

PM Network®

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The Wheelie 7 kit turns most existing wheelchairs into AI-powered machines controlled by the users' facial expressions (inset).

Smart Wheels

Wheelchair design has remained stagnant for decades. That's a problem, considering people with disabilities still can't always access everyday infrastructure. In Paris, France, for instance, only nine of 303 underground stations are fully accessible for wheelchair use. But recent technological advances are forging a new generation of wheelchairs that promises much greater accessibility, even for people with severe physical limitations.

The Wheelie 7, developed by Hoobox Robotics and Intel, allows users to control a wheelchair with facial expressions. The first next-gen offering to hit the market, it was made commercially available for lease in March at US\$300 per month. In India,

the Self-E wheelchair developed by students at Amrita Vishwa Vidyapeetham University in Tamil Nadu uses autonomous navigation and laser sensors to help users navigate terrain via a smartphone app.

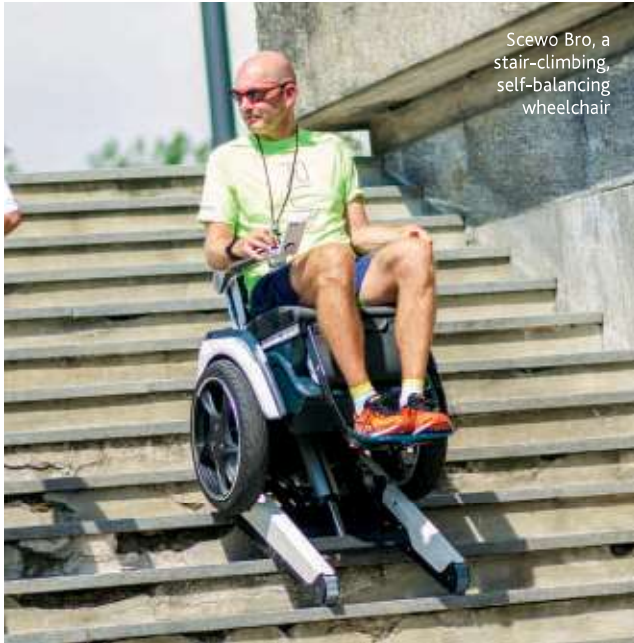
But costs remain a major barrier. In September, Switzerland-based Scewo unveiled a stair-climbing, self-balancing wheelchair prototype priced at CHF35,500.

"The Wheelie is a great example of how a company can use artificial intelligence not only to build a high-precision solution, but also to bring the final cost of it down," says Dandara Andrade, vice president of production, Hoobox, São Paulo, Brazil. One of the ways the project team kept final costs low, for instance, was to ensure that the entire system used a single light detection and ranging sensor, she says.

Seeking input from future users and iterating on their feedback can also lower costs—and help project teams ensure they're developing a product users need.

Trailblazers

Unlike other products, the Wheelie 7 is not a stand-alone wheelchair. Instead, a kit turns most existing wheelchairs into an AI-powered machine through the addition of a camera, which enables movement through facial expressions.



Scewo Bro, a stair-climbing, self-balancing wheelchair



Students at Amrita Vishwa Vidyapeetham University in India developed the Self-£ wheelchair.

The team took an iterative approach on the US\$1 million project from its onset in 2016, baking user feedback and subsequent product updates into the schedule. (The project was backed by a private investor and received grants from the São Paulo Research Foundation.) Working closely with future users on the design helped vet features, curb costs and keep the project within its scope, Ms. Andrade says.

“The advantage of developing a user-centered product from the beginning was that we did not spend time and money developing unnecessary features for the product, which is very common for this kind of solution,” Ms. Andrade says.

After spending six months building the prototype, the team held workshops around the U.S., its target market, to build interest among disabled war veterans. The company gave veterans free prototypes so they could test the technology and provide input on what features would be useful.

“This way, we made sure the common needs of the users were always a priority,” Ms. Andrade says. This strategy also helped market the product: For every kit given away for free, Ms. Andrade says the company acquired roughly three new clients.

The team conducted regular surveys to collect feedback. Ms. Andrade estimates that the project



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—Dandara Andrade, Hoobox, São Paulo, Brazil

team spent an hour each month with each user to gather input on the solution and hardware design. “When a large number of people pointed out a specific feature as necessary, the team and our testing group analyzed the request to make sure the feature was technologically viable and that it was not going to interfere negatively on the schedule, market position or manufacturing of the product,” Ms. Andrade says. For instance, some users asked that Hoobox’s technology give users the ability to control other electronic devices in the home. But the team found that providing such a feature would push back the schedule too far and be too costly at the time.

Ultimately, as a result of user feedback, the team decreased the size of the unit that controls the wheelchair joystick and introduced technology that recognizes more smiles, including a half smile. Ms. Andrade credits this approach for the Wheelie becoming available within two years of the project’s launch and for its more affordable price point.

“The Wheelie is worth pursuing because it changes the lives of the users by giving not only mobility but autonomy and freedom, improving their quality of life, and opening a new world of interactions for both the users and their families.”

—Ambreen Ali