Mind-controlled robot arm research project receives 2012 breakthrough award

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A University of Pittsburgh School of Medicine and UPMC research project in which a quadriplegic man moved a robot arm just with his thoughts has been chosen to receive one of Popular Mechanics' Breakthrough Awards of 2012.

The magazine will honor Tim Hemmes, the trial participant who sustained a spinal cord injury in a 2004 motorcycle accident that left him unable to move his limbs, and a research team led by Wei Wang, M.D., Ph.D., assistant professor, Department of Physical Medicine and Rehabilitation (PM&R), Pitt School of Medicine, at an invitation-only conference and gala awards ceremony in New York City on Oct. 4. The project also will be featured in the November issue of Popular Mechanics, available on newsstands Oct. 16.

"When Tim reached out with the robot arm to touch my hand, everyone who was watching burst into applause and cheered," Dr. Wang said. "It was an amazing moment for him and our research team."

In the trial, a grid of sensors was placed on the surface of Mr. Hemmes' brain and the wires needed to connect with a computer were placed under the skin of his neck and chest by neurosurgeon Elizabeth Tyler-Kabara, M.D., Ph.D., of the Department of Neurological Surgery at Pitt and Children's Hospital of Pittsburgh of UPMC. Research team member Alan Degenhart, a doctoral candidate in PM&R and Pitt's Department of Bioengineering, worked with a computer program to record neural signals from Mr. Hemmes' brain while he imagined or observed arm

motion. Those patterns were used to translate his thoughts to guide the actual movement of a sophisticated robot arm, which was developed by Johns Hopkins University's Applied Physics Laboratory.

On Sept. 21, 2011 – the last day of a 30-day trial protocol before the brain grid and wiring were removed – Mr. Hemmes was able to high-five Dr. Wang, illustrating his ability to control the device in three dimensions: up/down, right/left, and in/out.

"If continued testing and development is successful, we hope that one day this technology will be able to give people who are unable to use their own arms greater function and independence," said research team member Michael Boninger, M.D., professor and chair, PM&R, and director of UPMC Rehabilitation Institute, who also will attend the Oct. 4 event. "Tim's successes in the short time period he had the device are very encouraging."

According to magazine officials, Popular Mechanics Breakthrough Awards, now in its eighth year, are given in two categories: innovators, whose inventions will make the world smarter, safer and more efficient in the years to come, and products, which are setting benchmarks in design and engineering today.

"We are once again excited to recognize this year's list of incredible honorees for their role in shaping the future," said editor-in-chief James B. Meigs in the magazine's announcement. "From a featherweight metal to the world's fastest and most electrically efficient supercomputer, this year's winners embody the creative spirit that the Breakthrough Awards were founded upon."

More information: People who have limited or no use of their arms who are interested in learning more about participating in the trial can contact research coordinator Debbie Harrington at 412-383-1355.

Provided by University of Pittsburgh Medical Center