

Request for Research Funding for FY 2020-2021			
Requesting Office	Public Transportation	Priority	1 of 1
Proposed Title	Examining data needs and implementaion process of AV-based microtransit service: A case study in Lake Nona		
Justification	<p>Autonomous Vehicle (AV) technology offers a great promise to enhance transit services, reduce operation costs and attract new riders. But implementation is not easy, and there may be unforeseen issues and problems in the planning and implementation process, there is also a lack of quantifiable benefits or impacts from an AV-based microtransit service that is actually implemented.</p> <p>In Florida, a great opportunity has arisen to document the issues in the planning and implementation of AV-based micro-transit system. In November 2019, Orange County won a \$20 million grant from the U.S. Department of Transportation to create a Local Alternative Mobility Network (LAMN) to provide better mobility options in order to reduce the dependency on cars in southeast Orlando’s Lake Nona community. The grant will support the planning, design and construction of critical infrastructure for the components like shared mobility lanes and 20 self-driving vehicles, which is a huge investment for AV-based microtransit in the state of Florida. This is a rare opportunity to develop the evaluation framework and start to collect some baseline data in order to quantify the impacts after the project is implemented in the near future and present the lessons learned in the implementation process for other transit agencies in the state of Florida and to the nation.</p>		
Impact	<p>The success of this federal funded BUILD (Better Utilizing Investments to Leverage Development) grant project (hereafter BUILD grant) will have important impacts on the future AV-based microtransit development in the state of Florida. Therefore, it is important to document the full planning and decision-making process and collect baseline information in the Orange County area before the implementation. This is very timely given the grant is just awarded. This proposed research project will collect baseline information for future BUILD grant evaluation, it will also monitor, document and evaluate the lessons learned in the implementation process of AV-based microtransit services, which will be beneficial to other municipalities in Florida and the entire United States.</p> <p>Though many studies have been conducted to assess the impact of AVs or AV-based microtransit, few research work has examined the problems in implementation and the benefits or drawbacks of real-life AV-based micro-transit system. This proposed research project will address some fundamental questions such as:</p> <ul style="list-style-type: none"> a) what does it take to successfully implement an AV-based microtransit system by examining organization issues, infrastructure issues, safety issues, technology issues, and financing issues; b) what are the impacts on transit riders (e.g., mode shift, ride changes, and service satisfaction), neighborhood residents (e.g., attitude toward and usage of AV-based microtransit), communities (e.g., residents’ location choices and perceptions of livability), and transit agencies (e.g., impacts on operation management, maintenance, budget implications). 		
Affected Offices	<p>Identify any office and names of office personnel that will need to be involved in the scoping or conduct of the research, will be affected by implementation of the results, or will need to participate in the implementation process—including OTIT, if enterprise data/network software application will be a deliverable, and district staff, as appropriate, e.g., through statewide meetings. If the requesting office will not be the implementing office, please identify which office and names of specific personnel which will have to serve in that capacity—have they been involved?</p> <p>FDOT State Traffic Engineering and Operations, Planning, and Design. The results of this research will impact/affect all parties involved in the transportation industry countrywide.</p> <p>Local Affected Offices include: Orange County, City of Orlando</p>		
Existing Work	<p>In the last decade, AVs have evolved from conceptual devices to prototypes, and currently are being tested on public roads with freight and passengers. A number of studies have speculated the impact of AVs, especially in traffic safety enhancement and the improvement of passenger mobility with the decreasing of travel costs and increase of convenience (“Blueprint for Autonomous Urbanism,” 2017; Kohlstedt, 2017; Soteropoulos et al., 2019). According to published reports, AVs are the hope for</p>		

	<p>enhancing road safety, declining freight cost, reducing parking in cities, and improving mobility (“Taming the Autonomous Vehicle,” 2017). However, some concerns and doubts still exist such as: AVs may increase travel demand and thus may produce greater congestion, also, AVs may decrease the ridership of public transit (Fagnant & Kockelman, 2013; Weinberg, 2017).</p> <p>Recent studies on AV mobility have shown that AV deployment in urban areas may reduce 80% of private cars, but it is only possible if AVs appear in a ride-share scenario (UITP, 2016). Therefore, manufacturers have been more likely to produce vans and minibuses with a passenger capacity around 10 to 30 with electric power. This size allows AVs serve as either fixed-route bus or on-demand microtransit (Easymile. 2017, Navya. 2017, Tuvie. 2017).</p> <p>Some studies (Center for Advanced Multimodal Mobility Solutions and Education, 2019) have analyzed possible use cases for AV-based transit, such as: first-mile and last-mile connections to existing public transportation services; community circulators; mobile desert areas where it is difficult to integrate and promote active transportation through traditional transportation services. On the other hand, through assessment and simulation to judge potential benefits and costs, relevant guidelines were developed, including useful checklists, such as: goal setting for automation technology, technology and supplier evaluation, business planning and monitoring, technology implementation and deployment, route preparation, and consumption identification.</p> <p>For instance, the Center for Advanced Multimodal Mobility Solutions and Education (2019) proposed a project to mitigate delays experienced by occupied vehicles by minimizing the impact of empty AV route choice. Mobility e3 LLC (2019) developed guidance for transit agencies and communities on the development and deployment of Low-Speed Automated Vehicles pilots. Few research efforts aim to solve transit and pedestrian safety problems (Odell, Wade et al.,2019), such as developing designing, testing, piloting, demonstrating, and deploying candidate applications through an AV/CV Test Bed. Nevada Department of Transportation proposed a project on discussing how to qualitatively assess the feasibility of the business/funding case.</p> <p>However, all these previous studies are prediction and speculation without actual case and data support. Some guidance exists about how to implement AV systems in a testbed based on theoretical underpinning without actual documentation of the issues, challenges and lessons learned based on a real implementation and projects. There is an urgent need to conduct a study on the implementation of a real case before the AV-based microtransit system is fully deployed, so that a systematic assessment can be done after the system is implemented.</p>		
<p>Keywords Used In Existing Work Search (Cannot leave blank)</p>	<p>Autonomous vehicles; Microtransit; Shared Autonomous Vehicle; Connected vehicles; transit riders; Decision making</p>		
<p>Related Contracts (Give contract numbers)</p>	<p>None</p>		
<p>Funding Request</p>	<p>\$250,000</p>	<p>Anticipated Duration</p>	<p>18 months</p>
<p>Project Manager</p>	<p>Paul Schoelzel, District 5 Multimodal Coordinator</p>	<p>Contracting Method</p>	<p>direct contract with University of Florida as a task work order</p>
<p>Urgency</p>	<p>Score 1-5 1= highest , most immediate need [1]</p>	<p>Comments* (elaborate as appropriate on justification/impact comments to explain the urgency of the need . . . is a solution needed immediately, needed within a certain period of time or by a known or anticipated deadline, desired for enhancement, etc.)</p> <p>November of 2019 Orange County won a \$20 million BUILD (Better Utilizing Investments to Leverage Development) grant to create a Local Alternative Mobility Network (LAMN). With this endeavor underway,</p>	

		amongst the inclusion of many other automated vehicle technologies on Florida’s roadways, it’s imperative that the state have an academic, objective, analysis of decision making principles and implementation results.
Implementability	Score 1-5 1=greatest likelihood of and proximity to implementing results [1]	Comments* (consider both the likelihood of implementation and the length of time and resources required to implement the results of the research.) Identify any prerequisites to, requirements for, or barriers to implementing the anticipated results of this research (e.g., new or change to existing specifications, development of production units of prototype device, legislative change); please indicate if multiple phases of work shall be required Infrastructure improvements such as Lake Nona’s LAMN, although not on the same scale, are taking place throughout the state and will continue to proliferate. Industry leaders in transportation and technology will benefit from the expert analysis that Lake Nona’s program, and in turn this research opportunity, will provide.
Project Benefits (Succinct, complete explanation)		
The large scale automated vehicle infrastructure improvements taking place in Lake Nona are some of the first of their kind for the state of Florida. Analysis and documentation of decision making, implementation methodologies, and results will become essential to informed decision making in the future.		
Project Benefits (Select all that apply and explain)	Quantifiable Benefits (units, dollars, etc...if applicable)	Methodology or Data Sources Used to Determine Quantifiable Benefits. If not applicable, please give justification of project benefits
<input type="checkbox"/> Materials Enhancement		
<input type="checkbox"/> Materials Savings		
<input type="checkbox"/> Time Savings		
<input type="checkbox"/> Lives Saved/Injuries Prevented		
<input type="checkbox"/> Other (Explain)		This research effort aims at determining and documenting what the quantifiable benefits and impacts will be of this new technology. An analysis of project planning, design, and construction will aid leaders in future decision making and capital expenditure selection.

*Comments should explain and support urgency, financial benefit, and implementability scores