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Intelligent Robotic Fish Detect Pollution

SHOAL, the pan-European ICT project, part funded by the EU, has successfully developed and delivered intelligent robotic fish capable of working together to detect and identify pollution in ports and other aquatic areas.

Luke Speller, Project Leader of SHOAL and Senior Research Scientist at BMT Group commented: "SHOAL has introduced the capability of cutting the detection and analysis of pollutants in sea water time from weeks to just a few seconds. Chemical sensors fitted to the fish permit real-time in-situ analysis, rather than the current method of sample collection and dispatch to a shore based laboratory. Furthermore, the Artificial Intelligence which has been introduced means that the fish can identify the source of pollution enabling prompt and more effective remedial action."

The last 3 years has seen no less than 5 key areas of major development. These include Artificial Intelligence, Robotic Design, Chemical Analysis, Underwater Communication and Hydrodynamics.

Artificial Intelligence has been developed and introduced to enable the fish to manage multiple problems including avoiding obstacles, knowing where to monitor pollution, finding the source of a pollution, maintaining communication distance from the other fish and returning to be recharged. Each individual robotic fish has an array of sensors and external information that will allow it to navigate the environment.

The fish can map where it is, where it needs to go, what samples it has taken and where from and what the chemical composition of the samples are, as well as communicating all of this back through shallow water to a base station, the other fish and the user interface.



Significantly, the robotic fish have been developed to blend into the marine environment in such a way that marine life is neither disrupted nor impacted in any negative way by their presence, but carries on naturally.

Luke Speller continued: “SHOAL has seen the coming together of scientists from across Europe to create a system that could not have been achieved without collaboration between different disciplines. One of the greatest achievements of SHOAL is getting robots running outside the lab and in the harsh, dynamic conditions of the sea. Autonomously exploring and investigating the harbour, the fish can work together to monitor and track down sources of pollution.”

SHOAL is a consortium of 6 European organisations including: BMT Group - the project leaders and responsible for Artificial Intelligence; the University of Essex responsible for Robotic Development; the Tyndall National Institute responsible for the Chemical Sensors; the University of Strathclyde responsible for Hydrodynamic Research; Thales Safare responsible for the Communication Network and the Port Authority of Gijon - the testing port.

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