MIT to debut oil-slick absorbing robot

Prototype is less expensive and more efficient than current skimming methods

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updated 8/25/2010 6:23:01 PM ET

Researchers at MIT have created a fleet of robots that can cruise the ocean and clean up surface oil slicks.

The system, called Seaswarm, is a group of vehicles that may make cleaning up future oil spills both less expensive and more efficient than current skimming methods.

MIT's Senseable City Lab will unveil the first Seaswarm prototype at the Venice Biennale's Italian Pavilion on Saturday, August 28. The Venice Biennale is an international art, music and architecture festival whose current theme addresses how nanotechnology — the science of building machines on an atomic or molecular level — will change the way we live in 2050.

The Seaswarm robot uses a conveyor belt covered with a thin nanowire mesh to absorb oil. The fabric can absorb up to twenty times its own weight in oil while repelling water. By heating up the material, the oil can be removed and burnt locally and the nanofabric can be reused.

"We envisioned something that would move as a 'rolling carpet' along the water and seamlessly absorb a surface spill," said Senseable City Lab Associate Director Assaf Biderman in a statement. "This led to the design of a novel marine vehicle: a simple and lightweight conveyor belt that rolls on the surface of the ocean, adjusting to the waves."

The Seaswarm robot, which is 16 feet long and seven feet wide, uses two square meters of solar panels for self-propulsion. With just 100 watts, the equivalent of one household light bulb, it could potentially clean continuously for weeks.

Traditional skimmers are attached to large vessels and need to constantly return to the shore for maintenance. Over 800 skimmers were deployed in the Gulf of Mexico during the summer of 2010; however, it is estimated that these skimmers collected only three percent of the surface oil.

"Unlike traditional skimmers, Seaswarm is based on a system of small, autonomous units that behave like a swarm and 'digest' the oil locally while working around the clock without human intervention," said Senseable City Lab Director Carlo Ratti.

Using swarm behavior, the units will use wireless communication and GPS, manage their coordinates and ensure an even distribution over a spill site. By detecting the edge of a spill and moving inward, a single vehicle could clean an entire site autonomously or engage other vehicles for faster cleaning.

"We hope that giant oil spills such as the Deepwater Horizon incident will not occur in the future. However, small oil leaks happen constantly in offshore drilling," Ratti said. "The brief we gave ourselves was to design a simple, inexpensive cleaning system to address this problem."

MIT researchers estimate that a fleet of 5,000 Seaswarm robots would be able to clean a spill the size of the one in the gulf in one month. The team has future plans to enter their design into the X-Prize's $1 million oil-cleanup competition, which will award the group that can most efficiently collect surface oil with the highest recovery rate.