

Virtual environment tool helps patients with balance issues

September 30 2010, By Renee Cree

Since 2006, Temple's Virtual Environment and Postural Orientation (VEPO) Laboratory has been helping patients with balance and spatial orientation issues find other ways to walk and stand upright using virtual reality.

About 6.2 million Americans suffer from chronic dizziness or imbalance, two major disorders related to the vestibular system, which controls balance and orients the body in space. Over the summer, students from across Temple had the opportunity to help some of these patients, by designing technological applications for use in the VEPO Lab.

Jeremy Norman, a kinesiology senior, was interested in extending the clinical application of GVS, or galvanic vestibular stimulation, which applies [electrical stimulation](#) to the vestibular system. Norman used a device worn by patients in the lab that sends a very low-voltage electric current from the back of the ear through the head and causes the patient to sway involuntarily.

“It hasn't been used for treatment of balance before, but there could be applications that will help physical therapy patients by testing differences in the vestibular system versus visual cues and their effect on balance,” he said.

Jason Buranich, an electrical engineering senior, designed a pair of vibrating flip flops that can be worn in the “cave” - a virtual environment

in which patients wear 3-D glasses and interact while standing on a shifting platform surrounded by three large screens. A harness supports patients in case of a fall.

“The idea behind this is to test how the differences between the [vestibular system](#) and feedback from the feet and legs affect balance, and what those differences are between older and younger people,” he said.

Greg Teodoro, who will begin the master’s program in Computer Information Sciences this spring, worked on the Avatar project. Existing software uses a computer-generated face, or avatar, to help aphasia patients practice language skills. Teodoro and other students modified the face, enabling it to reflect any age, race, or ethnicity. They are also working on a program that will enable the avatar to talk directly to patients, and hope that one day patients will be able to use it on their home computers.

The current standard of treatment for aphasia patients is role playing with a speech therapist, but “changing the race, age and ethnicity of the avatars will hopefully make the patient more comfortable and will give them a more realistic example of how to emulate the sounds and the way the mouth moves,” said Anicha Malloy, a recent speech-language-hearing graduate who worked on the Avatar project.

One of the most complex VEPO projects involved creating a 3-D replica of Temple’s campus for the cave. Standing on the moving platform, outfitted with 3-D glasses, the patient takes a virtual tour of Broad Street. He passes by the Pearson and McGonigle complex, turns down Pollett Walk, and ends inside the Baptist Temple. Recent architecture graduate Ray McClane, and Adam Gerbert, a Computer Information Sciences senior, worked on the project.

“Rather than practicing in a [virtual environment](#) designed to look like a room or a hallway, in this scene the patient encounters buildings on either side of them and cars coming down the street,” said VEPO Lab director Emily Keshner, chair of the Physical Therapy department in the College of Health Professions and Social Work. “It gives them a more complex, real-world practice scenario.”

Funding for the student projects came from the government stimulus grant, to further the efforts of Keshner’s initial parent grant from the National Institutes of Health, which is to study the use of virtual reality to examine balance issues in the elderly and stroke victims.

“Working with virtual reality requires computer programming skills, so we initially reached out to Justin Shi in (Temple’s) Department of Computer and Information Science to recruit students,” said Keshner. “The extra funding allowed us to reach out to other departments and recruit students from kinesiology, engineering, architecture and communication and speech sciences.”

Provided by Temple University

Citation: Virtual environment tool helps patients with balance issues (2010, September 30) retrieved 7 May 2024 from

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