Center for Advanced Multimodal Mobility Solutions and Education

UTC Project Information – CAMMSE @ UNC Charlotte	
Project Title	Developing Robust Smart Traffic Signal Control
University	The University of Texas at Austin
Principal Investigator	Randy Machemehl
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Funding Sources and Amount Provided (by each agency or organization)	The University of North Carolina at Charlotte: $93,406 Texas Department of Transportation, Austin District : $46,703
Total Project Cost	$140,109
Agency ID or Contract Number	
Start and End Dates	10/01/2021 – 09/30/2023
Brief Description of Research Project	The traffic signal was born more than a century ago. Since then, the transportation system has become more efficient and safer with continued development of traffic signal control systems. Traffic signal control system concepts are still evolving as new technology is developed and implemented by both researchers and practitioners. Adding capacity to transportation facilities by adding new lanes or new alignments is very difficult in urban areas where congestion is most severe due to space limitations. However, capacity additions through enhanced urban traffic signal control systems are very possible and much less expensive than adding lanes or alignments. With the rapid development of machine learning technologies and lower costs of computing power,

	combining machine learning technologies with traffic signal control systems represents a great opportunity to cost effectively ameliorate urban congestion. There are three broad machine learning categories, and to be specific, reinforcement learning is the one most suitable for traffic signal control system improvement. Considerable research has been done in the field of improving traffic signal control methods to enhance intersection performance by implementing reinforcement learning methods as well as its variations to single intersections, corridors, and networks. However, a robust traffic signal controller based on reinforcement learning has not been studied enough to make it practical for both normal and special conditions, e.g., traffic disturbances due to special events and traffic incidents. The project goal is to help link field implementation and lab simulation of AI-based traffic signal control in the real world. The objective is to build a robust machine learning based traffic control algorithm and a microsimulation platform to test a robust traffic signal control. The platform will help practitioners better understand the benefits of AI-based traffic signal control. The proposed work will address at least two CAMMSE research thrusts: Generate innovations in multi-modal planning and modeling for high-growth regions; Innovations to improve multi-modal connections, system integration and security.
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-2022-UTC-Project-Information-07-Machemehl.pdf https://cammse.charlotte.edu/wp-content/uploads/sites/191/2023/10/CAMMSE-UNCC-2022-UTC-Project-Report-07-Machemehl-Final.pdf