness sub-sectors.

Total Awarded		£404,959	
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