



Can Shared Automated Vehicles Open New Transportation Options for People with Disabilities?

Shared Automated Vehicles (SAVs) could serve as safe and independent transportation option for older adults and people with disabilities. Inclusive SAV design can promote improved safety, participation in social activities, and quality of life. Unfortunately, early SAV deployments in the US have tended not to be designed **with people with disabilities in mind**.

Researchers from the University of Michigan worked to add more accessibility features to **an existing 4-passenger SAV (SAE Level-4)**. They assembled a team including researchers familiar with accessibility and subject matter experts, such as individuals with **mobility and sensory impairments**.

The team recommended these **key modifications**:

- Installing an **automated access ramp**
- Increasing the available **floor space** on-board
- Installing a **securement system** for wheeled devices and their occupants

Challenges

Researchers wanted to modify the SAV to exceed requirements set by the **Americans with Disabilities Act**. In the end, some changes couldn't be made without **compromising the structural integrity of the vehicle** and some modifications introduced **new usability concerns**.

Why?

- People who had mobility issues but did not use a wheelchair had difficulty using handrails to board the low height SAV. They chose to use the ramp.
- Seats were changed to smaller flip-up seats, with one seat becoming side-facing. These modifications negatively influenced usability and comfort.
- Only a four-point securement system was feasible, not an automated one. The user of the system needed an attendant to secure them in place.

According to the *American Association of People with Disabilities*

500,000+

people with disabilities **never** leave their homes due to

LACK OF TRANSPORTATION

What is a Shared Automated Vehicle (SAV)?

Shared automated vehicles (SAVs), a.k.a. automated or driverless shuttles, are a type of low-speed automated vehicles that can be used by two or more passengers at the same time.





Call To Action

- Automated vehicle manufacturers should incorporate accessibility considerations early in design and could simply be achieved by engaging people with disabilities into their design teams and organizations.
- There are no federal accessibility guidelines specific to the design of SAVs. Stakeholders should contact their representatives and request that this issue be included in the next legislative session.

SNAPSHOT INTO THE RESEARCH

Accessibility Retrofit of a Shared Automated Vehicle: Challenges and Lessons Learned. *Proc Hum Factors Ergon Soc Annu Meet.* (2021). DOI: 10.1177/1071181321651168; PMID: 34421289; PMCID: PMC8375518. Kamolnat Tabattanon, Clive D'Souza



Goal of the Study

To make retrofit modifications to the physical design/structure of a SAV, recounting the processes involved and lessons learned.

Findings

The modified SAV did not fully comply with minimum requirements specified by the ADA accessibility guidelines. However, these dimensions were less than the recommended dimensions for maximizing inclusion.

The modifications brought some changes in core vehicle features, space availability, and occupancy. The space and weight capacity supported one occupied manual wheelchair along with one to two (ambulatory) passengers. In this case, very little legroom on-board remained. Four ambulatory passengers could be

accommodated without a wheelchair on-board.

Solutions

Researchers recommended that the usability needs of all potential users be incorporated early in the design planning. Retrofitting vehicles for usability leaves many problems unaddressed and can even create additional concerns.

To minimize feelings of physical and psychosocial distress on the part of the users, the authors of the study recommend the following:

- Strive to accommodate the diverse range of passenger abilities from the project start.
- Design automation with user independence (autonomy, safety and usability) in mind.
- Avoid design choices that stigmatize users.
- Allow for trips with companions, both animal and human.

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