Device Lets Monkey's Brain Move Robot Arm

Research could one day aid amputees or paralysis victims

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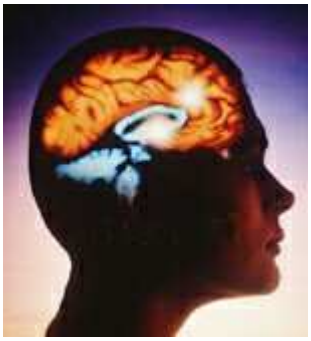
HealthDay Reporter



TUESDAY, Oct. 26, 2004 (HealthDayNews) -- Researchers have once again successfully wired monkey brains to robot arms, raising hope that science is moving closer to finding ways to help paralyzed people control their world.

Using their brains to control their robot arms, monkeys at the University of Pittsburgh were able to easily feed themselves, according to research presented Oct. 26 at the Society for Neuroscience annual convention in San Diego.

Testing in people is already under way. "It's pretty obvious that what works well in monkeys would work even better in humans," said chief researcher Andrew Schwartz, a professor of neurobiology, because people would understand the ultimate goal.

"When you're trying to teach a monkey to work a robot arm, they don't have a concept of what's supposed to happen," he said.

Researchers have spent decades exploring the possibilities of so-called "neural prosthetics" -- artificial limbs that are controlled simply by thought, not by muscles. Breakthroughs could help people with spinal cord injuries that prevent their brains from communicating with their limbs.

Among other accomplishments, scientists have successfully developed ways for monkeys to control robot arms and cursors on a computer screen.

Researchers tap into the brain through electrodes connected to miniature sensors in the cortex, which controls movement.

One major challenge is figuring out which neurons control specific actions, said Mandayam A. Srinivasan, director of The Touch Lab at Massachusetts Institute of Technology, who helped develop a similar robot-arm device four years ago.

"When we are feeding ourselves, thousands if not millions of neurons are turned on," he said. "When you put these electrodes in the cortex, you don't know which neurons you're contacting and which ones are involved in the task."

In the new research, Schwartz and his colleagues developed a mathematical formula that attempts to predict neuron activity. Using the formula, a computer analyzes activity in the brain's cortex, and then tells the robot arm what to do.

During tests, the arms of the monkey were restrained so the animal had to use the robot arm to grab pieces of food like bananas and cucumbers.

The monkeys didn't seem to mind the unusual eating arrangement, Schwartz said. "The

monkeys won't do this task unless they're really happy and comfortable doing it."

What's next? One problem is the tiny sensors in the brain that sense what neurons are doing. Over time, the body's immune system tries to wall them off, and they can become unusable, Schwartz said.

Then, there's the matter of developing a brain-controlled device that would work in people who need to do more than just move an arm.

"Our real goal is not to just make a robot arm move, but to make it move in a natural way," Schwartz said. "Say an amputee was using this device and had a long-sleeve shirt on. The fact that he had a motorized artificial arm wouldn't be noticeable."

More information

To learn more about brain-controlled devices, visit the Christopher Reeve Paralysis Foundation.

SOURCES: Andrew Schwartz, Ph.D., professor of neurobiology, University of Pittsburgh School of Medicine; Mandayam A. Srinivasan, Ph.D., director, The Touch Lab, Massachusetts Institute of Technology, Cambridge, Mass.; Oct. 26, 2004, presentation, Society for Neuroscience annual convention, San Diego

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