Many hands make light work: Robotic therapy to help stroke patients

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(PhysOrg.com) -- Putting on a coat may not seem like a large achievement, but new technology that could help stroke patients do just that now makes the act an attainable goal.

University of Idaho's Eric Wolbrecht, mechanical engineering assistant professor, is developing a robotic hand exoskeleton to help stroke patients regain some mobility after suffering from a stoke

"We're talking about small changes so they can get some functionality back," he said. "But even that small improvement can mean a lot to someone."

Wolbrecht earned a $380,000, 5-year grant for the University of Idaho as part of a larger grant from the National Institutes of Health. He is working with a professor and doctor at University of California Irvine and a professor with Universitat Politècnica de Catalunya – BarcelonaTech in Spain on a larger scale project to study robotic hand therapy for persons who have suffered a stroke.

As far as Wolbrecht's participation, he and his team are building 10 tabletop robotic hand devices that will allow participants in the study to use the device for physical therapy in their homes. The tabletop exoskeleton will help patients train with several different motions, like grasp and pinch. The group is looking to use computer games and music to help make the exercises engaging and fun.

Wolbrecht said benefits of robotic therapy include repeatability in the delivered therapy, the capacity for large repetition and the ability to measure and track performance.

“A robotic hand can do something 1,000 times, but insurance doesn’t cover the expense of a physical therapist to do that,” said Wolbrecht. “I don’t expect robotics will ever replace a physical therapist, but this will help fill that need for more hours of training.”

While a robotic hand changes the rehabilitation therapy interaction from personal to machine, Wolbrecht said the use of such robotic devices will be guided by physical therapists.

The project has three aims: to define the role of correlated sensory motor activity in promoting use-dependent motor plasticity (find out how much we need movement); to identify the effect of training with increased motor output levels on motor recovery (how can the brain be rewired with movement); and to identify the effect of spared brain resources and the quantitative history of movement practice on the reserve capacity for use-dependent motor plasticity (what makes therapy effective).

As part of the grant, Wolbrecht is able to fund a doctoral student and has brought on a graduate student. Together, the project requires the development, construction and initial testing of the devices.

Once the robotic hand therapy devices are built, they will be sent to UC-Irvine for testing with patients. The patient’s ability will be measured before and after training with the robotic exoskeleton. Wolbrecht said robotic devices have been used for the last 20 years for rehabilitation, but this study focuses on determining which factors influence functional recovery.

“We’re getting into the fine aspects, like what claims can be made, the movement, the control, does the device really do more for you?” he said.

With baby boomers aging into the stroke risk age bracket and people living longer, Wolbrecht said the project has the potential to have a large impact.

“To be working on a project that helps people, where there is a specific need, is a great experience,” said Wolbrecht.

Provided by University of Idaho