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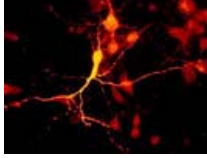


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18.01.2010



↔ **Electric Cockroach**

Researchers develop insect-like robot
By *Ralf Krauter*

Robotics .- At the challenge to design running machines that can autonomously bite even in rough terrain on their way, for many years, researchers from the teeth. But now scientists in Göttingen have been here a step further.

A nerve cell: The six-legged robot has a control that resembles a neural network. (Image: University of Magdeburg)

The videos on the website of the magazine "Nature" show a six-legged Mechanical Engineering, which is about 40 centimeters long and slowly crawls forward. We see cable, servo motors, a built-in camera and one on the back of the vehicle-mounted pocket computer. In which the brain puts the machine, says the Thai researcher Dr. Poramate Manoonpong by telephone from Kyoto.

"The inspiration for this robot was a cockroach. He has six legs, each of which has three joints that are adjusted by servomotors. In addition, the robot has a back hinge, so that he can climb over obstacles. Overall, we have 18 engines and about 18 sensors: cameras, speed sensors, inclinometers and influence so on. The information from these sensors, the behavior of the robot. "

The neuro computer Poramate Manoonpong has researched until a few weeks at Göttingen Bernstein Center for Computational Neuroscience. In an experiment carried out jointly with German colleagues, he has had to go through the six-legged robot autonomously a specific course. A course in the surprises were waiting, one of whom had no idea the machine - gradients, slopes and holes, for example. The exciting question was: Would the robot automatically adjust its behavior so that it still reaches the goal?

To give him a real chance to have the Göttingen researchers programmed adaptive control. Activate a neural network, which commands the motors in the legs of the crawler, and indeed different, depending on what the sensors report straight.

"The machine moves autonomously. If it detects an obstacle, it goes out of his way. Otherwise, they simply run forward. If it suddenly goes uphill, it changes to a slower pace. Otherwise, step in their reserves."

Such adaptive behavior is nothing new in itself. What is remarkable about the current experiments: Although the six-legged crawler, which has 18 engines is a very complex machine that is the control center of his electronic brain of only two simulated neurons, is thus extremely simple. Nevertheless, the robot learns to climb a slope in a matter of seconds, which gets him on pace to top energy-efficient, slows it down as soon as he goes down and crawls to pinpoint a source.

And even if one of his legs caught in a hole that knows how to help the robot. Thanks to a built-in chaos generator, he freed himself from himself off the hook. A nifty new feature, explains Poramate Manoonpong.

"Pressure sensors tell the robot to his feet, whether a particular foot is on the ground or not. As soon as one of the feet will not stop, solves this sensor information from a chaotic behavior. The robot starts moving randomly all his legs in order to find a way out find. And indeed, until he has somehow freed the trapped foot from the hole. "

In the experiments, the chaotic Beingezappel lasted barely 20 seconds. Then the hooked foot was free again - and went exploring.

"Of course one could use such a robot for rescue purposes, because it is work even in rough terrain. But what we really care about is the question: Can a very simple neural network to teach such a machine, adaptive behavior? That is clearly possible could be a reference for biologists, that in animals such as cockroaches, perhaps very similar to simple circuits to control their complex behavior. "

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