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CMRE successfully demonstrates systems for persistent, autonomous and real-time maritime surveillance

The Centre provided innovative concepts in the field of unmanned passive monitoring as part of the PERSEUS FP7 European project.

Conventional surveillance technologies cannot easily help to detect fast boats, which generally have small radar signatures and do not carry automatic identification systems (AIS). For this reason, the NATO STO CMRE (Centre for Maritime Research and Experimentation) has addressed this problem along with other project partners, as part of the European project PERSEUS.

The PERSEUS project (Protection of European BoRders and Seas through the IntElligent Use of Surveillance), coordinated by Spanish technological company Indra, is one of the most significant initiatives within the 7th Framework Programme of the European Commission, and has constituted the flagship of R&D in the maritime security segment.

In the Project's term, ended in June 2015, CMRE scientists and engineers worked to design, develop and demonstrate at sea concepts of continuous, real-time passive underwater acoustic systems for maritime surveillance. The objectives have been successfully met by using innovative solutions integrated on board unmanned mobile platforms, i.e. both on an underwater glider (an autonomous underwater vehicle which uses shifts in mass to steer and changes in buoyancy to dive and surface) and a Wave Glider (an autonomous vehicle with a surface float and a submerged glider, generating forward movement by exploiting sea wave energy). The embedded cutting-edge passive sonar surveillance system proved to be particularly effective due to its real-time continuous monitoring capability and the availability of several functionalities ranging from detection and localization to vessel classification. Furthermore, the platform/system combination has proven to be persistent and covert with wide area coverage and minimum environmental impact. Real-time detections and localizations have been made both on board the underwater glider and the Wave Glider, and the detection/tracking results have been disseminated to both CMRE and national control centers for display and further analysis. Also, target classification algorithms have been applied successfully in near real-time during at-sea demonstrations. Adaptation of the Wave Glider for shallow coastal waters has also been tested by adding low-cost add-ons for above water sensing, in the form of inexpensive daylight and thermal cameras, and radar detection devices. This technology may help enabling the detection of anomalous behaviours of marine traffic by fusing the above and the underwater picture.

CMRE has been the first to demonstrate a complete system for underwater acoustic surveillance with highly persistent mobile robots. In the future, these systems could be used within a network to continuously monitor maritime areas of interest.

About CMRE. The STO-CMRE (Science and Technology Organization – Centre for Maritime Research and Experimentation) is located in La Spezia, Italy. Formerly the NATO Undersea Research Centre (NURC), the Centre focuses on research, innovation and technology in areas such as defence of maritime forces and installations against terrorism and piracy, secure networks, development of the common operational picture, the maritime component of expeditionary operations, mine countermeasures systems, non-lethal protection for ports and harbours, anti-submarine warfare, modelling and simulation, and marine mammal risk mitigation. CMRE operates two ships, NATO Research Vessel *Alliance*, a 93-meter 3,180-ton open-ocean research vessel, and Coastal Research Vessel *Leonardo*, a smaller ship designed for coastal operations. In addition to its laboratories the Centre is equipped with a fleet of autonomous underwater and surface vehicles and a world-class inventory of seagoing sensors.

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