UTC Project Information

Project Title	MPC-699 – Evaluating Different Methods for Estimating Queue Length on Access Ramps
University	University of Utah
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Funding Source(s) and Amounts Provided (by each agency or organization)	USDOT, Office of the Assistant Secretary for Research and Technology $48,000 Utah Department of Transportation $60,000
Total Project Cost	$108,000
Agency ID or Contract Number	69A3551747108
Start and End Dates	October 13, 2022 to July 31, 2024
Brief Description of Research Project	Ramp metering is a traffic management strategy designed to mitigate congestion on freeways by adjusting the flow of traffic entering freeways. Ramps are often metered individually, where the ramp exit rate can be adjusted based on mainline congestion. Coordinated ramp metering is a higher-level strategy, where the exit rates across several adjacent ramps can be coordinated to reduce or eliminate mainline bottlenecks. In both individual or coordinated ramp metering systems, efficiency is gained when timely and accurate information about the ramp queue state is available. Currently, this information is collected using loop detectors, which exhibit limited accuracy in highly-congested (i.e., bumper-to-bumper) conditions. To this end, this project will develop a computer-vision-based method to infer queue states along the freeway ramps. The proposed method will be validated through comparisons against the loop detectors.

Describe Implementation of Research Outcomes (or why not implemented) Place Any Photos Here	The implementation roadmap of the study is presented with reports. It mainly depends on camera functionality, the image processing capacity of processing devices, and the proper installation of the camera. Currently, UDOT is upgrading cameras, and most of the cameras are attached to the mast arm, which is not the recommended position of the camera. Hence, because of the given implementation challenges, it was not implemented in the sites as of the current situation. However, it was taken care that the framework was evaluated using the worst-case scenarios which ensures that framework will perform with acceptable accuracy when tested, once the camera quality and location is fixed.
Impacts/Benefits of Implementation (actual, not anticipated)	Utilizing image processing as traffic data extraction will help to eliminate the in-road sensors like induction loops and coils. These in-road sensors have higher installation and maintenance costs in addition to disruption of the traffic services. Moreover, they are prone to error during congestion. Hence, replacing conventional in-road sensors with existing traffic cameras helps to minimize the installation and maintenance costs, without disturbing the traffic services.
Web Links • Reports • Project Website	• MPC Research Report – Evaluating Different Methods for Estimating Queue Length on Access Ramps