Results of Competition: Robotics and AI: Inspect, Maintain and Repair in Extreme Environments

Competition Code: 1805_ROBOTICS

Total available funding is £15 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
PLANT INTEGRITY LIMITED	Multi-Platform Inspection Maintenance & Repair In Extreme Environment (MIMRee)	£990,078	£495,039
BLADEBUG LIMITED		£99,480	£69,636
OFFSHORE RENEWABLE ENERGY CATAPULT		£324,900	£324,900
Royal College of Art		£200,000	£200,000
Royal Holloway Univ of London		£249,851	£249,851
THALES UK LIMITED		£697,591	£348,796
The University of Manchester		£242,379	£242,379
University of Bristol		£244,999	£244,999

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

Funders Panel Date: 01/11/2018

WOOTZANO LIMITED		£1,162,050	£813,435

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

Project vision

The Multi-Platform Inspection, Maintenance & Repair in extreme environments (MIMRee) project will introduce a step-change in the Operations and Maintenance (O&M) of offshore wind farms by removing humans from the loop during the inspection, maintenance and repair (IMR) of offshore wind turbine blades. The aim is to significantly reduce the costs and turbine downtime associated with these tasks and reduce the H&S risks of using rope access technicians.

In this project, the multi autonomous platform approach will be demonstrated for a use case in offshore renewables; however, the developed autonomous vehicle surface vessel hub, Human-Machine Interface (HMI), robotic teaming and communications, and automated mission planning will also have applications in the offshore Oil & Gas, Search and Rescue and Defense sectors.

Key objectives

* Remove the need to send humans offshore to carry out wind turbine blade IMR tasks;
* Remove the need to shut wind turbines down to carry out blade inspections;
* Reduce the risk of using autonomous vehicles offshore to carry out asset IMR tasks;
* Safely demonstrate a fully autonomous approach to blade IMR tasks in real-world operating conditions;
* Establish the business case for using autonomous vehicles for blade IMR;
* Develop a roadmap for transferring the MIMRee system to other relevant industries.

Main areas of focus

The developed MIMRee system will comprise of an Autonomous Surface Vessel (ASV) with capabilities to autonomously transport, charge and deploy UAVs and blade IMR robots at offshore wind farms. The UAVs will be developed to both autonomously inspect wind turbine blades and deploy blade IMR robots on stationary wind turbine blades. The blade IMR robot will be developed to conduct both autonomous NDT inspections and maintenance and repairs of wind turbine blades. Two-way communication with the ASV and on-board autonomous vehicles will be enabled by a HMI, enabling an onshore operator to both view gathered inspection data and issue automatically generated IMR mission plans. A novel sensor will be developed which can record images of moving wind turbine blades, which could be integrated with the UAVs and/or ASV. All technologies will be tested, validated and demonstrated in representative real-world conditions.

Project team

The project is led by Plant Integrity Limited who are collaborating with Thales UK Limited, Wootzano Limited, BladeBug Limited, Offshore Renewable Energy Catapult, University of Manchester, University of Bristol, Royal Holloway University of London and Royal College of Art to develop and demonstrate a prototype version of the MIMRee.

Results of Competition: Robotics and AI: Inspect, Maintain and Repair in Extreme Environments

Competition Code: 1805_ROBOTICS

Total available funding is £15 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
ROVCO LIMITED	Autonomous Aquatic Inspection and Intervention (A2I2)	£894,088	£625,862
DRISQ LTD		£249,328	£174,530
FORTH ENGINEERING (CUMBRIA) LIMITED		£499,944	£299,966
National Oceanography Centre		£550,006	£550,006
THALES UK LIMITED		£39,782	£19,891
The University of Manchester		£154,392	£154,392

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
Underwater robots are increasingly utilised for commercial and scientific applications to make measurements and interact with the underwater environment. The A2I2 (Autonomous Aquatic Inspection and Intervention) robots will operate in hazardous underwater environments, for offshore renewables, oil and gas, and nuclear applications. Two specific intervention use-cases will be addressed through demonstrators; offshore coring, and wet nuclear storage pond inspections and interactions. These demonstrators are significantly different and therefore enable the project to address multiple market opportunities. This project will address the need for new approaches that are required to permit operation near to critical infrastructure. These will include increased intelligence on the underwater robots to enable them to position themselves and navigate avoiding collision with the surrounding environment.

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

Results of Competition: Robotics and AI: Inspect, Maintain and Repair in Extreme Environments

Competition Code: 1805_ROBOTICS

Total available funding is £15 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
FORTH ENGINEERING (CUMBRIA) LIMITED	CHIMERA - Robotic Inspection of Pressure Vessels	£700,000	£420,000
HEADLIGHT AI LIMITED		£99,989	£69,992
METALLISATION LIMITED		£173,063	£103,838
ROLLS-ROYCE PLC		£1,262,629	£631,314
SOUND MATHEMATICS LTD		£222,050	£155,435
TWI LIMITED		£499,964	£499,964
UK Atomic Energy Authority		£162,834	£162,834
University of Nottingham		£370,262	£370,262

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

Funders Panel Date: 01/11/2018

Project description - provided by applicants
Pressure vessels are considered safety critical infrastructure and are present across many industries such as oil and gas, nuclear, petrochemical etc. Assuring the safety of these ageing assets is increasingly important for these industries as there have been many fatal failures in the past. Internal pressure vessel inspection has significant cost and health and safety risk associated with it and is required at specific intervals by industry codes/standards. In order to carry out internal inspection, the operator must; stop production, depressurise, store extracted fluid, vent etc. The total cost associated with these activities can easily exceed £1M within a few days depending on the production facility. More importantly, these tasks are currently carried out by humans and the hazardous environments have led to many injuries/fatalities. It is not possible for humans to carry out inspection on these assets without breaking containment, the only way to do so, is via robotics and artificial intelligence. CHIMERA is a semi-autonomous robotic platform for internal pressure vessel inspection, repair and maintenance. It will be deployed into the pressure vessel without breaking containment via an innovative bolt on headworks. It will be equipped with a sludge/sediment vacuum to clean the pressure vessel, an ultrasonic phased array inspection system and a slender arm for inspection and repair in confined spaces. To successfully deliver this, a consortium of experts has been formed with capabilities in robotics, inspection, navigation, in situ repair, AI, civil nuclear and oil and gas. There are close ties between the consortium and the targeted industries, providing a direct route to market/exploitation. CHIMERA represents a clear technological innovation for the UK pressure vessel inspection market with a major growth opportunity for the SME supply chain in the consortium.

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

Results of Competition: Robotics and AI: Inspect, Maintain and Repair in Extreme Environments

Competition Code: 1805_ROBOTICS

Total available funding is £15 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
HEADLIGHT AI LIMITED	Prometheus - A reconfigurable robotic platform(s) with advanced sensing for confined spaces	£535,035	£374,524
CALLEN-LENZ ASSOCIATES LIMITED		£535,000	£374,500
NETWORK RAIL INFRASTRUCTURE LTD		£440,128	£220,064
Royal Holloway Univ of London		£219,999	£219,999
THALES UK LIMITED		£39,782	£19,891
The University of Manchester		£217,806	£217,806
University of Bristol		£219,967	£219,967

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
The Innovate funded Prometheus project will develop a fully autonomous robot capable of geo-technical surveys in unknown voids for use in the mining, water infrastructure monitoring and offshore industries. This robot will be able to be automatically deployed and recovered through a standard restricted access bore of 150mm diameter, significantly increasing potential use cases over existing systems. Key demonstrations will be carried out during the project in conjunction with Network Rail - to explore and map mine workings that extend under existing rail infrastructure. Further, applications are also within the water industry with aging water infrastructure. This is presenting major issues to societies, in terms of leakages, burst water mains, flooding, contamination, etc. This is resulting in significant costs to infrastructure providers in terms of fines, legal fees, and complex repairs. The system itself will be designed, built and tested by a consortium led by Headlight -- an SME working with leading edge sensor and data processing technologies. Partners include Callen-Lenz, an SME with expertise in airborne robotic systems development and deployment. They will work closely with the Universities of Manchester, Royal Holloway and Bristol to integrate the latest sensors, control and manufacturing techniques into a truly novel and highly capable platform. This will include sensors and adaptive sensing software provided by both Thales and Headlight. The joint requirements of fully autonomous operation beyond visual line of sight (BVLOS), combined with deployment through a limited access 150-diameter borehole will be demonstrated both in a university lab environment and at key milestone demonstrations in conjunction with Network Rail. This will be an excellent illustration of robotics, autonomy and AI in extreme environments with widespread application. The final system will demonstrate a step change in autonomous capability, highly flexible operation and deployment, meeting a real and existing industrial need for rapid inspection of areas that are difficult to access and complex to navigate.

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

Results of Competition: Robotics and AI: Inspect, Maintain and Repair in Extreme Environments

Competition Code: 1805_ROBOTICS

Total available funding is £15 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
BARRNON LTD	Connect-R - Providing Structure in Unstructured Hazardous Environments	£2,034,942	£1,424,459
JIGSAW STRUCTURES LIMITED		£246,674	£172,672
ROSS ROBOTICS LIMITED		£1,480,995	£1,036,696
Royal Holloway Univ of London		£477,000	£477,000
THARSUS VISION LIMITED		£499,151	£299,491
UK Atomic Energy Authority		£99,921	£99,921
University of Edinburgh		£1,159,235	£1,159,235

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
There are many hostile working environments that require sophisticated tasks to be performed, such as the building of structures and deployment of tools where there is significant risk to the health and safety of any manual workers involved, high cost of deployment and significant timescales for completion. Examples are Nuclear Decommissioning, Oil and Gas, Mining and Space systems. Common to many of these environments is the extreme difficulty of effective deployment of the sophisticated kind of equipment that replaces human beings. These environments present the following challenges: -Hazardous working environments requiring protective equipment and limited time windows for operation -Limited access through which to deploy the systems -Unstable structures present that prevent occupation -Lifting of heavy objects (~50kg) that require mechanical assistance -Processing of large volumes of liquids (1000s litres) The Connect-R team propose to develop an industrial-scale self-building modular robotic solution to provide robotic access to work-sites in these hazardous environments.