

ROADWAY SAFETY INSTITUTE

Human-centered solutions to advance roadway safety



Rail Crossing Safety Research

Integrated Approach to Improve Railroad Grade Crossing Safety at Regional Level

More than 200 people lose their lives at railroad crossings in the United States each year. Railroad incidents involving hazardous material also pose significant threats to safety, public health, and the environment. Although the number of crashes has been declining in recent decades, the result of a vehicle–train collision is often catastrophic. The Roadway Safety Institute is conducting research aimed at improving the safety of railroad grade crossings and their surroundings through 1) a better understanding of crash occurrence, contributor factors, and crash prediction; 2) real-time prediction and monitoring of potential conflicts at grade crossings; and 3) location and operation of emergency response resources.

Accident Prediction Models Using Macro- and Micro-Scale Analysis

This research is developing a method for analyzing rail crossing crashes at a micro level to discover trends at a single crossing or a series of crossings along a corridor or within a region. This will allow researchers to improve the accuracy of crash predictions by incorporating the findings from the microscopic analyses into a macroscopic model and studying the regional trends that emerge but that are not observed at a national level. With this information, researchers can identify contributing risk factors that will help highway departments select crossings for safety improvements and determine the proper countermeasures at individual high-crash crossing locations.

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Accurate Prediction of Train Arrival Times for Emergency Response Management and Driver Decision Support

This project is studying train delays to accurately estimate train arrival times at grade crossings—leading to effective management of emergency response and helping alert drivers at unsignalized crossings through personal navigation devices. Delays at such crossings have been shown to be inherently variable, which illustrates the need for advanced prediction algorithms to reliably estimate arrival times as well as the uncertainty associated with the arrival times at grade crossings. Forecasting arrival times will involve acquisition of train positioning information to predict delay and developing historic and real-time statistical algorithms.

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Positioning, Planning, and Operation of Emergency Response Resources and Coordination Between Jurisdictions

Recent years have seen a significant increase in trains carrying hazardous materials such as oil, gas, and ethanol. Rail safety is a critical issue in Midwestern states such as Illinois, Wisconsin, and Minnesota because many of these trains pass through the Twin Cities, Chicago, and other population centers on their journey to East Coast refineries. This project is aiming to develop ways to strategically position and allocate emergency responders and resources in the event of a rail incident. This would include multijurisdictional agreements among stakeholders to allow responders to cross state or local boundaries. To do so, researchers are developing mathematical



models and techniques to enable systematic analysis of the emergency response system. The research will consider the vulnerability of the emergency response system itself, such as the risk of blocked crossings or other disruptions to the transportation network for first-responders. The result will provide operations guidelines and practical tools to policymakers to encourage systems that support safe and efficient railroad industry operations.

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About the Institute

The Roadway Safety Institute is the Region 5 University Transportation Center, led by the University of Minnesota. Other members are the University of Akron, the University of Illinois at Urbana-Champaign, Southern Illinois University Edwardsville, and Western Michigan University. Driven by the goal of preventing crashes to reduce fatalities and life-changing injuries, the Institute's activities focus on human-centered solutions to advance roadway safety.

For more information:

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