Center for Advanced Multimodal Mobility Solutions and Education

UTC Project Information – CAMMSE @ UNC Charlotte	
Project Title	Pedestrian Behavior and Interaction with Autonomous Vehicles (Phase II)
University	The University of Connecticut
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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	10/01/2021 – 09/30/2023
Brief Description of Research Project	Automobiles are being more advanced with improving the automotive support system such as adaptive cruise control, forward collision warning, lane detections, which are already influencing the automotive industry. 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. Gartner, Inc. Mc Kinsey & 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. This scenario will reduce

	vehicle insurance with time. It is expected that self-driving technology will enable the efficient use of traffic patterns, reduce traffic congestion, and increase roadway capacity. Autonomous vehicles will have the ability to understand the environment around them without any human involvement. For example, the headway distance of an upcoming vehicle, presence of non-motorized road users can be tracked by an autonomous vehicle. The interaction between pedestrian and autonomous vehicles are always challenging due to the complexity of this interaction process. While crossing a road, a pedestrian always checks the oncoming vehicles. Non-motorized users often rely on eye contact, hand motions, or audible dialogue with human drivers to accomplish roadway crossings. However, for autonomous vehicles (AVs), there is no driver with whom to interact, and in that case, the pedestrian can only check the surroundings. Human interaction and communication elimination with AV technology could influence unpredictable pedestrian behavior. Autonomous vehicles are expected to be designed in such a manner that it can create a similar situation as the human driver does. Mutual communication between the AV and pedestrians is important to understand pedestrian behavior. Currently, intensive research activity is being conducted for the autonomous vehicle technology; however, how an autonomous vehicle would interact

	with pedestrians is relatively ignored. Hence, the study of autonomous vehicle interaction with pedestrians is crucial. The first step of this research work is to understand the behavior of the pedestrian towards the AVs. 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: • To determine the impact of autonomous vehicles on pedestrian measures such as gap acceptance, waiting time while crossing the road. • This research work compares the human behavior changes with the automation level of the vehicle. • To understand 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)	

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Web Links • *Reports* • *Project website*	https://cammse.uncc.edu/sites/cammse.uncc.edu/files/media/CAMMSE-UNCC-2022-UTC-Project-Information-09-Lownes.pdf https://cammse.charlotte.edu/wp-content/uploads/sites/191/2023/10/CAMMSE-UNCC-2022-UTC-Project-Report-09-Lownes-Final.pdf