

UMTRI

RESEARCH REVIEW

• UNIVERSITY OF MICHIGAN TRANSPORTATION RESEARCH INSTITUTE • APRIL-JUNE 2005 • VOLUME 36, NUMBER 2 •

SPECIAL ISSUE



on page 1:

UMTRI's Gala 40th Anniversary

Inside:

- Secondary Driving Behaviors..4
- Auditory and Haptic Warnings..5
- Rear-Vision Systems6
- UMTRI Award Winners7
- Hot off the Press.....8
- Conferences & Events9

UMTRI

RESEARCH REVIEW

• UNIVERSITY OF MICHIGAN TRANSPORTATION RESEARCH INSTITUTE • APRIL–JUNE 2005 • VOLUME 36, NUMBER 2 •

ISSN 0739 7100

Writer and Editor: Monica Milla

Designer: Shekinah Errington

Cover Photography Credits: UMTRI—Shekinah Errington

Printer: Michigan Business Services

The UMTRI Research Review is published four times a year by the Research Information and Publications Center of the University of Michigan Transportation Research Institute, 2901 Baxter Road, Ann Arbor, Michigan 48109-2150 (<http://www.umtri.umich.edu>). The subscription price is \$35 a year, payable by all subscribers except those who are staff members of a State of Michigan agency or an organization sponsoring research at the Institute. See the subscription form on the inside back cover. For change of address or deletion, please enclose your address label.

The University of Michigan, as an equal opportunity/affirmative action employer, complies with all applicable federal and state laws regarding nondiscrimination and affirmative action, including Title IX of the Education Amendments of 1972 and Section 504 of the Rehabilitation Act of 1973. The University of Michigan is committed to a policy of nondiscrimination and equal opportunity for all persons regardless of race, sex*, color, religion, creed, national origin or ancestry, age, marital status, sexual orientation, disability, or Vietnam-era veteran status in employment, educational programs and activities, and admissions. Inquiries or complaints may be addressed to the Senior Director for Institutional Equity and Title IX/Section 504 Coordinator, Office of Institutional Equity, 2072 Administrative Services Building, Ann Arbor, Michigan 48109-1432, (734) 763-0235, TTY (734) 647-1388. For other University of Michigan information call (734) 764-1817.

**Includes gender identity and gender expression*

The Regents of the University:

David A. Brandon, Ann Arbor
Laurence B. Deitch, Bingham Farms
Olivia P. Maynard, Goodrich
Rebecca McGowan, Ann Arbor
Andrea Fischer Newman, Ann Arbor
Andrew C. Richner, Grosse Pointe Park
S. Martin Taylor, Grosse Pointe Farms
Katherine E. White, Ann Arbor
Mary Sue Coleman, *ex officio*

UMTRI Celebrates Its 40th Anniversary

UMTRI celebrated its fortieth anniversary in 2005, marking the occasion with two events: a gala reception at TRB and a safe driving symposium in Ann Arbor.

TRB Reception

UMTRI rang in its fortieth year of research excellence at the Transportation Research Board's 84th Annual Meeting. A reception was held on January 9, 2005, at the Omni Shoreham Hotel in Washington, D.C. to celebrate the milestone. Guests enjoyed hors d'oeuvres and other refreshments, and chatted with UMTRI's director, Dr. Peter Sweatman, as well as with other UMTRI staff members.

UMTRI staff members also actively participated in the TRB conference.

Ray Bingham, research associate professor in the Social and Behavioral Analysis Division, presented research he and Jean Shope conducted that demonstrates continuity between teens' psychosocial development and their problem driving behavior as young adults.

Dan Blower, assistant research scientist in the Transportation Safety Analysis Division, presented "Determination of Events Leading to Sport Utility Vehicle Rollover" in a session on safety evaluations and models.

Tim Gordon, head of UMTRI's Engineering Research Division, presided over a driver models workshop. He also participated in a panel discussion of the role of intelligent transportation systems (ITS) in supporting vehicle-infrastructure cooperation.

Steve Karamihis, senior research associate in the Engineering Research



Dr. Jeffrey W. Runge was the keynote speaker at UMTRI's 40th Anniversary Symposium in June.

Division, presented "Status of Ride Quality Technology: FHWA Rodeo Update." He also chaired a session on friction of pavement surface characteristics and gave a demonstration of the Smoothness Assurance Module of ProVAL.

Lidia Kostyniuk, research scientist in the Social and Behavioral Analysis Division, presented the paper "Motorcycle Crashes: Michigan Experience, 1997-2002." She also attended committee meetings on traveler behavior and values, and travel demand forecasting.

Jim Sayer, assistant research scientist, and Mike Flannagan, research associate professor, both in the Human Factors Division, led the workshop, "The World's Biggest Safety Problem: Improving Pedestrian Safety."

Jean Shope, research professor in the Social and Behavioral Analysis Division, participated in a session on safety workforce education and training.

Jennifer Zakrajsek, senior research associate in the Social and Behavioral Analysis Division, presented "Longitudinal Examination of Under-Age Drinking Situations and Risky Driving."

Safe Driving Symposium

UMTRI hosted its second major anniversary event, a symposium on safe driving, at the Michigan League on the University of Michigan campus on June 23, 2005. Nearly 100 people from UMTRI and 176 sponsors, University of Michigan collaborators, policy makers, partners, and affiliates of UMTRI attended the gala event.

Fawwaz Ulaby, U-M vice president for research (now U-M engineering professor), welcomed attendees and introduced the keynote speaker, **Dr. Jeffrey W. Runge**, administrator of the National Highway Traffic Safety Administration (now under secretary for science and technology for the U.S. Department of Homeland Security).

continued...



Dr. Runge presented UMTRI director Peter Sweatman with a plaque honoring the late Patricia Waller.

Runge commended UMTRI for its history of improving vehicle safety, saying “Forty years of research is an outstanding accomplishment. Your contributions to transportation-related studies have played a large part in the reductions in highway-related fatalities.”

Runge noted that NHTSA and UMTRI have a long history of working together, stating “We were founded within one year of each other, UMTRI in 1965, and NHTSA in 1966. This coincidence is no surprise. Traffic safety began growing as a public policy issue as more Americans bought automobiles and increased their number of miles traveled.”

NHTSA’s first project with UMTRI was an investigation of integrated seat and occupant restraint performance in 1967. Since then, Runge noted, UMTRI has worked on 272 NHTSA-sponsored projects. He said “Your research into heavy truck safety, crash investigations, understanding human injuries, the design of crash dummies, driver behavior, and driving performance all led to important advancements in each of these areas. There is no question that UMTRI has been a valuable resource for NHTSA.”

Runge then cited UMTRI’s impact in the following research areas:

- **Data collection:** Pioneering efforts in this area helped to formulate better traffic safety policies.

- **Restraint systems:** Runge noted UMTRI’s work on the Restraint System Evaluation Project (RSEP) from 1973–1975 and the National Crash Severity Study (NCSS) from 1976–1978. These endeavors provided the foundation from which James O’Day developed the National Accident Sampling System (NASS) in 1979. (O’Day was the first division head of UMTRI’s Transportation Safety Analysis Division, and he also served as an interim director of

UMTRI. He retired in 1988 and passed away in 1996.)

- **Crash avoidance:** Runge said that UMTRI’s longtime work with NHTSA in crash avoidance research, under the leadership of Bob Ervin and Paul Fancher, has brought us to today’s latest approaches in preventing crashes.

- **Impacts of crash injury:** As a CIREN (Crash Injury Research and Engineering Network) center, one of seven in the United States, UMTRI works to provide a better understanding of the impact of crashes on injuries, and improves medical response and treatment.

After his talk, Runge presented UMTRI’s director Peter Sweatman with a plaque honoring the late Patricia Fossum Waller, who served as UMTRI’s director from 1989–1999. Sweatman then spoke on UMTRI’s mission in transportation research, outlining our broad-based, cutting-edge research in the science of driving. Sweatman also presented plaques to the winning authors of UMTRI’s best publication award (see story on page 3).

Several industry partners joined UMTRI staff members in giving presentations.

Dr. Priya Prasad of Ford Motor Company and Larry Schneider, head of the Biosciences Division, spoke about improving occupant crash protection through injury biomechanics research.

Betty Mercer of the Mercer Consulting Group and former director of the Michigan Office of Highway Safety Planning joined David Eby, head of the Social and Behavioral Analysis Division, in discussing occupant restraint use

laws. Mercer said “I am a very satisfied sponsor. UMTRI is viewed around the country as an eminent resource for all the states as an impartial, reliable source for vehicle safety information and analysis.”

Kåre Rumar, a visiting professor at UMTRI and former director of road safety for the Swedish Road Administration, and Michael Sivak, head of the Human Factors Division, talked about designing vehicles and roadways to fit human capabilities. “Few groups publish as much,” Rumar said, citing the value of UMTRI’s independent research.

Dr. Ralph Craft of the Federal Motor Carrier Safety Administration and Dan Blower of the Transportation Safety Analysis Division spoke on trucks involved in fatal accidents.

Bob Clark, president of the Truck Manufacturers Association, and John Woodrooffe, head of the Transportation Safety Analysis Division, discussed the future of commercial vehicles.

Dr. David Meyer, a professor in U-M’s Department of Psychology, and Tim Gordon, head of the Engineering Research Division, presented their thoughts on the science of driving.

Four UMTRI researchers also addressed the group. Bruce Belzowski of the Office for the Study of Automotive Transportation spoke on globalization of the auto industry. Jim Sayer of the Human Factors Division and Dave LeBlanc of the Engineering Research Division discussed advanced driver-assistance systems. Bob Ervin, former head of the Engineering Research Division, provided an UMTRI retrospective.

The talks were followed with a reception featuring hors d’oeuvres and drinks to celebrate forty years of UMTRI and to toast forty more. **RR**

Statements from Dr. Runge came from his prepared remarks document. Quotes from others were taken from the Ann Arbor News article “Head of NHTSA Lauds U-M Institute” by Bryce G. Hoffman.

UMTRI Best Publications

The 2005 UMTRI best publication award went to “Cervical Spine Geometry in the Automotive Seated Posture: Variations with Age, Stature, and Gender,” which appeared in the *Stapp Car Crash Journal*. Coauthors are Kathy Klinich, senior research area specialist; Sheila Ebert, research area specialist; Chris Van Ee of Design Research Engineering; Carol Flannagan, assistant research scientist; Monica Prasad of the University of Michigan Medical School; Matt Reed, associate research scientist; and Larry Schneider, head of the Biosciences Division. You can access the article online at www.umtri.umich.edu/umtri/bestpaper05.pdf.

Two papers also received research excellence awards:

- “Adolescent Development Antecedents of Risky Driving among Young Adults” by Ray Bingham and Jean Shope, which appeared in the *Journal of Studies on Alcohol*.
- “Development of Cross Correlation for Objective Comparison of Profiles” by Steve Karamihas, which was published in the *International Journal of Vehicle Design*.

All three awards were presented at UMTRI’s 40th anniversary symposium (*see page 1 for symposium details*).

UMTRI Research at Driving Assessment 2005

Several UMTRI staff members gave presentations at the Third International Driving Assessment Conference, a premier event for human factors in driver assessment, training, and vehicle design. All of the papers are available at <http://ppc.uiowa.edu/driving%2Dassessment/2005/final/index.htm>.

Secondary Behaviors while Driving

UMTRI researchers presented a summary of “Driver Distraction: A Naturalistic Observation of Secondary Behaviors With the Use of Driver Assistance Systems.” The study was conducted by assistant research scientist Jim Sayer, research specialist Mary Lynn Mefford, and research assistants Kezia Shirkey and Jessica Lantz.

Data was collected for 66 drivers who took part in a field operational test for an automotive-collision-avoidance system. The primary purpose of the test was to study two driver-assistance systems: adaptive cruise control (ACC) and forward collision warning (FCW). Subjects’ use of these systems were video-recorded during much of their natural driving. The video was then examined for secondary driver behaviors, or behaviors not

central to basic driving tasks (such as talking with passengers or on a cell phone, grooming, and eating or drinking).

The test involved both baseline driving (with the driver assistance systems inactive) and driving under treatment conditions (with both ACC and FCW available for use). Eight-hundred-and-ninety video clips were reviewed and coded while participants drove manually, with conventional cruise control (CCC), ACC, and FCW. The method employed was to subsample video data and code drivers’ secondary behaviors



UMTRI best publication winners, from left to right, are Carol Flannagan, Sheila Ebert, Kathy Klinich, and Larry Schneider. Not pictured: Matt Reed.

continued...

using four-second video clips of the driver, collected every five minutes. Results showed that drivers who took part in the field test were no more likely to engage in secondary behaviors when driving with ACC and FCW in comparison to manual control.

Secondary behaviors were observed approximately 18 percent of the time while participants were driving at speeds greater than 25 mph in the manual baseline condition; and 19 percent of the time with FCW enabled and while ACC was engaged. This suggests that drivers are no more inclined to undertake additional tasks with the driver assistance systems available than they are under manual control. But fewer secondary behaviors were observed when CCC was engaged (7 percent), perhaps due to a limited sample or other factors related to the conditions under which drivers chose to use CCC, which have yet to be fully examined and understood.

The higher incidence of conversation with passengers is conspicuous as the primary activity that differentiates secondary activity with ACC from that with CCC, and with FCW enabled from that of manual control. In fact, had an increase in conversations with passengers not been observed when FCW was enabled, an overall decline in secondary behaviors would have taken place for the FCW-enabled condition. It is quite likely that the observed increase in conversation when either FCW or ACC was available is associated with the novelty of having the ACAS system. Drivers may have been excited about using these systems and wanted to explain how they operate to passengers in the vehicle. This hypothesis was supported by anecdotal evidence provided by participants when they returned the research vehicles. If this increase is associated with novelty, then one might expect to see this behavior diminish as the driver assistance systems reached greater market penetration.

The significance of this work is that it represents the first naturalistic driving data set in which drivers' involvement in secondary behaviors is examined in conjunction with the use of driver-assistance systems. These results counter the concern often raised that driver-assistance systems may promote driver distraction, lapses in attention or modification in perceived risk through some form of risk compensation or risk homeostasis.

Auditory and Haptic Warnings

In another poster session, Tina Brunetti Sayer of Visteon Corporation and Jim Sayer and Joel Devonshire of UMTRI presented "Assessment of a Driver Interface for Lateral Drift and Curve Speed Warning Systems: Mixed Results for Auditory and Haptic Warnings."

The researchers examined how drivers responded to auditory and haptic warnings while taking part in a road-departure crash-warning (RDCW) field operational test¹. The primary systems studied in the test were lateral-drift warning (LDW), which warns drivers if they are drifting out of their lane, and the curve speed warning (CSW), which warns drivers if they approaching an upcoming curve too fast. Both systems were developed to address road-edge departure and excessive speed, the two main critical events in run-off-road crashes. The two systems were installed in a fleet of instrumented vehicles and lent to 78 randomly selected licensed drivers for approximately four weeks.

Each system used two-stage alerts: cautionary and imminent. The first level was haptic in the form of seat vibration and the second, or more urgent, level was auditory. With LDW, the first-stage warning activated as a lateral seat vibration when the driver departed a lane with a dashed boundary. The second-stage warning, in the form of a warning tone, sounded when the driver departed a lane with a solid boundary. With CSW, the level of alerts was based on the degree of over-speed for the upcoming curve. If drivers were going only slightly too fast to negotiate the curve, they received a first-level warning in the form of a front-seat vibration. If they were going quite a bit too fast, they received the second level warning in the form the spoken words "Curve! Curve!"

After the drivers had finished using the RDCW system for three weeks, they were asked about their experiences. Their answers were analyzed in a two-by-two design of modality by system. After examining both the statistical results and the open-ended comments, it is still uncertain whether drivers prefer haptic or auditory warnings. Their

¹ The RDCW field operational test was sponsored by the U.S. Department of Transportation as part of its Intelligent Vehicle Initiative program. UMTRI was the prime contractor, partnering with Visteon and AssistWare Technology.

responses were mixed, expressing positive and negative aspects for each modality.

Drivers' subjective ratings showed very little difference in the ability of both auditory and haptic alerts to gain drivers' attention and warn them to take action. However, both drivers and passengers found the auditory alerts of both LDW and CSW systems to be more annoying than the haptic alerts. Sample passenger comments ranged from inquisitive ("What's wrong with the car?") and commentary ("That's annoying") to judgmental ("Dad, what are you doing?") and alarmed ("Are we going to crash?"). Few drivers reported that passengers could hear the vibration of the haptic seat, so passengers were largely unaware of haptic alerts. However, some drivers had difficulty differentiating where on the seat the haptic warnings occurred and thus could not easily tell whether the warning was for LDW (lateral localization) or for CSW (front localization). Drivers found it easier to distinguish the auditory warnings and were better able to understand their meaning and required responses.

A future edition of *UMTRI Research Review* will discuss objective measures of how the drivers reacted physically to the alerts (as determined from analysis of video-recordings of the drivers).

For more information on the RDCW study, see the Volume 35, number 2 edition of *UMTRI Research Review* (www.umtri.umich.edu/library/pdf/rr35_2.pdf).

Distance Perception with Camera-Based Rear-Vision System

Mike Flannagan, research associate professor, and Mary Lynn Mefford, research specialist, presented "Distance Perception with a Camera-Based Rear Vision System in Actual Driving." In their study, younger and older drivers (under 30 and over 60, respectively) drove an instrumented car in actual traffic on public roads. The car was equipped with a camera-based rear-vision system and conventional rearview mirrors.

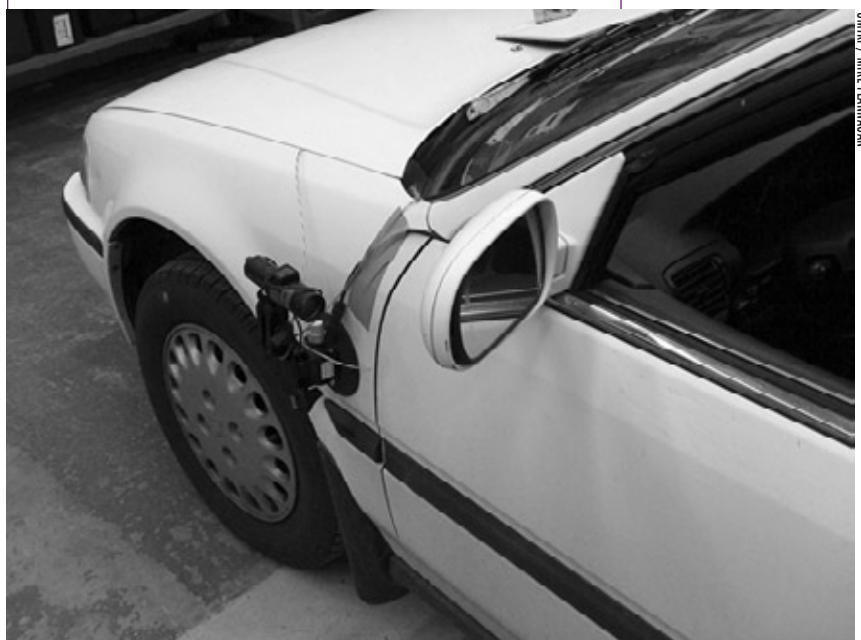
Participants observed the approach of the overtaking car and indicated the last moment at which it would be safe to initiate a lane-change maneuver in front of it. They observed the approach in one of three display conditions: the

conventional driver-side rearview mirror, the camera-based display with unit magnification (approximately the same magnification as the left mirror), and the camera-based display with 0.5 minification (half as large as the left mirror).

Judgments were strongly affected by the type of display used to observe the overtaking car. The longest distances (mean of 35.4 m) were obtained with the camera-based display at unit magnification. Distances were substantially shorter with the conventional mirror and with the camera-based display at 0.5 minification (means of 27.2 m and 27.5 m, respectively). These results are consistent with results from an earlier study² conducted under static field conditions.

Age group and gender did not have significant effects on the distance at which participants judged it safe to initiate a lane change. However, age group had a marginal effect, $F(1,8) = 4.35$, $p = .07$, with younger people tending to choose somewhat shorter distances than older people (means of 36.0 m versus 24.1 m, respectively). The effect of viewing condition was highly significant, $F(2,16) = 19.49$, $p < .0001$. **RR**

² Flannagan, M. J., Sivak, M., & Mefford, M. L. (2002). Distance perception in camera-based rear vision systems (SAE Technical Paper Series No. 2002-01-0012). Warrendale, Pennsylvania: Society of Automotive Engineers.



The camera used in the distance-perception study was mounted just below and in front of the left mirror.



Mike Flannagan Wins SAE Distinguished Speaker Award

Mike Flannagan, a research associate professor in UMTRI's Human Factors Division, was awarded the 2005 Lloyd L. Withrow Distinguished Speaker Award by the Society of Automotive Engineers (SAE). He is one of eight professionals from the engineering and science fields who received this honor.

The award, established in 1984, is named to honor the late Lloyd L. Withrow, former department head of General Motors Research Laboratories Fuels and Lubricants Department, and a noted speaker at many SAE meetings. The award recognizes individuals who have received the SAE Oral Presentation Award more than twice.

Flannagan is involved in research on the human factors aspects of driving. His recent focus has been on the improvement of driver vision via innovations in traditional vehicle systems, such as headlamps and mirrors; and by the introduction of new systems, such as infrared night vision systems and camera-based rear vision systems. Flannagan has been active in the SAE Lighting Committee and has authored more than 50 technical papers in the area of driver vision. Flannagan is a member of SAE, the American Psychological Society, and the Human Factors and Ergonomics Society. He has worked at UMTRI since 1988. He received an A.B. from Princeton University and a Ph.D. from the University of Michigan.

Other UMTRI researchers who have won this award in previous years include Miriam Manary, Matt Reed, and Donald Huelke (retired).



PHOTOS THIS PAGE:
UMTRI / KATHLEEN CROCKETT RICHARDS

Tom Gillespie Wins GM Distance Learning Faculty Award

Tom Gillespie, a research professor emeritus at UMTRI and an adjunct professor in the University of Michigan Department of Mechanical Engineering, received the General Motors Technical Education Program Outstanding Distance Learning Faculty Award in June, 2005.

The award is given annually to a faculty member who teaches distance education courses to General Motors employees. Gillespie was nominated for the award by students in his automotive engineering course. The course received outstanding ratings for the impact of the course on job performance, effectiveness and style of the instructor, and the handling of the course mechanics. He previously won the award in 1998.

Gillespie earned a reputation as an international leader in the fields of vehicle dynamics engineering and transportation policy and safety. Prior to joining UMTRI in 1976, he worked on automatic controls and pavement friction test methods at Pennsylvania State University and developed heavy-truck testing products at Ford.

At UMTRI, Gillespie conducted research in road roughness characterization, road-vehicle interactions, and modeling and simulation of vehicle dynamic behavior. He developed analytical methods and computer programs for predicting truck braking and handling, and devised improved methods for calibrating systems used to measure road roughness. The latter project led him to develop the International Roughness Index, a worldwide standard used to quantify the roughness of roads, for the World Bank. (For more information on road roughness, see "The Shape of Roads to Come" in volume 33, number 1 of *UMTRI*



U-M PHOTO SERVICES / PAUL JARONSKI

Jim Thomson Wins U-M Distinguished Administrator Award

Jim Thomson, UMTRI’s assistant director from 1985 through 2005, was awarded a Distinguished Research Administrator Award by the University of Michigan’s Office of the Vice President for Research in June 2005. The award is part of a staff service awards program and honors staff members from any unit at the University who have demonstrated, over a number of years, distinguished service exemplifying the goals of professional research administration.

Thomson served the University for more than 39 years. He joined the University in 1966 as a senior systems analyst in the Data Systems Center. After serving the University in multiple roles, he joined UMTRI as assistant director in 1985. He has served with four different directors, quickly adapting to the challenges presented and playing a significant role in fostering long-term relationships with UMTRI’s research sponsors. His personal efforts and qualities have contributed significantly to the stability and growth of UMTRI over the past two decades. His talent for playing the dual roles of task leader and culture bearer, amplified by his skill at encouraging communications between divisions, made him a key member of UMTRI. His efforts promoted smooth operation, making UMTRI a good place to work and contributing directly to its research success. After a long and productive career, Thomson will retire in the fall of 2005. **RR**

Research Review, www.umtri.umich.edu/library/pdf/rr33_1.pdf).

From 1987 to 1988, Gillespie served as a senior policy analyst in the White House Office of Science and Technology Policy. Upon returning to UMTRI, he served as the director of the Great Lakes Center for Truck and Transit Research.

Gillespie authored numerous technical reports and the textbook *Fundamentals of Vehicle Dynamics*. Considered required reading for all vehicle dynamics engineers, the book includes engineering principles and practical explanations of how automotive vehicles accelerate, brake, turn and ride.

Gillespie earned a B.S. in mechanical engineering from the Carnegie Institute of Technology at Carnegie Mellon University and a Ph.D. in mechanical engineering from Pennsylvania State University. He retired from UMTRI in April, 2005, and still teaches an automotive engineering class in U-M’s Department of Mechanical Engineering. He is also a cofounder of Mechanical Simulation Corporation, which develops software used to simulate vehicle performance under a wide variety of conditions.

Conference Papers

- Fancher, P.; Bareket, Z.; Ervin, R. 2004. "Driving assistance provided by adaptive cruise control." Michigan University, Ann Arbor, Transportation Research Institute, Engineering Research Division. 13 p. *Convergence 2004 Proceedings*. Warrendale, SAE, 2004, p. 547–559. Sponsor: Bayerische Motoren Werke, Munich (Germany); DaimlerChrysler Corporation, Auburn Hills, Mich.; Nissan Motor Company (Japan). Report No. 2004-21-0076.
- Tsimhoni, O.; Liu, Y. 2003. "Modeling steering using the queueing network-model human processor (QN-MHP)." Michigan University, Ann Arbor, Transportation Research Institute, Human Factors Division/ Michigan University, Ann Arbor, Transportation Research Institute, Engineering Research Division/ Michigan University, Ann Arbor, Department of Industrial and Operations Engineering. 5 p. *Proceedings of the Human Factors and Ergonomics Society 47th Annual Meeting*. Santa Monica, Human Factors and Ergonomics Society, 2003, p. 1875–1879.

Journal Articles

- Karamihis, S.M.; Rada, G.R.; Ostrom, B.K.; Simpson, A.L.; Wisner, L.J. 2004. "Pavement smoothness at weigh-in-motion sites: developing specifications for the Long-Term Pavement Performance Program." Michigan University, Ann Arbor, Transportation Research Institute, Engineering Research Division/ MACTEC Engineering and Consulting, Beltsville, Md./ Federal Highway Administration, McLean, Va. 8 p. *Transportation Research Record*. No. 1870 (2004), pp. 116–123.
- Kiefer, R. J.; LeBlanc, D. J.; Flannagan, C. A. 2005. "Developing an inverse time-to-collision crash alert timing approach based on drivers' last-second braking and steering judgments." General Motors Corporation, Structure and Safety Integration Center, Warren, Mich./ Michigan University, Ann Arbor, Transportation Research Institute, Engineering Research Division/ Michigan University, Ann Arbor, Transportation Research Institute, Biosciences Division. 9 p. *Accident Analysis and Prevention*. Vol. 37, no. 2 (Mar. 2005), pp. 295–303. Sponsor: General Motors Corporation, Warren, Mich.; Ford Motor Company, Dearborn, Mich.; Transportation Department, Washington, D.C.

Technical Reports

- Blower, D.; Matteson, A. 2004. *Evaluation of Florida crash data reported to MCMIS crash file; [Evaluation of Florida crash data reported to Motor Carrier Management Information System crash file]*. Michigan University, Ann Arbor, Transportation Research Institute, Truck and Bus Safety Analysis Division. 30 p. MCMIS Crash File. Sponsor: Federal Motor Carrier Safety Administration, Washington, D.C. Report No. UMTRI-2004-41.
- Blower, D.; Matteson, A. 2005. *Evaluation of California crash data reported to MCMIS crash file; [Evaluation of California crash data reported to Motor Carrier Management Information System crash file]*. Michigan University, Ann Arbor, Transportation Research Institute, Truck and Bus Safety Analysis Division. 39 p. MCMIS Crash File. Sponsor: Federal Motor Carrier Safety Administration, Washington, D.C. Report No. UMTRI-2005-6.
- Eby, D.W.; Bingham, C.R.; Vivoda, J.M.; Ragnathan, T. 2005. *Use of booster seats by Michigan children 4–8 years of age*. Michigan University, Ann Arbor, Transportation

Research Institute, Social and Behavioral Analysis Division/ Michigan University, Ann Arbor, Department of Biostatistics. 69 p. Sponsor: Michigan Department of Community Health, Injury Prevention Section, Lansing; Centers for Disease Control and Prevention, National Center for Injury Prevention and Control, Atlanta, Ga. Report No. UMTRI-2005-10.

Green, P.E.; Blower, D. 2005. *Evaluation of New Jersey crash data reported to MCMIS crash file; [Evaluation of New Jersey crash data reported to Motor Carrier Management Information System crash file]*. Michigan University, Ann Arbor, Transportation Research Institute, Truck and Bus Safety Analysis Division. 34 p. MCMIS Crash File. Sponsor: Federal Motor Carrier Safety Administration, Washington, D.C. Report No. UMTRI-2005-13.

McManus, W.S. 2005. *The effects of higher gasoline prices on U.S. light vehicle sales, prices, and variable profit by segment and manufacturer group, 2001 and 2004*. Michigan University, Ann Arbor, Transportation Research Institute, Office for the Study of Automotive Transportation. 13 p.

Sayer, J.R.; Mefford, M.L. 2005. *The roles of garment design and scene complexity in the daytime conspicuity of high-visibility safety apparel*. Michigan University, Ann Arbor, Transportation Research Institute, Human Factors Division. 19 p. Sponsor: Michigan University, Ann Arbor, Industry Affiliation Program for Human Factors in Transportation Safety. Report No. UMTRI-2005-4.

Shrank, M.; Hershberger, D.; Blower, D.; Woodrooffe, J. 2004. *Buses involved in fatal accidents codebook 2001 (Version December 16, 2004)*. Michigan University, Ann Arbor, Transportation Research Institute, Center for National Truck and Bus Statistics/ Michigan University, Ann Arbor, Transportation Research Institute, Transportation Safety Analysis Division. 122 p. Sponsor: Federal Motor Carrier Safety Administration, Washington, D.C. Report No. UMTRI-2004-42.

Shrank, M.; Hershberger, D.; Blower, D.; Woodrooffe, J. 2005. *Buses involved in fatal accidents codebook 2002 (Version February 16, 2005)*. Michigan University, Ann Arbor, Transportation Research Institute, Center for National Truck and Bus Statistics/ Michigan University, Ann Arbor, Transportation Research Institute, Transportation Safety Analysis Division. 122 p. Sponsor: Federal Motor Carrier Safety Administration, Washington, D.C. Report No. UMTRI-2005-5.

Shrank, M.; Matteson, A.; Pettis, L.; Blower, D. 2004. *Trucks involved in fatal accidents codebook 2002 (Version September 21, 2004)*. Michigan University, Ann Arbor, Transportation Research Institute, Center for National Truck and Bus Statistics/ Michigan University, Ann Arbor, Transportation Research Institute, Transportation Safety Analysis Division. 138 p. Sponsor: Michigan University, Ann Arbor, Transportation Research Institute, Center for National Truck and Bus Statistics, Affiliates Program; Federal Motor Carrier Safety Administration, Washington, D.C. Report No. UMTRI 2004-27.

Shrank, M.; Pettis, L.; Woodrooffe, J. 2005. *Trucks involved in fatal accidents codebook 2001 (Version May 25, 2005)*. Michigan University, Ann Arbor, Transportation Research Institute, Center for National Truck and Bus Statistics/ Michigan University, Ann Arbor, Transportation Research Institute, Transportation Safety Analysis Division. 135 p. Sponsor: Michigan University, Ann Arbor, Transportation Research Institute, Center for National Truck and Bus Statistics, Affiliates Program; Federal Motor Carrier Safety Administration, Washington, D.C. Report No. UMTRI 2005-16.

RR

CONFERENCES & EVENTS

**Transportation and Highway
Engineering Conference**
February 21–22, Urbana, Illinois
<http://cee.uiuc.edu/events/THE>

**2006 TransITech Information
Technology Conference**
February 22–24, Las Vegas, Nevada
[www.apta.com/conferences_ calendar/trantech](http://www.apta.com/conferences_calendar/trantech)

**Workshop on Using Regional
ITS Architectures**
February 28–March 1, Orlando, Florida
[www.itsa.org/
Feb2006ITSArchWorkshop.html](http://www.itsa.org/Feb2006ITSArchWorkshop.html)

Roadex 2006
March 12–15, Abu Dhabi, United Arab Emirates
www.roadex-uae.com

**30th World Congress of the International
Road Transport Union**
March 14–16, Abu Dhabi, United Arab Emirates
www.iru.org/events

Transportation Improvement Forum
March 19–21, Santa Monica, California
www.ibtta.org/Events

**Transportation Research Forum
Annual Meeting**
March 23–25, New York, New York
www.trforum.org/forum

Safety 2006:
World Conference on Injury Prevention
April 2–5, Durban, South Africa
www.safety2006.info

SAE 2006 World Congress
April 3–6, Detroit, Michigan
www.sae.org/congress

Midwest Transportation Planning Conference
April 4–7, Kansas City, Missouri
www.marc.org/mpoconference

Intertraffic Amsterdam 2006
April 4–7, Amsterdam, The Netherlands
www.amsterdam.intertraffic.com

Design-Build in Transportation Conference
April 5–7, Portland, Oregon
www.designbuildtransportation.com

ITE District 3 Annual Meeting
April 27, Lansing, Michigan
www.ite.org

Commercial Vehicle Telematics
April 27–28, Birmingham, England
www.telematicsupdate.com/cvuk2006

Preserving the Historic Road
April 27–30, Boston, Massachusetts
www.historicroads.org

**APTA International Bus Roadeo and
APTA Bus and Paratransit Conference**
April 29–May 3, Orange County, California
[www.apta.com/conferences_ calendar/bus](http://www.apta.com/conferences_calendar/bus) RR

To Subscribe to the *UMTRI Research Review*...

Complete the form below and send it with a check for \$35 made out to the University of Michigan. This entitles you to a one-year subscription to the *UMTRI Research Review*.

NAME _____ DATE _____

TITLE _____ ORGANIZATION _____

ADDRESS _____

CITY _____ STATE _____ ZIP _____

INCLUDE +4

Mail your check for \$35 and the form above to:

- Monica Milla, Editor • UMTRI Research Review • University of Michigan Transportation Research Institute •
- 2901 Baxter Rd • Ann Arbor, MI 48109-2150 •

Transportation Tidbits

- On April 3, 1885, Gottlieb Daimler was granted a German patent for his one-cylinder water-cooled engine design. The invention, in which water circulated around the engine block to prevent overheating, was a breakthrough method of handling the tremendous heat produced by internal combustion engines.
- On May 25, 1898, Elwood Haynes and Elmer Apperson founded the Haynes-Apperson Company in Kokomo, Indiana. Haynes built America's first gas-powered car. He was the first person to outfit cars with all-aluminum engines and to build car bodies of nickel-plated steel. When Haynes and Apperson delivered a car from Kokomo to a buyer in New York City, they took the first 1,000-mile car trip in the United States.
- Marcel Renault won the Paris-to-Vienna race, driving a car of his own design, on June 29, 1902. About three million people cheered Renault along his route during the four-day,

615-mile race. Such city-to-city races were the largest sporting events of that era, but, unfortunately, dozens of people who lined the raceways were killed each year. Road racing in Europe was banned in most places after 1904.

- Don Prudhomme was the first dragster to run the quarter mile in less than seven seconds on May 7, 1967. Driving a modified Ford, he reached 226 mph at the National Hot Rod Association World Series in Carlsbad, California.
- On April 1, 1970, AMC introduced the Gremlin, America's first subcompact car (no foolin'!). AMC initially introduced the compact car in the 1950s based on the vision of its first President George Romney, who strongly believed his company must offer smaller, more fuel-efficient cars. Designed to compete with Volkswagens and Japanese subcompacts, the Gremlin was on the market only a short time before the Big Three released their own subcompact models. **RR**

SOURCE: This Day in Automotive History, www.historychannel.com



UNIVERSITY OF MICHIGAN
TRANSPORTATION RESEARCH INSTITUTE

2901 Baxter Rd
Ann Arbor MI 48109-2150

Non-Profit Organization
U.S. Postage

PAID

Ann Arbor, MI
Permit No. 144