

# WHEELCHAIR SAFETY CHAMP

Flip through the pages of visiting professor Linda van Roosmalen's personal lab notebook and you'll find sketch after sketch and schematic after schematic of wheelchairs, casters, ratcheted restraint systems, and passenger retention devices and lots of notes and hasty scribbles—all aimed at capturing what she describes as a "slew" of new ideas in wheelchair transportation safety.

Van Roosmalen, a visiting assistant professor in the Department of Rehabilitation Sciences and Technology in Pitt's School of Health and Rehabilitation Sciences, brought many of those ideas to life in her lab on Pittsburgh's South Side. There, she and her research team have pieced together and then tested wheelchair docking stations, vehicle-mounted retention arms for public transportation, and countless other innovations. She recently left the University to start a company around some of her innovations.

Among her team's latest innovations was a forward-facing wheelchair containment and occupant retention system for large accessible-transit vehicles. The system is designed to prevent the chair and passenger from tipping sideways or otherwise moving in the event of sudden turns or stops by the vehicle. This technology has been licensed to a company for commercial development.

Another recent submission for commercial consideration was an accessible seat belt system in motor vehicles for people with limited dexterity and arm function. The system allows individuals to drive independently into a pre-buckled, vehicle-mounted seat belt system, without the need to buckle the pelvic and shoulder belts physically.

In pursuing her research, van Roosmalen describes herself as more of a designer than a researcher. "But I need the research to design technologies that are safe and functional," she says. "I do user research. I research people, and I like to study the interaction between products and people."

She attributes some of her design roots to her father, a civil engineer and part-time artist who designed buildings, prisons, bridges, and other concrete structures in his native Netherlands.

"I wanted to do something with colors and shapes, but I also loved solving problems," van Roosmalen says of her youth.

She moved to Pittsburgh in 1997 after graduating from Delft University of Technology in Delft, the Netherlands, with BS and MS degrees in industrial design engineering. She then earned her PhD in rehabilitation science and technology at Pitt. She focused her studies on product and system ergonomics, which then evolved into wheeled mobility and transportation safety.

Van Roosmalen says that her research philosophy is simple: "I believe we can design technologies that take human error out of the equation" when it comes to developing safe technology for use by all. Each term, she teaches that perspective to groups of bioengineering and rehabilitation science and technology students who, as part of

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their course work, must solve real-world problems with their own innovative ideas.

"What I like to teach my students is to do useful research and go through a series of structured steps in the design process," van Roosmalen says. "They need to observe. They need to look at people. Then they need to go from functional analysis to innovation."