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Robotic Search and Rescue: the new ICARUS system ready for use from 2016

The NATO Centre for Maritime Research and Experimentation played a crucial role in developing the maritime component of the ICARUS European project, including enhanced autonomy and integration between Unmanned Surface Vehicles and Unmanned Aerial Vehicles

On 9-10 July 2015, at the Portuguese Navy Base of Alfeite (Almada) in Lisbon, 24 Project Partners from 9 countries demonstrated the ICARUS (Integrated Components for Assisted Rescue and Unmanned Search Operations) system, as final step of the ICARUS European project (<http://www.fp7-icarus.eu/>) funded by the European Commission under the Seventh Framework Programme for Research and Innovation (FP7). Started in 2012, ICARUS has been devoted to develop advanced robotic platforms, which can support crisis intervention teams in detecting, locating and rescuing humans in danger, in maritime and land disaster scenarios. Unmanned Search and Rescue (SAR) devices offer valuable tools for saving human lives and for speeding up the SAR process. This is particularly crucial for maritime incidents, in which survival times are short and during which even SAR teams take considerable risks.

During the ICARUS final event in Lisbon, the Project Partners coming from Portugal (CINAV, INESC, ESRI), Spain (EURECAT and INTEGRASYS), Switzerland (ETHZ), Italy (CMRE, Calzoni), Poland (IMM) and Belgium (SpaceApplicationServices) demonstrated the effectiveness of the system in case of maritime accident. "Let's say that a passenger ship strands or drowns in high sea, but the atmospheric and maritime conditions do not allow the search and rescue teams to perform the victims' rescue operations in safety", says Anibal Matos, researcher from INESC TEC (INESC Technology and Science) and lecturer at the Faculty of Engineering of the University of Porto (FEUP), one of the responsible people for ICARUS Sea Trials in Lisbon 2015. "One solution would be to use autonomous robots that can help these teams in catastrophic situations".

The demonstration included Unmanned Surface Vehicles (USVs) and Unmanned Aerial Vehicles (UAVs), linked together in a shared robotic network that enhances interoperability and full collaboration. CMRE intelligent autonomy tools have been fully integrated into an existing robotic asset (USV) developed by an Italian company, L3 Calzoni. "Thanks to CMRE cutting-edge innovative technologies, the system, assisted by an unmanned salvage boat developed by INESC-TEC, is now capable of full autonomous SAR operations at sea with minimal human supervision. All the robots are integrated by means of standard protocols into the ICARUS robotic network" explains Stefano Fioravanti, Scientist in Charge for ICARUS at CMRE.

The system will be ready for use from 2016 when the ICARUS project officially ends. The Project's Consortium includes end-users, such as the Portuguese Navy and the Belgian First Aid and Support Team (B-FAST), which already showed interest in further exploitation of the technology, as complementary support tool for SAR teams.

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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