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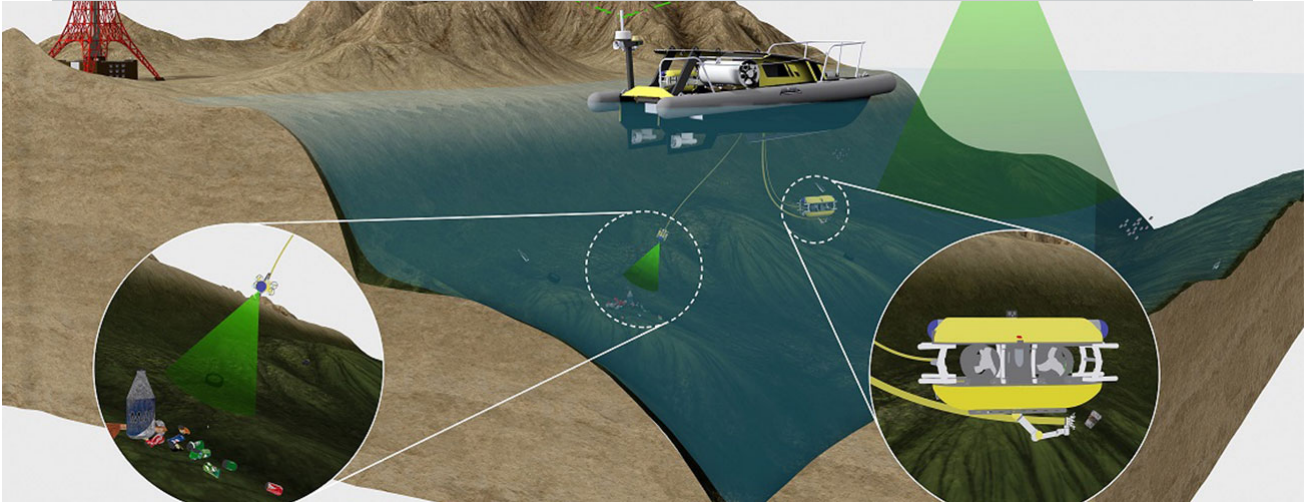Contact | Website | View Online

Press Release

Innovating the Maritime Sector.

SeaClear: Successful use of robots to collect marine litter

European researchers have developed a functioning team of intelligent robots to clear the seabed of litter. The SeaClear system, which was developed as part of a four-year European research project that ended in December 2023, has successfully passed a series of tests in both clear and murky waters.

The SeaClear system consists of several interlinked components. The base vessel acts as the central unit that deploys and controls two remotely operated underwater vehicles (ROV): a small ROV for scanning and a larger one for collecting the litter. The waste is deposited in a special basket developed by Fraunhofer CML. In addition, an aerial drone monitors and maps the sea surface and helps to identify litter hotspots. These elements work together to create a map of the seabed, detect litter and then efficiently collect and remove it. In its current state of development, the SeaClear system can lift up to 7 kg, the grabber can hold the volume of two 2-liter soda bottles, and the robots collect litter in waters up to ten meters deep. When the system is upgraded for commercial operation, it will operate at 70% less cost than divers.

Background

The research was funded as part of a Horizon 2020 project led by TU Delft in the Netherlands. "At the end of the project, we had a fully operational system that proved its functionality," says the project manager. This groundbreaking innovation shows the potential of autonomous robotics to tackle the pressing problem of marine pollution.

Litter not only affects the beauty and pristine nature of marine landscapes, but also destroys habitats, endangers and poisons marine life and affects entire underwater ecosystems. Microplastics, which are produced when larger pieces of plastic decompose, enter the food chain and pose a health risk to marine life and humans. The problem is exacerbated by the fact that much of the litter ends up on the seabed, where it is difficult to find and remove. SeaClear has set itself the task of combating this underwater waste with innovative, autonomous robotic technology in order to clean up our oceans and protect their biodiversity.

One of the key features of the SeaClear system is its adaptability to different conditions, including different water properties and different types of waste. "Unfortunately, there is waste everywhere, but different types of waste are found in different places," explains Cosmin Delea from Fraunhofer CML. For example, in the port of Hamburg, one of SeaClear's test areas, there is heavier industrial waste, while in the tourist areas of Croatia there is lighter and more diverse waste such as plastic bottles and bags.

SEACLEAR AT CML

Solution and Outlook

Artificial intelligence (AI) is central to the functionality of SeaClear. The AI algorithms accurately recognize and identify waste and are trained to distinguish it from marine life. By integrating machine learning and computer vision, the underwater robots can navigate and make decisions in the underwater world.

Building on the success of SeaClear, the team has received €9 million in Horizon Europe funding for SeaClear2.0 to develop a more robust system for litter on the surface and in the deep Mediterranean. In addition to robotics, this follow-up project will also focus on community engagement and policy, with activities such as gamified apps and educational programs to curb waste production. With demonstrations planned across the Mediterranean, the project consortium of 13 partners and 9 countries combines public engagement, artificial intelligence, marine technology and recycling know-how, enabling a comprehensive approach to environmental protection. The SeaClear2.0 project started in January 2023 and is part of the EU mission "Restore our Ocean and Waters".

Follow the project's social media channels to learn more!

PROJECT WEBSITE
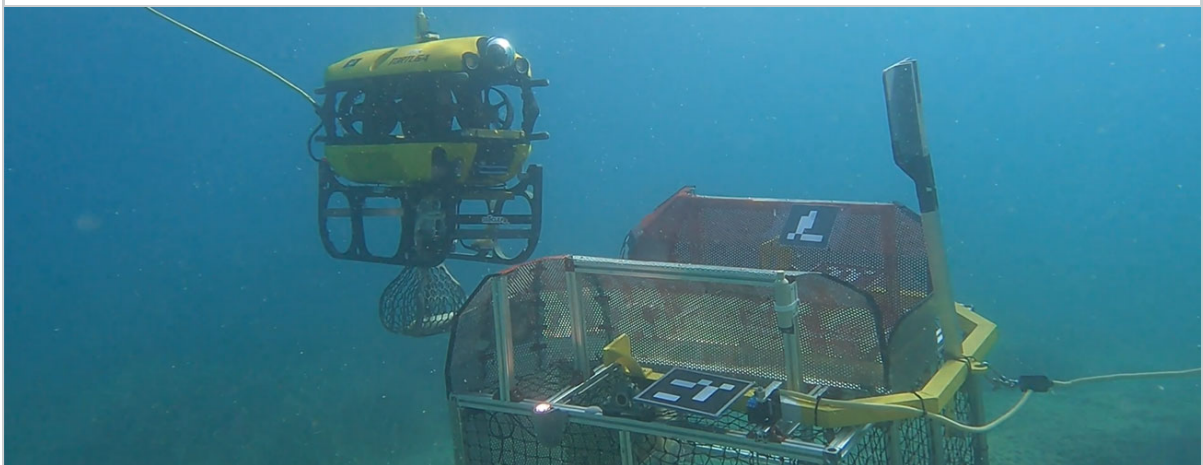
Videos
Get a visual impression!

Final demonstration in Dubrovnik (4:38 min.)
Short video focused on the system (2:24 min.)
SeaClear Demonstration in Hamburg (3:18 min.)
Concept video for follow-up project SeaClear2.0 (1:34 min.)

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