

Title:	Utilizing Telematics to Understand Driving Behavior During Missed Exits and Wrong Turns
The Problem:	<p>Many researchers have studied drivers' perception process of traffic signs in the presence of multiple visual cues competing for drivers attention. Missing, insufficient, or confusing signage and direction may often result in drivers missing their exits on highways or even getting lost. If a driver realizes that he or she is overshooting an exit, he or she may perform erratic maneuvers, sudden lane changes, rapid deceleration, or sudden breaking in attempts to correct the mistake. This results in major safety concerns and traffic flow disruptions. In another scenario, the driver would not be able to make it to the preferred exit and must leave the highway at the next exit and turn around. This results in reducing the efficiency of the transportation system.</p> <p>Telematics data from connected vehicles is now available and provides real-time access to the driving behavior at any location. Transportation agencies can use this data; i.e., speed, acceleration, and position, at highway exit areas and intersections to identify problematic exits, detect the frequency of overshooting exists, evaluate driving behavior after missing an exit or turn, and locate areas that require improved signage. They can also pinpoint issues drivers might be experiencing on the roadway such as:</p> <ul style="list-style-type: none"> • Locations where people are continually taking the wrong turn and are spending excess time on the roadway system. • Are signals reliably detecting people, or are people sitting at the same light through multiple cycles? • Are there locations where people are repeatedly driving outside their permitted lanes of travel? • Where are merging on highway ramps, or at lane endings causing particularly egregious issues? • Where are people repeatedly having to rapidly decelerate or stop in lanes of traffic and impeding the free flow? <p>This valuable information will provide transportation agencies with the necessary tools to reduce the frequency and negative consequences of well-intentioned infrastructure that is not calibrated to respond to human behavior.</p>
Technical Objectives:	<p>Detecting problematic exits and places of wrong turns and identifying signal and other issues will result in improving safety on highways by reducing crashes as well as optimizing traffic flows while minimizing disruptions. This project will also provide TxDOT with data-driven justification for future highway investments.</p> <p>To achieve the project objectives, the research team shall:</p> <ul style="list-style-type: none"> • Explore telematics data for a given set of roadways in Texas where issues have been identified by local TxDOT staff as frequent problems. These issues may include motorists missing exits or making wrong turns, traffic signals are not reliably detecting vehicles or vehicles waiting through multiple cycles at the same signal, motorists repeatedly driving outside their permitted lanes of travel while merging on highway ramps or improper merging at lane drops. • Clean and reformat; i.e, preprocess, explored data in a way that is suitable for further analysis. • Study the dataset closely to identify patterns in the data that indicate issues. • Develop rules; i.e, heuristics, or an artificial intelligence platform that can automatically detect events that indicate the issues. When applied on the entire dataset, problematic highway locations will be located and shared with TxDOT to be considered for future interventions. <p>The expected technology readiness level (TRL) for this project is 6.</p>
Anticipated Deliverables:	<ol style="list-style-type: none"> 1. Technical memorandum for each task completed. 2. Monthly progress reports. 3. Value of Research (VoR) that includes both qualitative and economic benefits, to be included in the 4. final research report. <u>This is not a stand-alone deliverable.</u> 5. Research report documenting the findings of the research, including the process for preprocessing and evaluating telematics data for the purpose of evaluating issues described herein, and rules required to detect and pinpoint hotspots for evaluating issues described herein. 6. Project Summary Report

Proposal Requirements:	<ol style="list-style-type: none">1. Proposal Deadline: 12:00 p.m. Central Time, Monday, March 6, 2023.2. RFP#1 Q&A Deadline: 12:00 p.m. Central Time, Wednesday, February 1, 2023.3. Use the current “ProjAgre” and “PA Forms” templates located at the RTI Forms webpage.4. Proposals will be considered non-responsive and will not be accepted for technical evaluation if they are not received by the deadline or do not meet the requirements stated in RTI's University Handbook.5. Proposals should be submitted in PDF format; (1) PDF file per proposal. File name should include project name and university abbreviation.6. This project will be tracked during the life of the project using the Technology Readiness Level (TRL) scale.7. The 2021 Texas Legislative Session requires that universities be in compliance with Senate Bill 475 by submitting a completed and signed TxDOT Security Questionnaire (TSQ) to RTIMAIN@txdot.gov in advance of a proposal submission. Universities found to not submit a completed and signed TSQ in advance of proposal submitting will be held in non-compliance and unable to participate in the Program.
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