UMTRI

RESEARCH REVIEW

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Peer Pressure on the Road?

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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

Peer Pressure on the Road?

NICHD grant will fund new research to study the effect of teen passengers on teen driving performance

For better or worse, teenagers are often influenced by their peers—even while they're driving. Studies show that when teenage drivers have other teens in the vehicle, their risk of crashing rises dramatically with each person present.

In a new $1.2 million study funded by the National Institute of Child Health and Human Development (NICHD), UMTRI researchers will set up a series of experiments to uncover the social and psychological mechanisms through which teen passengers increase the crash risk of teen drivers.

As a group, teen drivers have the highest rate of fatal and nonfatal crashes among all motorists. Researchers have long known that when these young drivers have teen passengers, their crash risk increases alarmingly: the crash risk doubles with one teen passenger and increases with each additional teen present. The causes behind the phenomenon are unclear.

"It's probably more than just overt distraction," says UMTRI research professor Ray Bingham, head of UMTRI's Young Driver Behavior and Injury Prevention Group. "We know that teens are often influenced by what they perceive others expect of them. They're also influenced by characteristics such as gender of their peers, relative social status, and social context."

Bingham, who is also a research professor of psychiatry in the U-M School of Medicine and in the U-M School of Public Health, will lead the four-year study with a team of researchers in collaboration with colleagues at the NICHD. Others involved in the project at UMTRI include research professor and associate director Jean Shope, research professor Paul A. Green, assistant research scientist Dave LeBlanc, associate research scientist Jim Sayer, and Alison L. Miller, research assistant professor in the Department of Health Behavior and Health Education at the U-M School of Public Health.

COURTESY OF UMTRI YOUNG DRIVER BEHAVIOR AND INJURY PREVENTION GROUP

Social and Psychological Influences

One mode of peer influence the researchers will test is injunctive norms. Teenagers are more sensitive than adults to the expectations of others and have a strong desire to comply. For instance, important people—such as parents, friends, or new acquaintances that a teen wants to please or impress—can affect the way a teen behaves.

Because of the influence of injunctive norms, the mere presence of a peer in the vehicle might affect how a teen drives. Other modes of influence that will be examined in the study include peer pressure and various sources of distraction, as well as the social setting in the vehicle while a teenager is at the wheel. These modes will be examined to understand not only how they contribute to increased risk, but also how they might mitigate risk.

To test the hypotheses, Bingham and his team are currently working with colleagues at the NICHD to design up to twelve separate experiments. The experiments will manipulate the number and type of passengers in controlled conditions. Pilot testing for the first experiment is set to begin in early February 2011, and the first experiment is scheduled for April.

Subjects in the experiments will consist of up to 160 teenage males. This choice was made, explains Bingham, because male teens have a much greater crash involvement than do female teens. Advancing science so that this high crash rate can be curbed is an important injury reduction objective.

continued...

Continued from page 1

New Driving Simulator: Key Part of Research

Researchers will use UMTRI's current driving simulator for the pilot study and the first experiments. A new state-of-the-art driving simulator is expected to be in place at UMTRI for the later experiments. The U-M Office of the Vice President for Research and UMTRI have agreed to provide matching funds for the purchase of the new simulator. According to Bingham, the new simulator will have expanded capacity and flexibility to create scenarios, and will also include a new cab contributed by Nissan, higher resolution projectors, and potentially a limited motion base.

While the first three phases of the NICHD study will be conducted in UMTRI's driving simulator, the last phase of the project will take place in instrumented vehicles on a set road course. The experiments using the instrumented vehicles will provide external validation of findings from the simulator experiments. This external validation will begin to link the findings with real-world driving and provide direction for future research.

COURTESY OF UMTRI YOUNG DRIVER BEHAVIOR AND INJURY PREVENTION GROUP

Overall, says Bingham, the study will yield information that advances knowledge in two fields: "On the one hand, we'll gain new understanding of some of the mechanisms linking teen passengers with poorer teen driver outcomes. On the other, we'll contribute new knowledge to the literature on peer influences." RR

IVBSS Results Reveal Significant Safety Benefits

Following one of the most extensive field tests undertaken—involving 126 drivers—UMTRI researchers have released the final results of the five-year Integrated Vehicle-Based Safety System (IVBSS) program.

The IVBSS program is a $32 million cooperative agreement with the U.S. Department of Transportation (U.S. DOT), UMTRI, and industry partners to test an integrated system of crash warning technologies designed to enhance the safety of light vehicles and heavy trucks. The advanced safety system integrates several crash-warning systems that alert drivers to threats related to forward collision, lane change, and road departure.

Associate Research Scientist Jim Sayer directs the IVBSS program for UMTRI in collaboration with Assistant Research Scientist David LeBlanc and Scott Bogard, lead engineer in UMTRI's Engineering Systems Group. According to Sayer, results of the IVBSS program have important implications for both commercial vehicles and passenger cars.

"We've learned from the field tests that the integrated safety system was a significant help to most drivers—and even prevented a few crashes," said Sayer. "Integrated warning systems are starting to become available in new vehicles, and we think that this type of integration approach will soon become the industry norm."

As part of the IVBSS program, the safety system was installed on sixteen passenger cars and ten commercial trucks that were driven more than 800,000 miles in field tests conducted by UMTRI from early 2009 to early 2010. The IVBSS system uses information gathered by inertial, video, and radar sensors, complemented by a global positioning system and digital mapping.

In all, 108 randomly selected drivers from southeast Michigan participated in the passenger car field test, and 18 commercial truck drivers from Con-way Freight participated in the heavy-truck field test. Drivers in the study drove the specially equipped vehicles for one year on public roads, yielding thousands of hours of naturalistic driving data.

Among the key findings from the heavy-truck field test, the majority of drivers felt that the integrated crash-warning system increased their driving safety and made them more aware of the traffic environment around their vehicle and their position in the lane. Following the study, Con-way Freight has put into service nearly 1,300 new Freightliner Cascadia 2010-model tractors, each equipped with an integrated suite of advanced driver-alert and truck-control technologies.

Among the key findings from the passenger-vehicle field test was a significant reduction in the frequency, distance, and duration of lane departures; increased turn signal use; wide acceptance; and a strong willingness to consider an integrated system when considering the purchase of a new car.

In addition to the immediate IVBSS findings, data from the field tests is warehoused in a relational database—making it a powerful research tool for investigating a variety of questions related to vehicle-to-vehicle communication (i.e., IntelliDrive^{SM}), driver behavior, and vehicle-systems development.

To access IVBSS technical reports and key findings, visit ***www.umtri.umich.edu/ivbss***

PHOTOS COURTESY OF IVBSS PROGRAM

UMTRI BRIEFS

New ITS Project Explores Signal Timing Communication

In a new Intelligent Transportation Systems (ITS) project, UMTRI researchers are working with engineers at the Michigan Department of Transportation (MDOT) to develop technologies that will enable vehicles to receive and communicate information about the signal, phase, and timing (SPAT) of traffic signals.

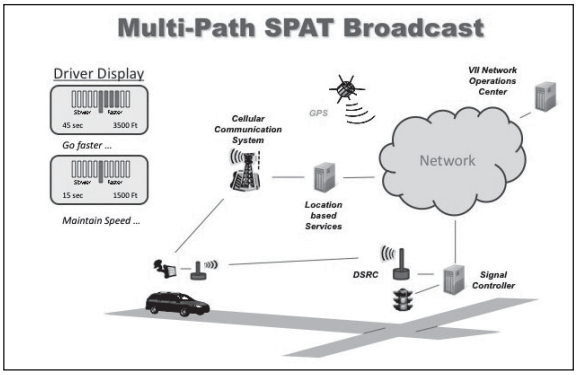
The ITS research is part of a collaboration between MDOT and engineers from the Taiwan Institute for Information Industry. According to MDOT, the collaboration may someday lead to in-vehicle devices that would provide drivers with information about signalized intersections.

For example, a computer module inside a vehicle could use signal timing information to alert drivers to the speed and distance of their vehicles even before a signal comes into view. This allows a vehicle to pass safely through during the green phase of the signal without stopping. The project will also study how information from an in-vehicle device could warn drivers to slow down when the light is red.

Ralph Robinson, a research scientist in UMTRI's ITS Integration Group, explains that to some extent this technology is already possible using Dedicated Short Range Communication (DSRC) and a Global Positioning System (GPS) device.

"If you know three things—the distance from the car to the signal, speed the vehicle is traveling, and timing of the signal—you can calculate what the driver needs to do to time his approach when the light is green," says Robinson. "A device with a simple display indicates whether the driver should maintain the current speed, or make a small adjustment to speed up or slow down."

The typical range of this signal-to-vehicle communication, however, is only about one-quarter mile. The MDOT project will investigate the feasibility of communicating this information over distances of up to two miles. At this range, explains Robinson, communication becomes more complex. The signal data must be sent to an Internet server and then to a cell tower. The in-vehicle device then picks up the cellular data. UMTRI researchers will use a computer simulation to develop this application and show that it will work.



UMTRI ITS INTEGRATION GROUP

In a multipath broadcast, traffic signal communication is sent via cellular and DSRC. Using cellular allows broadcast over several miles and multiple intersections.

Meanwhile, the Taiwanese engineers will provide the software and configure the communication system needed for the in-vehicle devices. In conjunction with Hubble, Roth and Clark, Inc., a Michigan engineering consultancy, the engineers will provide roadside equipment that will be installed at two locations in Oakland County next spring. The proposed intersections are 13 Mile Road and Franklin Road, and 13 Mile Road and Inkster Road. These two intersections for this project will complement an MDOT initiative with the U.S. Department of Transportation to place similar communication devices at twenty-two intersections along Telegraph Road in Oakland County in January 2011.

For more information, see ***www.michigan.gov/mdot***

Also see ***http://www.umtri.umich.edu/divisionPage.php?pageID=294***

RR

Focus on the Future Conference Series

The Business of IT Conference

UMTRI's third annual Focus on the Future automotive research conference series began in mid September with an in-depth look at the role of information technology in the automotive industry. "The Business of IT: Transforming the Organization and the Vehicle" took place on September 15 at the University of Michigan (U-M).

UMTRI assistant research scientist Bruce Belzowski introduced key issues and moderated the conference, which featured seven speakers and two question-and-answer panel sessions.

The first group of speakers discussed information technology in the context of transforming and globalizing organizations. Speakers included Raghu Padmanabhan of General Motors Corporation, Deborah deBoer Henderson of ArvinMeritor Corporation, Robert Cole of the University of California, Berkeley, and David Taylor of Siemens PLM Software.

The final three speakers discussed the impact that information technology is having inside the vehicle in the areas of infotainment, vehicle-to-vehicle safety applications, and autonomous vehicles. Speakers included Tom Schaffnit, VII Consortium, T.J. Giuli of Ford Motor Company, and Ryan Eustice of U-M.

Sponsors for the Business of IT conference were Siemens PLM and Oracle Corporation.

JOYCE DANIELS/UMTRI

A Chevy Volt provided an added attraction for participants at the Business of IT conference. The electric vehicle has more than 100 control modules, or processers.

Inside China Conference

UMTRI's automotive research conference series continued on November 10 with an inside look at the automotive industry in China.

The daylong event, "Inside China: Understanding China's Current and Future Automotive Industry," featured insights by manufacturers, suppliers, consultants, and U-M experts. Presentations focused on the fast expanding Chinese auto market, government incentive programs, and current labor issues facing all automotive companies doing business in China.

UMTRI assistant research scientist Bruce Belzowski moderated the conference and discussed his recent research on fleet turnover in China. Other speakers at the event included Ken DeWoskin of U-M and Deloitte Consulting; Jinyun Liu of U-M; Steven Syzdek of Stonebridge, Inc.; Deborah Swenson of the University of California, Davis; Felicia Chang of Global Wave Today; and Dennis Assanis of the U-M Memorial Phoenix Energy Institute.

The next event in the Focus on the Future conference series will be "Automotive Safety: How Far Have We Come and Where Are We Going?" on February 16, 2011.

UMTRI Report Analyzes Global Transition to Alternative Powertrains

Changes taking place in the global automotive industry related to alternative powertrains and fuels are affecting each country and region differently. A new UMTRI report, *Alternative Powertrain Strategies and Fleet Turnover in the 21st Century,* analyzes the time it will take for selected countries to transition their current fleet of gasoline- and diesel-fueled vehicles to those that employ alternative powertrain technologies.

The report is written by assistant research scientist Bruce M. Belzowski and economist Walter McManus.

To access the full report, see ***http://hdl.handle.net/2027.42/78001***

The research was supported by Sustainable Worldwide Transportation (SWT). To learn more about SWT, see ***http://www.umich.edu/~umtriswt/*** RR

Transforming Transportation Summit Set for April 2011

UMTRI and SMART (Sustainable Mobility and Accessibility Research and Transformation) will play major roles in the first Transforming Transportation: Economies and Communities Summit, to be hosted by the University Research Corridor (URC) in April 2011. The summit has been rescheduled for April 7-9 at the Westin Book Cadillac in Detroit.

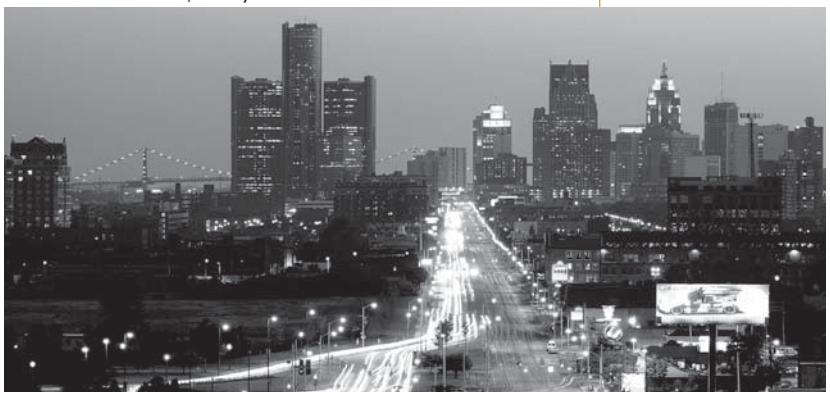
The Transforming Transportation Research Consortium is a new research and education effort of the URC linking the University of Michigan with Michigan State University and Wayne State University.

The URC inaugural summit is merging with SMART's annual summit, and as such, Susan Zielinski, managing director of SMART, has invited many diverse local and international partners to participate, and to help find common ground on innovative solutions and catalyze joint research and education that accelerates implementation of next generation transportation and related economic and employment opportunity in Michigan and beyond.

The event will include dynamic plenary sessions, research meetings, a poster session, and social events.

For more information, visit the SMART website at ***http://www.um-smart.org*** RR

Photo: *Jefferson Avenue in Detroit*
Credit: *Palmisano Photo Ltd., courtesy of Detroit Metro Convention & Visitors Bureau*



Detroit Selected to Host 2014 ITS World Congress

Detroit will welcome more than 10,000 international members of the transportation technology industry in October 2014 as a result of Michigan's winning bid to host the Intelligent Transportation Systems (ITS) World Congress.

The five-day event will take place at Cobo Conference and Exhibition Center and several adjacent facilities and will be hosted by the Intelligent Transportation Society of America (ITS America) in partnership with ITS Michigan, the state chapter of the national group.

"We're extremely pleased that the Motor City was selected to host this international industry gathering," said Scott Belcher, ITS America president and CEO. "Not only does Michigan's automotive heritage make it an ideal choice, but the region is a global leader in pioneering the advanced transportation technology of the future."

UMTRI is on the ITS Michigan Local Host Committee that recruited the event to Detroit.

"Because field demonstrations are a growing mainstay of World Congresses, this will confirm Michigan as the national lead for ITS test beds and model deployments, especially as we move forward with IntelliDrive V2V and a possible automotive regulatory decision in 2013," said UMTRI director Peter Sweatman, a member of the ITS America board of directors.

The annual ITS World Congress is held in the Americas once every three years. Next year's event will take place in Orlando, October 16-20, 2011. The event is held in Asia and Europe in the intervening years.

In addition to the ITS World Congress conference and exhibition, the event is expected to showcase the world's first sustainable deployments and advanced applications of connected-vehicle technologies. RR

Cultural Exchange

U-M students promote road safety to youth in South Africa

More than 1,500 young people in South Africa learned about road safety and American culture this summer through presentations given by a group of fifteen University of Michigan (U-M) undergraduate students led by UMTRI assistant research scientist and teaching fellow Oliver Page and student fellows Jennifer Cowhy and Rocky Block.

The group from U-M visited South Africa from July 18 through August 14 to promote road safety as part of the U-M Global Intercultural Experience for Undergraduates (GIEU) program. During their stay, the students visited twelve K-12 schools and three universities in rural and urban areas. The presentations covered a mixture of road safety information and facts about life in America.

"Often during the first half hour with the host students, our students talked about the importance of road safety and simple things kids can do to stay safe as pedestrians in South Africa," said Page. "The second half hour was usually filled with questions from the young people about America and American culture."

Road safety is a chronic problem in South Africa, explained Page, who cited poor driver behavior, DUI offenses, and pedestrian infractions including disregard for safe crossing places. As an example, the group visited a little-used pedestrian footbridge crossing the R512 highway in Zandspruit (north of Johannesburg). In this location, an informal settlement had formed on the edge of the highway, a situation that causes "tremendous road safety problems," Page said, as the makeshift town becomes quickly populated and residents cross the busy highway in arbitrary locations.

While in South Africa, the U-M students stayed with local host families and had the opportunity to visit places of interest including Kruger National Park and Mandela House in Soweto. They also explored a gold mine and attended a soccer game.

Before their trip to South Africa, some of the students met with UMTRI staff and toured UMTRI's research facilities.

"Their visit to UMTRI and subsequent tour of South Africa is all the more interesting with the possibility that one day they could view transportation research as a potential career opportunity," said Page, who is the first UMTRI faculty member to participate in the GIEU program.

The U-M students included Jake Bowman, Dia Bright-Johnson, Logan Chadde, Joel "Chaim" Frenkel, Munmun Khan, Agnes Kucharski, Annalise Latting, Jimmy Li, Xun Miao, Sarah Osman, Stephanie Soliz, LaDiamond Stanley, Semhar Tesfai, Avi Wolf, and Cheng Zheng.

To watch a video of the trip, go to ***http://bit.ly/GIEU-SA2010***

The South Africa trip was one of fourteen GIEU field sites around the globe in 2010. To learn more about the GIEU program, see ***http://www.gieu.umich.edu*** RR

During their four-week trip, the U-M students spoke to about 1,500 young people in urban and rural schools in South Africa.

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 to inquire about the availability of other publications listed here.

Conference Papers

Fuller, H. J.; Reed, M. P.; Liu, Y. 2010. "Integrating Physical and Cognitive Human Models to Represent Driving Behavior." *Proceedings of the Human Factors and Ergonomics Society 54th Annual Meeting,* September 27-October 1, 2010, pp. 1042-1046.

Jones, M. L.; Reed, M. P.; Chaffin, D. B. "The Effect of Bracing Availability on Force-Exertion Capability in One-Hand Isometric Pulling Tasks." *Proceedings of the Human Factors and Ergonomics Society 54th Annual Meeting,* September 27-October 1, 2010, pp. 1169-1173.

Reed, M. P.; Hoffman, S. G.; Ebert-Hamilton, S. M. 2010. "Hand Positions and Forces during Truck Ingress." *Proceedings of the Human Factors and Ergonomics Society 54th Annual Meeting,* September 27-October 1, 2010, pp. 1097-1100.

Journal Articles

Eby, D. W.; Molnar, L. J. 2010. "Driving Fitness and Cognitive Impairment." *JAMA,* vol. 303, no. 16, April 28, 2010, pp. 1642-1643.

Molnar, L. J.; Eby, D. W. 2010. "Cognitively Impaired Older Drivers, Risk Assessment, and Physician Responsibility—Reply." *JAMA,* vol. 304, no. 7, August 18, 2010, p. 745, DOI:10.1001/jama.2010.1151.

Resko, S. M.; Walton, M. A.; Bingham, C. R.; Shope, J. T.; Zimmerman, M.; Chermack, S. T.; Blow, F. C; Cunningham, R. 2010. "Alcohol Availability and Violence among Inner-City Adolescents: A Multi-Level Analysis of the Role of Alcohol Outlet Density." *American Journal of Community Psychology,* vol. 46, nos. 3-4, pp. 253-262, DOI: 10.1007/s10464-010-9353-6.

Technical Reports

Belzowski, B.; McManus, W. 2010. Alternative Powertrain Strategies and Fleet Turnover in the 21st Century. Report no. UMTRI-2010-20.

http://hdl.handle.net/2027.42/78001

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

Eby, D. W.; Molnar, L. J. 2010. M-CASTL 2010 Synthesis Report Volume 1: Older Adult Safety and Mobility. Report no. M-CASTL-2010-02.

http://m-castl.org/files/2010SynthesisReport-Vol1.pdf

The research documented in this report was sponsored by the Michigan Center for Advancing Safe Transportation throughout the Lifespan (M-CASTL).

Green, P. E.; Matteson, A. 2010. Evaluation of 2008 Florida Crash Data Reported to the MCMIS Crash File. Report no. UMTRI-2010-26.

http://hdl.handle.net/2027.42/78280

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

Sayer, J. R.; Bogard, S. E.; Funkhouser, D.; LeBlanc, D. J.; Bao, S.; Blankespoor, A. D.; Buonarosa, M. L.; Winkler, C. B. 2010. Integrated Vehicle-Based Safety Systems Heavy-Truck Field Operational Test Key Findings Report. Report no. UMTRI-2010-18.

http://hdl.handle.net/2027.42/77988

The research documented in this report was sponsored by the U.S. Department of Transportation, Research and Innovative Technology Administration, ITS Joint Program Office.

Conferences & Events

December

Transportation Engineering & Safety Conference
December 8-10, State College, Pennsylvania
http://www.outreach.psu.edu/programs/Transportation

January 2011

TRB 90th Annual Meeting
January 23-27, Washington, D.C.
http://www.trb.org/AnnualMeeting2011/Public/AnnualMeeting2011.aspx

North American International Auto Show
January 10-23, Detroit, Michigan
http://www.naias.com

Crash Data Retrieval User's Summit
January 17-19, Houston, Texas
www.crashconferences.com

February

New Partners for Smart Growth
February 3-5, Charlotte, North Carolina
www.newpartners.org

NAPA Annual Meeting
February 6-9, Orlando, Florida
www.hotmix.org

National Biodiesel Conference and Expo
February 6-9, Phoenix, Arizona
www.biodieselconference.org

American Trucking Associations Meeting
February 8-11, Tampa, Florida
www.truckline.com

SAE Hybrid Vehicle Technologies Symposium
February 9-11, Anaheim, California
www.sae.org/events/training/symposia/hybrid

National Conference of Regions
February 13-15, Washington, D.C.
http://narc.org/events/conferences.html

ATSSA Convention and Traffic Expo
February 13-17, Phoenix, Arizona
http://expo.atssa.com/

Automotive Safety: How Far Have We Come and Where Are We Going?
February 16, Ann Arbor, Michigan
www.umtri.umich.edu/divisionPage.php?pageID=47

March

Transportation & Infrastructure Convention
March 9-11, Washington, D.C.
www.transportationsummit.com

Traffic Safety Conference
March 21-23, Austin, Texas
http://tti.tamu.edu/group/cts/2011-traffic-safety-conference/

Lifesavers: National Conference on Highway Safety Priorities
March 27-29, Phoenix, Arizona
www.lifesaversconference.org

April

ITE Technical Conference and Exhibit
April 3-6, Lake Buena Vista, Florida
www.ite.org/conference

Transforming Transportation Summit
April 7-9, Detroit, Michigan
www.um-smart.org

APA National Planning Conference
April 9-12, Boston, Massachusetts
http://www.planning.org/conference/

SAE World Congress
April 12-14, Detroit, Michigan
www.sae.org/congress

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