

# research review

UNIVERSITY OF MICHIGAN TRANSPORTATION RESEARCH INSTITUTE | OCTOBER-DECEMBER 2015 | VOLUME 46, NUMBER 4

## INSIDE . . .

4 .....  
\$1.2 million awarded for cyber security research

4 .....  
Study to examine energy savings in connected vehicles

5 .....  
UMTRI Briefs

6 .....  
Names and Faces

8 .....  
Recent UMTRI Publications

9 .....  
UMTRI in the News

9 .....  
Upcoming Events

10 .....  
Publication Information

## In the Driver's Seat

### Significant UMTRI Behavioral Science Impacts and Milestones through the Years

You might call it the human element—the drivers and passengers that have been part of vehicle



motorization throughout its history. Drivers, especially, play a central role in transportation around the world. No matter what type of vehicle or level of automation, drivers make decisions that impact their own safety and that of their passengers.

Since 1965, UMTRI behavioral scientists have recognized the importance of understanding driver behavior at all points along the age spectrum—from young drivers with little experience to older drivers facing new challenges. Social and behavioral scientists at UMTRI investigate the physical, behavioral, and cognitive changes that take place in humans over time, which ultimately affect driving ability and safety.

Behavioral science topics at UMTRI have encompassed such issues as seat-belt use, drinking and driving, child safety seats, young driver risk behaviors, and the challenges faced by older drivers, among many others.

Through multidisciplinary collaborations with experts in areas such as public health, psychology, injury prevention, and medicine, UMTRI behavioral scientists work to better understand the intricacies of the human element in the driving process. Their research has helped make driving safer and more enjoyable for the motoring public in Michigan, nationally, and globally.

Highlighted here are significant UMTRI impacts and milestones over the past fifty years in the area of behavioral science.

► **NOTABLE BEGINNING.** Health behavior expert Alex Wagenaar becomes head of the Injury Analysis and Prevention Division in 1985, UMTRI's first behavioral science group. He launches the group's focus on evaluating state and national traffic safety laws, policies, and programs, which remains one of UMTRI's key areas of expertise.

► **LEADERSHIP IN TRAFFIC SAFETY PLANNING.** Scientist Fritz Streff becomes division head in 1989 and renames it the Social and Behavioral Analysis Division. His work with the Michigan Office of Highway Safety Planning is instrumental in establishing the group as a leader in traffic safety planning and problem identification.

► **DRINKING AND DRIVING RESEARCH.** With funding from the National Institutes of Health, UMTRI investigators Patricia Waller and Jean Shope conduct longitudinal research on young drivers' alcohol use and drinking and driving. With funding from the Michigan Department of State in 1992, UMTRI researchers Fritz Streff, and in 1993 David W. Eby, evaluated the effects and impacts of Michigan's drunk and impaired driving laws, leading to revisions that made these laws more effective in preventing drunk driving behavior.

(Continued on page 2)

# In the Driver's Seat (Continued from page 1)

► **MICHIGAN'S SEAT BELT LAW.** Michigan's seat belt law goes into effect in 1985. UMTRI research played a key role in the design of occupant protection systems, in the development of restraint system standards and test procedures, and in the determination of the effectiveness of occupant restraint systems in the field. In a continuing effort to evaluate the effectiveness of Michigan's mandatory seat belt use law, UMTRI researchers led by Alex Wagenaar, Fritz Streff, David W. Eby, and Lidia P. Kostyniuk designed and conducted statewide direct observation studies from 1984-2005, publishing more than 100 articles on this and related topics.



Michigan governor James Blanchard (center) signs the Michigan seatbelt law at UMTRI in 1985.

► **AN INFLUENTIAL FIGURE.** Noted researcher Patricia Waller is named UMTRI director in 1989. Throughout her career, Waller published more than 190 research papers on topics as varied as motor-vehicle injury, drinking and driving, societal human factors, public-health aspects of transportation, aging drivers, and driver licensing.



► **NEW DIVISION HEAD.** Jean Shope takes over as the head of the Social and Behavioral Analysis Division in 1995.

► **GRADUATED DRIVER LICENSING.** Michigan's graduated licensing law is passed in 1996 and implemented the following year. UMTRI researchers have published nearly twenty research publications on the topic.

## ► **OLDER-DRIVER SAFETY.**

In 1997, UMTRI scientists Jean Shope, David W. Eby, Lidia Kostyniuk, and Lisa J. Molnar are awarded two older driver research projects sponsored by the General Motors Corporation, starting a long-term interest in older adult safe mobility. Eby, Molnar, and Kostyniuk continue this work up to the present with sponsorship from AAA, AARP, the Alzheimer's Association, CDC, USDOT, Michigan Department of Transportation, Michigan Office for Highway Safety Planning, and the Transportation Research Board.



► **CHILD SAFETY SEATS.** UMTRI investigators David W. Eby, Lidia Kostyniuk, and Carl Christoff conduct the first statewide study of child safety seat use and misuse in 1997, providing a starting point for the statewide assessment of child occupant protection in Michigan and a background for improving how these seats can be installed in vehicles.

► **PRIMARY ENFORCEMENT OF SEAT-BELT LAWS.** UMTRI investigators David W. Eby, Lidia Kostyniuk, and Lisa J. Molnar complete a 2004 study showing that standard (primary) enforcement of mandatory safety-belt use laws does not lead to police harassment, prompting many states to switch from secondary to standard enforcement.



► **NEW DIVISION HEAD.** In 2005, David W. Eby takes over as the head of the Social and Behavioral Analysis Division.

► **SAFE TRANSPORTATION THROUGHOUT THE LIFESPAN.** In 2007, UMTRI establishes the Michigan Center for Advancing Safe Transportation throughout the Lifespan (M-CASTL), a USDOT-sponsored University Transportation Center, under the direction of research professor David W. Eby.

► **YOUNG DRIVER BEHAVIOR.** As an outgrowth of the NIH longitudinal study, research professors Ray Bingham and Jean Shope strengthen their focus on young-driver behavior and injury prevention at UMTRI. Linking with national colleagues with similar interests, they are among the founding members of a new Transportation Research Board subcommittee on young drivers.



► **REORGANIZATION.** As part of UMTRI's reorganization in 2009, Ray Bingham and Jean Shope form the Young Driver Behavior and Injury Prevention Group, while the rest of the researchers in the Social and Behavioral Analysis Division (Eby, Kostyniuk, and Molnar) rename themselves the Behavioral Sciences Group, with David W. Eby as the head.

► **DISTRACTED DRIVING.** Research professor Paul A. Green and colleagues in the Driver Interface Group conduct numerous behavioral research studies on distracted driving, often using the UMTRI driving simulator to test behaviors such as cell phone use and texting while driving.





► **DEMENTIA RESEARCH.** UMTRI behavioral scientists collaborate with UMTRI engineers and others to conduct the first naturalistic driving study of people with early-stage dementia. 2009.

► **NTSB FORUM ON AGING DRIVERS.** Behavioral scientists David W. Eby and Lisa J. Molnar present UMTRI research as part of the National Transportation Safety Board (NTSB) Public Forum on Safety, Mobility, and Aging Drivers broadcast live on C-Span.



► **YOUNG DRIVER SAFETY.** Research professors Raymond Bingham, Jean Shope, and colleagues pioneer research on peer influences on young driver behavior, using the UMTRI simulator and fMRI to

identify social, psychological and neurocognitive factors that increase susceptibility to peer influences on novice drivers.

► **U-M INJURY CENTER.** UMTRI research professor Jean Shope, former director of the U-M Center for Injury Prevention among Youth, plays a key role in establishing the U-M Injury Center with collaborators at the U-M School of Public Health and the U-M Medical School. The new CDC-funded injury control research center builds and strengthens U-M's capacity in injury research, including a focus on motor vehicle safety.

► **MICHIGAN'S AGING POPULATION.** With support from MDOT, scientists David W. Eby, Lisa J. Molnar, and Lidia P. Kostyniuk begin a comprehensive research study of the demographics, travel patterns, and mobility needs of Michigan's aging population.



► **CHECKPOINTS PROGRAM.** Working in collaboration with NIH and CDC, UMTRI research professors Jean Shope and Raymond Bingham and collaborators including driver educators test the efficacy and effectiveness of the Checkpoints Program for parents of teen drivers. Two subsequent dissemination studies were

conducted, and CDC now sponsors the Checkpoints website that resulted from those studies.

► **TRANSPORTATION LEADERSHIP AND SAFETY.** In collaboration with the Texas A&M Transportation Institute, UMTRI establishes the Center for Advancing Transportation Leadership and Safety (ATLAS), a USDOT-sponsored University Transportation Center. The ATLAS Center is managed by UMTRI scientists David W. Eby and Lisa J. Molnar.



► **AUTOMATED DRIVING.** UMTRI researcher Anuj Pradhan extends the use of UMTRI's driving simulator to examine driver behavior in automated vehicles, while researcher Lisa Buckley studies

the consumer attitudes and preferences about automated driving technologies.

► **LONGROAD STUDY.** UMTRI is chosen by the AAA Foundation for Traffic Safety as one of five national test sites to address the well-being of older drivers. Co-managed by David W. Eby, the Longitudinal Research on Aging Drivers (LongROAD) is a five-year \$12 million project that will allow researchers to better understand the role of physical and cognitive functions, medical conditions, medications and vehicle technologies in driving safety. The Michigan data collection site is managed by Lisa J. Molnar with collaboration with the UMTRI Engineering, U-M Medical School, and the U-M Institute for Social Research. 2015.

For more information, visit the University of Michigan Transportation Research Institute website, [www.umtri.umich.edu](http://www.umtri.umich.edu).



# Department of Homeland Security awards UMTRI-led team \$1.2 million for cybersecurity research

The Department of Homeland Security (DHS) Science and Technology Directorate (S&T) awarded \$1.2 million to the University of Michigan for the development of technology that can help defend government and privately owned vehicles from cyber-attacks.



The project titled “Secure Software Update Over-the-Air for Ground Vehicles Specification and Prototype” was awarded through Broad Agency Announcement HSHQDC-14-R- B00016 and is part of the DHS S&T Cyber Security Division’s larger Cyber Physical Systems Security (CPSSEC) program.

“This is a critical time to be thinking about automotive cyber security,” said DHS Under Secretary for Science and Technology Dr. Reginald Brothers. “Most modern vehicles are operated by computers and software. Attacks on these systems could have significant and dangerous impacts. We cannot be complacent defending against these attacks.”

Advances in networking, computing, sensing, and control systems have enabled a broad range of Cyber Physical Systems (CPS) devices, including modern vehicles, medical devices, building controls, the smart power grid, and the Internet of Things. Driven by functional requirements and fast moving markets, these systems

are being designed and deployed quickly. The design choices being made today will directly impact the nation’s industries and critical infrastructure sectors over the next several decades. S&T’s Cyber Security Division (CSD) recently launched the CPSSEC project that aims to “build security into” emerging CPS designs.

“Like any other software, CPS in automobiles requires periodic updates for safe and efficient operation,” said Dr. Dan Massey, S&T CPSSEC Program Manager. “We must ensure that updates are adequately protected. The consequences can be costly and potentially impact millions of lives.”

The University of Michigan team, led by Dr. André Weimerskirch, proposes to develop a system for convenient, safe and reliable software over-the-air (SOTA) updates to securely deploy to vehicles before vulnerabilities can be exploited. The goal is to develop a comprehensive industry standard that includes technical design specification, reference source code and best practice guidance for integration, testing, and deployment.

## U-M, two national labs to study energy savings in connected vehicles

Could vehicles that communicate with each other and their surroundings, helping drivers avoid crashes, also save energy?



The University of Michigan is working with two U.S. Department of Energy national laboratories to study whether connected and automated vehicles could help people drive more efficiently.

U-M, with Argonne National Laboratory and Idaho National Laboratory, won a three-year, \$2.7 million grant from DOE to fund the research.

Reuben Sarkar, deputy assistant secretary for transportation at the Energy Department, announced the grant Wednesday during a conference at U-M. He called it an “incubator award” to help DOE learn more about connected and automated vehicles, which are a growing focus for the agency.

“I want to congratulate the University of Michigan as the recipient of our incubator award, in partnership with Argonne National Lab and Idaho National Lab, to help us study the energy impact of connected and automated vehicles by taking advantage of U-M’s 500-vehicle fleet,” Sarkar said.

U-M’s team of researchers is drawn from the U-M Mobility Transformation Center, the U-M Transportation Research Institute, and the College of Engineering.

“Nobody knows the magnitude of what the energy savings of connected and automated vehicles will be,” said MTC Director Peter Sweatman. “We’re going to actively collect the data to do that.”

U-M will recruit 500 volunteers in the Ann Arbor area to participate in the project. Their personal vehicles will be equipped to collect energy consumption data, in addition to information about vehicle motion, such as speed and location, as the volunteers go about their daily routines. Some of the vehicles could belong to fleet or commercial users.

The project also will study how drivers react to various functions in connected and automated vehicles, and whether any resulting change in behavior affects energy consumption.

(Continued on page 7)

## Transportation Safety Research Symposium

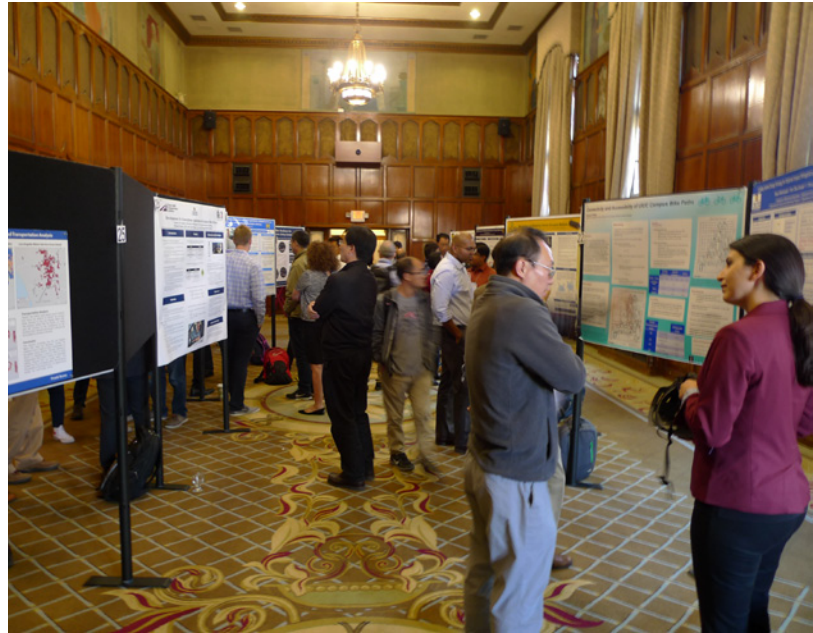
UMTRI's inaugural Transportation Safety Research Symposium took place on October 15 at the University of Michigan.



The day-long symposium highlighted UMTRI's interdisciplinary transportation safety research through panel sessions, Q&A discussions, and a student poster competition featuring nearly forty participants.

UMTRI interim director Carol Flannagan welcomed guests and highlighted success stories in the field of transportation research. She noted that the nation's motor-vehicle fatality rate has dropped to one-fifth of what it was in 1965, the year UMTRI began. "UMTRI is a part of that success story," said Flannagan.

Grant Baldwin, Ph.D., MPH, director of the Division of Unintentional Injury Prevention at the National Center for Injury Prevention and Control, Centers for Disease Control and Prevention (CDC), gave the keynote address. He congratulated UMTRI on fifty years of leadership in transportation safety research



and highlighted the CDC's progress in motor vehicle injury prevention, current activities, and future opportunities.

UMTRI researchers served as moderators and discussants on panel sessions that included the following topics: People are Not Dummies: Advanced Human Modeling for Improved Vehicle Occupant Protection; Big Data: Using Data to Understand Drivers - Where They Go, What They Do, and How to Keep Them Safe; Decision Making: Improving Decisions to Maintain Safe Transportation among Older Adults; and Future Technology: How Technology Will Help Avoid the Crash Before it Happens.

## Automotive Research Conferences

Automotive industry manufacturers, suppliers, and consultants joined academic experts at the University of Michigan on November 11 for the eighth, annual Inside China Automotive Conference, highlighting the current and future prospects for the industry.



The Inside China Conference is part of a series of automotive research conferences hosted by UMTRI Automotive Futures Group (AFG) throughout the year and moderated by AFG managing director Bruce Belzowski.

Upcoming conferences in 2016 include the following:

► **February 17: New Mobility: The Future of Freight.** A new conference that examines the major changes IT-enabled goods movement will have on the freight movement industry.

► **April 13: Globalization of the Automotive Industry:** The 2016 Update. A new conference that brings everyone up to date on the trends in the globalization of the automotive industry from a manufacturer and supplier perspective.

► **July 20: Powertrain Strategies for the 21st Century.** Our 8th annual conference will provide an overview of all the electrification progress that has been made in the global auto industry.

More information: <http://umtri.umich.edu/our-results/projects/focus-future-conferences>

## Sayer Receives White House Champions of Change Award

UMTRI's James Sayer was honored on October 13 at the White House for his leadership in advancing connected and automated transportation.



Sayer, a research scientist at UMTRI and deployment director for the U-M Mobility Transformation Center, is one of 11 recipients from across the country to receive a 2015 Transportation Champions of Change Award.

The award is given to transportation leaders “who have provided exemplary leadership in advancing transportation and championing innovation that will benefit our nation’s transportation system for decades to come.”

During the event, Sayer was recognized by U.S. Department of Transportation Secretary Anthony Foxx and participated in a panel discussion to discuss his work.

“Jim Sayer is widely recognized as a leader in the field of connected vehicles,” said S. Jack Hu, interim vice president for research at U-M. “His work with the Connected Vehicle Safety Pilot Model Deployment was instrumental in demonstrating the potential of the technology, and his ongoing work with the U-M Mobility Transformation Center, including the design and development of Mcity, is laying the foundation for a new era of driverless vehicles.”

Sayer was the principal investigator of the U.S. DOT-funded Connected Vehicle Safety Pilot Model Deployment and serves as the principal investigator for the Ann Arbor Connected Vehicle Test Environment.

With support from U-M and the Michigan Department of Transportation, Sayer has overseen the creation, construction and operation of Mcity—the world’s first controlled environment specifically designed to provide safe, rigorous, repeatable testing of connected and automated vehicle technologies before they are tried out in real traffic.

Mcity, part of the U-M Mobility Transformation Center, simulates a broad range of complexities that vehicles and pedestrians encounter in urban and suburban traffic environments. It is located on U-M’s North Campus in order to ensure student engagement in, and learning from, the development of connected and automated technologies.

“Every year, motor vehicle crashes claim thousands of lives. In fact, in the U.S. motor vehicle crashes are the leading cause of death of people under 35 years old,” Sayer said. “Last year, alone, there were more than 30,000 fatalities. Connected vehicles could reduce up to 80 percent of unimpaired crashes.”



Photo credit: USDOT

U-M, along with partners in government and industry, has made significant investments in the advancement of intelligent transportation, including connected and automated vehicle technologies, Sayer said.

Since 2012, UMTRI has been the test conductor for the U.S. DOT-funded Connected Vehicle Safety Pilot Model Deployment, the largest connected vehicle pilot in the world. U-M is expanding on that experiment with the Ann Arbor Connected Vehicle Test Environment.

The deployment of connected vehicles and infrastructure technologies will soon expand from a small section of Ann Arbor to include the entire city, as well as add several thousand additional vehicles. It is one of three complementary on-road vehicle deployments that, along with Mcity, will serve as test beds to evaluate the most promising approaches to connected and automated mobility.

“The Ann Arbor Connected Vehicle Test Environment takes us from research to real-world deployment,” Sayer said. “Ann Arbor is the world’s first example of how connected vehicle and infrastructure technology can and will be utilized by an entire community in the future.”

## UMTRI researchers recognized at 59th Stapp Car Crash Conference

The 59th annual Stapp Car Crash Conference was held November 9–11 in New Orleans, Louisiana. For the second year in a row, members of UMTRI's Biosciences Group received the John Paul Stapp Best Paper Award.



The winning paper, titled “Response and Tolerance of Female and/or Elderly PMHS to Lateral Impact,” was authored by Lauren (Wood) Zaseck, Carl

Miller, Nathaniel Madura (formerly with UMTRI and now with Toyota), Matthew Reed, Lawrence Schneider, Kathleen Klinich, and Jonathan Rupp.

The Stapp Car Crash Conference is the premier forum for presentation of research in impact biomechanics, human injury tolerance, and related fields that advance the knowledge of land-vehicle crash injury protection. UMTRI researchers Lawrence Schneider and Jonathan Rupp are members of the Stapp Conference Advisory Committee. UMTRI's Leda Ricci serves as Executive Director.

UMTRI also participated in a display at the first university-sponsored reception, held on November 9 following the day's technical sessions. The reception was hosted by five universities, including the Medical College of Wisconsin, University of Michigan Transportation Research Institute, The Ohio State Injury Biomechanics Research Center, Virginia Tech Center for Injury Biomechanics, and Wayne State University.



Photo: From left are Jonathan Rupp, Larry Schneider, Matthew Reed, Nathaniel Madura, Carl Miller, and Lauren Wood Zaseck, authors of the John Paul Stapp Best Paper Award. Not pictured: Kathleen Klinich.

Additional UMTRI attendees at this year's Stapp Conference included associate research scientist Jingwen Hu, Yulong Wang (visiting Ph.D. student from Hunan University in Changshai, Hunan), and Jisi Tang (visiting Ph.D. student from Tsinghua University).

(Continued from page 4)

## U-M, two national labs to study energy savings in connected vehicles

“Reducing emissions and saving fuel are expected to be significant benefits once connected and automated vehicles are on the road in large numbers,” said Huei Peng, associate director of MTC and a principal investigator on the DOE project.

“Unlike the safety impact of these vehicles, however, energy consumption has not been widely studied. This research will help us better understand the potential energy savings, and identify possible obstacles to achieving meaningful reductions.”

The majority of vehicles in the study will be hybrid-electric vehicles, plug-in hybrid-electric vehicles and battery electric vehicles, with a small number expected to be traditional cars or trucks. Peng said there is a clear relationship between vehicle motion and energy consumption in conventional vehicles, but that relationship can vary widely in hybrid-electric and plug-in vehicles.

Read the full article at: <http://www.mtc.umich.edu/>

# Recent UMTRI Publications



Most UMTRI reports are available in full text online. See the website address at the end of the citation. Please contact the UMTRI Library at 734-764-2171 or [umtridocs@umich.edu](mailto:umtridocs@umich.edu) to inquire about the availability of other publications listed here.

## Conference Papers

► Hu, J.; Wood, L.; Orton, N.; Chen C.; Rupp, J.; Reed, M.; Gruber, R.; Scherer, R. (2015). "Effects of Occupant Size, Military Gear, Seatbelt Type, and Advanced Seatbelt Features on Occupant Kinematics in Tactical Vehicles during Frontal Crashes." *Proceedings of the National Defense Industrial Association Ground Vehicle Systems Engineering and Technology Symposium and Advanced Planning Briefing for Industry*, August 4-6, 2015, Novi, Michigan.

<http://ww2.esd.org/gvsets/>

► Jones, M.L.H; Kim, K.H; Keefe, A.A.; Farrell, P.S.E.; Bossi, L.M. 2015. "A Pilot Study of Three-Dimensional Equipped Anthropometry." *Proceedings of the 19th Triennial Congress of the International Ergonomics Association*, August 9-14, 2015, Melbourne, Australia.

[http://ergonomics.uq.edu.au/iea/proceedings/Index\\_files/papers/1067.pdf](http://ergonomics.uq.edu.au/iea/proceedings/Index_files/papers/1067.pdf)

## Journal Articles

► Hu J.; Manary, M.A.; Klinich, K.D.; Reed, M.P. (2015) "Evaluation of ISO CRS Envelopes Relative to U.S. Vehicles and Child Restraint Systems." *Traffic Injury Prevention*, vol. 16, no. 8, pp. 781-785.

DOI:10.1080/15389588.2015.1014550.

► Jones, M.L.H; Kim, K.H.; Ebert, S.M.; Reed, M.P. 2015. "Development of Methods to Assess Self-Reach Capability." *Proceedings of the Human Factors and Ergonomics Society Annual Meeting*, vol. 59, no. 1, pp. 1283-1287.

DOI:10.1177/1541931215591208

► Jones, M.L.H; Klinich, K.D.; Ebert, S.M.; Malik, L.J.; Manary, M.A.; Reed, M.P. 2015. "Short Communications from AAAM's 59th Annual Scientific Conference, Traffic Injury Prevention" ("A Pilot Study of Toddler Anthropometry and Posture in Child Restraint Systems"). *Traffic Injury Prevention*, vol. 16, sup. 2, pp. S231-S250.

DOI:1080/15389588.2015.1073071

► Zhu, F; Jiang, B.; Hu, J.; Wang, Y.; Shen, M.; Yang, K.H. 2015. "Computational Modeling of Traffic Related Thoracic Injury of a 10-Year-Old Child Using Subject-Specific Modeling Technique." *Annals of Biomedical Engineering*, published online July 1, 2015.

DOI:10.1007/s10439-015-1372-x.

## Technical Reports

► Jones, Monica L.H.; Ebert, S.M.; Reed, M.P. 2015. *A Pilot Study of Law Enforcement Officer (LEO) Anthropometry with Applications to Vehicle Design for Safety and Accommodation*. Report no. UMTRI-2015-21.

<http://hdl.handle.net/2027.42/116202>

The research documented in this report was sponsored by Anthrotec, Inc.

► Schoettle, B.; Sivak, M. 2015. *Consumer Preferences Regarding Product Registration*. Report no. UMTRI-2015-26.

<http://hdl.handle.net/2027.42/116202>

The research documented in this report was sponsored by UMTRI's Sustainable Worldwide Transportation program.

► Schoettle, B.; Sivak, M. 2015. *Motorists' Preferences for Different Levels of Vehicle Automation*. Report no. UMTRI-2015-22.

<http://hdl.handle.net/2027.42/114386>

The research documented in this report was sponsored by UMTRI's Sustainable Worldwide Transportation program.

► Schoettle, B.; Sivak, M. 2015. *Motorists' Views of Fuel Economy and Advanced Vehicle Technologies*. Report no. UMTRI-2015-18.

<http://hdl.handle.net/2027.42/113267> 18

The research documented in this report was sponsored by UMTRI's Sustainable Worldwide Transportation program.

► Sivak, M.; Schoettle, B. 2015. *Mortality from Road Crashes in the Individual U.S. States: A Comparison with Leading Causes of Death*. Report no. UMTRI-2015-28.

The research documented in this report was sponsored by UMTRI's Sustainable Worldwide Transportation program.

► Sivak, M.; Schoettle, B. 2015. *On-Road Fuel Economy of Vehicles in the United States: 1923-2013*. Report no. UMTRI-2015-25.

<http://hdl.handle.net/2027.42/115486>

The research documented in this report was sponsored by UMTRI's Sustainable Worldwide Transportation program.





of the said can- the

Indeed, in the past, Taliban gunmen have killed or threatened tribal leaders who defied them, and the American military and the Afghan government have largely been unable to protect them.

# NEWS



## UMTRI In The News

► **Ann Arbor partners with U-M to continue connected vehicle research**

[http://www.mlive.com/news/ann-arbor/index.ssf/2015/09/ann\\_arbor\\_partners\\_with\\_u-m\\_on.html](http://www.mlive.com/news/ann-arbor/index.ssf/2015/09/ann_arbor_partners_with_u-m_on.html)

► **Time to fall back, but keep alert for pedestrians and bicyclists**

<http://www.wxyz.com/news/time-to-fall-back-but-keep-alert-for-pedestrians-and-bicyclists>

► **NHTSA eyes automatic braking requirement for trucks**

<http://fleetowner.com/regulations/nhtsa-eyes-automatic-braking-requirement-trucks>

► **Driver's licenses for self-driving cars?**

<http://ns.umich.edu/new/releases/23228-driver-s-licenses-for-self-driving-cars>

► **Gas mileage drops for second straight month**

<http://ns.umich.edu/new/releases/23185-gas-mileage-drops-for-second-straight-month>

► **The Geography of Car Deaths in America**

<http://www.citylab.com/commute/2015/10/the-geography-of-car-deaths-in-america/410494/>

► **Autonomous cars may spur young adults to hit the road**

<http://www.ns.umich.edu/new/releases/23348-get-your-motor-runnin-autonomous-cars-may-spur-young-adults-to-hit-the-road>



## Upcoming Events

**TRB Annual Meeting**

January 10–14; Washington, D.C.  
<http://www.trb.org>

**North American International Auto Show**

January 11–24; Detroit, Michigan  
<http://www.naias.com>

**Crash Data Retrieval User's Summit**

January 25–27; Houston, Texas  
<http://www.cdrsummit.com/>

**New Mobility: The Future of Freight**

February 17; Ann Arbor, Michigan  
<http://www.umtri.umich.edu>

**American Trucking Association Meeting**

February 29–March 3; Nashville, Tennessee  
<http://www.trucking.org>

**Aging in America Conference**

March 20–24; Washington, D.C.  
<http://www.asaging.org/aia>

**Automotive Cyber Security Summit**

March 21–23; Detroit, Michigan  
<http://www.automotivecybersecurity.com/>

**Michigan Traffic Safety Summit**

March 22–24; East Lansing, Michigan  
<http://www.michigan.gov/msp>

**Lifesavers National Conference**

April 3–5; Long Beach, California  
<http://www.lifesaversconference.org>



# Publication Information

## University of Michigan Transportation Research Institute

*UMTRI Research Review*

October–December 2015

Volume 46, Number 4

ISSN 2379-3635

### UMTRI Interim Director:

Carol Flannagan

### UMTRI Associate Director:

Lawrence Schneider

### UMTRI Business Administrator:

Holly Nielsen

### UMTRI Communications and Marketing Director:

Francine Romine

### UMTRI Information Resources Manager:

Bob Sweet

### Writer and Editor:

Joyce Daniels

### Layout and design:

Graphikitchen, LLC

*The UMTRI Research Review* is published four times a year by the Research Information and Publications Center of the University of Michigan Transportation Research Institute, 2901 Baxter Road, Ann Arbor, Michigan 48109-2150. To subscribe, visit [www.umtri.umich.edu/subscribe-umtri-research-review](http://www.umtri.umich.edu/subscribe-umtri-research-review).

The University of Michigan, as an equal opportunity/affirmative action employer, complies with all applicable federal and state laws regarding nondiscrimination and affirmative action. The University of Michigan is committed to a policy of equal opportunity for all persons and does not discriminate on the basis of race, color, national origin, age, marital status, sex, sexual orientation, gender identity, gender expression, disability, religion, height, weight, or veteran status in employment, educational programs and activities, and admissions. Inquiries or complaints may be addressed to the Senior Director for Institutional Equity, and Title IX/Section 504/ADA Coordinator, Office for Institutional Equity, 2072

Administrative Services Building, Ann Arbor, Michigan 48109-1432, 734-763-0235, TTY 734-647-1388, [institutional.equity@umich.edu](mailto:institutional.equity@umich.edu).

## The Regents of the University

Mark J. Bernstein, Ann Arbor

Julia Donovan Darlow, Ann Arbor

Laurence B. Deitch, Bloomfield Hills

Shauna Ryder Diggs, Grosse Pointe

Denise Ilitch, Bingham Farms

Andrea Fischer Newman, Ann Arbor

Andrew C. Richner, Grosse Pointe Park

Katherine E. White, Ann Arbor

Mark S. Schlissel, *ex officio*

## 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

To subscribe, visit [www.umtri.umich.edu/subscribe-umtri-research-review](http://www.umtri.umich.edu/subscribe-umtri-research-review).