

# Wii key to helping kids balance

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Custom sensors built by Rice engineering students are part of the active handrails that provide force feedback on how heavily patients are depending on their arms as they perform balancing tasks on the Wii boards. Credit: Jeff Fitlow/Rice University

By cleverly linking five Wii Balance Boards, a team of Rice University undergraduates has combined the appeal of a video game with the utility of a computerized motion-tracking system that can enhance the progress of patients at Shriners Hospital for Children-Houston.

The Rice engineering students created the new device using components of the popular Nintendo game system to create a balance training system.

What the kids may see as a fun video game is really a sophisticated way to help them advance their skills. The [Wii](#) Balance Boards lined up between handrails will encourage patients age 6 to 18 to practice their balance skills in an electronic gaming environment. The active handrails,

which provide feedback on how heavily patients depend on their arms, are a unique feature.

Many of the children targeted for this project have cerebral palsy, spina bifida or amputations. Using the relatively inexpensive game console components improves the potential of this system to become a cost-effective addition to physical therapy departments in the future.

Steven Irby, an engineer at Shriners' Motion Analysis Laboratory, pitched the idea to Rice's engineering mentors after the success of last year's Trek Tracker project, a computer-controlled camera system for gait analysis that was developed by engineering students at Rice's Oshman Engineering Design Kitchen (OEDK).

The engineering seniors who chose to tackle this year's new project -- Michelle Pyle, Drew Berger and Matt Jones, aka Team Equilibrators -- hope to have the system up and running at Shriners Hospital before they graduate next month.

"He (Irby) wants to get kids to practice certain tasks in their games, such as standing still, then taking a couple of steps and being able to balance, which is pretty difficult for some of them," Pyle said. "The last task is being able to take a couple of steps and then turn around."

"This isn't a measurement device as much as it is a game," Irby said. "But putting the two systems together is what makes it unique. The Wii system is not well suited to kids with significant balance problems; they can't play it. So we're making something that is more adaptable to them."

The game requires patients to shoot approaching monsters by hitting particular spots with their feet as they step along the Wii array, computer science student Jesus Cortez, one of the game's creators, explained. The game gets harder as the patients improve, he said, and the chance to rack

up points gives them an incentive.

A further step, not yet implemented, would be to program feedback from the handrails into the game. Leaning on the rails would subtract points from the users' scores, encouraging them to improve their postures. The [game](#) would also present challenges specific to younger and older children to keep them engaged.

The programming team also includes undergraduate Irina Patrikeeva and graduate student Nick Zhu. Studio arts undergraduate Jennifer Humphreys created the artwork.



Team Equilibrator combines engineering, computer science and art students in a project that uses Wii Balance Boards, a handrail sensor system and custom game software to help patients at Shriners Hospital for Children-Houston develop their balance. Clockwise from left: Matt Jones, Drew Berger, Jesus Cortez, Nick Zhu, Irina Patrikeeva, Michelle Pyle and Jennifer Humphreys. Credit: Jeff Fitlow/Rice University

The system's components include a PC, the Wii boards (aligned in a frame) and two balance beam-like handrails that read how much force patients are putting on their hands. Communications to the PC are handled via the Wii's native Bluetooth protocol.

The students said their prototype cost far less than the \$2,000 they'd budgeted. Rice supplied the computer equipment and LabVIEW software they needed to create the diagnostic software that interfaces with Shriners' existing systems, and they purchased the Wii Balance Boards on eBay.

"Small force plates that people commonly use for such measurements cost at least a couple of grand, but Wii boards -- and people have done research on this -- give you a pretty good readout of your center of balance for what they cost," Pyle said.

Jones, who is building the final unit for delivery to Shriners, said he wants patients to see the Wii boards. "We're putting clear acrylic over the boards so there aren't any gaps that could trip up the younger ones," he said. "We wanted to use a device that's familiar to them, but they might not be convinced it's a Wii board unless they can see it."

Provided by Rice University

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