UNIVERSITY TRANSPORTATION CENTER

RESEARCH BRIEF

PROJECT TITLE: **Exploring Weather-Related Connected Vehicle Applications for Improved Winter Travel in the Pacific Northwest**

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INSTITUTION: MULTI-INSTITUTION PROJECT
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Background

CV technologies hold the promise to revolutionize mobility and travel time reliability if widely implemented. The potential mobility benefits is largely dependent on the market penetration. The USDOT has estimated that combined vehicle-to-vehicle (V2V) and vehicle-to-infrastructure (V2I) systems may potentially reduce travel time by up to 27%, 23% travel time reduction for emergency vehicles, and up to 42% on freeways when cooperative adaptive cruise control and speed harmonization are optimized for the environment (Najafi et al. 2016).

The benefits of CV on roadway mobility are likely be more significant during adverse weather conditions. Winter weather presents unique mobility challenges such as reduced pavement friction, traffic speed and roadway capacity and increased crash risk, as well as the need for road weather information that is timelier and of better spatial resolution, for travelers en route or before their trip. The real-time, microlevel road weather condition information can be communicated to the general public so that they can slow down, choose a different route, or stay home in light of inclement weather. Winter road maintenance (WRM) operations, especially the more proactive tactics (e.g., anti-icing), can benefit greatly from better information collected beyond the RWIS stations from fixed locations, i.e., the mobile data collection platform of CV. The mobility on winter roadways are affected by snow event characteristics (duration, amount, severity, etc.), traffic characteristics, driver behavior, as well as pavement conditions which is affected not only by the winter weather but also by the WRM operations.

Research Project

The objectives of this project are to investigate how connected vehicle (CV) data such as images and friction coefficients could be integrated with data from road weather information system (RWIS) stations and other existing infrastructure; and how the integrated data could be utilized to improve decision-making for highway operations and enhance traveler information during inclement winter weather events. The main approach for this project is formulated as follows: (1) Actively engage regional agencies (WSDOT and Oregon DOT) and industry partners/stakeholders to develop the operational scenarios of CV for improved winter road operations and traveler information service; (2) Demonstrate the proof-of-concept of selected operational solutions at the UW test-bed; (3) Develop the CV solution for winter road surface condition monitoring and traveler information; (4) Pilot test the CV solution on selected road segments in Pacific Northwest, conduct preliminary analyses, and make recommendations for implementation.

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