



## Center for Advanced Multimodal Mobility Solutions and Education

UTC Project Information – CAMMSE @ UNC Charlotte	
<b>Project Title</b>	Prioritizing People - Mixed Equilibrium Assignment for AV Based on Occupancy
<b>University</b>	The University of Connecticut
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<b>Funding Sources and Amount Provided (by each agency or organization)</b>	The University of North Carolina at Charlotte: \$31,113 The University of Connecticut: \$15,706
<b>Total Project Cost</b>	\$46,819
<b>Agency ID or Contract Number</b>	
<b>Start and End Dates</b>	10/01/2019 – 09/30/2021
<b>Brief Description of Research Project</b>	Autonomous Vehicles (AV) have the potential to revolutionize transportation operations mode choice. In June 2017, Connecticut Public Act No. 17-69 “An Act Concerning Autonomous Vehicles” authorized the testing of AVs on Connecticut roads. In April 2018, Connecticut launched the Fully Autonomous Vehicle Testing Pilot Program (FAVTPP), which set the permitting and testing requirements for AVs on public roads. Although there is optimism that introduction of AVs will mitigate traffic congestion and vastly improve safety, the transition to a completely AV fleet - which will take time - presents non-trivial problems. In the United States, automobiles did not begin to outnumber horses on roadways until



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the late 1920's, twenty years after the first Model T rolled off the production line. If a similar timeline for AV deployment and market penetration holds, we won't see AVs outnumber human-driven vehicles until sometime in the 1930's and won't see a completely autonomous fleet until somewhat later. This means that for the next 20+ years we will be operating in a mixed traffic environment including human-driven vehicles, occupied AVs and unoccupied AVs.

Some AVs will operate as part of a centrally owned, shared autonomous fleet in which vehicles are routed according to real-time requests similar to current human-driven e-hailing services. However, a not insignificant portion of AVs will continue to be owned by a single household. The availability of an AV in a household may allow them to own fewer vehicles at a considerable cost savings, as a single AV could be used to meet multiple household members' tripmaking needs provided it could reach the next household member in time to get them to their destination on time. This means that a significant portion of the AV travel time will be unoccupied, depending on the tripmaking needs of the household. These unoccupied AVs will impact the travel times of occupied AV and human-driven vehicles.

It seems obvious that the travel needs of occupied vehicles (AV and human-driven) should be prioritized, and that empty AVs should be



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	<p>routed to minimize the impacts on occupied vehicles. However, if unoccupied AVs are assigned a route that is too circuitous, it may not be able to meet a household’s tripmaking needs – requiring additional vehicles and eliminating the cost savings for the household of owning an AV.</p> <p>The central research question of this proposal is: How do we route unoccupied AVs to minimize the impacts on occupied vehicles without disproportionately hurting households that own an AV?</p> <p>The proposed research will focus on the following topics:</p> <ol style="list-style-type: none"> <li>1) Mitigating travel delays experienced by occupied vehicles by minimizing the impact of empty AV route choice.</li> <li>2) Differential route assignment for occupied versus unoccupied vehicles while considering impacts of unoccupied AV route choice on AV owners.</li> <li>3) Application of the methodology on a Hartford, CT case study.</li> </ol>
<p><i>Describe Implementation of Research Outcomes (or why not implemented)</i></p> <p><i>Place Any Photos Here</i></p>	
<p><i>Impacts/Benefits of Implementation (actual, not anticipated)</i></p>	
<p><i>Web Links</i></p>	<p><a href="https://cammse.uncc.edu/sites/cammse.uncc.edu/files/media/CA">https://cammse.uncc.edu/sites/cammse.uncc.edu/files/media/CA</a></p>



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<ul style="list-style-type: none"><li>• <i>Reports</i></li><li>• <i>Project website</i></li></ul>	<p><a href="#">MMSE-UNCC-2020-UTC-Project-Information-09-Lownes.pdf</a></p> <p><a href="https://cammse.uncc.edu/sites/cammse.uncc.edu/files/media/CA-MMSE-UNCC-2020-UTC-Project-Report-09-Lownes-Final.pdf">https://cammse.uncc.edu/sites/cammse.uncc.edu/files/media/CA-MMSE-UNCC-2020-UTC-Project-Report-09-Lownes-Final.pdf</a></p>
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