Request for Research Funding for FY 2023-2024	

Project Number (Research Center Use Only): D5-24-01

Requesting Office	District 5	**Priority**	1 of 3
Proposed Title	A Systematic Assessment of Autonomous Vehicle (AV) Pilot Projects in the U.S.		

Justification	Currently, numerous cities nationwide are actively participating in Autonomous Vehicle (AV) pilot programs. These pilots consist of smaller-scale implementations or confirmatory investigations aiming at proving the AV concept's feasibility and AV prototypes' potential operational efficiencies. Both industry and city/county/state governments stand to benefit from the resulting use and impact lessons learned. To build such knowledge and experiences, various studies have synthesized AV pilot projects' state of practice, examined use cases, aggregated existing literature, and assessed the impacts through approaches like site surveys and interviews.
	However, a research gap has emerged where the case studies and analyses were primarily sporadic and qualitative in nature rather than systematical, i.e., using a general AV evaluation framework to measure the project's effectiveness and cost-efficiency, integrating the perceptions of government officials, AV operating companies, and community users. **As a result, without quantitative evidence, it is difficult for transportation agency decision-makers to ascertain the merit of AV deployments, select the right AV programs or incorporate AVs in their long-term planning process, which will be imperative as the country moves closer and closer** . Besides, as AV technology is rapidly advancing and pilot projects often have short life spans, studies conducted around three years ago have been outdated. Therefore, it is critical to systematically review AV pilot projects in the U.S. under a uniform assessment framework and matrix and assess some of the most quintessential ones with on-site in the field analysis.
	
	Specific tasks are as follows:
	1. Task 1: synthesis and comparison of active AV pilot projects in the U.S.
	    1.1. Review existing studies/research that examined completed and active AV pilot projects in the United States.
	    1.2. Keep an up-to-date list of AV pilot projects inventory, which will cover existing AV pilots' primary characteristics, including physical scale, methods of operation, and infrastructure use/needs.
	2. Task 2: systematical analysis and impact assessment of selected AV pilot projects
	    2.1. Modify and consolidate existing AV evaluation frameworks and assess the pilot projects' effectiveness independently and objectively.
	    2.2. Interview local DOT/city/county agencies to assess the AV pilots' impact.
	    2.3. Identify several pilots (at least one pilot project in each category) that include different modes of transportation to perform on-site observation and analysis of operations, technology, and experience.
	3. Task 3: develop a comprehensive report on site visit evaluations and make recommendations to FDOT
	    3.1. Conclude the assessment scores, and observation and interview results into a formal report.
	    3.2. Summarize lessons learned, identify implementation successes and issues or rooms for improvement, to support FDOT's long-term AV transportation planning efforts.

Impact	1. This research will integrate planning, design, and technology expert analysis into on-site/in-the-field observations and experiences of active autonomous vehicle pilot programs in the United States. Types of AV pilot programs may range from robotaxis(driverless taxis/AV ride-hailing), to autonomous transit, AV freight hubs, and vertical takeoff and landing facilities. 2. The research will also complete a systematic, holistic, and up-to-date review of AV pilot projects nationwide and select some epitomizing ones for further investigation and quantitative assessment, facilitating the Florida Department of Transportation (FDOT) and partner agencies to make more informed decisions in its AV deployment efforts. **3. Results on this research may call for future increased investment or divestment in Autonomous technology.**
Affected Offices	FDOT(Modal Development, Planning, Traffic Operations/TSMO), MPO/TPOs, Transit Agencies - Nationwide
Existing Work	There are three reports/documents related to this research. 1. U.S. Department of Transportation's *Automated Vehicles Comprehensive Plan* (2021). The plan describes how the U.S. DOT is supporting the safe integration of Automated Driving Systems (ADS) into the surface transportation system. It explains Departmental goals related to ADS, identifies actions being taken to meet those goals, and provides real-world examples of how these Departmental actions relate to emerging ADS applications. 2. National League of Cities' *Autonomous Vehicle Pilots Across America* (2018). It is a guide that gives cities the ability to better understand and approach the impending rollout of autonomous vehicles in their cities. It describes the current legal/regulatory structure, state of AV pilot programs, and some practices. 3. *A synthesis and comparison of American automated shuttle pilot projects* by Haque and Brakewood (2020). This journal article is a literature review that lists all AV shuttle pilot projects in the United States.

	However, there are a few critical research gaps. The AV comprehensive plan is a roadmap that envisions the future of AV deployment instead of a holistic analysis of all kinds of AV programs. The second document is a relatively brief, qualitative report, emphasizing storytelling and case studies of some AV transit pilots and self-driving car experiments. The third paper is an inventory of AV shuttle pilots rather than all types of AV pilots. Additionally, the last two reports are somehow outdated. Lastly, none of the reports/documents provide quantitative assessments derived from on-site analysis.	
Keywords Used In Existing Work Search (Cannot leave blank)	Autonomous vehicle, Autonomous vehicle pilot projects, Systematic assessment, Effectiveness Evaluation Framework	
Related Contracts (Give contract numbers)	BDV31-977-144	
Funding Request	$900,000	**Anticipated Duration**	24 -36 months
Project Manager	Paul Schoelzel	**Contracting Method**	Direct contract with UF
Urgency	1	Comments: as AV technology is rapidly advancing and pilot projects often have short life spans, current studies conducted around three years ago have been outdated. Besides, a significant gap exists in assessing and quantifying the effectiveness/impacts of various types of AV pilot programs and on-site case studies. Therefore, there is an immediate need to conduct this research to provide up-to-date data and analysis to facilitate decision-makers to make more informed decisions in AV-related transportation investments.
Implementability	1	Comments: The results of this project would be directly implementable to support FDOT in comparing and evaluating AV pilot projects and making their investment decisions.

Project Benefits (Succinct, complete explanation)
1. This will be the only research project, worldwide, to use on-site observations and experiences to provide an objective academic evaluation of operational/active AV systems from numerous modes.
2. The research will provide an up-to-date, holistic inventory of all ongoing AV pilot projects in the U.S., of which many have come and gone in the past several years, while some have been operating successfully during the same time period, containing characteristics such as name, place, project duration, operating company, length, fleet size, funding sources and amount, and government departments in charge.
3. The final report will comprise assessment results of the selected AV pilot projects, lessons learned, observations and recommendations to the FDOT.
4. This project will build upon work already completed under contract BDV31-977-144.

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
o Materials Enhancement		
o Materials Savings		
o Time Savings		
o Lives Saved/Injuries Prevented		
o Other (Explain)	Better inform decision making for: Transportation planning, roadway design, technology investment, pilot program management and investment,	The results provided by this research would help decision-makers in FDOT, Districts, local governments, and transit agencies to make more informed decisions and investments. The benefit is demonstrated if the decision-makers cite this research results when they make investment decisions regarding AV. A right decision would save FDOT millions or even billions of dollars. Transportation/transit agencies nationwide are actively evaluating whether to invest in automation and the impact these systems will have on infrastructure design and construction. **This project will determine the real-world functionality and feasibility of such a system and whether additional government time and resources are merited.**

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