

Under embargo: Wednesday 24th June 2020

## **Autonomous motherships and robot repair teams at offshore wind farms? On their way, says MIMRee**

**One year on from the launch of MIMRee (Multi-Platform Inspection, Maintenance and Repair in Extreme Environments), the project reports breakthroughs in its quest to demonstrate an end-to-end autonomous inspect and repair mission to offshore wind farms.**

MIMRee, awarded a £4.2 million grant from Innovate UK, is one of offshore wind's most ambitious robotics project to date. The end-game is demonstration of an autonomous system capable of planning its own operational missions to offshore wind farms, whereby a mothership will scan *moving* turbine blades on approach, then launch teams of inspection drones carrying blade crawlers for forensic inspection and repair of damaged blades.

The Consortium reports a series of technological challenges already overcome in the first year of the two-year project, evidencing the feasibility of their vision.

The Thales imaging system has achieved blur-free images of moving wind turbine blades at the Offshore Renewable Energy (ORE) Catapult's Levenmouth Demonstration Turbine off the coast of Fife. Scanning blades for defects, without stopping turbines for days at a time, is considered a game-changer for wind farm operations.

The MIMRee mission planning software developed by Professor Sara Bernardini of Royal Holloway University of London has been integrated with the Thales vessel and the inspection drones developed by a team from Manchester and Bristol Universities. The drones have successfully coordinated launch, recovery and navigation from the vessel.

One of the aims of the project is to demonstrate an integrated inspect-and-repair system for wind turbine blades, using the BladeBUG robot, which has recently demonstrated its walking abilities on a variety of blade surfaces at ORE Catapult's National Renewable Energy Centre. Recently achieved milestones related to the system include:

- ! An autonomous repair arm, developed by Dr Sina Sareh's team at the Royal College of Art Robotics Laboratory, can rapidly switch between modules for cleaning, sanding and top-coating damaged areas of blades, providing real-time feedback visualisation and human-in-the-loop teleoperation of repair tasks via a user-interface system.
- ! Following experimentation with visible and short-wave infrared image capturing, Plant Integrity (PI) has produced the blade crawler's non-destructive testing (NDT) payload. The module uses an advanced machine learning algorithm and a precision scanner for exact measurement of defects under a wide variety of ambient light conditions.
- ! An electronic skin, called Wootzkin, patented by high-tech robotics company, Wootzano, will enable the robot to feel the surface of the blade. Wootzkin also allows the robot to determine the surface conditions of the blade helping the robot to walk in an extreme environment. Finally, Wootzkin enables the robot's existing vacuum

system to attach onto the blade more accurately by using supervised machine learning algorithms.

Martin Bourton, Project Lead at Plant Integrity comments: “This time last year we could talk about a spectacular concept. A year in, we can say that MIMRee is not futurology, but an imminent possibility with a host of technological breakthroughs achieved. The project is developing a variety of spin-off technologies: the ability to scan a working turbine, without stopping it for days while it is inspected, is just one with a very obvious benefit to industry.”

Chris Hill, Operational Performance Director at the Offshore Renewable Energy (ORE) Catapult: “Robotics and autonomous systems are vital to optimising offshore wind operations and meeting our net-zero targets by mid-century, a core objective of our Operations and Maintenance Centre of Excellence. UK companies are well placed to lead this technological revolution and having a project like MIMRee home-grown in the UK, spearheaded by UK businesses and our leading academic institutions, gives us a competitive advantage for the supply chain of the future.”

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## NOTES TO EDITORS

### Multimedia

The MIMRee Scenario Animation: <https://youtu.be/kQvN71bfTA4>

BladeBUG: Backing the Game-Changers: <https://youtu.be/uCq2NsEvamI>

### About the Offshore Renewable Energy Catapult

ORE Catapult was established in 2013 by the UK Government and is one of a network of Catapults set up by Innovate UK in high growth industries. It is the UK’s flagship technology innovation and research centre for offshore wind, wave and tidal energy and helps to reduce the cost of offshore renewable energy, supporting the growth of the industry and creating UK benefit. [ore.catapult.org.uk](http://ore.catapult.org.uk)

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