Center for Advanced Multimodal Mobility Solutions and Education

UTC Project Information – CAMMSE @ UNC Charlotte	
Project Title	Pedestrian Behavior and Interaction with Autonomous Vehicles
University	The University of Connecticut
Principal Investigator	Nicholas Lownes
PI Contact Information	(860)-486-2717 / nicholas.lownes@uconn.edu
Funding Sources and Amount Provided (by each agency or organization)	The University of North Carolina at Charlotte: $60,000 The University of Connecticut: $30,007
Total Project Cost	$90,007
Agency ID or Contract Number	
Start and End Dates	10/01/2020 – 09/30/2022
Brief Description of Research Project	Connected and autonomous vehicles (CAV) are advancing in many ways in the current automobile market, such as adaptive cruise control, forward collision warning, and lane detection. By 2023, worldwide net additions of vehicles equipped with hardware that could enable autonomous driving without human supervision may exceed 700,000 units, which is up from 137,129 units in 2018. McKinsey & Co estimated that self-driving vehicles would eliminate 90% of the vehicle accidents in the United States and save up to US$190 billion of the expenses related to damages and health costs while also saving thousands of lives. It is expected that self-driving technology will enable the efficient use of traffic patterns, reduce traffic congestion, and increase roadway capacity. CAV will have

	the ability to understand the environment around them without any human involvement. Studying the interactions between pedestrians and autonomous vehicles is challenging due to the complexity of this interaction process. Pedestrians often rely on eye contact, hand motions, or audible dialogue with human drivers to accomplish roadway crossings. However with CAVs there is no driver with whom to interact. The lack of human interaction and communication inherent with CAV technology could influence unpredictable pedestrian behavior. Autonomous vehicles are expected to be designed to attempt to overcome this challenge. Communication systems between CAV and pedestrian are being developed and tested. However, how CAVs interact with pedestrians is a relatively unexplored topic due to the difficulty in replicating pedestrian-CAV interactions in a safe manner. This study proposes the use of virtual reality (VR) as a means to overcome the safety challenges inherent in studying pedestrian-vehicle interactions and will focus on identifying any differences in pedestrian behavior when CAV are introduced to the traffic stream. The central research question of this proposal is: Are there significant behavioral changes in the way pedestrians interact with vehicles at a crossing when a portion of the vehicles is autonomous? The proposed research will focus on the following

	topics: 1) To determine the impact of autonomous vehicles on pedestrian measures such as gap acceptance, waiting time while crossing the road and pedestrian acceleration. 2) Measuring any pedestrian behavior changes with the automation level of the vehicle. 3) Measuring the psychophysiological (e.g., Electrodermal Activity-EDA, blood pressure, and heart rate change) changes of the pedestrians' while interacting with AV.
Describe Implementation of Research Outcomes (or why not implemented) *Place Any Photos Here*	
Impacts/Benefits of Implementation (actual, not anticipated)	
Web Links • *Reports* • *Project website*	https://cammse.uncc.edu/sites/cammse.uncc.edu/files/media/CAMMSE-UNCC-2021-UTC-Project-Information-06-Lownes.pdf https://cammse.uncc.edu/sites/cammse.uncc.edu/files/media/CAMMSE-UNCC-2021-UTC-Project-Report-06-Lownes-Final.pdf