



Robotic Boat Being Used to Study Red Tide

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By James Longton

Marine biologists join forces with a roboticist to try to understand the phenomenon.

REDONDO BEACH - The re-search team from the Caron Laboratory at the University of Southern California (USC) was back in King Harbor mid-month for its ongoing efforts to understand some recurring and problematic issues with water quality there. Working with leading USC roboticist Professor Gaurav Sukhatme, the team hopes to monitor and compare the waters before, during and after the annual algal bloom cycle known as "red tide."

Research scientists placed a series of sensor buoys designed to track the temperature, levels of dissolved oxygen and changes in algae in marine waters. But this time, they incorporated an experimental, robotic assistant in the form of a 7-ft., 100-lb. radio-controlled boat. Funded by a Center for Embedded Network Sensing from a National Science Foundation grant, Sukhatme has been developing the automated ro-botic boat to collect and monitor water samples.

"The boat is remote-controlled and equipped with a sensor package that is extended and lowered by a computer-operated winch," said USC Professor Dave Caron. "We plan to use the boat to provide vertical profiles around the harbor of things like water temperature, salinity, depth, dissolved oxygen and phytoplankton biomass."

The constant sampling necessary to analyze algal bloom activity effectively can be tedious and time consuming. Sukhatme's idea is to develop robots that can do some of the sampling and profiling work in place of human beings.

Another prospective advantage of the program is improved response time. With the stationary buoys and the mobile boats monitoring the waters, samples could be obtained almost immediately after a bloom, which is imperative for accurate testing. For now, the boat is either operated dockside or kept stationary while the winch takes samples at different depths. The system is designed so that the buoys will communicate with the robotic boats. If a buoy were to detect something of interest in its measurements, it could send for the boat to take a sample.

With the prospect of these robot boats patrolling the waters inside the harbor, some local boaters have expressed concern. Currently, the boat is never deployed in a populated area, such as around marinas, unless a human operator is within the line-of-sight. The small research vessel is equipped with a camera and is able to avoid obstacles in her path. She also has a circuit that allows the operator to take control of the boat immediately if she gets too close to anything.



Roboboat - Researchers from USC are working with a roboticist to study the effects of red tide on harbor waters using a radio-controlled boat.

"Although the boat is robotic, we don't 'let it loose' in the harbor," Caron said. "We will keep it under human control for the foreseeable future, because its object avoidance capabilities are not perfect ... yet."

The team will return in April to collect more samples and track any developments in toxic algal growth.

"Thus far, the biology has been quiet, so we are still having pre-bloom conditions," Caron said. "This will likely change later in the spring."
