Life is a Highway
New technology allows wheelchair users to drive traditional automobiles

By Lauren Himiak

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Typically, wheelchair users who would like to continue to drive are forced to convert their vehicles, which can be very involved and expensive. Common modifications range from lowering or replacing the vehicle floor to relocating the fuel tank and moving fuel lines. Changes such as these are permanent and can decrease the resale value of the vehicle.

Even worse, those seeking self-sufficient mobility typically drive while sitting in their wheelchairs. This can be a safety hazard as the chairs may be inadequately secured. But there could be a new solution.

The Automated Transport and Retrieval System (ATRS) is creating a lot of buzz as a new way to allow wheelchair users to drive or ride as passengers more safely but at a lower cost.

What is ATRS?
ATRS was an idea born out of Cook Technologies Inc., the parent company of Freedom Sciences LLC—a Philadelphia-based robotics company, after Cook started its Freedom Lift division in 2002. Freedom Lift manufactures high-quality, value-added mobility lifts through a nationwide dealer network. By 2004, Freedom Lift was looking to expand into a larger market, van conversion, so it developed a research and development team to create a better technology-driven approach to independent personal transportation.

The team consisted of members from Cook/Freedom Lift, Lehigh University, Carnegie Mellon University and the University of Pittsburgh. After collaborating and demonstrating their idea, ATRS was created and is expected to go to market with the first commercial version of the system in September.

This new system is so unique because it not only allows power wheelchair users to get in and out of their vehicles while completely stowing and retrieving the power wheelchair remotely, but also lets users drive while sitting in a standard vehicle seat.

“Let’s say you are a wheelchair user and want to drive a traditional automobile,” suggested John R. Spletzer, PhD, assistant professor at Lehigh University. “You would have to transfer from the wheelchair to the vehicle seat somehow, then stow the wheelchair inside the automobile. If you have a power wheelchair this is not feasible. Instead, you normally have an attendant who takes the wheelchair for you to the rear of the vehicle, drives it onto the wheelchair lift and stows the lift. Then he gets into the car and you drive away. Now imagine that the wheelchair would just drive by itself to and from the lift platform at the rear of the vehicle. You would no longer need an attendant. This is the premise of ATRS.”

How Does It Work?
ATRS is comprised of three key components: the Freedom Seat, an articulating automotive seat that extends outside the vehicle to facilitate wheelchair-to-vehicle transfer; the Tracker, a power lift platform that lifts the
wheelchair in and out of the vehicle; and a “smart” wheelchair and laser guidance system.

First, the wheelchair user moves the chair next to the driver’s side of the vehicle. Using a remote-control device, he opens the vehicle door and instructs the vehicle to lower the driver’s seat alongside the wheelchair. Next, he will slide over from the wheelchair into the driver’s seat. Once in the driver’s seat, he can deploy the power lift platform from the rear of the vehicle by touching a button.

The driver then uses a joystick for remote control to guide the empty wheelchair to the rear of the vehicle. There, the chair is switched to autonomous mode, and drives itself onto the lift platform using position feedback from an integrated laser system. The lift platform then raises and stows the chair in the back of the van.

Lastly, the driver presses another button to raise the driver’s seat up into the vehicle, securing a normal driving position. Upon arrival at the driver’s destination, the entire procedure is reversed.

“There is nothing on the market like ATRS,” stated Tom Panzarella, chief technology officer at Freedom Sciences LLC. “When we demonstrate our system at consumer trade shows and get to interact with our potential customers, the looks on their faces and hopes of complete independence is what it is all about for me. I want to change people’s lives and ATRS will do this for many.”

“I believe ATRS will provide a safer, more cost-effective alternative to van conversions for drivers or passengers in wheelchairs,” added Dr. Spletzer.

**Does It Beat The Competition?**

Although the primary target market for the ATRS is individuals in power wheelchairs who have the upper-body strength to perform a seat-to-seat transfer, it has much to offer.

“The system will give these individuals complete independence,” Panzarella noted. It will also be helpful for caregivers as a means to cut down the time it takes to get into a vehicle. “The current solution for independent automobility is a van conversion,” said Dr. Spletzer. But ATRS allows for a less expensive, yet safer alternative. By comparing the typical van conversion to ATRS, Panzarella pointed out many differences.

With a van conversion, there is a higher cost of ownership and resale value is significantly reduced due to structural modifications. When it comes to the interior of the automobile, a person with limited mobility typically sits in a wheelchair that is merely strapped into a vehicle. This forces the airbag system to be disengaged, something that increases the risk of injury or fatality in an accident.

Wheelchair users who want to drive are also limited to their automobile selection as minivans are most commonly modified.

With ATRS, there is a significantly lower cost of ownership. This is because the system is transferable from vehicle to vehicle and the vehicle will have a much higher resale value as it can be restored to its original condition easily because no modifications need to be made to the vehicle to install ATRS. Panzarella also pointed out the system’s superior safety.

“A person with limited mobility can now ride in the fully crash-tested Freedom Seat and the wheelchair is secured using our proprietary Dock ‘N’ Lock system,” he stated. “All of this means that the airbag system can remain engaged.”

ATRS allows for a much wider range of vehicle selections because no structural modifications need to be made to a vehicle. Drivers can choose from vans, minivans, SUVs, pickup trucks and crossovers. Also, drivers may purchase the components of the system separately to spread the cost over time and provide more assistance if a disability progresses.

**Just the Beginning**

“There are many opportunities to apply robotics and automation technologies for purposes of enhancing the quality of life of individuals,” stated Panzarella.

He and others working on the product believe that it will continually improve. In 2008, Freedom Sciences plans to release an add-on to the ATRS called “Round Trip Technology,” which will eliminate the need to use the joystick while the chair is docking or undocking. The company is also working on a product to eliminate the seat-to-seat transfer.

The Automated Transport and Retrieval System will be available for purchase in September, though pricing is not yet finalized. Panzarella expects the complete solution to be available for approximately $25,000 to $30,000, which will include the seat, lift, robotics and all dealer costs.

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