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**
University	University of Michigan
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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 1st, 2019 – May 31st, 2021
Brief Abstract of Research Project	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. 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.
Most Relevant CCAT Research Thrusts	Human Factors Models and Implementation
Describe Implementation of Research Outcomes (or why not implemented) Place Any Photos Here	The lane change decision and maneuver models for weaving have been developed and will be installed in the Mcity automated vehicle. Before the test at Mcity, the models is verified with the environments of computer simulation and augmented reality to guarantee the safety for the test. Due to the pandemic, the instrumentation to AV and testing at Mcity is delayed and the research team is improving the models for safety concerns. The field test will be reengaged in February 2021.

Impacts/Benefits of Implementation (actual, not anticipated)	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.
Web Links • Reports • Project website	ccat.umtri.umich.edu