UTC Spotlight
University Transportation Centers Program
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U.S. Department of Transportation, Research and Innovative Technology Administration

This monthly report from the University Transportation Centers Program highlights some of the recent accomplishments and products from one of the University Transportation Centers (UTCs) managed by the U.S. Department of Transportation's Research and Innovative Technology Administration.

Travel Assistant Device (TAD) Aids Transit Riders with Special Needs

Passengers with cognitive disabilities have difficulty using public transportation and often must travel with a personal assistant to ensure that they get to their destinations. But recent advances in mobile technology may soon lessen the need for such assistance. Global Positioning System (GPS)-enabled cell phones are being used for a variety of novel services based on the phone's ability to pinpoint geographic locations. One such service is the Travel Assistant Device (TAD), a software system designed to aid transit riders with special needs. Developed by faculty members at the National Center for Transit Research at the University of South Florida, TAD provides the riders with customized real-time audio, visual, and tactile prompts to aid them in their travels.

Sean Barbeau, CUTR

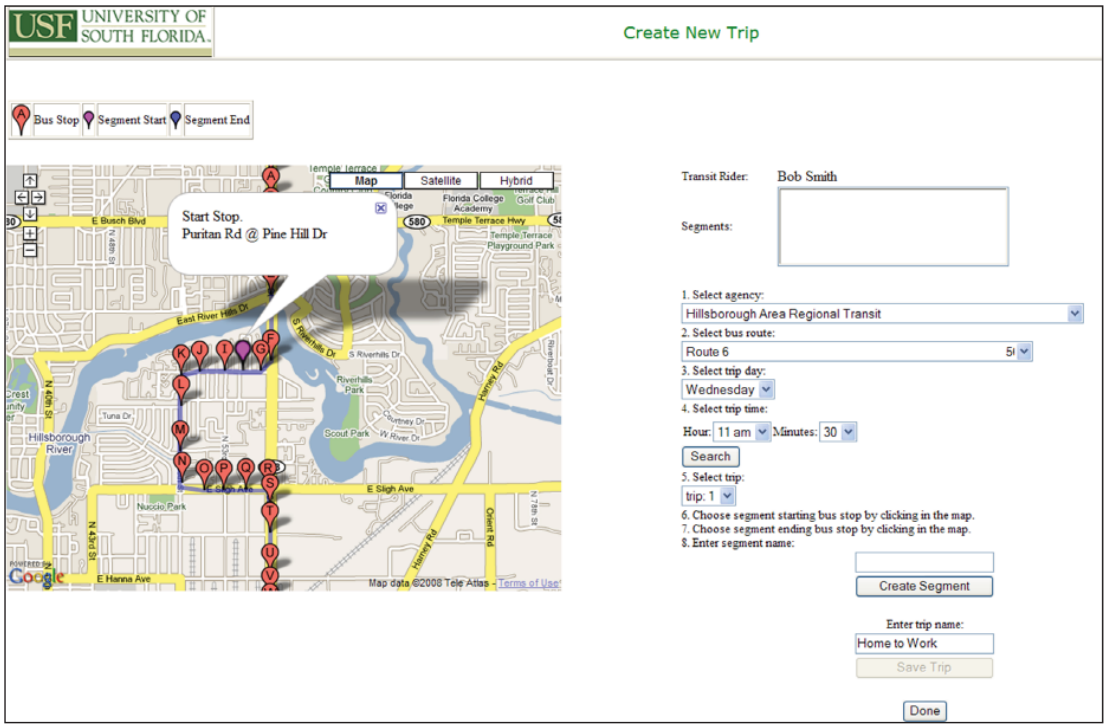
Mark Sheppard, HART's travel trainer, shows his trainee the travel assistance device (TAD) application on his cell phone.

The goal of the Americans with Disabilities Act (ADA) is to provide equal opportunity, full participation, and independence to persons with disabilities. However, for the cognitively impaired, the inability to travel, or the lack of knowledge in accessing available transportation, frequently translates into difficulty finding employment, seeking medical services, and participating in educational or vocational training.

Skilled travel trainers teach people with cognitive disabilities to read a bus schedule, pay the fare, plan and practice transit trips, and develop other skills needed to effectively and confidently use a transit system. Any tool a travel trainer can use to help a trainee become confident in possessing and using these skills lessens the burden of caregivers; frees up time for trainers, who can then turn their attention to others in need; and advances the mission of the ADA.

TAD provides the rider with customized audio, visual, and tactile prompts. For example, TAD could be used to signal the rider when they should exit the transit vehicle by literally announcing "Get ready..." and "Pull the cord now!" Future versions of TAD could utilize Bluetooth™ wireless headsets so that audio would be heard privately by the rider through a headset, something that field test participants stated would be preferable.

Additionally, the TAD system provides alerts to the rider, caretaker, and travel trainer when the rider has deviated from their planned route. A website allows easy access for the creation of



User interface for adding, changing, or deleting transit trip itineraries for uploading to the rider's cell phone for use by the travel assistance device software. The travel trainer or administrator chooses the desired bus route as well as the date and time when the trip will be taken. A single trip may span more than one bus route and involve transfers between buses.

new trip itineraries and allows the monitoring of the rider's location by authorized personnel in real-time from any computer. While TAD was designed to aid transit riders with special needs in order to increase their level of independence, any transit rider can benefit from its service—particularly those who are new to a transit system or are uneasy using it.

To date, qualitative results indicate that TAD works precisely and is able to deliver notifications to the user in the exact location chosen by the travel trainer via the web page. After overcoming institutional barriers and putting research subject protections in place, limited field tests with six cognitively disabled young adults successfully demonstrated the proof-of-concept of the TAD system.

Trip planning functionality could eventually be integrated into the TAD website, e.g., using Google Transit software, eliminating the need for prior knowledge of a bus system's routes and schedules to set up a trip. Using a source and destination address, software would automatically plan a trip and set up the proper routes and schedules for download by the TAD mobile application.

While TAD is usually able to alert the rider at the appropriate time, both bus stop detection and alert triggering algorithms should be enhanced to avoid giving alerts that are close to, but not exactly at, the desired stop. The current algorithm provides some alerts in locations that require very fast rider reaction time in requesting a stop before the bus passes the destination stop. Advanced bus stop detection algorithms should give the rider ample notification without giving the alert too soon. In the future, tools such as Google Earth™'s Streetview, which provide a first-person perspective of the street at the bus stop location, should prove very useful to travel trainers in remotely viewing the potential destination of a transit rider's planned trip.

Integrating TAD into travel training curriculums will require input from multiple parties, including special education professionals and travel trainers. The tracking feature and automated route deviation alert are designed to aid the travel trainer and/or guardian in case the rider becomes lost; however, trainers should adequately prepare the rider for such an occurrence. TAD has the potential to significantly improve the lives of people with cognitive disabilities by improving their ability to travel independently. Independent travel enhances their ability to be contributing members of society by getting disabled individuals to work, school, or wherever they might need or want to go.

About This Project

DOT invests in the future of transportation through its University Transportation Centers Program, which awards grants to universities across the United States to advance the state-of-the-art in transportation research and to develop the next generation of transportation professionals. The DOT grant supporting this research was awarded to the National Center for Transit Research that is located at the Center for Urban Transportation Research at the University of South Florida in Tampa, FL, where Joel Volinski (Volinski@cutr.usf.edu) is NCTR Director. The project was partially funded by the Florida Department of Transportation (FDOT). Sean Barbeau, research associate, CUTR, was the principal investigator for this project. His team includes: Philip L. Winters, TDM Program Director, CUTR, Nevine Labib Georggi, Senior Research Associate, CUTR, Miguel Labrador, PhD, Computer Science and Engineering, USF, Rafael Perez, PhD, Computer Science and Engineering, USF, and Computer Science and Engineering Students: Alfredo Perez, Dmitry Belov, and Milena Sarmiento. Amy Datz, State Transit Environmental Facilities Design Program Manager of the FDOT Public Transit Office was project manager. A copy of the final report can be found at ttp://www.nctr.usf.edu/abstracts/abs77711.htm.