

research review

UMTRI Symposium: Societal Trends Pose Challenges for Transportation

The second annual UMTRI Transportation Safety Research Symposium took place on Thursday, October 6, at the U-M Michigan League. The daylong event featured two keynote speakers, more than twenty transportation experts in four panel sessions, and seventeen student posters. Keynote speaker Vinn White of the USDOT opened the symposium by outlining the nationwide transportation context and future challenges.

Much has been accomplished over the last forty years in terms of vehicle-safety improvements, said Vinn White, acting assistant secretary of the US Department of Transportation, at U-M on October 6. Yet, despite the technological advancements, daunting safety challenges remain.

White, who was the morning keynote speaker at the annual UMTRI Transportation Safety Research Symposium, highlighted recent motor-vehicle fatality data that shows an increase from 32,744 fatalities in 2014 to 35,092 in 2015—the greatest single-year increase in the last fifty years. Reducing this number warrants continued research to help understand and address underlying factors.

On a technological front, connected and automated vehicles have the potential to reduce vehicle crashes involving unimpaired drivers by an estimated 80 percent, White said. He highlighted the DOT’s recent Federal Automated Vehicles Policy, noting that the need for public understanding, knowledge, and acceptance is more important than ever.



“Our task at DOT, as we move to this new level of technology, is the same as it ever was—to ensure public safety,” said White, “and frankly, to leverage every tool we have to reduce 35,092.”

Looking forward, White outlined a number of societal trends that will evolve over the next few decades in America—among them population growth, an increase in the number of older citizens, and the emergence of large urban clusters or megaregions—that will impact the nation’s transportation network.

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UMTRI Symposium: Societal Trends Pose Challenges for Transportation

By the year 2045, the population is expected to increase by 70 million new Americans. The result, said White, is that as a nation we're going to see a spike in demand for travel and subsequently an increase in congestion. White referenced the U.S. DOT draft document *Beyond Traffic: Trends and Choices 2045*, which describes these trends, their implications for the transportation network, and choices and opportunities. He noted that part of the *Beyond Traffic* narrative addresses how the nation can overcome these serious challenges over the next few decades, which will be accomplished by advancements and innovations and supported by research and data.

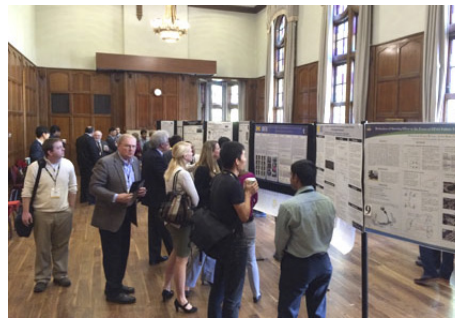
Safety on Our Roads

Following this theme, UMTRI assistant research scientist Monica Jones moderated the symposium's first panel session, "Improving Safety on Our Roads," showcasing a variety of UMTRI research projects that use data-driven approaches to address motor-vehicle safety challenges. UMTRI presenters included associate research scientist Daniel Blower, assistant research scientist Lisa Buckley, associate research scientist David LeBlanc, and assistant research scientist Anuj Pradhan.

Research projects in the safety panel encompassed an analysis of the underlying factors behind crash-data trends from 2001 to 2012; evaluation of an intervention protocol to improve seatbelt fit for drivers; a yearlong field study examining how drivers use crash-avoidance systems; and an overview of the different approaches and methods used in human-factors research and its increasing importance as automated vehicles become more prevalent.

Mobility in a Diverse Society

The second panel session, moderated by UMTRI associate research scientist Lisa Molnar, brought together a number of innovative research initiatives that



addressed methods to ensure mobility in a diverse society. Alexandra Murphy, assistant professor in the U-M Department of Sociology, presented a Transportation Security Index, a novel approach to measuring mobility, which can be used to assess an individual's ability to get to the places he or she needs to go, which can allow or limit access to employment, education, and healthcare.

UMTRI research professor David Eby, director of the ATLAS Center, presented results of a comprehensive study funded by the Michigan Department of Transportation, which examined the mobility needs of Michigan's older citizens. About 10 percent of Michigan's population is age 70 or older, said Eby, and more than 80 percent are licensed to drive. Through the project, the website *Safe Drivers Smart Options*, www.Michigan.gov/agingdriver, was created to provide much-needed information and resources to help Michigan's older citizens drive safely or access alternative mobility services after they stop driving.

Afternoon keynote speaker Jurek Grabowski, research director at the AAA Foundation for Traffic Safety, also touched on this theme, noting that the nation's population is getting proportionately older. According to Grabowski, 322,803 people turn 60 every month, making research on the mobility needs of older citizens extremely important. He recognized UMTRI as being among the research partners involved in the important LongROAD Senior Cohort Study, <http://www.longroadstudy.org/>.

Robert Hampshire, UMTRI assistant research professor, and Pascal Van Hentenryck, professor in the U-M Department of Industrial and Operations Engineering, rounded out the mobility panel session with presentations on urban mobility relative to accessibility to services in the "sharing economy," such as peer-to-peer car sharing, and analysis and optimization of urban transit systems.

Energy and Emerging Technologies

Energy and emerging technologies highlighted the third panel session at the UMTRI symposium. Moderated by UMTRI associate research scientist Shan Bao, the session featured thought-provoking presentations by research professor John DeCicco of the U-M Energy Institute, UMTRI research professor Henry Liu, and UMTRI associate research scientist Kathy Klinich.

A final panel session featured research projects that recently won UMTRI Research Excellence Awards. (See the *July-September 2016 issue of the UMTRI Research Review for project summaries*.) The session was moderated by UMTRI research associate professor Carol Flanagan, and included presentations by UMTRI associate research scientist Jingwen Hu, senior research associate Miriam Manary, assistant research scientist Daniel Park, research area specialist lead Sheila Ebert, and associate research scientist John Sullivan.

A poster awards presentation capped off the daylong symposium, moderated by UMTRI research professor Ray Bingham. 📄

Links to presentations are available on the UMTRI website: <http://umtri.umich.edu/what-were-doing/news/umtri-symposium-trends-pose-challenges-transportation>



Study: Double-Digit Rise in Head Injuries after Michigan Helmet Law Repeal

Fewer motorcycle riders who are involved in crashes across the state of Michigan are wearing a helmet, and the state's trauma centers have seen a 14 percent increase in head injuries among motorcyclists, since the state's partial repeal of its universal helmet law in April 2012, a new study finds.

In addition, emergency physicians and trauma surgeons are seeing a shift in the types of head injuries resulting from motorcycle crashes, with the proportion due to mild concussions falling 17 percent, while the proportion due to skull fractures increasing 38 percent during the same time period.

This increase in overall head injuries was also associated with an increased need for costly hospital services, including invasive neurosurgical procedures necessary to treat serious head injuries.

The study was conducted by a team of researchers from the University of Michigan Injury Center, which is funded by the federal Centers for Disease Control and Prevention, as well as the University of Michigan Transportation Research Institute (UMTRI) and the Insurance Institute for Highway Safety (IIHS). The study compared statewide rates of helmet use, fatalities, and serious head injuries for the 12-month periods before and after the repeal.

The partial repeal allowed Michigan motorcycle riders 21 years of age or older to legally ride without wearing a helmet if they have passed a motorcycle safety course or held the motorcycle endorsement on

their driver's license for at least two years. In addition, they must also have at least \$20,000 in first-party medical benefits.

Helmets, research has proven, are a key injury-prevention measure. Prior studies have shown that helmets decrease the risks for fatal and non-fatal head injuries by 69 percent and the overall risk of fatality after a motorcycle crash by 42 percent.

In addition, the National Highway Traffic Safety Administration estimates that unhelmeted motorcyclists are 40 percent more likely to suffer fatal head injuries and 15 percent more likely to suffer nonfatal head injuries than helmeted motorcyclists involved in a crash.

In the current study, published online in the American Journal of Public Health, the researchers cite prior studies in other states that have demonstrated both the success of universal helmet laws at increasing helmet use among riders and the detrimental impact of similar repeal efforts in other states on the rates of head injuries and fatalities.

Still, "No previous studies have examined the effects of Michigan's repeal on head injuries or fatalities in a statewide context," says Patrick Carter, MD, lead author of the study

and an assistant professor of emergency medicine in the U-M Injury Center.

Carter, joined by team members from the U-M Injury Center, the U-M Medical School Department of Surgery, UMTRI and IIHS, began by analyzing two data sets: police-reported crashes that captured both in- and out-of-hospital fatalities, and head injuries among patients hospitalized at trauma centers. This second dataset was formed by linking police-reported crashes to statewide trauma registry data from all twenty-three Level-1 and Level-2 Michigan trauma centers.

Researchers examined helmet use, fatalities, and head injuries from the twelve months prior to and after the repeal, and included 7,235 riders involved in police-reported crashes and 1,094 riders hospitalized at trauma centers. Both data sets included motorcycle operators or passengers in Michigan who were sixteen years of age or older and who were involved in either a police-reported motorcycle crash, or evaluated and treated at a Michigan trauma center for a traumatic injury between April 12, 2011, and April 12, 2013.

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Exploring In-Vehicle User Interfaces at AutomotiveUI

The eighth International Conference on Automotive User Interfaces and Interactive Vehicular Applications—also known as AutomotiveUI—took place at the University of Michigan in October.

The event brought together 200 researchers from the United States and Europe, including practitioners and students who are interested in both the technical and the human aspects of in-vehicle user interfaces and applications. The conference format included a mix of workshops and tutorials, scientific paper and poster sessions, and collaborative opportunities.

Research professor Paul Green, head of the UMTRI Driver Interface Group, served as general chair of the 2016 conference. He said that this year's event featured approximately forty scientific papers and forty posters addressing state-of-the-art work.

“The conference had twin goals of providing a forum for the presentation of high-quality information concerning research, practice, and education pertaining to vehicle interfaces as well as providing for opportunities to build personal connections,” said Green. “Accordingly, the workshops

were included in registration and attended by almost all attendees. To support building connections, we had name tags that indicated conference topics of interest, a speed-networking format, sponsored meals at small tables to facilitate interaction, and follow-on, birds-of-a-feather meetings.”





Consistent with prior conferences, AutomotiveUI 2016 addressed novel in-vehicle services, models of and concepts for enhancing the driver experience, driver performance and behavior, development of semiautonomous driving, and the needs of different user groups. The overarching goal of the conference was to support the development of interfaces that are safe, easy to use, and desired by users.

Several UMTRI faculty were among the conference organizers, including assistant research scientist Anuj Pradhan (publication co-chair), and associate research scientist Shan Bao and research fellow Brian Lin



Keynote speaker Renee Stephens of J.D. Power speaks at the AutomotiveUI conference in October. Credit: Photo courtesy of Paul Green, UMTRI

(local arrangements co-chairs). Students from the University of Michigan Human Factors and Ergonomics Society chapter played a significant role in helping to coordinate the meeting.

The next AutomotiveUI conference will take place in Oldenburg, Germany, in September 2017.    



UMTRI Research Presented at International Research Council on the Biomechanics of Injury

Several members of the UMTRI Biosciences Group presented research at the annual meeting of the International Research Council on the Biomechanics of Injury (IRCOBI), held in Málaga, Spain, in September.

Associate research scientist Kathy Klinich presented a study demonstrating the continuing importance of crashworthiness and occupant-protection technology even with the eventual development of highly effective crash-avoidance technology.

Assistant research scientist Lauren Zaseck presented an innovative study using computer simulation to assess the effects of rib fractures on dynamic thorax response in crash loading.

Research professor Matt Reed presented research showing that many rear-seat occupants experience poor belt fit. In addition, Reed presented work from former UMTRI PhD student Katelyn Klein Hunter on the development of new pelvis geometry for crash-test dummies.

Reed was also a coauthor on a paper presented by collaborators from Spain who are working to improve protection for people with osteogenesis imperfecta.


The UMTRI research cited below appears in the proceedings from IRCOBI 2016:

Klinich, K.D., Flannagan, C.A.C., Hu, J., and Reed, M.P. "Potential Safety Effects of Low-Mass Vehicles with Comprehensive Crash Avoidance Technology."

Zaseck, L.W., Chen, C., Hu, J., Reed, M.P., and Rupp, M.P. "The Influence of Pre-Existing Rib Fractures on GHBMC Thorax Response in Lateral Impact."

Park, J., Ebert, S.M., Reed, M.P., and Hallman, J.J. "Effects of Occupant and Vehicle Factors on Three-Point Belt Fit in Rear Seats."

Klein, K., Reed, M.P., and Rupp, J.D. "Development of Geometric Specifications for the Pelvis of a Small Female Anthropomorphic Test Device."

Martinez, L., Reed M.P., Garcia, A., de Loma-Ossorio, M., Torres, C., and Bueno, "A. Crash Impact Dummies Adapted to People Affected by Osteogenesis Imperfecta." 

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Study: Double-Digit Rise in Head Injuries after Michigan Helmet Law Repeal

What Carter and his colleagues found should give motorcyclists pause before they head out on the road without the protection provided by a helmet.

Helmet use dropped 24 percent among riders involved in crashes, and 27 percent among those seeking care at trauma centers, following the repeal.

Although the number of motorcyclist fatalities statewide did not increase, motorcyclists who were not wearing a helmet in a crash had a fatality rate of 5.4 percent—nearly twice as high as the 2.8 percent rate for riders wearing a helmet.

That's on top of the 14 percent increase in head injury rates overall.


Among the crash-involved riders and trauma patients sampled before and after the repeal, researchers also found that not wearing a helmet doubled the odds of a fatality and the odds of a head injury among those involved in a crash or treated at a trauma center.

"Head injuries can have a devastating impact on the long-term health of motorcyclists and their families after a crash," Carter says. "The 14 percent increase in head injuries observed in our study is consistent with the negative public health impact we have witnessed following similar repeals in other states."

Carter hopes the sobering results can be used to inform policymakers about the motorcycle helmet law and how the repeal

is affecting the health of citizens.

"This study provides important data that should be considered as part of the policy debate regarding the importance of universal helmet laws for preventing injury," he says.

Coauthors on the study were Lisa Buckley (UMTRI), Carol Flannagan (UMTRI), Jessica Cicchino (IIHS), Mark Hemmila (U-M Department of Surgery), Patrick Bowman (UMTRI), Farideh Almani (UMTRI), and C. Raymond Bingham (UMTRI). 

Source: University of Michigan Health System, <http://www.uofmhealth.org/news/archive/201611/study-double-digit-rise-head-injuries-after-michigan-helmet>

Aditi Misra




Aditi Misra joined UMTRI in September as an assistant research scientist in the CMISST group. She received her PhD in civil engineering from Georgia Tech in 2016 with a concentration in transportation systems engineering and a minor in computational econometrics.

She has an MS in civil engineering from the University of Connecticut where she worked on developing quantitative metrics for assessing project sustainability.

Misra's doctoral research focused mainly on nonmotorized transportation and travel-behavior modelling using

crowdsourced, innovative data-collection methods. Through her research, she gained extensive experience in nonstandardized data handling and management, GIS and transportation-data analytics, and discrete choice modelling. She has also worked on projects related to toll-lane usage and equity aspects of smartphone-based information

sharing. Misra's research interests include bicycle and pedestrian safety, citizen science, smart and connected cities, and data-driven learning. She is also deeply motivated by fundamental research in travel-behavior-model development and methodological improvements. 

Mobi 2016 Winners Honored at Habitat III in Quito

SMART (Sustainable Mobility and Accessibility Research and Transformation) at the University of Michigan is proud to announce that the winners of the 2016 MobiPrize were honored at the HABITAT III International Conference in Quito, Ecuador, held October 16–20.

Honoring entrepreneurial ventures as well as city and state governments supporting entrepreneurs, the MobiPrize provides a platform to showcase the kind of disruptive innovation in new mobility that is driving investment throughout the global marketplace.

The winners of MobiPrize 2016 include the following:

- ▶ **Best Enterprise Global Grand MobiPrize** (sponsored by Ford Motor Company): WhereIsMyTransport! (www.wherismytransport.com) Accepted by Devin Devries.
- ▶ **Best Enterprise Michigan MobiPrize** (sponsored by NEXT Energy): Current Motor (www.currentmotor.com) Accepted by Lauren Flanagan.
- ▶ **Best Enterprising City/State/Nation MobiPrize** (in partnership with ICLEI Eco-

Mobility Alliance): Medellín, Colombia (www.aciMedellin.org) Accepted by Medellín Mayor Federico Gutierrez and Luz Dary Botero, Planning Director, City of Medellín.

- ▶ **Best Enterprise Mobi-x India** (in partnership with Institute for Competitiveness, India): Jump in Jump out (www.jumpinjumpout.com) Accepted by Chetan Temkar.

The official award ceremony took place on October 16 at Habitat III, the United Nations Conference on Housing and Sustainable Urban Development, in Quito, Ecuador. The MobiPrize winners and team



members were also part of various panels during the course of the conference.

To read more about each winner, visit the MobiPrize website, <http://mobi-platform.com/mobiprize/>. 



UMTRI In The News

As evening commute gets darker, it also gets more dangerous

http://www.nytimes.com/2016/10/27/nyregion/new-york-commute-dusk-and-darkness-safety-campaign.html?src=twr&_r=2

Plug-in electric vehicles: A consumer wish list

<http://ns.umich.edu/new/releases/24361-plug-in-electric-vehicles-a-consumer-wish-list>



Upcoming Events

96th Annual TRB Meeting

January 8-12; Washington, D.C.

<http://www.trb.org/AnnualMeeting/Annual-Meeting.aspx>

New Mobility Strategies and Technologies

February 15; Ann Arbor, Michigan

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

Aging in America Conference

March 20-24; Chicago, Illinois

<http://www.asaging.org/asas-annual-aging-america-conference>

Michigan Traffic Safety Summit

March 21-23; East Lansing, Michigan

<http://www.michigan.gov/msp>

Lifesavers National Conference

March 26-28; Charlotte, North Carolina

<http://lifesaversconference.org/>

European Automotive Cyber Security Summit

March 27-30; Germany

<http://www.automotive-cyber-security.com/>

SAE World Congress

April 4-6; Detroit, Michigan

<http://www.sae.org/congress/>

AASHTO GIS for Transportation Symposium

April 10-13; Phoenix, Arizona

<http://www.gis-t.org/>

U-M and the Japanese Automotive Industry: A 35-Year Partnership

April 12; Ann Arbor, Michigan

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



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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

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