## FY10 ITS Institute research projects

Projects are listed under their corresponding research category and alphabetically by principal investigator. Project summaries and additional information for each research project listed in this section are online on the ITS Institute’s Web site at www.its.umn.edu/Research.

### Human Performance and Behavior

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<td>In-Vehicle Decision Support to Reduce Crashes at Rural Thru-Stop Intersections</td>
<td>Caroline Hayes, Department of Mechanical Engineering</td>
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<td>Usable and Effective Haptic Interfaces for In-Vehicle Decision Support</td>
<td>Caroline Hayes, Department of Mechanical Engineering</td>
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<td>Speed Impacts of Occasional Hazard Residential Street Warning Signs</td>
<td>Keith Knapp, formerly, Humphrey Institute of Public Affairs</td>
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<td>Requirements for Effective Fuel Economy Displays for Improving Fuel Economy and Safety</td>
<td>Michael Manser, Department of Mechanical Engineering, and Michael Rakauskas, formerly, Department of Mechanical Engineering</td>
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<td>Speed and Distance of Computing, Sensing, Communications, and Control Systems</td>
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<td>Real-time Non-intrusive Detection of Driver Drowsiness (Phase I)</td>
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<td>Real-time Non-intrusive Detection of Driver Drowsiness (Phase II)</td>
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<td>Infrared Thermal Camera-Based Real-Time Identification and Tracking of Large Animals to Prevent Animal-Vehicle Collisions (AVCs) on Roadways</td>
<td>Xun Yu, Department of Mechanical and Industrial Engineering (Duluth)</td>
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<tr>
<td>An Evaluation of a Prototype Safe Teen Car</td>
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<td>Warning Efficacy of Active Versus Passive Warnings for Unsignalized Intersection and Mid-Block Pedestrian Cross-Walks</td>
<td>Thomas Smith, Department of Kinesiology, and Nikolaos Papanikolopoulos, Department of Computer Science and Engineering</td>
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<td>Detection of Water and Ice on Bridge Structures by AC Impedance and Dielectric Relaxation Spectroscopy (Phase I)</td>
<td>John Evans, Department of Chemistry and Biochemistry (Duluth)</td>
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<td>Detection of Water and Ice on Bridge Structures by AC Impedance and Dielectric Relaxation Spectroscopy (Phase II)</td>
<td>John Evans, Department of Chemistry and Biochemistry (Duluth)</td>
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<td>Detection of Water and Ice on Bridge Structures by AC Impedance and Dielectric Relaxation Spectroscopy (Phase III)</td>
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<td>Deployment and Field Testing of Novel Water and Ice Sensor Systems on Bridge Decks</td>
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<td>Developing an Intelligent Decision Support System for the Proactive Implementation of Traffic Safety Strategies</td>
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<td>Using Velocity Constraints to Enhance Carrier Phase GPS Robustness</td>
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<td>Development of a Portable Work Zone Traffic Information System Based on DSRC and Bluetooth-Enabled Cell Phones</td>
<td>John Evans, Department of Chemistry and Biochemistry (Duluth)</td>
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<td>Development of an Accurate and Low-Cost GPS-Based Heading Determination System</td>
<td>Demoz Gebre-Egziabher, Department of Aerospace Engineering and Mechanics, and Craig Shankwitz, Department of Mechanical Engineering</td>
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<td>Deployment of a Proximity Warning System for Use Within Construction Work Zones to Notify Pedestrian Workers of Hazards</td>
<td>Demoz Gebre-Egziabher, Department of Aerospace Engineering and Mechanics, and Craig Shankwitz, Department of Mechanical Engineering</td>
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<td>Development of a Low-Cost Interface between Cell Phones and DSRC-Based Vehicle Unit for Efficient Use of VII Infrastructure</td>
<td>M. Imran Hayee, Department of Electrical and Computer Engineering (Duluth)</td>
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<td>Development of a Portable Work Zone Traffic Information System Based on DSRC and Bluetooth-Enabled Cell Phones</td>
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<td>Taek Kwon</td>
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► Status: In progress

Hua Tang, Department of Electrical and Computer Engineering (Duluth)
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✔ Status: New

Peter Willemsen, Department of Computer Science (Duluth)
Snow Rendering for Interactive Snowplow Simulation—Improving Driver Ability to Avoid Collisions When Following a Snowplow
► Status: In progress

Peter Willemsen, Department of Computer Science (Duluth), Lee Zimmerman, Department of Electrical and Computer Engineering (Duluth), and Albert Yonas, Department of Child Development
Snow Rendering for Interactive Snowplow Simulation—Supporting Safety in Snowplow Design (Phase I)
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Peter Willemsen, Department of Computer Science (Duluth), Lee Zimmerman, Department of Electrical and Computer Engineering (Duluth), and Albert Yonas, Department of Child Development (Duluth)
Snow Rendering for Interactive Snowplow Simulation—Supporting Safety in Snowplow Design (Phase II)
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Gary Davis and John Hourdos, Department of Civil Engineering
Access to Destinations: Arterial Data Acquisition and Network-Wide Travel Time Estimation (Phase I)
✔ Status: Complete

Gary Davis and John Hourdos, Department of Civil Engineering
Access to Destinations: Streamlining the Arterial Data Acquisition and the Estimation of Network-Wide Travel Link Times
► Status: In progress

Gary Davis, John Hourdos, and Chen-Fu Liao, Department of Civil Engineering
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✔ Status: New

Gary Davis and Henry Liu, Department of Civil Engineering
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Max Donath, Department of Mechanical Engineering
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Max Donath, Department of Mechanical Engineering
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Demoz Gebre-Egziabher and Greg Nelson, Department of Aerospace Engineering and Mechanics
Analysis of Uninhabited Aerial Vehicles ITS Concept of Operations
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Nikolas Geroliminis, formerly, Department of Civil Engineering
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John Hourdos, Department of Civil Engineering
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John Hourdos, Department of Civil Engineering, and Seraphin Chally Abou, Department of Mechanical and Industrial Engineering (Duluth)
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John Hourdos and Gary Davis, Department of Civil Engineering
TH-36 Full Closure Construction: Evaluation of Traffic Operations Alternatives
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John Hourdos and Gary Davis, Department of Civil Engineering, and Nikolas Geroliminis, formerly, Department of Civil Engineering
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► Status: In progress

John Hourdos and Panos Michalopoulos, Department of Civil Engineering
Development of Next Generation Simulation Models for Twin Cities: Freeway Metro-Wide Simulation Model (Phase I)
► Status: In progress

David Levinson and Henry Liu, Department of Civil Engineering, and Kathleen Harder, College of Design
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Chen-Fu Liao, Department of Civil Engineering
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Chen-Fu Liao, Department of Civil Engineering, and Michael Rakauskas, formerly, Department of Mechanical Engineering
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Henry Liu, Department of Civil Engineering
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Henry Liu, Department of Civil Engineering
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✔ Status: Complete

Henry Liu, Department of Civil Engineering
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Henry Liu, Department of Civil Engineering
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Chen-Fu Liao and Gary Davis, Department of Civil Engineering
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Chen-Fu Liao and Henry Liu, Department of Civil Engineering
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Henry Liu and David Levinson, Department of Civil Engineering
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Henry Liu and Chen-Fu Liao, Department of Civil Engineering
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► Status: In progress

Henry Liu and Panos Michalopoulos, Department of Civil Engineering
Development of Algorithms for Travel-Time-Based Traffic Signal Timing (Phase I)
► Status: In progress

Henry Liu and Panos Michalopoulos, Department of Civil Engineering
Development of the Next-Generation Metro-Wide Simulation Models for the Twin Cities’ Metropolitan Area: Mesoscopic Modeling
► Status: In progress

Panos Michalopoulos, Department of Civil Engineering
Transportable Low-Cost Traffic Data Collection Device for Rapid Deployment for Intersections and Arterials
► Status: Complete

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John Bryson, Barbara Crosby, and Melissa Stone, Humphrey Institute of Public Affairs
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Jason Cao and Frank Douma, Humphrey Institute of Public Affairs
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Jason Cao and Lee Munnich, Humphrey Institute of Public Affairs
Benefit-Cost Analysis of Value Pricing: Case Study for MnPass
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Frank Douma, Humphrey Institute of Public Affairs
ITS and Privacy: Developing New Rules for Virtual Roads
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Frank Douma, Humphrey Institute of Public Affairs
ITS and Locational Privacy: Suggestions for Peaceful Coexistence
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Thomas Horan, Humphrey Institute of Public Affairs
ITS and Safety Planning: ITS and EMS System Data Integration for Safety and Crisis Information and Decision-Making Systems
► Status: Complete

Thomas Horan and Benjamin Schooley, Humphrey Institute of Public Affairs
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► Status: In progress

Thomas Horan and Benjamin Schooley, Humphrey Institute of Public Affairs
ITS and Transportation Safety: EMS System Data Integration to Improve Traffic Crash Emergency Response and Treatment (Phase III)
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David Levinson, Department of Civil Engineering
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Greg Lindsey, Humphrey Institute of Public Affairs
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► Status: In progress

Lee Munnich, Ferrol Robinson, and Zhao Zhirong, Humphrey Institute of Public Affairs
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Carissa Schively Slotterback, Humphrey Institute of Public Affairs, and John Houdros, Department of Civil Engineering
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Elizabeth Wilson, Humphrey Institute of Public Affairs, Kevin Krizek, University of Colorado (formerly, Humphrey Institute of Public Affairs), and Julian Marshall, Department of Civil Engineering
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Elizabeth Wilson, Humphrey Institute of Public Affairs, and Julian Marshall, Department of Civil Engineering
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