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UTC Project Information	
Project Title	Autonomous Delivery Vehicle as a Disruptive Technology: How to Shape the Future with a Focus on Safety?
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Funding Source(s) and Amounts Provided (by each agency or organization)	Safe-D: $290,000.00 ADV Companies (Non-Federal): $513,700.00
Total Project Cost	$803,700.00
Agency ID or Contract Number	Grant No: 69A3551747115 Project: 05-087
Start and End Dates	01/10/2020-05/31/2022
Brief Description of Research Project	The National Highway Traffic Safety Administration (NHTSA) recently granted permission to deploy low-speed autonomous delivery vehicles (ADVs). Unlike conventional low-speed vehicles, these ADVs are designed to have no human occupants and they operate exclusively using an automated driving system. However, extensive safety-related issues of these vehicles have not been examined. With the enormous growth of e-commerce, light deliveries have increased tremendously in the last few years. Additionally, the ongoing pandemic COVID-19 clearly indicates the quintessential need for a human-less delivery system. To make these delivery systems effective, it is critically important to perform a rigorous investigation of the associated safety issues. The goal of this project is to examine the safety-critical issues associated with ADVs. The main research questions include: What are the existing capabilities of ADVs in terms of safety? Are ADVs safe compared to conventional delivery vehicles? How can we determine the safety performance measures of the ADVs? What measures are needed to be considered for safe deployments of ADVs? This research involves conducting a review of the literature; gathering and integrating several datasets such as aggregated ADV trips and trajectories, ADV incidents, demographic data, crash, roadway, and traffic data, and crowdsourced data from multiple sources; performing rigorous analysis to determine the safety effects of ADVs and developing a

	decision support tool to provide contexts of potential deployment zones for ADVs.
Describe Implementation of Research Outcomes (or why not implemented) Place Any Photos Here	**<u>Deliverables</u>** • Database – The final datasets developed for this project. • Final Report – The report will document the work performed, models and results, lessons learned, conclusions, and recommendations. • Decision Support Tool– The source codes and instruction manual of the decision support tool. • PowerPoint Presentation – The presentation will be used to summarize the work performed, the results of the analysis, and explain how other agencies can repeat similar analyses. **<u>EWD Products</u>** • Onboarding of the students • Master's thesis • Learning modules for the workshop • Online Book Material **<u>T2 Products</u>** • Conference papers at the Transportation Research Board Annual Meeting • Developed Dataset and metadata • Journal article (submitted to a peer-reviewed journal such as TRB's Transportation Research Record or Accident Analysis and Prevention) • Decision Support Tool • Conduct webinar to present the project methodology and findings to industry partners and explain how to conduct a similar analysis
Impacts/Benefits of Implementation (anticipated)	It is anticipated that the findings of this study will assist federal, state, tribal, MPO, and other local public agencies in deploying ADV safely. Other end users that may benefit from these products are research institutes and private entities that provide research and engineering services and technical support to transportation agencies. Civil engineering students may also benefit by learning how to perform data-driven safety analysis, apply deep learning algorithms, and statistical analysis using a comprehensive database developed from multiple sources.
Web Links • Reports • Project website	https://safed.vtti.vt.edu/projects/autonomous-delivery-vehicle-as-a-disruptive-technology-how-to-shape-the-future-with-a-focus-on-safety/

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