

Robotics lab helps stroke patients with recovery

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Robotics engineers at Rice University are teaming with doctors from Memorial Hermann/TIRR to develop a PC-based system for physical rehabilitation.

"It can take months of physical therapy for stroke patients to regain the use of their limbs," said system architect Marcia O'Malley, director of Rice's Mechatronics and Haptic Interfaces Laboratory (MAHI). "We hope to refine our system to allow patients to recover faster and to allow therapists to more precisely monitor patients' recovery."

O'Malley and Memorial Hermann/TIRR doctors this fall began a two-year study of a prototype rehabilitation system developed at MAHI that uses a joystick to help patients with eye-to-hand coordination. The study involved 16 patients. In one exercise, the patients use the joystick to move an object from one part of the computer screen to another. Like all the systems in O'Malley's lab, the rehab program uses force-feedback technology called "haptics" that allow people to "feel" their environment while they are in virtual reality.

The term "haptic" refers to the perception of touch, and in the prototype rehab system, the joystick is outfitted with motors that push the stick to resist moves in the wrong direction. As a result, the patient's hands are guided along the right path. By repeating the exercise over and over, patients can gradually learn to control the objects on the screen in a smooth, precise way.

"We're interested in measuring how smooth the movements are, compared to what might be optimal," said O'Malley, assistant professor of mechanical engineering and materials science. "The computer can precisely measure how a patient responds to every single exercise. This lets the doctors and physical therapists know exactly what their patient most needs to work on. This precise, measurable feedback provides a great advantage over the subjective evaluations currently in use."

O'Malley said researchers have been using computer-controlled robots for physical rehabilitation since the early 1990s, but so far the technology has been too expensive to use on a large scale. She thinks this will change within the next few years.

O'Malley said patients' enthusiasm for the technology is one reason it's likely to catch on.

"The patients who get a chance to try this tend to get very excited," said O'Malley, who has previously worked with doctors and patients from the Department of Veterans Affairs. "I've been inspired to see how hard patients are willing to work to regain their mobility, and our technology really plays to that strength. The machine never gets tired. It allows them to work as long and as hard as they want."

Source: Rice University

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