Automated Last Mile Connectivity for Vulnerable Users

Abstract

The primary objective of this project is to evaluate the real-world usability and potential benefits of an Automated Last Mile Shuttle (ALMS) system. This research would be targeted specifically towards usability by vulnerable road users (VRU) such as seniors and the disabled. New and innovative methods of expanding public transportation access to VRUs are needed to ensure equitable and appropriate mobility while allowing transit operators to improve the sustainability of their operations. Based on how heavily VRUs are leveraging fixed-route transit options, one approach is to develop first and last mile (i.e., "Last Mile") solutions that improve bidirectional access between users' homes and destinations and existing fixed-route nodes. ALMS mobility systems have been proposed to provide VRUs with efficient, convenient, and timely on-demand access to existing fixed-route transit systems. The primary components of these systems are driverless shuttles and the scheduling and routing environment that controls their automated operation. Highly accessible, low speed, and environmentally-friendly electric vehicles that are homed and charged at transit stops are envisioned for this application. The central control system would operate in a highly connected environment and rely upon data from those requesting a ride, fixed-route buses, shuttles, and traffic control centers for determination of routing and scheduling.

This work will be conducted in multiple phases over 3 years and will employ a variety of methods to meet research goals. Data collection is planned in Blacksburg, VA and Greensboro, NC to include the spectrum of varying transit and mobility characteristics from small college town to larger metro area, respectively. The first year's work will culminate in pilot testing of the ALMS at an off-road test site in Blacksburg that is served by the local bus transit system. Other first year milestones will include literature review and development of test methods, survey, and focus group activities. Subsequent phases of work will expand to other areas, include more participants, and will operate under additional scenarios.

VRU participants will be recruited for evaluation of ALMS usability. Data collection methods for on-road study will include naturalistic, and potentially experimental, methods. Additionally, pre- and post-testing surveys will be used to aid in system development and for usability evaluation. These may include self-reported rankings, researcher interviews, and focus groups. An associated ride request and scheduling system would be developed for use by participants. Development of this system would benefit from parallel UTC work being conducted to evaluate human-machine-interfaces (HMI) for VRUs. The potential benefits of implementation of an automated shuttle system will also be analyzed. The literature and other sources will be used to determine the baseline operating parameters with respect to the operational costs and environmental impacts of those systems currently in use and the automated shuttle systems that are proposed for future deployment. Rider level-of-service as defined by the Federal Transit Administration (FTA) or another more relevant metric will be used as a basis for comparison.

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