

UTC Project Information	
Project Title	Identifying and Mitigating Congestion Onset (Project H5)
University	Team: North Carolina State University, Georgia Tech, Florida International University
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Funding Source(s) and Amounts Provided (by each agency or organization)	STRIDE: \$241,842
Total Project Cost	\$241,842
Agency ID or Contract Number	69A3551747104
Start and End Dates	October 1, 2021 to December 31, 2022
Brief Description of Research Project	<p>Phase 1 of Identifying and Mitigating Congestion Onset (STRIDE Project J3) conducted by the proposed research team focused on developing algorithms that can help transport agencies use “big data” to mitigate congestion and manage system performance, for freeways and arterials. The research team has tested several techniques for identifying the onset of congestion, identifying the occurrence of incidents, and monitoring system performance. These techniques were tested in a series of case studies, described in the Project Summary below. In the first case study demand-induced congestion (DIC) and incident-induced congestion (IIC) on freeways are detected based on the differences in the distribution of travel rates measured using probe vehicles (travel time per unit distance traversed). The second case study explores utilizing machine learning based on connected vehicle (CV) data for detecting and predicting congestion in real-time freeway management and operations. The utilized machine learning techniques include cluster analyses, decision trees, fuzzy based rule system and neuro-fuzzy inference system. The third case study sought to complement the first two case studies; whereas the first two studies utilized probe vehicle data the third case study is based on detector data streams. In this case study a supervised learning framework separating pre-congestion traffic from other states was used to allow for the training of selected machine learning (ML) classifiers. The assessment of the developed models through these three-case study demonstrated their potential to detect and forecast</p>

	<p>congestion. Phase 2, the effort in this proposal, extends the effort of Project J3 described above by assessing the potential of using the models developed in that project to trigger the activation of special traffic management activities on the freeway such as ramp metering and variable speed limits. This project will also extend the effort to the management of urban arterial streets, in addition to freeway management addressed in Project J3. Data from multiple sources will be used to detect and forecast congestion on arterial streets, as well as to estimate operation parameters based on data from multiple sources including probe data, connected vehicle data, sensor data, and high-resolution data. The effort will help agencies in managing their systems by developing and activating better plans to improve system performance. System users will experience less delay; agencies will be able to use their financial resources more effectively; and society will be better off.</p>
<p>Describe Implementation of Research Outcomes (or why not implemented)</p> <p>Place Any Photos Here</p>	<p>Not available yet.</p>
<p>Impacts/Benefits of Implementation (actual, not anticipated)</p>	<p>Not available yet.</p>
<p>Web Links</p> <ul style="list-style-type: none"> • Reports • Project website 	<p>https://stride.ce.ufl.edu/project-h5-phase-ii-of-project-j3//</p>