



CENTER FOR CONNECTED AND AUTOMATED TRANSPORTATION

UTC Project Information	
Project Title	Development of machine-learning models for autonomous vehicle decisions on weaving sections of freeway ramps
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Funding Source(s) and Amounts Provided (by each agency or organization)	CCAT: \$145,429
Total Project Cost	\$145,429
Agency ID or Contract Number	69A3551747105
Start and End Dates	July 1 st , 2019 – March 31 st , 2022
Brief Abstract of Research Project	<p>To date no systems can recommend when and how lane changes should be made in weaving sections with limited length to ensure that traffic stays safely and smoothly separated. This study aims to (1) investigate drivers’ decision and speed control before changing lanes into/out of the weaving section, (2) develop the lane change decision and maneuver algorithms for automated vehicles (AVs), (3) apply the algorithms to AVs, and (4) validate the algorithms on Mcity Test Facility.</p> <p>Two types of model/algorithm will be created to (1) identify the surrounding vehicle characteristics, and (2) classify drivers’ decision to change lanes and model the lane change maneuvers in the weaving section. The validation taking place on Mcity will provide evidence to test and improve the algorithms, as well as a demonstration to showcase how the AV can interact with weaving vehicles.</p>
Most Relevant CCAT Research Thrusts	<input type="checkbox"/> Control & Operations <input type="checkbox"/> Enabling Technology <input checked="" type="checkbox"/> Human Factors <input type="checkbox"/> Infrastructure Design & Management <input checked="" type="checkbox"/> Modeling & Implementation <input type="checkbox"/> Policy & Planning

<p>Describe Implementation of Research Outcomes (or why not implemented)</p> <p>Place Any Photos Here</p>	<p>Due to the pandemic, the instrumentation to AV and testing at Mcity were deferred and the research team were improving the models for safety. The weaving models have been developed and have been verified in the environments of computer simulation offline and augmented reality (AR) at Mcity. In the final phase, we will soon have the test track experiment and demonstration with the weaving models and the Mcity automated vehicle.</p>
<p>Impacts/Benefits of Implementation (actual, not anticipated)</p>	<p>With the validated algorithms, AVs can strategically weave and efficiently interact with the other weaving/non-weaving vehicles. The negative effect on traffic flow in both the through lane and auxiliary lane can be minimized, the time that AV stay in the original lane can be shortened, the possibility of missing the entrance/exit (not weave before approaching the end of weaving section) will reduce, and the incidents will reduce.</p>
<p>Web Links</p> <ul style="list-style-type: none"> • Reports • Project website 	<p>ccat.umtri.umich.edu</p>