Center for Advanced Multimodal Mobility Solutions and Education

UTC Project Information – CAMMSE @ UNC Charlotte	
Project Title	Optimal Variable Speed Limit Control for the Mixed Traffic Flows in a Connected and Autonomous Vehicle Environment
University	The University of North Carolina at Charlotte
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Funding Sources and Amount Provided (by each agency or organization)	U.S. Department of Transportation: $60,000 The University of North Carolina at Charlotte: $30,007
Total Project Cost	$90,007
Agency ID or Contract Number	
Start and End Dates	10/01/2017 – 09/30/2018
Brief Description of Research Project	Traffic congestion occurs frequently with the continually increasing traffic demand (including both passenger cars and heavy vehicles), which is detrimental to transportation mobility, efficiency, environment, and safety. Due to the limited budget, government agencies at all the local, state, and federal levels need to work together and seek new ways to meet the increasing demand rather than simply relying on the physical expansion of roadways. As such, active traffic management (ATM) strategies have been proposed and used by transportation researchers and practitioners to optimize the existing roadway networks. Variable speed limit (VSL), which is an indispensable ATM component, has received increasing

	attention and been recognized as a promising way to relieve traffic congestions. Even though a lot of promising results have been obtained from the studies of the VSL control, several critical issues related to the VSL operation remain to be addressed. For example, although the connected and autonomous vehicles are becoming to gain greater market penetration, the optimal variable speed limit control for the mixed traffic flows in a connected and autonomous vehicle environment has not been studied and therefore there is a strong need in this research area. This project aims to systematically study the optimal variable speed limit control for the mixed traffic flows at the bottlenecks in a connected and autonomous vehicle environment. Several tasks will be conducted, including an extensive literature review on the development and implementation of the VSL control. Several multi-objective nonlinear integer models will be formulated for the VSL control for mixed traffic flows both under normal conditions and in a connected and autonomous vehicle environment. Discrete optimization based solution algorithms will be developed to solve these VSL models. Finally, the developed VSL algorithms will be implemented and evaluated by using a real world freeway corridor as a case study. Sensitivity analyses of the proposed VSL systems will be conducted, and comprehensive numerical results will also be presented.
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-2018-UTC-Project-Information-05-Fan.pdf https://cammse.uncc.edu/sites/cammse.uncc.edu/files/media/CAMMSE-UNCC-2018-UTC-Project-Report-05-Fan-Final.pdf