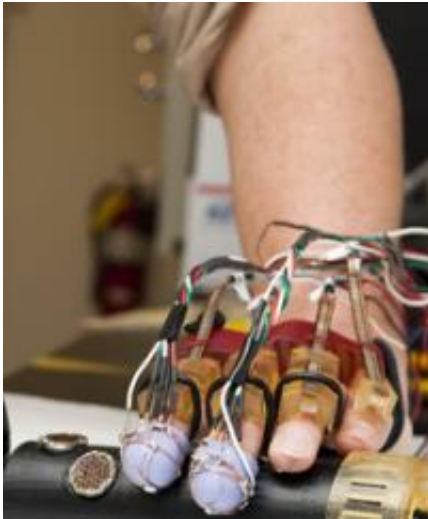


Mending the brain with a mechanical glove

February 29 2012, By Jason Kornwitz



Northeastern student-researchers have created a post-stroke rehabilitation glove designed to improve cognitive ability to complete everyday tasks. Credit: Mike Mazzanti

Northeastern University student-researchers have created a post-stroke rehabilitation glove designed to increase hand strength through finger extension and improve cognitive ability to complete everyday tasks such as picking up a glass, turning a doorknob or unscrewing a soda bottle.

The innovative device, dubbed “Excelsior,” was designed for a senior capstone project under the direction of Constantinos Mavroidis, Distinguished Professor of Engineering, and Richard Ranky, a mechanical engineering doctoral candidate. The undergraduate team members included Aaron Bickel, Abhishek Singhal, Craig Pacella and

Nisha Parekh, whose work was supported by a three-year, \$270,000 grant from the National Science Foundation.

According to the Centers for Disease Control and Prevention, some 800,000 stroke cases occur in the United States each year. Ranky said survivors require physical therapy and ongoing exercise to regain mobility and dexterity. As he put it, “A major goal for patients post-stroke is regaining their fine motor control.”

Excelsior – which was developed using 3-D additive manufacturing with embedded sensors and can be customized to fit a patient’s hand – was designed with that goal in mind.

To improve cognitive function, users match colored LEDs (light-emitting diodes) on the device’s fingertips with those on external objects fashioned into household shapes, such as cups or doorknobs.

In preparation for designing the prototype, students interviewed physical therapists at Spaulding Rehabilitation Hospital in Boston who shed light on patient needs.

Pacella, a senior mechanical engineering major, praised his group’s final design. “No other device assists with opening the hand and has cognitive exercises like this,” he said. “Most commercial hand motion rehab devices don’t use sensors to measure range of motion and control of the fingers.”

Mavroidis, who has filed a provisional patent on the glove, plans to license and commercialize the rehab device, which would cost patients approximately \$200. But there’s work to be done. “It still needs to become more user-friendly, stronger and thinner,” Mavroidis explained.

Pacella said programming and developing circuit boards for the

prototype forced him outside of his comfort zone, which, he said, would serve him well in his first professional job.

“There’s no such thing as a job in only [mechanical engineering](#),” Pacella said. “In the real world, you need to understand other disciplines, which you can only learn through experience.”

Ranky agreed, highlighting the value of experiential learning. “Working on a capstone project is different from solving a problem in class where there is only one solution,” he said. “Capstone is as close as you can get to the real world.”

Provided by Northeastern University

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