Research in Progress

Smart Work Zone Control and Performance Evaluation Based on Trajectory Data

Research Need

The number of fatalities due to work zone crashes has increased 42% from 2013 to 2019. Also, approximately 24% of non-recurring congestion is attributed to work zones. Given the aging infrastructure in the U.S. and the recent $1.2 trillion infrastructure bill, it is anticipated that there will be more work zones in the coming years. How to improve work zone traffic safety and operations will become an increasingly important issue.

Many strategies can potentially affect work zone safety and traffic operations, including taper length and rumble strips. The performance of these strategies is often evaluated based on traffic throughput, speed, etc. measured at selected locations. Such metrics do not provide sufficient detail regarding individual drivers' speed choice and lane-changing behavior over the course of the entire work zone, which are critical for understanding work zone safety and traffic operations under different traffic, control, and layout conditions.

Goals/Objectives

The proposed research aims to (1) develop methods to extract vehicle trajectories; (2) use the trajectories to analyze driver behavior, particularly lane-changing behavior under different traffic conditions; (3) use the trajectories to quantify the effects of various merging taper lengths and rumble strip configurations on vehicle speed and lane-changing behavior; and (4) use the analysis results to identify safety hazards and opportunities to improve work zone safety and operations.

Research and Technology Transfer Section
MassDOT Office of Transportation Planning
Planning.Research@dot.state.ma.us

Project Information

This project is being conducted as part of the Massachusetts Department of Transportation (MassDOT) Research Program with funding from Federal Highway Administration (FHWA) State Planning and Research (SPR) funds.

Principal Investigators:
Yuanchang Xie, Danjue Chen, and Benyuan Liu

Performing Organizations:
University of Massachusetts, Lowell

Project Champion:
Carrie McInerney, MassDOT

Project Start Date:
March 2022

Expected Project Completion Date:
August 2023

Methodology

1. Review of relevant literatures.
2. Develop and finalize the plan to collect trajectory data for work zones considering different merging taper lengths and rumble strip configurations.
3. Conduct trajectory data collection in the field using advanced sensors.
4. Develop algorithms to extract and stitch vehicle trajectories from the collected sensor data.
5. Analyze the trajectory data to quantify the impacts of taper length and rumble strip on vehicle speed and lane-changing behavior under different operating conditions. Provide recommendations to MassDOT.

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