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**

- **Janet Creaser and Michael Manser, Department of Mechanical Engineering**
  Development and Evaluation of a Second Generation In-Vehicle Driver Assistance for Teenagers to Facilitate a Reduction in Crash Rates
  **Status:** Completed

- **Janet Creaser and Michael Manser, Department of Mechanical Engineering**
  Usability Evaluation of the Teen Driver Support System
  **Status:** Newly funded

- **Max Donath, Janet Creaser, Michael Manser, and Craig Shankwitz, Department of Mechanical Engineering**
  Smartphone-Based Novice Teenage Driver Support System
  **Status:** In progress

- **Kathleen Harder, College of Design**
  Psychological and Roadway Correlates of Aggressive Driving (Phase II)
  **Status:** Completed

- **Kathleen Harder and John Bloomfield, College of Design**
  The Effectiveness and Safety of Traffic- and Non-Traffic-Related Messages Presented on Changeable Message Signs (Phase II)
  **Status:** Completed

- **Kathleen Harder and John Bloomfield, College of Design**
  Comparison of Dual-Phase Static Signage
  **Status:** In progress

**Computing, Sensing, Communications, and Control Systems**

- **Keith Knapp, Humphrey Institute of Public Affairs**
  Speed Impacts of Occasional Hazard Residential Street Warning Signs
  **Status:** In progress

- **Michael Manser, Department of Mechanical Engineering**
  Generation of a Multi-State Consensus on Rural Intersection Decision Support
  **Status:** Completed

- **Thomas Smith, Department of Kinesiology, and Nikolaos Papanikolopoulos, Department of Computer Science and Engineering**
  Warning Efficacy of Active Versus Passive Warnings for Unsignalized Intersection and Mid-Block Pedestrian Cross-Walks
  **Status:** Completed

- **Xun Yu, Department of Mechanical and Industrial Engineering (Duluth)**
  Real-Time Nonintrusive Detection of Driver Drowsiness (Phase I)
  **Status:** Completed

- **Xun Yu, Department of Mechanical and Industrial Engineering (Duluth)**
  Real-Time Nonintrusive Detection of Driver Drowsiness (Phase II)
  **Status:** In progress

- **Max Donath and Craig Shankwitz, Department of Mechanical Engineering**
  Toward a Multi-State Consensus on Urban Communities
  **Status:** Completed

- **Max Donath, Craig Shankwitz, and Mike Manser, Department of Mechanical Engineering**
  CICAS Stop Sign Assist (SSA) System
  **Status:** In progress

- **John Evans, Department of Chemistry and Biochemistry (Duluth)**
  Detection of Water and Ice on Bridge Structures by AC Impedance and Dielectric Relaxation Spectroscopy (Year 1)
  **Status:** Completed

- **John Evans, Department of Chemistry and Biochemistry (Duluth)**
  Detection of Water and Ice on Bridge Structures by AC Impedance and Dielectric Relaxation Spectroscopy (Year 2)
  **Status:** In progress

- **John Evans, Department of Chemistry and Biochemistry (Duluth)**
  Detection of Water and Ice on Bridge Structures by AC Impedance and Dielectric Relaxation Spectroscopy (Year 3)
  **Status:** In progress

- **Caroline Hayes, Department of Mechanical Engineering**
  In-Vehicle Decision Support to Reduce Crashes at Rural Thru-Stop Intersections
  **Status:** Newly funded

- **Taek Kwon, Department of Computer and Electrical Engineering (Duluth)**
  Cellular Wireless Mesh Sensor Network for Comprehensive Spatial Traffic Movement Detection and Data Fusion (Phase II)
  **Status:** Completed

- **Taek Kwon, Department of Computer and Electrical Engineering (Duluth)**
  Advanced Dynamic LED Warning Signs for Rural Intersections Powered by Renewable Energy
  **Status:** In progress

- **Taek Kwon, Department of Computer and Electrical Engineering (Duluth)**
  Development of a Weigh-Pad-Based Portable Weigh-in-Motion (WIM) System
  **Status:** In progress

- **Taek Kwon, Department of Computer and Electrical Engineering (Duluth)**
  Development of Data Warehouse and Applications for Continuous Vehicle Class and Weigh-in-Motion (WIM) Data
  **Status:** In progress

- **Taek Kwon, Department of Computer and Electrical Engineering (Duluth)**
  Migration of Automatic Traffic Recorder (ATR) and Short-Duration Traffic Data Warehouse at UMD Data Center to Mn/DOT Office of Transportation Data and Analysis (TDA)
  **Status:** In progress

- **Venkatram Mereddy, Department of Chemistry and Biochemistry (Duluth)**
  Development of Novel Hydrogen Storage Materials for Road-Traffic-Related Applications (Phase I)
  **Status:** In progress

- **Nikolaos Papanikolopoulos and Vassilios Morellas, Department of Computer Science and Engineering**
  Counting Empty Parking Spots at Truck Stops
  **Status:** In progress

- **Nikolaos Papanikolopoulos and Vassilios Morellas, Department of Computer Science and Engineering**
  Deployment of Practical Methods for Counting Bicycling and Pedestrian Use of a Transportation Facility
  **Status:** Newly funded

- **Nikolaos Papanikolopoulos, Department of Computer Science and Engineering**
  Data Mining of Traffic Video Sequences
  **Status:** In progress
Craig Shankwitz, Department of Mechanical Engineering
Automatic Safety Alert System for Work Zones with Flag Operators
Status: Completed

Craig Shankwitz, Department of Mechanical Engineering
New Battery-less Wireless Traffic Sensors as a Replacement for Loop Detectors
Status: Completed

Craig Shankwitz, Department of Mechanical Engineering
Positioning System (VPS) for Transit Guidance Augmentation Using Vehicle Mechanical Engineering
Status: In progress

Rajesh Rajamani, Department of Mechanical Engineering
Roadway Message Painter Maintenance by Developing a Robotic System
Status: In progress

Rajesh Rajamani and Lee Alexander, Department of Civil Engineering
Enhancements and Field Test Evaluation of New Battery-Less Wireless Traffic Sensors
Status: In progress

Rajesh Rajamani and John Hourdos, Department of Civil Engineering
Ultra-Reliable Detection of Imminent Collision for Enhanced Passenger Safety
Status: In progress

Ryan Rosandich, Department of Mechanical and Industrial Engineering (Duluth)
Improve Safety and Efficiency of Roadway Maintenance by Developing a Robotic Roadway Message Painter
Status: In progress

Craig Shankwitz, Department of Mechanical Engineering
Guidance Augmentation Using Vehicle Positioning System (VPS) for Transit Applications (Year 2)
Status: Completed

Hua Tang, Department of Computer and Electrical Engineering (Duluth)
Development of a New Tracking System Based on CMOS Vision Processor Hardware (Phase I)
Status: In progress

Hua Tang, Department of Computer and Electrical Engineering (Duluth)
Development of a New Tracking System Based on CMOS Vision Processor Hardware (Phase II)
Status: In progress

Peter Willemsen, Department of Computer Science
Snow Rendering for Interactive Snowplow Simulation: Supporting Safety in Snowplow Design
Status: In progress

Peter Willemsen, Department of Computer Science
Snow Rendering for Interactive Snowplow Simulation: Supporting Safety in Snowplow Design
Status: In progress

Peter Willemsen, Department of Computer Science
Snow Rendering for Interactive Snowplow Simulation: Supporting Safety in Snowplow Design
Status: In progress

Gary Davis, Department of Civil Engineering
Bus Signal Priority Based on GPS and Wireless Communications (Phase II: Signal Priority System Development)
Status: Completed

Gary Davis and Al Yonas, Institute of Child Development, and Lee Zimmerman
Snow Rendering for Interactive Snowplow Simulation: Supporting Safety in Snowplow Design (Phase I)
Status: In progress

Gary Davis, Department of Civil Engineering
Cross-Median Crashes: Identifications and Countermeasures
Status: Completed

Gary Davis and John Hourdos, Department of Civil Engineering
Access to Destinations: Arterial Data Acquisition and Network-Wide Travel Time Estimation (Phase II)
Status: In progress

Gary Davis and Henry Liu, Department of Civil Engineering
Using Detailed Signal and Detector Data to Investigate Intersection Crash Causation
Status: Newly funded

Robert Feyen, Department of Mechanical and Industrial Engineering (Duluth)
Assessing Coordination Between Agencies Involved in Traffic Incident Management
Status: Completed

Demoz Gebre-Egziabher, Department of Aerospace Engineering and Mechanics, and Ted Morris, Department of Civil Engineering
Remotely Operated Vehicle Surveillance for Transportation Management and Security
Status: Completed

Demoz Gebre-Egziabher and Greg Nelson, Department of Aerospace Engineering and Mechanics
Analysis of Uninhabited Aerial Vehicles ITS Concept of Operations
Status: In progress

Nikolas Geroliminis and Panos Michalopoulos, Department of Civil Engineering
Development of the Next-Generation Stratified Ramp Metering Algorithm Based on Freeway Density
Status: In progress

M. Imran Hayee, Department of Computer and Electrical Engineering (Duluth)
Development of a Low-Cost Interface Between Cell Phones and DSRC-Based Vehicle Unit for Efficient Use of Vehicular Infrastructure
Status: In progress

M. Imran Hayee, Department of Computer and Electrical Engineering (Duluth)
Development of a Portable Work Zone Traffic Information System Based on DSRC and Bluetooth-Enabled Cell Phones
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

Rajesh Rajamani, Department of Mechanical Engineering
Winter Road Maintenance Measurement, and Applicator Control for Automated Vehicle Location, Friction Geospatial Database
Status: Completed

Rajesh Rajamani, Department of Mechanical Engineering
Robust Lane Assistance
Status: Completed

Craig Shankwitz, Department of Mechanical Engineering
Multilane, High-Accuracy, High-Density Geospatial Database
Status: Completed

Craig Shankwitz, Department of Mechanical Engineering
Analysis of Highway Design and Geometric Effects on Crashes
Status: In progress

Craig Shankwitz and Max Donath, Department of Mechanical Engineering
GPS Augmentation for Robust Lane Assistance
Status: In progress

Craig Shankwitz, Department of Mechanical Engineering
Technology for Transit: Lane Guidance for Shoulder-Running Buses
Status: In progress

Craig Shankwitz, Department of Mechanical Engineering
2-D Optical Sensor for DGPS Augmentation
Status: Newly funded

Craig Shankwitz, Department of Mechanical Engineering
In-Situ Testing of State Patrol Vehicle Lighting, Retro-Reflectors, and Paint
Status: Newly funded

Technologies for Modeling, Managing, and Operating Transportation Systems

Gary Davis and Chen-Fu Liao, Department of Civil Engineering
Bus Signal Priority Based on GPS and Wireless Communications
Status: Completed

Status:

In progress

Completed

Newly funded
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**John Houriados and Gary Davis, Department of Civil Engineering**
Vehicle-Probe-Based Real-Time Traffic Monitoring on Arterials
**Status:** Newely funded

**John Houriados and Gary Davis, Department of Civil Engineering**
TH-36 Full Closure Construction: Evaluation of Traffic Operations Alternatives
**Status:** In progress

**John Houriados and Ted Morris, Department of Civil Engineering**
Portable, Nonintrusive Advance Warning Devices for Work Zones With or Without Flag Operators
**Status:** In progress

**David Levinson and Henry Liu, Department of Civil Engineering, and Kathleen Harder, College of Design**
Traffic Flow and Road User Impacts of the Collapse of the I-35W Bridge Over the Mississippi River
**Status:** In progress

**Chen-Fu Liao, Department of Civil Engineering and Mick Rakauskas, Department of Mechanical Engineering**
Accessible Traffic Signals for Blind and Visually Impaired Pedestrians
**Status:** Newely funded

**Chen-Fu Liao and Henry Liu, Department of Civil Engineering**
Advanced System Analysis for Public Transit (ASAPT) Using Data-Driven Transit Performance Measures for Transit Network Analysis
**Status:** Newely funded

**Chen-Fu Liao, Department of Civil Engineering**
Using Archived Truck GPS Data for Freight Performance Analysis on Interstate 1-94/I-90 from the Twin Cities to Chicago
**Status:** In progress

**Henry Liu, Department of Civil Engineering**
Evaluation of Cell Phone Traffic Data
**Status:** Completed

**Henry Liu, Department of Civil Engineering**
Responding to the Unexpected: Development of a Dynamic Data-Driven Traffic Operation Model for Effective Evacuation
**Status:** In progress

**Henry Liu, Department of Civil Engineering**
Estimating and Measuring Arterial Travel Time and Delay
**Status:** Newely funded

**Henry Liu and Chen-Fu Liao, Department of Civil Engineering**
SMART-Signal: Systematic Monitoring of Arterial Road Traffic and Signals (Phase II)
**Status:** In progress

**Henry Liu and Panos Michalopoulos, Department of Civil Engineering**
Development of a Real-Time Arterial Performance Monitoring System Using Traffic Data Available from Existing Signal Systems
**Status:** Completed

**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**
Development of Real-Time Traffic-Adaptive Accident-Reduction Measures for the I-94/35W Commons Section
**Status:** Completed

**Panos Michalopoulos, Department of Civil Engineering**
Enhanced Micro-Simulation Models for Accurate Safety Assessment of Traffic Management ITS Solutions
**Status:** Completed

**Panos Michalopoulos, Department of Civil Engineering**
Transportable Low-Cost Traffic Data Collection and Wireless Surveillance Device for Rapid Deployment for Intersections and Arterials
**Status:** In progress

**Panos Michalopoulos and Ted Morris, Department of Civil Engineering**
Low-Cost Portable Video-Based Queue Detection for Work Zone Safety
**Status:** In progress

**Xun Yu, Department of Mechanical and Industrial Engineering (Duluth)**
Intelligent Pavement for Traffic Flow Detection (Phase I)
**Status:** In progress

**Xun Yu, Department of Mechanical and Industrial Engineering (Duluth)**
Intelligent Pavement for Traffic Detection (Phase II)
**Status:** In progress

**Jason Cao and Lee Munnich, Humphrey Institute of Public Affairs**
Benefit-Cost Analysis of Value Pricing: Case Study for MnPass
**Status:** Newely funded

**John Bryson, Melissa Stone, and Barbara Crosby, Humphrey Institute of Public Affairs**
Technology and Collaboration in Effective Transportation Policy
**Status:** Completed

**John Bryson, Melissa Stone, and Barbara Crosby, Humphrey Institute of Public Affairs**
The Urban Partnership Agreement: A Comparative Study of Technology and Collaboration in Transportation Policy Implementation
**Status:** In progress

**Jason Cao and Frank Douma, Humphrey Institute of Public Affairs**
Substitution Between E-shopping and Travel: Evidence from the Twin Cities
**Status:** In progress
Frank Douma, Humphrey Institute of Public Affairs
Improving Car Sharing Transit Service with ITS
Status: Completed

Frank Douma, Humphrey Institute of Public Affairs
ITS and Privacy: Developing New Rules for Virtual Roads
Status: In progress

Frank Douma, Humphrey Institute of Public Affairs
ITS and Locational Privacy: Suggestions for Peaceful Coexistence
Status: Newly funded

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: Completed

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 II)
Status: In progress

Elizabeth Wilson, Humphrey Institute of Public Affairs, and Julian Marshall, Department of Civil Engineering
Decision Tools for Assessing Transportation Impacts of School Policy and School Choice
Status: In progress

David Levinson, Department of Civil Engineering
The Role of Social Networks and Information and Communications Technology on Destination Choice
Status: Complete

Greg Lindsey, Humphrey Institute of Public Affairs
Understanding Use of Nonmotorized Transportation Facilities
Status: Newly funded

Lee Munnich and Ferrol Robinson, Humphrey Institute of Public Affairs
Implementing Distance-Based User Fees as a Replacement for the Gas Tax
Status: Newly funded

Carissa Schively Slotterback, Humphrey Institute of Public Affairs, and John Hourdos, Department of Civil Engineering
Technology in Planning and Participatory Processes: Identifying New Synergies Through Real-World Application
Status: In progress

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
School Travel and the Implications for Advances in Transportation Technology
Status: In progress