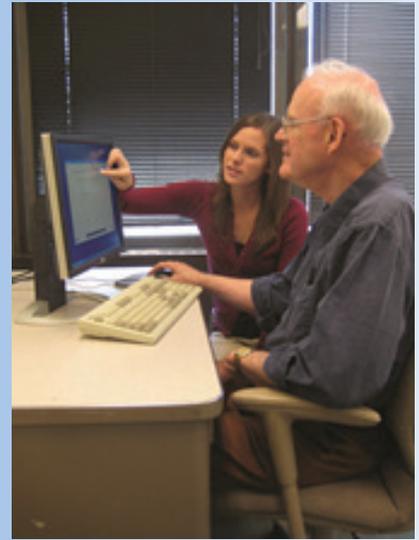


UMTRI

RESEARCH REVIEW

• UNIVERSITY OF MICHIGAN TRANSPORTATION RESEARCH INSTITUTE • APRIL-JUNE 2014 • VOLUME 45, NUMBER 2 •



New Faculty Expand UMTRI Research Portfolio

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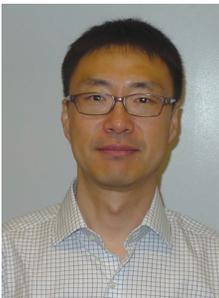
UMTRI's Strategic Intent

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

New Faculty Research Portraits

Significant growth and change have defined the past year at UMTRI due in part to the appointment of several new faculty researchers representing a broad array of professional transportation expertise. Portraits of five of UMTRI's newest researchers are presented here along with snapshots of their current research projects and interests.



Han Kim
Biosciences Group

Background: Han Kim joined UMTRI's Biosciences Group in January 2014. He received his PhD degree in industrial and operations engineering from the University of Michigan. Before joining UMTRI, he worked at the Safety and Health Assessment and Research Program

of the Washington State Department of Labor and Industries and previously was a postdoctoral researcher with the Graybiel Spatial Orientation Laboratory at Brandeis University.

Current Research Focus: Kim's passion for human modeling fits well with current Biosciences research, says Kim, which is all about "linking the human and the vehicle." Computational human modeling is a crucial tool to improve occupant safety and comfort in vehicle design. His methodologies include traditional anthropometry and other new techniques, such as human-body scanning and motion capture. Kim's work currently focuses on the Equipped Reach Study for military-vehicle design. In this study, soldiers perform increasingly diverse tasks in tactical vehicles, such as communication and weapon-system control. Kim assesses the task performance and accuracy of the soldiers, whose postures and motions are greatly influenced by the different personal protective equipment (PPE), gear, and harnesses they must wear.



Lisa Buckley
Young Driver Behavior and Injury Prevention Group

Background: Lisa Buckley was a vice-chancellor's senior research fellow at the Centre for Accident Research and Road Safety-Queensland (CARRS-Q), Queensland University of Technology.

She had a faculty appointment since 2008 at CARRS-Q, following completion of her PhD, also at CARRS-Q. A major component of her work was the design

and evaluation of school-based injury prevention programs focused on alcohol prevention, violence prevention, and road safety outcomes. Prior to her PhD, she trained in counseling psychology and was a registered psychologist in Australia.

Current Research Focus: Buckley is continuing to build on her work in social psychology, particularly related to understanding social influences on adolescent behavior. She is excited to be funded with pilot projects to examine neurological underpinnings of social influence using functional near-infrared spectroscopy (fNIRS). She and her colleagues will look at the influence of the presence of a vehicle passenger on teen drivers and on adult drivers as indicated by regions of the brain associated with impulse control. In a separate study, the team will look at this relationship for those with attention deficit hyperactivity disorder. In addition, Lisa has been writing up the findings of the evaluation of some of her Australian research on a school-based program that focused on ways in which friends can look out for each other, including providing additional skills to support this (such as first-aid training), that showed reduced self-reported injury experiences after twelve months. This was a randomized controlled trial with 35 schools in Queensland, Australia.



André Weimerskirch
Engineering Systems

Background: André Weimerskirch holds a PhD from Ruhr-University Bochum, Germany, in the area of applied data security. Before joining UMTRI, he was cofounder and CEO of the embedded-systems security company ESCRYPT. He is active in all areas of automotive and

transportation cybersecurity and privacy.

Current Research Focus: Weimerskirch's research focuses on all aspects of embedded data security and privacy, with a special focus on automotive and transportation systems. He is a main designer of the vehicle-to-vehicle safety communication security system that is the leading candidate for deployment in the United States and which was also deployed in the UMTRI-led Safety Pilot Model Deployment. Currently Weimerskirch is working in a team to refine the design and specify the details. He is also working on in-vehicle cybersecurity, including secure CAN bus, secure infotainment and telematics systems, intrusion detection systems, secure architectures,

Continued on page 2

Continued from page 1

and trustworthy platforms. Weimerskirch believes that proper security solutions require industry to collaborate and to use solutions with open designs but proprietary configuration.



Lisa Molnar
Behavioral Sciences Group

Background: Lisa Molnar recently received her PhD in public health from Monash University in Australia and was appointed associate research scientist at UMTRI in April 2014. She joined UMTRI in 1986, and her primary areas of interest are traffic

safety and driving behavior.

Current Research Focus: One of Molnar's current research interests is self-regulation of driving by older adults. As drivers age, most experience some decline in visual, cognitive, or psychomotor abilities that can compromise safe driving. Research suggests that modifying driving behavior by driving less or avoiding situations considered challenging may help older adults compensate for some of these declines and continue to drive safely. Her doctoral work examined self-regulation at multiple levels of driver performance and decision making, including strategic (decisions made prior to driving) and tactical (decisions made while driving). It also delved deeply into the motivations for driving modification to distinguish actual self-regulation from simply avoiding driving situations due to lifestyle choices. To collect data, she developed and tested a comprehensive self-regulation questionnaire (the Advanced Driving Decisions and Patterns of Travel or ADDAPT questionnaire) and pilot-tested it with people with clinically determined impairments in vision, cognition, or psychomotor functioning and also healthy drivers. She then used the questionnaire to gather self-report data from a sample of older drivers in Australia. These data were compared with naturalistic driving data collected through in-car recording devices installed in their personal vehicles, as well as clinical-assessment data on functioning. Findings revealed that drivers give many reasons for modifying driving behavior, only some of which have to do with what is commonly thought of as self-regulation. Strategic self-regulation often occurs at specific times, such as at night or in bad weather, and is influenced by factors such as not feeling comfortable or safe while driving in those situations. Reported tactical self-regulation includes such behaviors as avoiding distractions (not talking on a cell phone, for instance) and leaving more room between vehicles, and is influenced in part by the driver's age.



Anuj K. Pradhan
Young Driver Behavior and Injury Prevention Group

Background: Anuj Pradhan comes from the Kingdom of Bhutan. He holds a bachelor's degree in mechanical engineering, and he received a master's and PhD in industrial engineering and operations research from the University

of Massachusetts Amherst. He then received an Intramural Research Training Award from the National Institutes of Health in Bethesda, Maryland, where he worked as a post-doctoral visiting fellow in the Prevention Research Branch of the Division of Epidemiology, Statistics and Prevention Research in The Eunice Kennedy Shriver National Institute of Child Health and Human Development (NICHD) for three years.

Current Research Focus: Pradhan's broad research interest is the etiology of injuries and fatalities due to motor-vehicle crashes. His approach leverages various methodologies and technologies including driving simulation, naturalistic driving and other observational methods, as well as using other measurement tools including eye-tracking and neuroimaging. He is especially interested in adolescent drivers and in examining from a human-factors and behavioral standpoint the mechanisms, norms, influences, and other factors associated with teenage overrepresentation in motor-vehicle crashes. For example, Pradhan is currently researching peer-passenger influences on healthy teen drivers and on teen drivers with attention deficit hyperactivity disorder (ADHD) from a neurological perspective using driving simulation and functional near-infrared spectroscopy (fNIRS), a novel method of imaging brain activity. He is also focused on the human-factors issues associated with automated vehicles and is currently leading an initiative to develop in-house automated vehicle simulation capabilities that can help answer fundamental questions about automation and the human driver.



Connecting the Past and Future: 2014 ITS World Congress

The Intelligent Transportation Society of America (ITS America) will host the 2014 World Congress on Intelligent Transport Systems, September 7-11, 2014, in Detroit, Michigan in partnership with ERTICO and ITS Asia-Pacific.

More than 10,000 of the world's leading transportation policymakers, researchers, high-tech innovators, and business professionals from the United States, Europe, and Asia will gather at Detroit's newly refurbished Cobo Hall to share the latest intelligent transportation systems (ITS) applications from around the globe.

Detroit automakers are excited to showcase their city as well as the latest technological developments in the transportation industry. CEOs from the auto world and major corporations will lead programs, and the event will display more demonstrations than ever before. Organizers are planning an array of technical tours highlighting the latest regional, national, and global deployments—from connected vehicles to freight management and smart parking to cutting-edge ITS architecture.

UMTRI director Peter Sweatman is a member of the board of directors for this year's milestone event, and serves as chair of the program committee.

"It is extremely valuable to Michigan's automotive industries, R&D groups, and universities to have this key technology event in southeast Michigan," said Sweatman. UMTRI and the Mobility Transformation Center (MTC) will be strongly represented in the program, exhibit, and demonstrations, and tours will be run from the congress headquarters at the Cobo Center to UMTRI, the Ann Arbor Connected Vehicle Deployment, and the new Michigan Mobility Transformation Facility (MTF) under construction. "A number of UMTRI faculty and staff are involved in the congress," he added, "which helps us lock more ITS research and deployment into Michigan."

The World Congress on Intelligent Transport Systems is an international meeting and exhibition that rotates annually among three major geographic regions, the Americas, Europe, and Asia Pacific. The event is held in the United States once every three years. The world's leading transportation policymakers, technology, and business professionals will gather in Detroit in September with a goal of bringing greater levels of safety, reliability, sustainability, and accessibility to transportation systems worldwide.

The 21st World Congress will host interactive technology showcases, more than 250 sessions, a 350,000 square-foot exhibit hall, and numerous networking events with ITS industry leaders from across the world.

For more information on the 2014 ITS World Congress, visit www.itsworldcongress.org.



ITS America Annual Meeting and Exposition

ITS America's Annual Meeting & Exposition will take place in conjunction with the 21st World Congress. While focusing on topics of the World Congress theme, "Reinventing Transportation in our Connected World," ITS America's annual meeting will provide a distinct series of events for the society's members, which will focus on exploring solutions for easing traffic congestion, financing and improving the nation's transportation system, advancing life-saving vehicle technologies, and much more through exhibits, panel discussions, technology demonstrations, technical tours, training sessions and networking events.

This year the annual meeting will feature an ITS America plenary session, leadership circle meeting, a host of committee forum meetings and the Best of ITS Awards, state chapter awards, and student essay competition winners.

For more information on ITS America, see www.itsa.org/



Industry Leaders Join Mobility Transformation Initiative

The University of Michigan's Mobility Transformation Center announced on May 6 that key industry leaders from a variety of sectors, including Bosch, Econolite, Ford, General Motors, Toyota and Xerox have joined the center as its initial industry partners.

They will partner with federal, state, and local government representatives in a major U-M initiative to revolutionize the movement of people and goods worldwide.

The goal of MTC is to lay the foundations of a commercially viable system of connected and automated vehicles—vehicles that communicate wirelessly with one another and with infrastructure to warn of potential hazards and allow increasing automation of vehicle functions. Plans call for demonstrating a working system in Ann Arbor by 2021.

“The potential of this technology is truly transformative, opening up broad opportunities in the emerging marketplace,” said Peter Sweatman, director of the MTC and the U-M Transportation Research Institute. “Partnering with these and a select group of other visionary companies from a range of sectors that will play a role in shaping the future—as well as with government at all levels—is critical if we are to realize that promise.”

Systems of connected and automated vehicles could dramatically reduce crashes, relieve urban congestion, and cut pollution and energy use.

MTC's new partners—the initial members of the center's Leadership Circle—convened for the first time in May on the occasion of a groundbreaking ceremony marking the start of construction on a unique simulated urban environment for testing advances in connected and automated mobility systems.

Located on 32 acres of U-M's North Campus Research Complex, the off-roadway test site is being designed and built in cooperation with the Michigan Department of Transportation to simulate the complexities of a dynamic urban environment. It will include a network of approximately three lane-miles of concrete and asphalt roads with intersections, traffic signs and signals, sidewalks, roundabouts, benches, simulated buildings, streetlights, and obstacles such as construction barriers. Current plans call for the facility to be completed in fall 2014.

The MTC is also developing three complementary on-roadway vehicle deployments of up to 20,000 vehicles across southeastern Michigan. The deployments will serve as test beds for evaluating consumer behavior with these transformative technologies and exploring market opportunities.

To accelerate the development and implementation of connected and automated technology, members of the MTC's Leadership Circle will work together to identify opportunities and barriers to achieving them, anticipate and shape key standards and regulations, and help guide the direction of the research.

“The task before us goes beyond the technical challenges,” Sweatman said. “In our research, we will be addressing the interrelated legal, political, regulatory, social, economic, and urban-planning issues as well.”

Members of the Leadership Circle will each commit a total of \$1 million over three years to support the MTC and its programs. In addition to adding members to the Leadership Circle, the MTC is planning other opportunities to engage industry in the work of the center.

“A wide range of sectors have a stake in the future of mobility,” Sweatman said. “We are reaching out to such areas as telecommunications, big-data management, freight, public transportation, and insurance as well as to OEMs and tier-1 suppliers.”

For more information on the MTC, visit www.MTC.umich.edu.



Parents and Driver Distraction

More than 75 percent of parent drivers said they engaged in distractions like cell-phone use, eating, or feeding a child, according to a University of Michigan study published recently in *Academic Pediatrics*. Despite their precious cargo, parents are no less likely to engage in driving distractions than drivers from the general population.

The study found that 90 percent of parent drivers said they engaged in at least one of the ten distractions examined in the study while their child was a passenger and the vehicle was moving, says lead author Michelle L. Macy, M.D., M.S., an emergency medicine physician at the University of Michigan's C.S. Mott Children's Hospital. Additional authors included UMTRI research professor and U-M Injury Center faculty member Raymond Bingham, as well as faculty from the U-M Medical School and U-M School of Public Health.

The study, conducted in two Michigan emergency departments, showed that about two-thirds of the study respondents said they've talked on cellular phones while driving their child, consistent with other studies in the general population. About 15 percent of the study respondents said they've texted while driving their child.

But, it is important to note that drivers in this survey admitted to other distractions, such as giving food to their child more frequently than they disclosed talking on a cellular phone, Macy says.

"This just highlights the need to consider multiple sources of driver distraction when kids are passengers. Giving food to a child or picking up a toy for a child not only requires a driver to take their hands off the wheel but also take their eyes off the road," Macy says.

Each year, more than 130,000 children younger than 13 are treated in U.S. emergency departments after motor-vehicle collision-related injuries. About one in six fatal motor-vehicle collisions in the U.S. in 2008 resulted from driver distraction, and Macy says that over time that percentage has likely increased.

Researchers also found that those parents with higher education and who were non-Hispanic whites were more likely to report cellular phone and

directions-related distractions like use of navigation systems.

"If this finding is a result of greater access to technology among more highly educated and non-Hispanic white parents, we can expect the problem of technology-based distractions to expand because national rates of cell-phone ownership in the U.S. have climbed above 90 percent," Macy says.

The study was conducted at the University of Michigan C.S. Mott Children's Hospital pediatric emergency department, located in Ann Arbor, and the Hurley Medical Center emergency department located in Flint. The U-M location serves a predominantly white, privately insured population, and the Flint location has a higher proportion of African American patients covered by Medicaid.

The study is based on responses of 570 parents of 1- to 12-year-old children who arrived in the emergency departments of the two hospitals.

Whether a driver engaged in a distraction also was significantly associated with the age of the child, Macy says. Odds of reporting a child-related distraction was higher among parents of children between the ages of 2 and 8 than among parents of 1-year-olds.

Macy says she is concerned as well about whether parents are modeling the right behaviors in front of children who will eventually learn to drive.

"We know there are some limitations to this study, especially that people are often reluctant to disclose that they engage in dangerous, and in the case of text messaging in Michigan, illegal behaviors while driving," says Macy.

"But our results do highlight the fact that child passengers are frequently being exposed to the risks of distracted driving.

"Efforts to improve child-passenger safety have often focused on increased and proper use of restraining seats. But this study shows that reducing distractions and discouraging unsafe behaviors could prevent crashes."

Source: www.uofmhealth.org/news

See www.sciencedirect.com/science/article/pii/S1876285914000771.



Dynamics of Heavy Trucks Short Course

Several UMTRI researchers will participate as instructors in the U-M short course Dynamics of Heavy Trucks, to be held June 16-19, 2014, at the University of Michigan. The course, offered through Michigan Engineering Integrative Systems + Design (ISD), covers critical components of heavy trucks as well as fundamental principles that determine handling and performance.

UMTRI senior research specialist Steve Karamihas is course chair.

“One of the main goals of the course is to cover how the entire truck performs,” says Karamihas. “The way we go about that is first by covering the individual truck components such as tires, and suspensions—and how each one of the components contributes to the overall performance of the vehicle. In the second half of the course, we talk about performance—things like turning, rollover, and ride quality.”

Other UMTRI experts will participate as course lecturers, including Dave LeBlanc, head of the UMTRI Engineering Systems Group, senior research

engineer Michelle Barnes, senior research scientist emeritus Paul Fancher, research professor emeritus Tom Gillespie, and senior research scientist emeritus Chris Winkler.

Karamihas, Gillespie, and Winkler will also present the short course at the University of Cambridge (UK), July 7-11, and again at the University of Witwatersrand (South Africa), September 8-11, 2014.

Much of the information in the Dynamics of Heavy Duty Trucks course is based on UMTRI research. UMTRI has long been a leader in research, testing, and innovation of heavy vehicles and heavy-vehicle safety. Current heavy-truck research areas include cab ergonomics, crash causation and countermeasure analysis, heavy-vehicle rollover, rollover protection for hazardous-materials tank trucks, and stability-control systems.

For more information about the short course and to see a video, go to

<http://isd.engin.umich.edu/>.



Thomas Gillespie

Christopher Winkler

Steven Karamihas

UMTRI Researchers at SAE World Congress

The Society of Automotive Engineers (SAE) held its 2014 World Congress and Exhibition April 8–10 at the Cobo Center in Detroit. More than 11,000 participants attended the event, which featured over 1,500 technical presentations in seven topic areas. Technology tracks included electronics; emissions, environment and sustainability; integrated design and manufacturing; management and marketplace; materials; propulsion and powertrain; and safety and testing.

Several UMTRI researchers participated in the four-day event. In the session on active safety and advanced driver-assistance systems, associate research scientist David LeBlanc presented “Tradeoffs in the Evaluation of Light Vehicle Pre-Collision Systems,” coauthored by Mark Gilbert and Stephen Stachowski of UMTRI, who also attended, and Rini Sherony of Toyota.

Research associate professor Michael Flannagan helped organize the technical session on automotive-lighting technology and also presented the paper “Subjective and Objective Effects of Driving with LED Headlamps,” coauthored by Mitsuhiro Uchida, and John Michael Sullivan and Mary Lynn Buonarosa of UMTRI.

Research professor Paul Green attended the SAE congress on April 10, accompanied by his entire IOE 436 class, which participated in the professional event for one day as part of a class requirement.

Senior research associate Steve Karamihas chaired the SAE Vehicle Dynamics Standard Committee meeting on April 10.

A call for papers has been issued for the SAE 2015 World Congress. The submission deadline is September 1, 2014. For more information, see www.sae.org/congress/cfp/authors2015.htm

RR

Land Use Transport and Population Health



Mark Stevenson, director of the Monash University Accident Research Centre in Melbourne, Australia, gave a special presentation at UMTRI on May 21 addressing strategic opportunities related to land-use transport and population health.

Stevenson is a leading injury epidemiologist and professor and director of the Monash University Accident Research Centre and the School of Public Health and Preventive Medicine at Monash University. He is a National Health and Medical Research Council Fellow, an honorary professor at the Peking University Health Science Center and the Sydney Medical School, the University of Sydney. He is a Lifetime Fellow of the Australasian College of Road Safety.

Professor Stevenson has extensive research experience in road trauma and considerable public-health experience in low-income countries, including as a consultant for the World Health Organization (WHO), UNICEF and the Swedish International Development Agency. Stevenson is an advisor for injury to the Director General of the World Health Organization and was part of the World Health Organization’s editorial committee for the *World Report on Road Traffic Injury Prevention* and the *World Report on Child Injury Prevention*.

RR

UMTRI NAMES & FACES

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 to inquire about the availability of other publications listed here.

Journal Articles

Armstrong, K.; Watling, H.; Buckley, L. 2014. "Young Women's Strategies for Protecting Behavior in Alcohol Situations." *Addictive Behavior*, vol. 39, no. 5, 2014, pp. 1000-1005. DOI:10.1016/j.addbeh.2014.01.017

Buckley, L.; Chapman, R.L.; Sheehan, M.C.; Reveruzzi, B.N. 2014. "In Their Own Words: Adolescents Strategies to Prevent Friends' Risk-Taking." *Journal of Early Adolescence*, vol. 34, no. 4, May, pp. 539-561. DOI:10.1177/027243161349663

Chen, Y.; Berrocal, V.J.; Bingham, C.R.; Song, P.X.K. 2014. "Analysis of Spatial Variations in the Effectiveness of Graduated Driver's Licensing (GDL) Program in the State of Michigan." *Spatial and Spatio-Temporal Epidemiology*, vol. 8, April, pp. 11-22. DOI:10.1016/j.sste.2013.12.001

Eby, D.W.; Molnar, L.J. 2014. "Has the Time Come for an Older Driver Vehicle?" *Journal of Ergonomics*, 2014 S3. <http://www.omicsgroup.org/journals/has-the-time-come-for-older-driver-vehicle-2165-7556.S3-002.pdf> DOI:10.4172/2165-7556.S3-002

Macy, M.L.; Carter, P.M.; Bingham, C.R.; Cunningham, R.M.; Freed, G.L. 2014. "Potential Distractions and Unsafe Driving Behaviors among Drivers of 1- to 12-Year-Old Children." *Academic Pediatrics*, vol. 14, no. 3, May-June, pp. 279-286. DOI:10.1016/j.acap.2014.02.010

Simons-Morton, B.; Bingham, C.R.; Falk, E.B.; Li, K.; Pradhan, A.K.; Ouimet, M.C.; Almani, F.; Shope, J.T. 2014. "Experimental Effects of Injunctive Norms on Simulated Risky Driving Among Teenage Males." *Health Psychology*, advance online publication January 27, 2014. DOI:10.1037/a0034837

Technical Reports

Blower, D.F. 2014. Assessment of the Effectiveness of Advanced Collision Avoidance Technologies. Report no. UMTRI-2014-3. <http://hdl.handle.net/2027.42/102534>

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

Schoettle, B.; Sivak, M. 2014. A Survey of Public Opinion about Connected Vehicles in the U.S., the U.K., and Australia. Report no. UMTRI-2014-10.

<http://hdl.handle.net/2027.42/106590>

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

Sivak, M. 2014. Has Motorization in the U.S. Peaked? Part 5: Update through 2012. Report no. UMTRI-2014-11.

<http://hdl.handle.net/2027.42/106404>

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



June 2014

European Conference on Human Centered
Design for Intelligent Transport Systems
June 5-6; Vienna, Austria
<http://conference2014.humanist-vce.eu/>

2014 IEEE Intelligent Vehicles Symposium
June 8-11; Dearborn, Michigan
www.ieeeiv.net/

RESNA Annual Conference
June 11-15; Indianapolis, Indiana
www.resna.org/conference/

July 2014

Automated Vehicles Symposium
July 15-17; San Francisco, California
www.trb.org/calendar

Transportation Planning for Small- and
Medium-Sized Communities
July 21-23; Burlington, Vermont
www.trbtoolsoftbetrade.org/

August 2014

CAR Management Briefing Seminars
August 4-7; Traverse City, Michigan
<http://www.cargroup.org/>

National Rural ITS Conference
August 24-27; Branson, Missouri
www.nritisconference.org/

International Symposium on Naturalistic
Driving Research
August 25-28; Blacksburg, Virginia
<http://www.vttindrs.org/>

September 2014

ITS World Congress on Intelligent Transport
Systems
September 7-11; Detroit, Michigan
www.itsworldcongress.org

UMTRI RESEARCH REVIEW

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