

Research Project Name: Operational Innovations for Efficiency and Accessibility of On-demand Mobility in Rural Areas
Recipient/Grant (Contract) Number: 69A3552348321
Center Name: Rural Safe Efficient Advanced Transportation (R-SEAT) Center
Research Priority: Preserving the Existing Transportation System
Principal Investigator(s): Yanshuo Sun, Ren Moses
Project Partners: Jacksonville Transportation Authority (JTA); IT Curves
Research Project Funding: \$73,866 (Federal request); \$36,933 (Non-Federal cost share)
Project Start and End Date: June 1, 2024 – May 31, 2025
Project Description: Unlike the fixed-route transit service, microtransit can thrive in rural and suburban areas with low demand density, because its operation is tailored to individual travel plans. Therefore, microtransit has great potential in improving mobility and accessibility for certain individuals in rural areas. Although many researchers have investigated how microtransit vehicle schedules and routes can be optimized, it is widely assumed that travel requests submitted by individual riders are accommodated independently, without exploring any coordination among riders. The proposed project aims to relax this assumption and test the hypothesis that a microtransit operator can significantly improve the operational efficiency (measured by the vehicle occupancy) by merely adjusting the requested pickup time windows through a process named <i>rider schedule coordination</i> . The following research tasks are proposed under this project: conducting a comprehensive review of individual decision-making coordination in microtransit, formulating and solving a mathematical program for schedule coordination, and deriving insights from extensive numerical studies and case studies. This project, once completed, can improve the microtransit accessibility for residents in rural communities and reduce the service delivery cost for the operator, both of which are well aligned with the center's themes.
US DOT Priorities: The proposed research project is directly related to the key themes of REAT, because it seeks to addresses the research needs of on-demand microtransit operators, especially those provide services in rural areas. From the riders' perspective, it is expected that individuals in rural communities would gain improved access to activity centers such as school, employment, and medical opportunities, thus promoting mobility and accessibility. From the operator's perspective, due to the low demand density, the average vehicle occupancy of microtransit could be very low, which means an unsatisfactory operational efficiency. The proposed rider schedule coordination method can directly improve the microtransit vehicle utilization and reduce the microtransit operating cost while serving all rider requests. This project, once successfully completed, can help increase economic efficiency, and stimulate transformations in microtransit.
Outputs: This project will yield the following outcomes: an in-depth review of the scholarly literature on rider behavior coordination in on-demand microtransit, an efficient optimization algorithm for supporting the implementation of the proposed rider schedule negotiation approach, and some key policy insights into the real-world deployment of rider schedule negotiation in microtransit, discovered through numerical studies under this project.



The research team will complete a final project report and prepare technical articles for peer-reviewed journals to disseminate the research findings.

Outcomes/Impacts: Research Tasks 1-3 have been completed as of Jan 2025. The research team is working on Task 4. One journal paper is under preparation, which will be submitted to Transportation Research Part A for publication by April 2025.

Final Research Report: N/A