UTC Project Information – CAMMSE @ UNC Charlotte	
Project Title	Trajectory Optimization of Connected and Autonomous Vehicles (CAVs) at Signalized Intersections
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Total Project Cost	$90,007
Agency ID or Contract Number	
Start and End Dates	10/01/2018 – 09/30/2020
Brief Description of Research Project	Connected and autonomous vehicle (CAV) technologies are known as an effective way to improve safety and mobility of the transportation system. As a combination technology of connected vehicle and autonomous vehicle, CAVs share real time traffic data with each other, such as position, speed, and acceleration. Also, CAVs enable the communication between vehicles and traffic signals. Traffic signals play an important role in urban traffic management. Although traffic signals can increase the intersection capacity particularly when the traffic volume is high, they may also increase travel time, gas emissions and fuel consumption of vehicles. Moreover, stop-and-go traffic increases the possibility of

vehicle collisions and leads to economic cost as a result. The coordinated operation among CAVs and the communication between CAVs and traffic signals will improve the throughput at signalized intersections and lead to a higher intersection capacity.

As the travel demand increases in recent years, traditional intersections are generating more delays and gas emissions. As such, there is an urgent need to increase intersection capacity and the throughput mobility using the emerging CAV technologies. The coordinated through or turning maneuvers of CAVs may also reduce crashes and minimize the total delay at an isolated intersection. Due to the rapid development of CAV technologies, it can be expected that CAVs will soon penetrate into the transportation system in the near future. In order to better estimate the impact of CAVs on intersection delays, relevant analysis needs to be conducted. New guideline for estimating intersection delays with consideration of CAVs involved mixed traffic needs to be established. The impact of CAVs on traffic delay and congestion needs to be quantified under different market penetration levels of CAVs.

This research will develop guidelines and recommendations on estimating and predicting intersection delays in the presence of CAVs and their trajectory optimization, and therefore will lead to a better understanding of how CAVs will improve mobility on the

	urban transportation system.
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-2019-UTC-Project-Information-04-Fan.pdf https://cammse.uncc.edu/sites/cammse.uncc.edu/files/media/CAMMSE-UNCC-2019-UTC-Project-Report-04-Fan-Final.pdf