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4 Robots That Are Saving the World

Smart machines help fix humanity's ecological screwups.

by Brittany Grayson

The New Doggy Treat: Poisonous Chemicals



Image courtesy of Natalie Jeremijenko

Natalie Jeremijenko of New York University leads groups of students in creating robotic dogs to sniff out chemical pollutants. Each student chooses a commercially available dog robot, like HasBro's iDog or Sony's defunct Aibo, and customizes it to detect certain toxic chemicals. Classes program their dogs to work in packs. When released on a site, the dogs communicate among themselves and compare signals. The dog with the strongest scent becomes the temporary leader of the pack until another dog picks up a stronger scent. This continues until the dogs locate the spot with the highest concentration of whatever toxic chemical they are sniffing out.

The virtue of the project is that it not only traces toxic substances, Jeremijenko says, but also gets people interested in toxic waste detection and cleanup. "The kids themselves have a lot of fun with the theatrics of the dogs," she says. "The packs sit when they hit a certain level [of chemical contamination]. Or they'll bark the national anthem. Or they'll fall over and play dead." The sight of the dogs sniffing out toxic levels of chemicals helps students understand and explain to their communities the distribution of toxic waste.

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Jeremijenko has bred 10 packs of dogs in places as diverse as Arizona, Dublin, and the Bronx, New York. Currently she's creating a curriculum that will help educators proliferate the chemical-tracking canines throughout classrooms worldwide.

Other researchers have placed similar robots, in the form of lobsters and lampreys, on the seafloor, and Jeremijenko hopes to have still more varieties hopping, slithering, and climbing their way into the environment soon.

Robots Don't Blink



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Video courtesy of Ken Goldberg
UCBerkeley/Texas A&M
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Sometimes all a biologist needs is a pair of eyes watching the sky. Humans, imperfect lookouts that we are, are prone to distraction, especially when being drowned, baked by a hot southern sun, or bitten by poisonous snakes. Robots are resistant to these human frailties, which is why they're perfect for scrutinizing the patch of Arkansas swamp where an ivory-billed woodpecker—a bird scientists thought had been extinct for decades—may have been spotted in 2005. "Robots don't blink," says Ken Goldberg, an engineer at the University of California at Berkeley.

After hearing of the ivory-billed woodpecker sighting in a notoriously inhospitable swamp, Goldberg contacted biologists at Cornell University and offered his help. He and Dezheng Song, a computer scientist at Texas A&M University, built an autonomous camera to keep an eye on the sky. A pair of cameras continuously records video of the swamp and can distinguish birds from airplanes, drifting leaves, and trees waving in the wind. They store images of birds and each month a researcher in a canoe paddles out to retrieve the data. Eventually, the cameras will be able to send them back to Song

electronically.

The system hasn't found its quarry since it was set up last October. But ornithologists suspect that the woodpecker's extreme skittishness has kept it under the radar for decades, so the robot may have a better chance than a relatively noisy and impatient scientist.

Goldberg and Song hope to soon set up cameras to record grizzly bears in Alaska, gorillas in Rwanda, and giant pandas in China.

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