

UMTRI

RESEARCH REVIEW

• UNIVERSITY OF MICHIGAN TRANSPORTATION RESEARCH INSTITUTE • JULY–SEPTEMBER 2007 • VOLUME 38, NUMBER 3 •



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**UMTRI Launches
Transportation
Systems Group
to Focus on
Sustainability**

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UMTRI's Strategic Intent

To be the leader in transportation systems research integrating vehicles, people, and infrastructure to achieve a highway transportation system where:

- Fatalities and injuries are eliminated
- People and goods flow efficiently
- Reliance on nonrenewable energy is reduced

UMTRI Launches Transportation Systems Group

UMTRI is expanding its research focus to include systems-level research in areas such as sustainability, transportation energy, vehicle-infrastructure integration (VII), and heavy-truck telematics. The Transportation Systems Group (TSG) was established to meet this focus and will collaborate with researchers throughout UMTRI and the University of Michigan (U-M). The group will recruit and address the needs of new sponsors, and provide a U-M umbrella function to assist faculty with common interests in these research areas.

The TSG is divided into two offices: the Office of Sustainable Transportation Systems and the Office of ITS Integration. The Office of Sustainable Transportation Systems addresses the overarching question of how to make personal transportation more sustainable and still meet consumer wants and needs. Answering this question requires understanding the influence of new vehicle and fuel technologies, costs, consumer perception, and policy instruments on successful marketplace acceptance. To this end, the office will focus on alternative energy and model the evolution of the automotive marketplace, including technological advances and customer acceptance.

The Office of ITS Integration promotes vehicle infrastructure integration (VII), which allows vehicles to send data to other vehicles and to roadside devices to communicate traffic, navigation, and weather data. The initial focus of the office is to support a VII proof-of-concept test bed, and later,

under an initial contract with the Michigan Department of Transportation (MDOT), to aggregate, structure, and analyze data generated in this test bed in a number of MDOT safety and traffic management applications. This effort will also support the greater national VII program analysis and several cooperative programs in Europe and Asia where similar efforts are underway. These initial efforts will provide a foundation for ongoing VII application development work being planned for national, state, and local users of these systems.

Key research faculty are John Sullivan, Ralph Robinson, and François Dion.

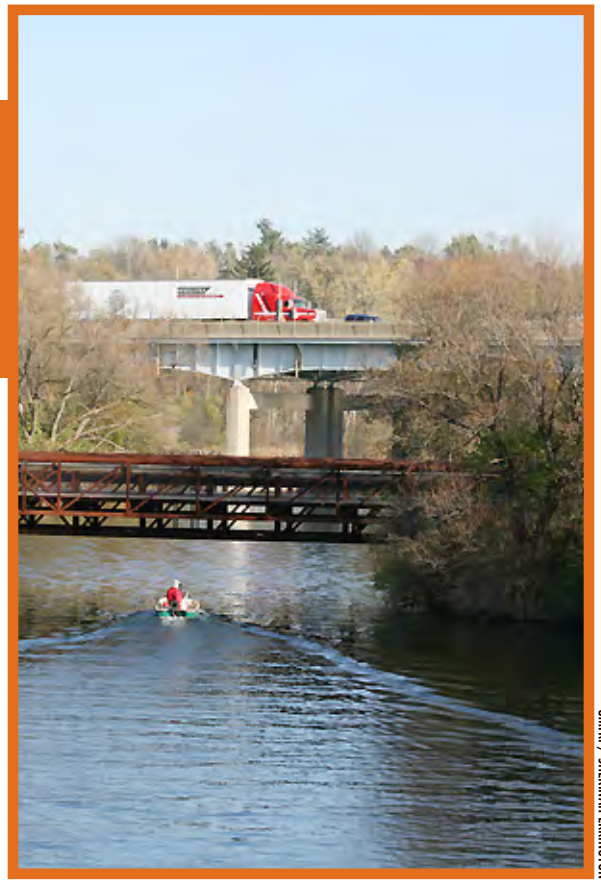
John L. Sullivan, research scientist, is colead of the TSG and head of the Office of Sustainable Transportation Systems. John will focus on sustainable transportation, innovative fuels and powertrains, and complex systems modeling. His research interests include adoption of new technologies, alternative powertrains, emissions policies and standards, land use and driving patterns, and seat belt fit.

Prior to joining UMTRI, Sullivan was principal of Sustainable Strategies, LLC, a consulting firm specializing in analyzing life cycles of sustainable products. He was also working half time for Argonne National Laboratory. Prior to that, Dr. Sullivan enjoyed a thirty-year career at Ford, working most recently as a staff technical leader. In that role, he founded Ford's Sustainability

Science Group, developed a biofuels program, applied life-cycle assessment to product sustainability evaluations, and created and applied complexity science methods to sustainable transportation methods. He was also a senior research scientist, supervisor, and group leader earlier in his time at Ford. Before then, he was a postdoctoral scholar at the Macromolecular Research Center at the University of Michigan.

Sullivan possesses a bachelor's degree in chemistry and a Ph.D. in polymer physical chemistry from the State University of New York (SUNY), Syracuse. He holds four patents for seatbelt damper assemblies. He is a member of the American Chemical Society and Sigma Xi, an international honor society for scientific and engineering research.

Ralph Robinson, research scientist, is colead of the TSG and head of the Office of ITS Integration. Ralph brings a broad range of experience in vehicle system design, vehicle networking,



UMTRI / SHEKMAH ERINGTON

continued...

vehicle telematics, and multimedia systems development. His greatest areas of interest include transportation system optimization through vehicle/highway connectivity, which involves traffic systems modeling and congestion mitigation technologies.

Prior to joining UMTRI, Robinson was president and cofounder of the Vehicle-Infrastructure Integration Consortium (VII-C), which represents eight car companies who are evaluating the feasibility of a national deployment of a wireless system. In this role, he was on loan from his primary position at Ford, where he was a senior staff technical specialist. Robinson was employed at Ford for forty years, holding technical specialist and management positions in product development operations.

Robinson holds a bachelor of science degree in electrical engineering from Lawrence Technological Institute and three patents for embedded microprocessor designs. He has been a member of the ITS-Michigan Board of Directors, the ITS Congressional Caucus Advisory Committee, the Michigan/Ohio University Transportation Center Evaluation Team, the SAE Dedicated Short Range Communications Technical Committee, and the IDB Forum Board.

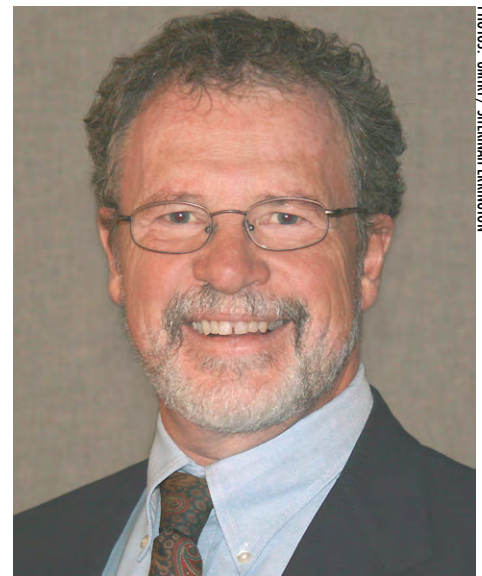
François Dion, assistant research scientist, is working in the Office of ITS Integration. His areas of expertise are ITS, VII, intelligent traffic modeling, and traffic engineering. He is responsible for projects related to intelligent transportation systems (ITS) and vehicle-infrastructure integration (VII). His research interests include information technology applications to transportation, advanced traffic signal control systems, integrated control of transit and traffic operations, traveler information systems, modeling driver behavior, traffic simulation, vehicle fuel consumption, and pollutant emissions.

Prior to joining UMTRI, Dion was an assistant professor at Michigan State University, teaching transportation engineering, transportation policies, ITS, transportation and the environment, and simulation and optimization of urban transportation networks. He created a microscopic traffic simulation model for ITS applications combining modeling of vehicle-to-infrastructure and vehicle-to-vehicle communications, evaluated the impacts of wireless communication delays on the performance of automated vehicle control systems, developed a vehicle control model considering potential delays in wireless communications, and developed a methodology to assess the potential benefits of transit signal priority deployments along urban arterials.

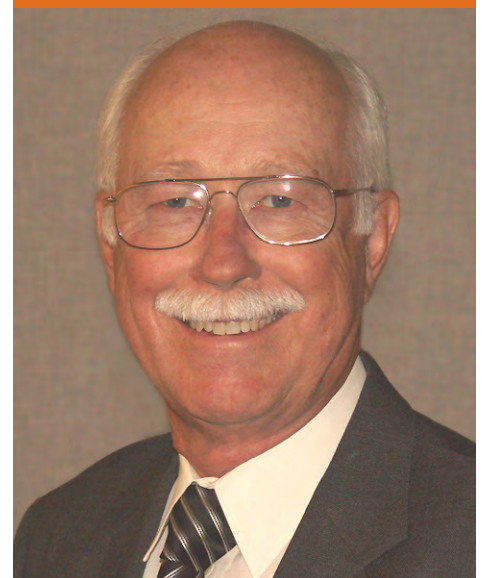
Dion also worked for the Virginia Tech Transportation Institute (VTTI) conducting research on real-time traffic signal control systems, transit signal preemption systems, real-time transportation data collection systems, modeling and simulation of urban transportation networks, and modeling of vehicle fuel consumption and emissions. He also occasionally taught transportation engineering classes for Virginia Tech's Charles Edward Via, Jr. Department of Civil and Environmental Engineering.

Dion has a Ph.D. in civil engineering from the University of Waterloo, and an M.A.Sc. and a B.Eng. in civil engineering (transportation) from the École Polytechnique in Montréal. He is a licensed professional engineer in both Michigan and Québec, and a member of the Transportation Research Board, the Institute of Transportation Engineers, the American Society of Engineering Education, and the Chi Epsilon Honor Society.

Watch future editions of the *UMTRI Research Review* for updates and more information on the Transportation Systems Group. **RR**



John L. Sullivan



Ralph Robinson



François Dion

UMTRI Conducts SHRP 2 Safety Research

UMTRI has been awarded three projects under the Strategic Highway Research Program 2 (SHRP 2) to collect and use naturalistic driving data to improve highway safety. Congress established the SHRP 2 program in 2006 to investigate the underlying causes of highway crashes and congestion in a short-term program of focused research. The program is funded by the American Association of State Highway and Transportation Officials and managed by the Transportation Research Board of the National Academy of Sciences. Research is being carried out in four main areas: safety, renewal, reliability, and capacity. All three UMTRI projects fall under the safety category, with aims to significantly improve highway safety by understanding driving behavior in a study of unprecedented scale.

UMTRI is leading two SHRP 2 projects and playing a major role in a third. The initial phase of this four-year, \$43.2 million safety research program includes a pilot study for vehicle-based data collection, a second pilot for the automated capture of vehicle trajectories using roadside video capture, and leading-edge research using geographic information systems (GIS) to analyze safety data captured during earlier naturalistic vehicle studies.

While crash analysis is an established field, little is known about the precursors to highway crashes, particularly in terms of how driver behavior contributes to crash risk. Tim Gordon, head of UMTRI's Engineering Research Division and principal investigator of the two UMTRI-led studies, says, "This research program aims to develop a new and detailed understanding of the factors and mechanisms that lead to highway crashes, particularly the very large numbers that happen at intersections or involve cars running off the road."

The information gathered in this research will support the development of new safety measures based on improved highway design, vehicle technologies, and even next-generation communications systems that will network vehicles and the

highway to improve safety. UMTRI director Peter Sweatman says, "SHRP 2 is the major scientific effort of our generation to understand driving behavior and risk."

For the vehicle-based data project, which will be led by the Virginia Tech Transportation Institute, researchers will record and analyze high-quality, naturalistic driving data from test vehicles that subjects will drive as they would their own vehicles. This will involve fitting electronic data systems to the vehicles of volunteer drivers, and recording huge amounts of information on driving patterns and driver response to different situations on the road. The initial pilot study is to develop the necessary reliable and highly capable data-collection systems—ones that can be fitted and left in place for up to a year at a time, recording events in great detail. Not only will crashes be recorded, but the risk factors will be better understood, and this knowledge will be applied to improve safety. With several thousand vehicles to be instrumented in the main study, the pilot project will provide a robust proof of concept, developing sensing, data recording, database and analysis systems to support what will be an unprecedented resource for vehicle safety research in the future.

The roadside, or site-based, data systems project will be developed with a similar aim, but using data captured from the outside world. The system to be developed will provide high-accuracy video motion capture, based on modern digital video technology and image

continued...

SHRP 2 Overview

SHRP 2 is a targeted, results-oriented program of strategic highway research designed to advance highway performance and safety for U.S. highway users. The overall goal of the program is to develop a consistent, systematic approach to performing highway renewal that is rapid, causes minimum disruption, and produces long-lived facilities. The renewal scope applies to all classes of roads. SHRP 2 will focus on applied research in four areas:

- **Safety.** Prevent or reduce the severity of highway crashes by understanding driver behavior (this is the area of UMTRI's projects).
- **Renewal.** Address the aging infrastructure through rapid design and construction methods that cause minimal disruption and produce long-lived facilities.
- **Reliability.** Reduce congestion through incident reduction, management, response, and mitigation.
- **Capacity.** Integrate mobility, economic, environmental, and community needs in the planning and designing of new transportation capacity.



SHRP2 GRAPHICS COURTESY TRANSPORTATION RESEARCH BOARD / STRATEGIC HIGHWAY RESEARCH PROGRAM

processing from multiple cameras set up at intersections. This work will improve upon earlier studies UMTRI and others have carried out, especially in terms of high levels of automation and improved accuracy. One particular aim will be to develop “crash surrogates” from the data captured, which means that data can be used to assess crash risk, without having to wait long periods to count numbers of actual crashes. This will provided a stepping stone for the rapid evaluation of safety systems and design improvements in the future.

The third project that UMTRI will be working on is to develop new techniques for safety analysis based on the integration of highway and other geographic data with naturalistic driving data. For example, when drivers are regularly challenged by particular situations, and those situations tend to arise at particular locations, the combined datasets will provide the basis for understanding the underlying reasons and suggesting countermeasures. This research is particularly targeted at run-off-road crashes and

builds on technology and data previously developed by UMTRI.

Researchers from UMTRI’s Engineering Research, Human Factors, Transportation Safety Analysis, and Social and Behavioral Analysis Divisions will work together to contribute to this research effort. The vehicle-based safety study is being led by the Virginia Tech Transportation Institute, and supporting research on the two UMTRI projects will be provided by Battelle, the University of California, Berkeley, Soar Technology, Inc., the Michigan Department of Transportation, and Dinh-Zarr Associates.

For more information, see TRB’s SHRP 2 website at www.trb.org/SHRP2/ or contact Tim Gordon at tjgordon@umich.edu.

UMTRI Staff Wins Publication Awards

The 2007 UMTRI Best Publication Award winners were announced in early September. Ray Bingham, research associate professor, Jean Shope, research professor and associate director of UMTRI, and Michael Elliott, assistant professor of biostatistics of the University of Michigan School of Public Health, won for “Social and Behavioral Characteristics of Young Adult Drink/Drivers Adjusted for Level of Alcohol Use.” The article was published in *Alcoholism: Clinical and Experimental Research*, volume 31, number 4, on pages 655–664. The winning paper is available online at <http://tinyurl.com/242wlg>.

Two articles also received Research Excellence Awards:

- “The Effects of Tethering Rear-Facing Child Restraint Systems on ATD Responses” by Miriam Manary, senior research associate, Matt Reed, associate research scientist, Kathy Klinich, assistant research scientist, Nichole Ritchie, research area specialist, and Larry Schneider, division head, all in UMTRI’s Biosciences Division. The article appeared in the *Annual Proceedings of the Association for the Advancement of*

Research Excellence Award Winners (l-r). At right: Paul E. Green and John Woodrooffe. Below: Nichole Ritchie, Matt Reed, Miriam Manary, and Larry Schneider. (Not pictured: Kathy Klinich.)





Automotive Medicine, volume 50, on pages 376–410.

- “The Estimated Reduction in the Odds of Loss-of-Control Type Crashes for Sport Utility Vehicles Equipped with Electronic Stability Control” by Paul E. Green, assistant research scientist, and John Woodroffe, division head, in UMTRI’s Transportation Safety Analysis Division. The article was published in the *Journal of Safety Research*, volume 37, on pages 493–499.

The publication and research excellence award winners are chosen each year by UMTRI’s steering committee to recognize excellence in articles published in academic journals.

Michigan Traffic Crash Facts Website Wins Award

The Michigan Traffic Crash Facts (MTCF) website won the 2007 Best Traffic Records Web Site Award from the Association of Transportation Safety Information Professionals (ATSIP). The website was created and is maintained by UMTRI staff for the Michigan State Police Office of Highway Safety Planning. The site provides a yearly compilation and analysis of Michigan crash data for government agencies, researchers, libraries, the media, and the public. The data is provided by the Michigan Department of State Police from its Michigan Traffic Crash Forms (UD-10).

This year, a new data tool was added to the website that allows displaying query results geographically. The site, which previously displayed data (at the crash, vehicle, or person levels) solely in table formats, now also displays the data, for the years 2004–2006, graphically as points on a map.

Charles Compton, manager of UMTRI’s Transportation Data Center, accepted the award on behalf of UMTRI and the team headed by Steve Schreier at the Michigan Office of Highway Safety Planning on July 24 at a ceremony in St. Louis, Missouri. The website also won the ATSIP award in 2005.

Check out the Michigan Traffic Crash Facts website at www.michigantrafficcrashfacts.org, and explore the new data query tool at www.michigantrafficcrashfacts.org/datatool/. **RR**

At left: 2007 UMTRI Best Publication Award winners Jean Shope and Ray Bingham flank UMTRI Director Peter Sweatman.

Above: The UMTRI team that designed, developed, and maintains the MTCF website includes (left to right, standing): Helen Spradlin, Robert Schultz, Mary Bennett, Charlie Compton, Mary Helen Eschman, Anne Matteson, and Bob Kennedy, and (left to right, in photos) Chris DiVirgilio, Andy Matteson, and Margaret Bennett.



PHOTOS THIS SPREAD: UMTRI / SHERIAH BRIMMON

Paul Green Elected HFES President

Paul A. Green, a research professor in UMTRI's Human Factors Division, was recently elected president of the Human Factors and Ergonomics Society (HFES), a group of 4,500



human factors professionals. Effective October, 2007, Green will serve for one year as president elect, and then move into the role of president the following year. He will serve three years on the HFES Executive Council, as president elect, president, and past president.

Green leads a research team that focuses on driver workload and workload managers, navigation system design, and motor vehicle controls and displays. The research makes extensive use of instrumented cars and UMTRI's driving simulator. Green has led the development and managed all three generations of the simulator over the last dozen years. Green's research has been published in approximately 200 journal articles, proceedings papers, and technical reports. He was the lead author of several landmark publications: the first set of U.S. DOT telematics guidelines and SAE recommended practices concerning navigation system design (SAE J2364, the 15-second rule) and design compliance calculations (SAE J2365).

Green is also an adjunct associate professor in the University of Michigan (U-M) Department of Industrial and Operations Engineering (IOE), teaching an ergonomics laboratory and human-computer interaction class. He has also coled the U-M Human Factors Engineering Short Course (with Dick Pew of BBN Technologies and Chris Wickens of the University of Illinois) for twenty-five years.

Before joining UMTRI, Green held appointments in U-M's Department of Psychology and the School of Art (Industrial Design). He has a B.S. degree in mechanical engineering from Drexel University and three degrees from U-M: an M.S.E. in IOE, an M.A. in psychology, and a joint Ph.D. in IOE and psychology.

Walter McManus Wins Abramson Award

Walter McManus, head of UMTRI's Automotive Analysis Division, won the 2007 National Association of Business Economics' Abramson Award for best



article in *Business Economics*. Walter's paper, "The Link between Gasoline Prices and Vehicle Sales," was picked by the editorial board of *Business Economics* as the best feature article from the year's editions. The award commemorates Adolph Abramson, the founder and first president of the National Association of Business Economics.

McManus is an expert on alternative drive powertrains and automotive forecasting with a record of influential research and a history of leadership accomplishments. He is regularly invited to speak to industry, policy, and research organizations, and is widely cited as an authority on the automotive industry in the business and general media.

Prior to joining UMTRI, McManus worked at General Motors where he developed models to forecast vehicle sales, created visual information tools to stimulate new product development, and spent a year as a manufacturing supervisor in a component factory. He also conducted research on new automotive technologies and their impact on society and the environment, the market potential of hybrids and diesel-powered vehicles, and automotive product and brand portfolio strategies.

McManus earned a B.A. in economics from Louisiana State University, and an M.A. and Ph.D. in economics from the University of California, Los Angeles. He was a Sidney Stern Fellow and a Foundation for Research in Economics and Education Fellow.

Omer Tsimhoni Wins SAE Award

Omer Tsimhoni, an assistant research scientist in UMTRI's Human Factors Division, received the SAE Engineering Meetings Board Outstanding Oral



PHOTOS THIS SPREAD: UMTRI / SHERINAH ERINGTON

Presentation Award for the paper, "The Virtual Driver: Integrating Task Planning and Cognitive Simulation with Human Movement Models." Tsimhoni presented the paper, which was coauthored by Matt Reed, an associate research scientist in UMTRI's Biosciences Division, at the 2006 SAE World Congress and Exhibition. The award was presented to Tsimhoni earlier this year at the 2007 SAE World Congress in Detroit.

Tsimhoni is engaged in human factors research at UMTRI and the University of Michigan Department of Industrial and Operations Engineering, where he is an adjunct assistant professor, teaching discrete event simulation. His research interests focus on driver performance while using in-vehicle devices (driver distraction) and span a wide range of approaches from on-the-road experiments to simulator laboratory experiments and computational modeling of human performance. He has conducted several driving simulator experiments to further the understanding and quantification of the visual demands of driving in relation to the use of in-vehicle systems. His research has involved in-vehicle navigation systems, data entry using keyboards and speech recognition, the effect of driving while listening to text-to-speech email messages, head-up displays, and night vision enhancement systems.

Tsimhoni has published dozens of technical reports, conference proceedings, and journal articles. He holds a B.S. in physics and computer science from the University of Tel Aviv, and M.S.E. and Ph.D. degrees in industrial engineering from the University of Michigan. **RR**

UMTRI NAMES & FACES

CONFERENCES & EVENTS

International Sustainable Transport Congress
September 17–19, Mexico City, Mexico,
www.ctsmexico.org/congress

PIARC World Road Congress
September 17–21, Paris, France
www.piarc.org/en/paris2007

IRCOBI Conference: Biomechanics of Impact
September 18–21, Maastricht, the Netherlands
www.ircobi.org/conference.htm

**International Symposium on
Automotive Lighting**
September 25–26, Darmstadt, Germany
[www.lt.e-technik.tu-darmstadt.de/
ISAL.662.0.html](http://www.lt.e-technik.tu-darmstadt.de/ISAL.662.0.html)

**IEEE Conference on Intelligent
Transportation Systems**
September 30–October 3, Seattle, Washington
www.itsc2007.org

**Human Factors and Ergonomics Society
Annual Meeting**
October 1–5, Baltimore, Maryland
www.hfes.org

2007 National Rural ITS Conference
October 7–10, Traverse City, Michigan
www.nritsconference.org

**Traffic Management and Work Zone
Safety Conference**
October 9–12, Fort Lauderdale, Florida
www.artba.org

**World Congress on Intelligent
Transportation Systems**
October 9–13, Beijing, China
www.itsworldcongress.cn

**Association for the Advancement of
Automotive Medicine Scientific Conference**
October 14–17, Melbourne, Australia
www.aaaml.org/annual/annual.php

Stapp Car Crash Conference
October 29–31, San Diego, California
www.stapp.org/2007.shtml

GIS in Transit Conference
November 6–8, Tampa, Florida
www.nctr.usf.edu/gis

**International Conference on Road Safety
and Simulation**
November 7–8, Rome, Italy
www.rss2007.org

Road Safety on Four Continents
November 14–16, Bangkok, Thailand
www.vti.se

Highway Information Seminar
November 28–30, Arlington, Virginia
www.fhwa.dot.gov/policy/ohpi/hscourse3.htm

Transportation Finance Summit
December 2–4, Washington, D.C.
www.ibtta.org

**Battery, Hybrid, and Fuel Cell Electric
Vehicle Symposium**
December 2–5, Anaheim, California
www.electricdrive.org/evs23

**Transportation Engineering and
Safety Conference**
December 5–7, State College, Pennsylvania
[www.outreach.psu.edu/programs/
transportation](http://www.outreach.psu.edu/programs/transportation)

**World Forum on Sustainable Mobility
and Governance**
December 10–12, Nantes, France
www.governance-mobility.org/en

**Improving National Transportation Geospatial
Information Workshop**
December 14, Washington, D.C.
www.trb.org/calendar

TRB Eight-Seventh Annual Meeting
January 13–17, Washington, D.C.
www.trb.org/meeting 

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Technical Reports

Blower, D.F.; Matteson, A. 2007. *Evaluation of 2005 Nebraska Crash Data Reported to Motor Carrier Management Information System Crash File*. Report No. UMTRI-2007-11. <http://hdl.handle.net/2027.42/55188>

The research documented in this report was sponsored by the Federal Motor Carrier Safety Administration.

Blower, D.; Matteson, A. 2007. *Evaluation of 2005 South Dakota Crash Data Reported to the Motor Carrier Management Information System Crash File*. Report No. UMTRI-2007-10. <http://hdl.handle.net/2027.42/55397>

The research documented in this report was sponsored by the Federal Motor Carrier Safety Administration.

Devonshire, J.M.; Flannagan, M.J. 2007. *Effects of Automotive Interior Lighting on Driver Vision*. Report No. UMTRI-2007-1.

The research documented in this report was sponsored by UMTRI's Industry Affiliation Program for Human Factors in Transportation Safety.

Green, P.E.; Blower, D.F. 2007. *Potential Effectiveness of Signal Optimization for Various Corridors in Michigan*. Report No. UMTRI-2007-5.

<http://hdl.handle.net/2027.42/55176>

The research documented in this report was sponsored by the Michigan Department of Transportation.

Jarossi, L.; Matteson, A.; Woodrooffe, J. 2007. *Trucks Involved in Fatal Accidents Factbook 2003*. Report No. UMTRI-2007-07-14.

<http://hdl.handle.net/2027.42/55213>

The research documented in this report was sponsored by the Federal Motor Carrier Safety Administration.

LeBlanc, D.J.; Kantowitz, B.H. 2006. *Emerging Technologies for Vehicle-Infrastructure Cooperation to Support Emergency Transportation Operations*. Report No. UMTRI-2006-25.

<http://hdl.handle.net/2027.42/55212>

The research documented in this report was sponsored by the Federal Highway Administration.

McManus, W.Z. 2006. *Can Proactive Fuel Economy Strategies Help Automakers Mitigate Fuel-Price Risks?* Report No. UMTRI-2006-38.

<http://hdl.handle.net/2027.42/55389>

Sullivan, J.M.; Flannagan, M.J. 2007. *Characteristics of Nighttime Pedestrian Crashes: Implications for Headlighting*. Report No. UMTRI-2007-3.

The research documented in this report was sponsored by UMTRI's Industry Affiliation Program for Human Factors in Transportation Safety.

Tsimhoni, O.; Flannagan, M.J.; Mefford, M.L.; Takenobu, N. 2007. *Improving Pedestrian Detection with a Simple Display for Night Vision Systems*. Report No. UMTRI-2007-2.

The research documented in this report was sponsored by UMTRI's Industry Affiliation Program for Human Factors in Transportation Safety.

Vivoda, J.; Eby, D.; St. Louis, R.; Kostyniuk, L. 2006. *A Study of Nighttime Seat Belt Use in Indiana*. Report No. UMTRI-2006-28.

<http://hdl.handle.net/2027.42/55275>

The research documented in this report was sponsored by the National Highway Traffic Safety Administration.

Journal Articles

Shope, J.T. 2007. "Graduated Driver Licensing: Review of Evaluation Results Since 2002." *Journal of Safety Research*, vol. 38, no. 2, pp. 165-175.

Zakrajsek, J.S.; Shope, J.T. 2006. "Longitudinal Examination of Underage Drinking and Subsequent Drinking and Risky Driving." *Journal of Safety Research*, vol. 37, no. 5, pp. 443-451.

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T R A N S P O R T A T I O N T I D B I T S

- The inventor of cruise control, Ralph R. Teetor, was born in Hagerstown, Indiana, on August 17, 1890. Although he lost his eyesight at the age of six, Ralph went on to graduate from the University of Pennsylvania and to work as an engineer. He was president of his family business, the Perfect Circle Company, and a life-long inventor. [△]
- On July 7, 1928, Chrysler Corporation introduced the Plymouth at the Chicago Coliseum with much publicity and aviator Amelia Earhart behind the wheel. The car took three years to complete and was designed to compete with Ford and GM vehicles. The Plymouth was quite affordable at \$670, and Chrysler had to drastically expand its production line to keep up with the demand—80,000 vehicles sold in the first year alone. [△]
- The U.S. government passed legislation on September 1, 1989, that required all new cars to include driver-side air bags. [△]
- In 2001 (the last year for which data is available), the average person made 4.1 daily trips by car and drove 40 miles per day. [⊕]
- As of 2005, there were 46,873 miles of interstate highway, 115,500 miles of other national highway system roads, and 3,849,259 miles of other roads in the United States. [⊕]
- In 2005, 9 percent of households did not own any vehicle, 33 percent of households had one vehicle, 38% of households has two vehicles, and 20 percent of households had three or more vehicles. [⊕] **RR**

[△] This Day in Automotive History, www.historychannel.com/tdih

[⊕] Pocket Guide to Transportation 2007, www.bts.gov/publications/pocket_guide_to_transportation.



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