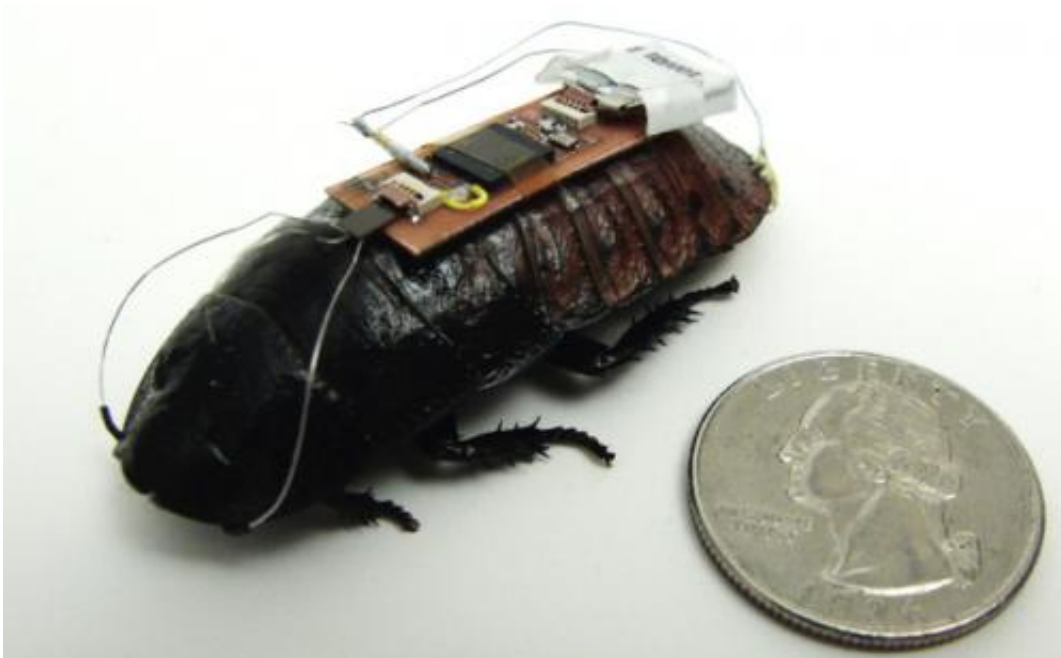


## Researchers develop technique to remotely control cockroaches (w/ Video)

September 6 2012, by Matt Shipman, North Carolina State University

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Remote control cockroach cyborgs

Researchers from North Carolina State University have developed a technique that uses an electronic interface to remotely control, or steer, cockroaches.

"Our aim was to determine whether we could create a wireless biological interface with [cockroaches](#), which are robust and able to infiltrate small spaces," says Alper Bozkurt, an assistant professor of electrical

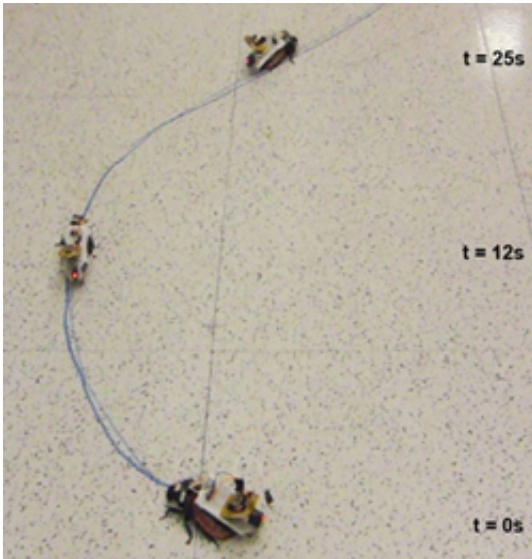
engineering at NC State and co-author of a paper on the work.

"Ultimately, we think this will allow us to create a mobile web of [smart sensors](#) that uses cockroaches to collect and transmit information, such as finding survivors in a building that's been destroyed by an earthquake.

"Building small-scale robots that can perform in such uncertain, dynamic conditions is enormously difficult," Bozkurt says. "We decided to use biobotic cockroaches in place of robots, as designing robots at that scale is very challenging and cockroaches are experts at performing in such a hostile environment."

But you can't just put sensors on a cockroach. Researchers needed to find a cost-effective and electrically safe way to control the roaches, to ensure the roaches operate within defined parameters – such as a disaster site – and to steer the roaches to specific areas of interest.

The new technique developed by Bozkurt's team works by embedding a low-cost, light-weight, commercially-available chip with a wireless receiver and transmitter onto each roach (they used Madagascar hissing cockroaches). Weighing 0.7 grams, the cockroach backpack also contains a microcontroller that monitors the interface between the implanted [electrodes](#) and the tissue to avoid potential neural damage. The microcontroller is wired to the roach's [antennae](#) and cerci.



Researchers were able to precisely steer the roaches along a curved line.

The cerci are sensory organs on the roach's abdomen, which are normally used to detect movement in the air that could indicate a predator is approaching – causing the roach to scurry away. But the researchers use the wires attached to the cerci to spur the roach into motion. The roach thinks something is sneaking up behind it and moves forward.

The wires attached to the antennae serve as electronic reins, injecting small charges into the roach's neural tissue. The charges trick the roach into thinking that the antennae are in contact with a physical barrier, which effectively steers them in the opposite direction.

In a recent experiment, the researchers were able to use the [microcontroller](#) to precisely steer the roaches along a line that curves in different directions.

**More information:** The paper, "[Line Following Terrestrial Insect](#)

[Biobots](#)," was presented Aug. 28 at the 34th Annual International Conference of the IEEE Engineering in Medicine & Biology Society in San Diego, Calif. The paper was authored by Tahmid Latif, a Ph.D. student at NC State, and co-authored by Bozkurt. Bozkurt has previously developed similar interfaces to steer moths, using implanted electronic backpacks.

Provided by North Carolina State University

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