

UMTRI

RESEARCH REVIEW

• UNIVERSITY OF MICHIGAN TRANSPORTATION RESEARCH INSTITUTE • OCTOBER-DECEMBER 2012 • VOLUME 43, NUMBER 4 •



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Reducing Teen Driver Distraction: Parents Play Important Role

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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

Reducing Teen Driver Distraction: Parents Play Important Role

Preliminary findings from a national study of teen drivers (ages 16 to 18) and parents of teen drivers, conducted jointly by UMTRI and Toyota Motor Sales, USA, Inc., show a significant correlation between parent and teen behaviors behind the wheel. Results suggest that parents play a significant role in modeling risky behavior on the road.

“Children look to their parents for a model of what is acceptable,” said Ray Bingham, research professor and head of UMTRI’s Young Driver Behavior and Injury Prevention Group. “Parents should know that every time they get behind the wheel with their child in the car they are providing a visible example that their child is likely to follow.”

UMTRI and Toyota researchers surveyed more than 2,600 newly licensed U.S. drivers ages 16 to 18 and nearly 3,000 parents of drivers in this age group, including 400 pairs of teens and parents from the same households, during August and September 2012. They found that parents who more frequently engage in distracted driving behaviors have teens who engage in distracting behaviors more frequently than other young drivers.

A key finding, however, is that what teens think their parents do while driving has a greater impact on teen behavior than what parents actually

report they do. For example, if a teen’s parent reports dealing with passenger issues while driving, the teen is twice as likely to do the same. But if a teen thinks his or her parent deals with passenger issues while driving, the teen is five times more likely to do so themselves.

Likewise, if a teen’s parent reports looking for something in the vehicle while driving or reports eating or drinking while driving, the teen is twice as likely to do the same, but is four times



UMTRI YOUNG DRIVER BEHAVIOR AND INJURY PREVENTION GROUP

more likely if he or she thinks his or her parent looks for something in the vehicle while driving and three times more likely to eat or drink behind the wheel.

Bingham and UMTRI colleagues Jennifer Zakrajsek and Jean Shope say that teens think their parents engage in distracted driving more often than may be the case. A third of teens believe their parents use an iPod or other electronic device for music while driving, while only 10 percent of parents report that they do. Seventy-one percent of

teens believe their parents read or write down directions while driving, while 55 percent of parents say they actually do. Eighty-five percent of teens believe their parents deal with passenger issues while driving, while 70 percent of parents say they do.

“Overall, teens think that their parents engage in distracted driving behaviors more often than may be the case, which may allow them to justify certain high-risk behaviors behind the wheel,” Bingham said.

Another major finding from the study is that parents may underestimate how much their teens text while driving. More than a quarter of teens (26 percent) read or send a text message at least once every time they drive, although only 1 percent of their parents said their teen did this.

Other findings include:

- Cell phone use by teen drivers is similar to use by parents. More than half of teens and about 60 percent of parents say they use a hand-held cell phone while driving.
- Texting while driving remains pervasive. About 25 percent of teens respond to and 30 percent read a text message once or more every time they drive. Nearly one in 10 parents respond to a text once or more every time they drive, while 13 percent of them read a text or email once or more while driving. Perhaps even more alarming: 20 percent of teens and 10 percent of parents admit they have extended, multimesage text conversations while driving.

Continued

Continued from page 1

- Digital and social media are significant driving distractions. More than half of teens say they search for music on a portable music player while driving, while just 12 percent of parents do. More than one in 10 teens say they update or check Facebook, Twitter, or other social media while driving.
- Teens regularly drive with young passengers despite serious risks. More than two-thirds of teens say they drive with two or three teen passengers in their car with no adults, which is shown to double the driver's risk of being killed in a crash. Nearly half of teens do so with more than three teen passengers and no adults, which quadruples a driver's risk of being killed. In addition, 50 percent of teens say they deal with passengers while driving and 30 percent say they do this at least once a trip.

UMTRI YOUNG DRIVER BEHAVIOR AND INJURY PREVENTION GROUP



The study, sponsored by Toyota's Collaborative Safety Research Center, was designed to shed new light on frequently discussed driving risks and to identify effective recommendations to help keep teens safe and help parents serve as more effective driving role models. It also looked at a range of risk factors that receive less public attention but pose great risks on the road, as well as the role parents and peers play in encouraging distracted driving behaviors.

"Driver education begins the day a child's car seat is turned around to face front," said Tina Sayer, CSRC principal engineer and teen safe-driving expert. "As the study shows, the actions parents take and, by extension, the expectations they set for young drivers each day are powerful factors in encouraging safe behavior behind the wheel. Seat belts and good defensive driving skills are critical. However, the one piece of advice I would give to parents to help them keep newly licensed drivers safe on the road is to always be the driver you want your teen to be."

For more information see

<http://www.toyota.com/csrc>

<http://www.umtri.umich.edu/news.plp?id=3197>

Source: Bernie DeGroat, U-M News Service

RR

Measuring Children in 3D for Vehicle Safety Analysis

Measuring and tracking human body size—or anthropometry—is critical in a number of industries, among them clothing and furniture. However, many aspects of vehicle safety also rely on accurate, current human body measurements. These measurements are used to develop crash-test dummies, which are in turn used to assess the protection provided by child restraints, belt-positioning boosters, and vehicle seat-belt restraint systems.

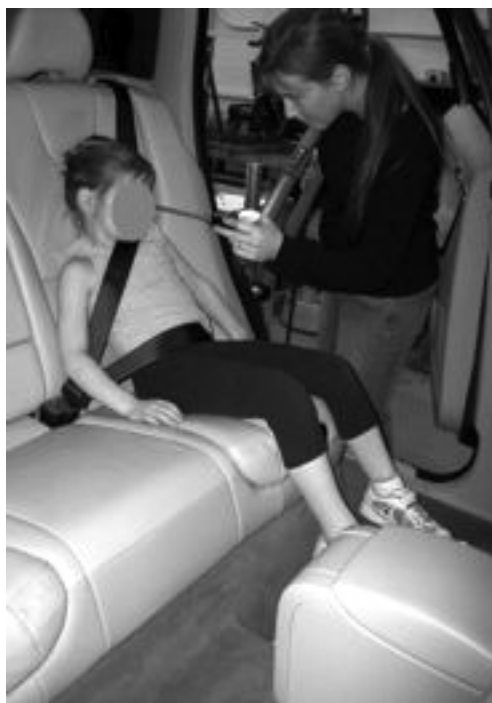
One problem, explains UMTRI research associate professor Matt Reed, is that the only detailed anthropometric data for U.S. children were gathered in an UMTRI study over 35 years ago. The National Center for Health Statistics (NCHS) tracks standing height and body weight for children across the U.S., but doesn't record detailed measurements of the trunk and limbs. Those data show that children on average are heavier now than they were in the 1970s. Just as with adults, this extra body weight can cause problems with fit. "For children, this can mean poor seat-belt fit or problems fitting into some belt-positioning boosters," Reed said.

Reed and his team have addressed this challenge by developing an extensive database containing detailed body-size measurements of 162 children, ages 4 to 12. This study was the first to use three-dimensional surface measurement techniques to capture child body shapes in a wide range of seated postures.

Use of advanced technology has allowed the researchers to obtain detailed body measurements that wouldn't have been possible even a few years ago. "Our laser scanner is like a 3D camera that can capture over 500,000 points on the surface of the body in under 12 seconds," explained Kathy Klinich, assistant research scientist in UMTRI's Biosciences Group. "We recorded data in up to two dozen seated and standing postures for each child, so we can see how their body shape changes in different situations."

The research team is now analyzing the data for application to a wide range of problems. First up is the development of new anthropometric standards for crash dummies representing children. "The current child crash dummies look more like scaled-down adults than the elementary-school-age children they're supposed to represent," Klinich said. "With the new data, we can get the shapes right in the areas important for assessing belt fit."

The data will also be used to create computational models of children that can be used to perform virtual crash testing. "Crash dummies can only tell us so much," said Reed. "Computer simulations with parametric human-body models that can represent the complex variability in posture and body shape will provide an unprecedented ability to optimize crash protection for children as well as adults." **RR**



Measuring posture by digitizing the 3D locations of body landmarks

UMTRI BIOSCIENCES

UMTRI to Partner with Texas A&M Transportation Institute

An innovative, new partnership between UMTRI and Texas A&M Transportation Institute (TTI) will unfold in 2013, allowing the two research organizations to collaborate on key transportation topics, most notably connected-vehicle technology.

John Maddox, director of collaborative program strategies at both UMTRI and TTI, will coordinate the partnership and identify areas where the two organizations can work together. According to Maddox, the UMTRI-TTI collaboration capitalizes on synergies with UMTRI's expertise in vehicle research and TTI's expertise in infrastructure.

"UMTRI is the preeminent research organization for vehicle safety technology," says Maddox, "while TTI is the preeminent research organization for the roadway infrastructure side of transportation safety. As technology in transportation progresses, it is important to connect vehicles to infrastructure in a way that benefits safety, mobility and the environment. The TTI-UMTRI connection is a perfect metaphor for that need to connect the vehicle to the road."

One of the first priorities is for TTI to contribute to UMTRI's Safety Pilot project, the connected-vehicle research being conducted by UMTRI for the U.S. Department of Transportation. The Safety Pilot is a thirty-month program that tests wireless communications among vehicles and roadside equipment in a real-world setting for use in generating data to enable safety applications. Passenger cars, commercial trucks, and transit buses in Ann Arbor are being equipped with a mix of integrated, retrofit, and aftermarket vehicle-to-vehicle (V2V) and vehicle-

to-infrastructure (V2I) safety systems, technologies that could prevent thousands of crashes.

"Also, we are already starting to plan and theorize how TTI can contribute to the automated vehicle research work as well as the connected-vehicle research work," says Maddox. "Those two things will eventually be intertwined."

Another area of potential collaboration is combining transportation data expertise. The two institutes are exploring how best to coordinate and use vehicle connectedness to get real-time data for urban planning and mobility.

"Currently we are identifying the areas that make the most sense to begin the collaboration on," says Maddox. "But clearly, connected and automated vehicles and transportation data would be prime examples of where the two institutes could interface together very well."



The UMTRI-TTI collaboration capitalizes on UMTRI's expertise in vehicle research and TTI's expertise in infrastructure.

Other possible areas of collaboration between UMTRI and TTI include vehicle and roadway lighting, and heavy-vehicle crash avoidance and occupant protection. According to Maddox, the coordinated combination of UMTRI and TTI provides unparalleled value to government and private organizations and will facilitate the advancement of our transportation system.

Headquartered on the Texas A&M university campus, TTI works on over 600 research projects with over 200 public and private sponsors annually. **RR**

US DOT

UMTRI Plays Key Role in 19th ITS World Congress

The 19th ITS World Congress took place October 22-26, in Vienna, Austria. With the motto “Smarter on the way,” this year’s ITS World Congress brought the global ITS community together to discuss the latest trends and policies in intelligent transportation.

UMTRI director Peter Sweatman, chair of the Intelligent Transportation Society of America’s board of directors, was one of several invited speakers for the event’s opening ceremony. He was pleased to see a strong North American delegation, which exceeded 350 delegates from U.S., Canada, Central and South America.

In a welcome letter in the 2012 final program, Sweatman notes that smarter, more sustainable mobility is increasingly significant globally, and bringing global thought leaders in Intelligent Transportation Systems together in Vienna “creates another milestone towards a world where ITS is a major force in improving the well-being of society.” Sweatman also participated in ITS World Congress board of directors meetings to review the Vienna meeting and prepare for the 2013 ITS World Congress in Tokyo.

Several UMTRI staff members also played a role at the ITS World Congress. UMTRI research scientist James Sayer, program manager of the Safety Pilot Model Deployment, was one of several invited speakers in the session Global Vehicle Safety Systems. In this session, a mixed panel of automotive manufacturers, safety advocates and regulators discussed Intelligent Transportation System activities in regions around the world, which are leading to major improvements in road safety. John Maddox, director of collaborative

program strategies, held active discussions with global partners in connected vehicles and infrastructure. Dave LeBlanc participated in events with EuroFOT and the CAR2CAR Consortium.

With 300 exhibitors, the ITS World Congress is the preeminent international exhibition on devices, technologies, and services related to intelligent transport systems. Exhibitors cover all aspects of transport systems—from complex information and communication systems and increasingly advanced navigation and payment systems to security, ecology, and electromobility.

The 20th ITS World Congress will take place in Tokyo, October 14-18, 2013. **RR**



UMTRI director Peter Sweatman.

Recent Research Performed through *Sustainable Worldwide Transportation*

Sustainable Worldwide Transportation (SWT), <http://www.umich.edu/~umtriswt/>, is a consortium of international members formed in 2005 at UMTRI. Its mission is to address important safety and environmental issues related to road transportation worldwide. Two recent SWT publications are summarized below. The abstracts of all thirteen publications released in 2012 are available at <http://www.umich.edu/~umtriswt/publications.html>.

Driver Demographics: Female Drivers Overtaking Males

In a recent paper in the journal *Traffic Injury Prevention*, Michael Sivak and Brandon Schoettle examined changes in the gender composition of U.S. drivers from 1995 to 2010.

They found that in 1995 male drivers outnumbered female drivers for each age group up to age 70. Today, that holds true only up to age 45. In addition, the percentage of males with a driver's license decreased from 1995 to 2010 for those younger than 60. For females, this decrease occurred for those younger than 50. Overall, there are now slightly more females than males with a driver's license.

Sivak and Schoettle say that changing gender composition will have major implications on the extent and nature of vehicle demand, energy consumption, and road safety. This is the case because females are more likely than males to purchase smaller, safer, and more fuel-efficient vehicles; they drive less; and they tend to have a lower fatality rate per distance driven.

Better Fuel Economy: Billions and Billions Saved

As fuel economy of new vehicles improved 18 percent over the past five years, billions of

gallons of gas and billions of pounds of emissions have been saved, according to Michael Sivak and Brandon Schoettle. They collected fuel data on 61 million new cars, pickup trucks, minivans and SUVs sold in the U.S. since 2007—about a quarter of all light vehicles, both new and used, on U.S. roads today.

Using a recent estimate of the average annual distance driven in the U.S. (about 13,000 miles every year), the researchers found that new vehicles in the last five years saved about 6.1 billion gallons of fuel—equal to about two weeks' worth of gas consumption for all vehicles in the U.S.

They also looked at the current monthly savings in fuel use for new vehicles and found that 293 million gallons of fuel were saved in September alone.

“The reductions in the amount of fuel consumed are important in themselves,” said Sivak, a research professor at UMTRI. “However, they also represent reductions in emissions.”

Sivak and Schoettle say that since late 2007, carbon dioxide emissions have been reduced by about 120 billion pounds. During September, the reduction was 5.7 billion pounds—about 3 percent of the average monthly consumption of fuel and of carbon dioxide emissions of all light vehicles on the road today.

“The improvements in vehicle fuel economy over the past five years are noteworthy, especially in relation to the modest improvements during the preceding eight decades,” Sivak said. “As a consequence, we have seen sizeable savings in fuel consumed and emissions produced. The new fuel economy standards issued in August will accelerate this process.”

Read the report: <http://deepblue.lib.umich.edu/bitstream/2027.42/93781/1/102888.pdf>

By Bernie DeGroat, U-M News Service

Monthly monitoring of vehicle fuel economy and emissions:

http://www.umich.edu/~umtriswt/EDI_sales-weighted-mpg.html
http://www.umich.edu/~umtriswt/EDI_values.html

RR

Strickland Launches UMTRI-Toyota Seminar Series

JANE RITTER, UMTRI



A special presentation by NHTSA administrator David Strickland on November 13 marked the official launch of the UMTRI-Toyota Leadership in Transportation Seminar Series. The speaker series will explore issues related to the future of

transportation, from safety, mobility, and environment to connected and automated technology.

Strickland highlighted the evolution and transformation of the automotive fleet, crediting a new spirit of collaboration and partnership. He discussed the emerging perception that since human error plays a role in motor-vehicle crashes, there is now a growing awareness and acceptance of the need to have the car support the driver in critical situations or even to have the car take over some tasks. Advanced safety technology is now something that people aspire to have, he said. “It’s an amazing transformation.”

Strickland also emphasized the importance of sound science in supporting long-term cultural shifts and the need to accurately communicate transportation advances to the public. “It’s an important time for all of us,” said Strickland, who cited the importance of the Safety Pilot project, advances in active safety technology, new CAFE standards, and progress toward autonomous vehicles.

Green Honored as Fellow of HFES



UMTRI

UMTRI research professor Paul A. Green was honored as a Fellow of the Human Factors and Ergonomics Society (HFES) at the organization’s fifty-sixth annual meeting in Boston on October 23. Green was one

of seven people elected as Fellows in 2012 for outstanding achievement in the field of human factors and ergonomics.

Green is head of UMTRI’s Driver Interface Group. His research team focuses on driver distraction, driver workload and workload managers, navigation system design, and motor-vehicle controls and displays. Green is also an adjunct associate professor in the University of Michigan Department of Industrial and Operations Engineering.

Molnar Receives Special Recognition from GSA



COURTESY OF LISA MOLNAR

Lisa Molnar, lead research associate in UMTRI’s Behavioral Sciences Group, received a Special Recognition Award in November from the Gerontological Society of America’s Transportation and Aging Interest Group

for her “dedicated commitment to research, scholarship, and service to the field of older driver safety and mobility.” Molnar is assistant director of the Michigan Center for Advancing Safe Transportation throughout the Lifespan (M-CASTL), a university transportation center dedicated to increasing the safety and mobility of both young people and older adults. She joined UMTRI in 1986. Her primary areas of research are traffic safety and driver behavior.

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.

Conference Papers

Al-Dirini, R.M.A.; Reed, M.P.; Paul, G.; Thewlis, D. 2012. "A Subject-Specific Model of Human Buttocks and Thighs in a Seated Posture." Proceedings: 7th Australasian Congress on Applied Mechanics (ACAM 7), <http://www.engineersaustralia.org.au/events/7th-australasian-congress-applied-mechanics>.

Reed, M.P. 2012. "A Pilot Study of Three-Dimensional Child Anthropometry for Vehicle Safety Analysis." Proceedings of the 2012 Human Factors and Ergonomics Society Annual Meeting, doi:10.1177/1071181312561489.

Zhou, W.; Armstrong, T.J.; Wegner, D.M.; Reed, M.P. 2012. "Influence of Object Size and Hand Posture on Upper Limb Joint Loads during One-Handed Lifting Exertion." Proceedings of the American Society of Biomechanics 36th Annual Meeting, <http://www.asbweb.org/conferences/2012/abstracts/415.pdf>.

Journal Articles

Bingham, C.R.; Ehsani, J.P. 2012. "The Relative Odds of Involvement in Seven Crash Configurations by Driver Age and Sex." *Journal of Adolescent Health*, vol. 51, no. 5, pp. 484–490, doi:10.1016/j.jadohealth.2012.02.012.

Fuller, H.J.A.; Reed, M.P.; Liu, Y. 2012. "Integration of Physical and Cognitive Human Models to Simulate Driving with a Secondary In-Vehicle Task." *IEEE Transactions on Intelligent Transportation Systems*, vol. 13, no. 2, pp. 967-972, doi:10.1109/TITS.2012.2182764.

Klinich, K.D.; Ebert, S.M.; Reed, M.P. 2012. "Quantifying Cervical Spine Curvature Using Bezier Splines." *Journal of Biomechanical Engineering*, vol. 11, no. 4, pp. 114503-114508, doi:10.1115.1.4007749.

Klinich, K.D.; Flannagan, C.A.C.; Jermakian, J.S.; McCartt, A.T.; Manary, M.A.; Moore, J.L.; Wells, J.K. 2012. "Vehicle LATCH System Features Associated with Correct Child Restraint Installations." *Traffic Injury Prevention*, accepted author version posted online August 13, 2012, doi:10.1080/15389588.2012.701030.

Klinich, K.D.; Miller, C.S.; Hu, J.; Samorezov, J.E.; Pearlman, M.D.; Schneider, L.W.; Rupp, J.D. 2012. "Characterization of Ovine Utero-Placental Interface Failure." *Placenta*, vol. 33, no. 10, pp. 776-781, doi:10.1016/j.placenta.2012.06.012.

Reed, M.P.; Ebert-Hamilton, S.M.; Rupp, J.D. 2012. "Effects of Obesity on Seat Belt Fit." *Traffic Injury Prevention*, vol. 13, no. 4, pp. 364-372, doi:10.1080/15389588.2012.659363.

Sivak, M.; Schoettle, B. 2012. "A Note: The Changing Gender Demographics of U.S. Drivers." *Traffic Injury Prevention*, vol. 13, no. 6, pp. 575-576, doi:10.1080/15389588.2012.727110.

Sivak, M.; Schoettle, B. 2012. "Update: Percentage of Young Persons with a Driver's License Continues to Drop." *Traffic Injury Prevention*, vol. 13, no. 4, pp. 341-341, doi:10.1080/15389588.2012.696755.

Sullivan, J.M.; Flannagan, M.J. 2012. "Heavy Trucks, Conspicuity Treatment, and the Decline of Collision Risk in Darkness." *Journal of Safety Research*, vol. 43, no. 3, pp. 157-161, doi:10.1016/j.jsr.2012.05.005.

Wu, J.; Hu, J.; Reed, M.P.; Klinich, K.D.; Cao, L. 2012. "Development and Validation of a Parametric Child Anthropomorphic Test Device Model Representing 6- to 12-Year-Old Children." *International Journal of Crashworthiness*, vol. 17, no. 2, pp. 606-620, doi:10.1080/13588265.2012.703474.

Technical Reports

Palamara, P., Molnar, L.J.; Eby, D.W.; Kopinanthan, C.; Langford, J.; Gorman, J.; Broughton, M. 2012. Review of Young Driver Risk Taking and its Association with Other Risk Taking Behaviours. Report no. RR 1. <http://hdl.handle.net/2027.42/94210>

The research documented in this report was sponsored by the Road Safety Council of Western Australia.

Sivak, M.; Schoettle, B. 2012. Benefits of Recent Improvements in Vehicle Fuel Economy on Overall Fuel Consumption and Emissions. Report no.UMTRI-2012-27. <http://hdl.handle.net/2027.42/93781>

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

Sivak, M. 2012. Road Safety in the United States: Are the (Relatively) Good Times Over? Report no. UMTRI-2012-26. <http://hdl.handle.net/2027.42/93637>

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

Sivak, M.; Bao, S. 2012. Road Safety in New York and Los Angeles: U.S. Megacities Compared with the Nation. Report no. UMTRI-2012-24.

<http://hdl.handle.net/2027.42/93634>

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

Sivak, M.; Pottinger, M. 2012. Analysis of Performance Ratings for Tires. Report no. UMTRI-2012-8.

<http://hdl.handle.net/2027.42/90513>

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



January 2013

TRB 92nd Annual Meeting
January 13-17; Washington, D.C.
www.trb.org

North American International Auto Show
January 19-27; Detroit, Michigan
www.naias.com

Crash Data Retrieval User's Summit
January 21-23; Houston, Texas
www.cdrsummit.com/

SAE Government/Industry Meeting
January 30-February 1; Washington, D.C.
www.sae.org

February 2013

Conference on Electric Roads and Vehicles
(CERV)
February 4-5; Park City, Utah
<http://cervconference.org>

National Biodiesel Conference and Expo
February 4-7; Las Vegas, Nevada
<http://www.biodieselconference.org/2013/?AspxAutoDetectCookieSupport=1>

New Partners for Smart Growth
February 7-9; Kansas City, Missouri
www.newpartners.org

National Asphalt Pavement Association
(NAPA) annual meeting
February 9-13; Scottsdale, Arizona
www.hotmix.org

National Conference of Regions
February 10-12; Washington, D.C.
<http://www.narc.org>

Future Directions in Product Portfolio
Management
February 13; Ann Arbor, Michigan
<http://www.umtri.umich.edu/divisionPage.php?pageID=47>

ATSSA Convention and Traffic Expo
February 22-26; San Diego, California
<http://expo.atssa.com/>

March/April 2013

Lifesavers National Conference
April 14-16; Denver, Colorado
<http://www.lifesaversconference.org/>

SAE World Congress and Exhibition
April 16-18; Detroit, Michigan
<http://www.sae.org/congress/>

ITS America Annual Meeting
April 22-24; Nashville
www.itsa.org

Adapting Freight Models and Traditional
Freight Data Programs for Performance
Measurement
April 30-May 1; Washington, D.C.
www.trb.org/calendar

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