

# Scientists aiming to reap benefits of lobster's nose

Creature's method of smelling could lead to device able to sniff out bomb

By Katy Human

*Camera Staff Writer*

From the flick of a lobster's antenna-like nose, a University of Colorado engineer hopes to learn enough to build a sophisticated artificial schnozz capable of locating a bomb, for example, or a land mine.

Lobsters "sniff" by flicking short appendages called antennules, and the manner of those flicks turns out to be an exquisitely sensitive way of finding smelly things in a complicated environment,

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"This is an animal known better for being tasty rather than smart, and yet it's able to accomplish this seemingly difficult task, very quickly, with an extremely high degree of efficiency."

**John Crimaldi**  
*CU engineer*

according to CU's John Crimaldi and several other authors of a paper published today in *Science*.

Crimaldi and his colleagues, led by biologist Mimi Koehl of the University of California, Berkeley, said they hope the crustaceans' smelling strategy can help them fig-

ure out how to make robots that use odors to find objects.

"This is an animal known better for being tasty rather than smart," Crimaldi said, "and yet it's able to accomplish this seemingly difficult task, very quickly, with an ex-

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remely high degree of efficiency. We said, 'Hey, we ought to be able to learn how to do this.'"

Using a sophisticated water bath, a lobster exoskeleton filled with epoxy, and high speed video, the researchers sent a puff of fluorescent dye, a simulated odor, toward a fake lobster. The fake lobster "flicked" its antennules exactly as real lobsters do; with a fast downstroke and a slow return stroke.

The fast downstroke let the dye flow through tiny arrays of hair on the lobster's antennules, where it contacted smell receptors, the researchers discovered.

But the slower return stroke kept water away from those receptors, like a paddle. That let the dye sit for a few fractions of a second on the antennule — effectively leaving the smell signal intact.

"That perhaps gives (the lobster's brain) time to analyze that sample," Crimaldi said.

Although the research is probably years away from producing a robot with an electronic nose, it represents



MARTY CAIVANO / Daily Camera

**John Crimaldi**, an engineer at the University of Colorado, is studying how lobsters detect odors, which could aid development of bomb-sensing robots. Crimaldi is shown in the CU Environmental Fluid Mechanics Lab, featuring a flume device that holds water for experiments.

an important step in the process, Crimaldi said. Many researchers have worked on electronic devices that detect odors, but none is able to track down the sources of odors.

Somehow, lobsters do that task very easily, and part of their ability resides in their antennules, Crimaldi said.

He hopes to continue the re-

search by analyzing how turbulence stretches and strains odor molecules as they drift in water, and how lobsters obtain location information from those swirls.

Joel White, a research assist-

ant professor of neuroscience at Tufts University near Boston who has been working on artificial noses, said the work is important.

"One of the big emphases, in part since the events of Sept. 11, is detecting explosives at a distance, there's a big interest in that," he said. "If you could be downwind of an odor source ... so you didn't have to be right on top of the explosive itself, that would be a major advance."

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