Bicycle and Pedestrian Safety Research

Roadway Safety Institute research focuses on reducing the high risks faced by pedestrians and bicyclists using our transportation network through approaches that target all aspects of the journey—from better planning for routes and facilities to developing technologies and countermeasures for preventing crashes.

Following are active projects by Institute-affiliated researchers. For more information on these projects and other RSI research, visit www.roadwaysafety.umn.edu.


State and local officials need data about bicycle and pedestrian traffic volumes to know if countermeasures for improving safety for these users are effective. This project is developing methods for estimating bicycle and pedestrian traffic volumes that can be used to help assess their exposure to risk. Researchers are collaborating with state and local agencies to deploy commercially available monitoring technologies and collect and analyze bicycle and pedestrian traffic data. The data and tools generated through this project will help agencies make better planning and management decisions and will inform future research related to quantifying risk and crash rates.

For more information: Greg Lindsey, 612-625-0669, linds301@umn.edu

A Positioning and Mapping Methodology Using Bluetooth and Smartphone Technologies to Support Situation Awareness and Wayfinding for the Visually Impaired

People with vision impairment are often wary of traveling alone in an unfamiliar environment because they lack information about it. To improve their mobility, accessibility, and level of confidence in using the transportation system, it is important to remove not only the physical barriers but also the information barriers. Personal assistive systems that provide location information to the visually impaired are helpful only if the user can trust that the information is valid and robust. To that end, RSI researchers are developing a “self-aware” infrastructure using commercial off-the-shelf Bluetooth low-energy modules that can self-monitor and ensure the information they provide is up to date.

For more information: Chen-Fu Liao, 612-626-1697, cliao@umn.edu
Safety in Numbers? Accessibility, Traffic, and Safety of Nonmotorized Travelers

This project is developing a risk model for pedestrian and bicycle travel in urban areas that reflects the cross-modal interactions produced from nonmotorized and motorized travel on individual road segments or intersections. To supply nonmotorized travel volumes where measurements are unavailable or insufficiently detailed, the research will develop a model to help resolve two challenges related to research of nonmotorized travel safety: the need for metrics that reflect the risk exposure produced by cross-modal traffic volume interactions, and the need for risk models that can be applied in local contexts such as individual streets and intersections.

For more information: Andrew Owen, 612-626-0024, aowen@umn.edu

Novel Collision-Avoidance System for Bicycles

More than 48,000 bicyclist–motorist crashes occur each year in the U.S., many because either the motorist does not see the bicyclist or the bicyclist behaves in an unpredictable manner. This project is developing a sensor system for a bicycle that can predict imminent bicycle-motorist crashes and provide an audio warning of the bicycle’s presence to the motorist. The system will also record a video image of the surroundings for a short duration after an imminent collision is predicted. The ultimate goal is to create and commercialize an inexpensive system for bicyclists.

For more information: Rajesh Rajamani, 612-626-7961, rajamani@umn.edu

Long-Term Effects of Gateway R1-6 Treatment on Yielding to Pedestrians, Vehicle Speed, and Sign Survival

Prior research has demonstrated that a “gateway” configuration of R1-6 in-street signs can produce a marked increase in the percentage of motorists yielding the right-of-way to pedestrians at uncontrolled crosswalks on multilane roads. Pilot data also showed that the gateway treatment produced a 10 mph speed reduction at one crosswalk without an increase in hard braking. In this project, researchers are collecting yielding and speed data at 14 permanent installations of the gateway treatment. The project aims to determine the persistence of the treatment’s effects over time, the survival of various elements of the treatment, and the treatment’s effect on driver speeds.

For more information: Ron Van Houten, 269-387-4471, ron.vanhouten@wmich.edu

Assessing the Impact of Pedestrian-Activated Crossing Systems

In the past decade, several treatments aimed at improving pedestrian safety and mobility by affecting driver behavior have been designed and deployed. These include the Pedestrian Hybrid Beacon, Rectangular Rapid Flashing Beacon, and flashing LED crosswalk signs. Although these treatments can have a positive effect on driver yielding rates, their effect on pedestrian crashes is less clear. In addition, richer insight as to their selection and placement is needed. This project will integrate results from a crash-record-based safety study with direct, long-term, and staged observations of pedestrian–vehicle interactions at crosswalks with particular treatments. Selected sites will also undergo a traffic conflict study based on pedestrian and vehicle trajectories to identify the individual effect each treatment has on crash potential.

For more information: John Hourdos, 612-626-5492, hourd001@umn.edu

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.