Robot fleet could use 'nano paper' to soak up oil

by Tim Hornyak

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Seaswarm robots are floating conveyor belts that lap up oil after a spill. (Credit: MIT)
We've seen remote-operated submarine robots deployed to shut down the Deepwater Horizon wellhead in the Gulf of Mexico oil spill--with mixed results. Now researchers at MIT are proposing surface robots that autonomously collect and process oil. Could they help in the next oil disaster?

The prototype Seaswarm robots move on the water as a fleet. They have large conveyor belts covered with reusable nanowire mesh that absorbs oil. Designed to be 16 feet long by 7 feet wide, the robots are small enough to clean estuaries and shallow waters, but can also tackle large slicks.

As the belt rolls into the body of each robot, the mesh is heated, separating the oil, which is then burned off. As it rolls out of the head, the mesh is ready to absorb more oil. Powered by solar panels, the robots can run on only 100 watts, and could operate for weeks on the water without any need for maintenance.

The researchers, including MIT Senseable City Lab Director Carlo Ratti, estimate that a fleet of 5,000 Seaswarm robots working for one month can clean up surface oil the size of the Gulf spill.

At the heart of the prototype is a nanomaterial fabric developed by MIT's Francesco Stellacci and collaborators that can absorb up to 20 times its weight in oil. It looks and feels like paper, and acts like a paper towel.

Described in a 2008 Nature Nanotechnology report, the fabric consists of minute wires made of potassium manganese oxide. It only absorbs hydrophobic liquids like oil, and repels water. Apparently, it can be immersed in water for months and will be dry when removed.

The video below says the robots would communicate via GPS and Wi-Fi to distribute themselves in the most efficient manner through an oil leak. The researchers believe this tactic could result in better oil recovery rates than the estimated 3 percent by some 800 skimmers in the Gulf disaster. They haven't given an estimated cost for each robot, and have only tested the device in the Charles River in Massachusetts.

The team plans to present the Seaswarm prototype at the Venice Biennale on Saturday,
and enter it into the $1.4 million **X-Prize Oil Cleanup Challenge** in the future.

Winning that prize might help give everyone better tools to deal with the inevitable next oil spill.