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Lowly roach inspires high-tech robotics

Innovative maneuvering based on buggy behavior

From James Hattori (CNN)
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(CNN) -- Most people think of cockroaches as household pests. But for a group of American scientists, roaches are a source of robotic inspiration.

University of California-Berkeley biologist Bob Full is fascinated by the way cockroaches move. "They're very effective at maneuvering. They can seem to go anywhere and nothing seems to stop them."

Using time-lapse computer studies, Full has determined the six-legged creatures move using three legs at a time -- two on one side, one on the other -- in a bouncing pogo-stick-like manner.

It's a simple structure, allowing cockroaches to maneuver effortlessly, even over obstacles.

The mechanic simplicity of their bodies and the ease at which they can maneuver over obstacles inspired Full to model robots after the cockroaches. While working as a consultant on the animated movie "A Bug's Life," Full got the idea of insect-like robots. He realized cockroaches' self-stabilizing leg structure was much simpler than traditional robotic designs.

"(It's) kind of like a spring suspension system in your car," explained Full, "rather than the stiff metal element with a motor where you're calculating every instant each movement. That's not how animals move, so why should we make robots like that?"

The research led Full and collaborators at McGill University and the University of Michigan to produce RHex, a robot that maneuvers independently.

"It can go up to 3 meters per second now, as it scrambles over rough terrain," Full said. "And it can do that without any sensing of the environment. ... It can't see anything, it can't feel anything, and yet it's able to negotiate these incredible obstacles."

The simple mechanics of a cockroach's body also inspired the robot "sprawlita." The air-driven robot and its successors, the "sprawlettes," are the work of Mark Cutosky's lab at Stanford University.

"Are cockroaches and those kind of animals good models for building robots? If you



Stanford University's "sprawlita" may be a NASA planetary rover in the future.

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want to build small things that run very fast, yes," said Cutosky.

The six-legged sprawlita has been clocked by its makers at three body-lengths per second, and is able to overcome obstacles that reach the level of its "hip."

Potential uses in the future include planetary rovers for NASA or finding land mines for the military.

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