

UMTRI

# RESEARCH REVIEW

• UNIVERSITY OF MICHIGAN TRANSPORTATION RESEARCH INSTITUTE • OCTOBER–DECEMBER 2006 • VOLUME 37, NUMBER 4 •



*"Safety  
and mobility  
throughout the  
lifespan."*



*on page 1:*

## UMTRI Wins University Transportation Center

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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

# UMTRI-Led Effort Wins University Transportation Center

The U-M University Transportation Center will research and address the unique safety and mobility challenges of young people and older adults, across the dimensions of the roadway, vehicle, and driver.

*UMTRI* is leading a \$6 million University of Michigan (U-M) grant to establish a U.S. DOT Tier I University Transportation Center (UTC). It was announced by the U.S. DOT on September 29 that the U-M team led by UMTRI was successful in its UTC proposal under the theme “safety and mobility across the lifespan.”

The U-M UTC will conduct research, provide education, and disseminate research results. The Center will support a vigorous research program encompassing basic and applied projects to improve safety and mobility for young people and older adults, with a strong emphasis on advanced research. Expected accomplishments over the three-year grant period include providing matching support for fifteen or more research projects that attract an equal number of students into the transportation field.

The Center will also provide current transportation safety and mobility practitioners with ongoing education and accreditation, host conferences with international representation, create webcasts of transportation seminars,



GREGORY KOSTINIK

and increase awareness through newsletters, annual reports, and annual synthesis reports.

David W. Eby, research associate professor and head of UMTRI’s Social and Behavioral Analysis Division, will serve as director of the U-M UTC. He says, “Both young people and older adults present unique safety and mobility challenges. The U-M UTC will examine the risks related to these two ends of the age spectrum, across the dimensions of the roadway, vehicle, and driver. We’ll focus on understanding the

changing perceptual, cognitive, and psychomotor abilities of older drivers; the transportation needs of young people and older adults; and the elevated crash risk of young drivers.”

Peter Sweatman, UMTRI director, says, “This is a phenomenal opportunity to partner with the U.S. Department of Transportation and to involve more of the unique strengths of the University of Michigan schools and colleges in highway safety research. The UTC vision—to meet the nation’s need for

*continued...*

safe, efficient, and environmentally-sound movement of people and goods—meshes perfectly with UMTRI’s mission. We look forward to building this program collaboratively with expert faculty at the University.”

Sweatman will also chair a UTC advisory board of executive stakeholders from the auto industry, other businesses, government agencies, and community groups. A core group of U-M faculty will teach courses and collaborate on research, and UMTRI staff members will administer the grant. An executive committee, composed of U-M faculty, will provide guidance on UTC activities.

This project is funded through the Research and Innovative Technology Administration (RITA) of the U.S. DOT. Research will begin when the UTC officially launches in the summer of 2007.

Watch future editions of *UMTRI Research Review* for UTC updates as the research progresses. **RR**



UMTRI / SHEKINAH ERRINGTON



# UMTRI Wins Wheelchair Transportation Safety Grant

UMTRI and three other university partners have been awarded a \$4.5 million federal grant to continue research on transportation safety and usability for people in wheelchairs. The U.S. Department of Education's National Institute on Disability and Rehabilitation Research has renewed funding of the Rehabilitation Engineering Research Center on Wheelchair Transportation Safety (RERC WTS) for five years.

The RERC WTS partnership is headed by UMTRI and also includes the universities of Pittsburgh, Louisville, and Colorado. The RERC WTS was formed in 2001 to advance the safety, usability, and independence of the large proportion of 1.7 million wheelchair users who remain in their wheelchairs when traveling in motor vehicles.

"While considerable progress has been made in the past five years, the announcement by the National Institute on Disability and Rehabilitation Research to fund the RERC WTS for another five years provides an important opportunity to solidify past accomplishments and to make measurable gains such that transportation for the growing population of wheelchair users is not an impediment to successful integration into today's society," says Larry Schneider, the Center's new director and a research professor and head of UMTRI's Biosciences Division.

Wheelchair users need access to public and private motor-vehicle transportation to successfully function in today's society, Schneider says. Although federal, state, and regional legislation and policies of the past three decades have increased the availability and use of motor-vehicle transportation by wheelchair users, these policies have done relatively little to

assure that these individuals can travel easily, independently, and safely, he adds.

"Recently, the National Council on Disability reported that many people with disabilities who are willing and able to work cannot do so because of inadequate transportation," Schneider says. "While this report and other similar studies apply to people with all types of disabilities, there is little question that wheelchair users face the majority of transportation problems."

The partnership of universities will conduct research and development in six project areas, ranging from developing solutions for forward-facing and rear-facing wheelchair passenger stations in large accessible transit vehicles, to investigating issues of school bus transportation for children in wheelchairs, to improving frontal- and rear-crash protection for wheelchair occupants in private vehicles.

In addition, the RERC WTS will disseminate information, train future researchers, transfer technology concepts to manufacturers, and develop and revise voluntary industry standards.

For more information on the Biosciences Division and its research programs, see [www.umtri.umich.edu/bioscil](http://www.umtri.umich.edu/bioscil).

**UMTRI and three partners have been awarded a \$4.5 million five-year federal grant to continue research on transportation safety and usability for people in wheelchairs.**

UMTRI BRIEFS

*continued...*



UMTRI / CHARLES BRADLEY

# UMTRI Moves Forward in IVBSS

UMTRI has been engaged for many years in the development and evaluation of warning systems to help drivers avoid crashes. Recently, UMTRI was awarded \$25 million by the U.S. Department of Transportation to further develop and evaluate these technologies. Along with its partners Honda, Cognex, Eaton, Battelle, Visteon, and the Michigan Department of Transportation, and an additional \$6.6 million in cost-share funding, UMTRI will develop and test a new, integrated crash warning system in a fleet of passenger cars and heavy-duty trucks to be evaluated by a representative sample of drivers.

The Integrated Vehicle-Based Safety Systems (IVBSS) program field operational test will help address the crash types that account for approximately 67 percent of all motor-vehicle crashes in the United States. The program, led by Jim Sayer, assistant research scientist in UMTRI's Human Factors Division, will develop integrated, advanced

technologies that will warn drivers when they may be about to leave the roadway, are in danger of colliding with another vehicle while attempting a lane change, or are at risk of colliding with the vehicle in front of them. The system employs a variety of sensors, including radar, image processing, and global positioning data to determine the relationship between an equipped vehicle and the roadway environment.

In a soon-to-be-published UMTRI report from a similar program, the Road Departure Crash Warning field operational test, there are significant new findings regarding the ability of one of these crash warning systems to reduce the frequency and amount of time drivers spend outside of their own lane. Analyses have shown that lane departure warning systems have the potential to reduce the incidence of drifting out of the lane by 50 percent. Such lane departures can lead to one of the most fatal crash types, single-vehicle road departures, where vehicles frequently collide with fixed objects such as trees. Along with a wide variety of efforts currently underway at UMTRI to help drivers avoid and survive crashes, this form of research builds upon UMTRI's growing strength

This illustration shows a sample installation of IVBSS sensor coverage for commercial trucks.



EATON VORAD / MICHAEL K. LESHER

in the naturalistic measurement of driver behavior (including driver use and acceptance of new technologies) and leads toward an ultimate goal of a “science of driving.”

## Web Video Highlights Nighttime Driving

Mike Flannagan, research associate professor in UMTRI’s Human Factors Division, is featured in a web-based video produced by the Motor Vehicle Lighting Council. The video, “Protecting Drivers from the Dark,” highlights lighting technologies, such as high intensity discharge (HID) headlamps, that can enhance vehicle and pedestrian safety at night. To see the video, go to <http://media.medialink.com/WebNR.aspx?story=32585>.

## TRB Releases Report on Commuting

The Transportation Research Board (TRB) recently released the third edition of “Commuting in America,” a report prepared by Alan E. Pisarski under a joint project of the National Cooperative Highway Research Program and the Transit Cooperative Research Program. Overall, the report found that commuting trends are changing as baby boomers are nearing retirement age at the same time that a large immigrant population has joined the U.S. labor force. While the personal vehicle is still the most common way to go to work, transit and carpooling are increasing in many areas, and more commuters are traveling from suburb to suburb rather than from suburb to a central city.

During the coming decades, many baby boomers will leave the workplace and stop commuting. At the same time, projections from the Census Bureau show that the number of younger people entering the workforce will

increase, though these new workers will not outnumber those who will retire.

Due to an influx of immigrants (about 8 million more than projected by the 1990 census), the nation’s 30-year decline in population growth reversed sharply in the 1990s, returning to the growth rates of the 1970s. This increase in immigration is changing the nature of the workforce and overall commuting patterns. Although immigrants make up less than 14 percent of all workers, they represent about 40 percent of those in large carpools. The percentage is particularly high among Hispanic immigrants, who are largely responsible for the recent growth in carpooling after 30 years of decline. Recent immigrants also are more likely to walk or bike to work, or to use public transportation.

The general direction of commutes also has shifted. From 1990 to 2000, about 64 percent of the growth in commuting in metropolitan areas was from suburb to suburb, and the number of Americans commuting from the city to the suburbs increased by 20 percent. In fact, as more employers have moved out of cities to be closer to skilled suburban workers, more Americans now commute from the city to the suburbs than the other way around.

Other report findings include:

- The number of new solo drivers grew by almost 13 million in the 1990s.
- The number of workers with commutes lasting more than 60 minutes grew by almost 50 percent between 1990 and 2000.
- While the population over age 65 grew by only 12 percent from 1990 to 2000, workers over 65 increased by 21 percent.
- 30 million vehicles were added to households from 1990 to 2000, and 13 million of those were in households that already had two or more vehicles.

For more information and to access the report, see [www.trb.org/news/blurbs\\_detail.asp?id=6699](http://www.trb.org/news/blurbs_detail.asp?id=6699). 

## Zipcars Debut on Campus

Zipcar, North America's largest and fastest growing car-sharing company, debuted at the University of Michigan (U-M) on November 1. U-M faculty, staff, and students can join Zipcar and drive, by the hour or day, to locations on and off campus. Currently, six vehicles (two models each of the Toyota Matrix, Mazda 3, and Ford Escape) are available 24 hours a day, seven days a week from three pick-up locations on the central, north, and medical campuses.

Zipcar provides an alternative to owning and maintaining a vehicle on or near campus. Students who cannot or do not want to bring a car to school can use Zipcar as needed to travel off-campus to attend interviews, run errands, or take a weekend trip. Faculty and staff members, especially in small groups, may find it convenient to take a Zipcar to off-campus meetings.

"We already have a number of transportation demand management (TDM) tools in place at U-M, including free bus service, subsidized vanpools, and low-cost parking options," said David Miller, executive director of U-M's Parking and Transportation Services. "Zipcar is one more tool we've added to our TDM toolkit. We're excited about this partnership and hope to see the demand for car sharing exceed the initial fleet of six vehicles. If the demand is there, we will grow the fleet."

Zipcar members can reserve a car online or over the phone, choosing the vehicle, time, and pickup location. Members then access the car at the reserved location and time by holding their Zipcard to a code reader on the car's windshield to unlock its doors. After completing their journey, members return the car to its reserved parking spot.

Bob Goodsell, a programmer analyst in UMTRI's Engineering Research Division, recently signed up with Zipcar. He says, "Signing up was

UMTRI / SHERMAH BERNINGTON



**Above:** The Zipcar's doors unlock when the driver holds a Zipcard over a code reader on the windshield.  
**At right:** The Zipcars on the U-M campus have satellite radios.



UMTRI / DAN HUDLESON

simple, similar to making a purchase online. A few days later, I received my Zipcard. Reserving a car was straight-forward; the website displays each car's availability on a timeline, with links to details on each car's description and location. Using the car worked just as promised. The car was brand new, it ran well, and the satellite radio provided entertainment."

For a \$30 annual fee, U-M faculty, staff, and students can join Zipcar and have access to cars for \$8 per hour or a maximum of \$60 per day. The rates include gas, reserved parking spaces, insurance, and XM satellite radio.

## "Magic Bus" Tracks Buses in Real Time

Thanks to the University of Michigan (U-M) Magic Bus project, campus bus riders now have access to real-time bus arrival information. Using wireless technology and data from global positioning systems affixed to campus buses, the system displays real-time bus location data and predicts arrival times for upcoming stops. The Magic Bus takes the guesswork out of determining when to head to a bus stop, and provides useful feedback

# U-M TRANSPORTATION

to transportation supervisors if buses are stuck in traffic or experiencing mechanical problems.

Bus riders can access arrival times both through a website and by instant messaging. The website displays information in three ways: A route view shows moving icons that represent real-time bus locations along an entire route, a line view lists arrival times for all stops on a route, and a stop view displays both map icons and times for the next two scheduled bus arrivals at any selected stop. Riders can also use America Online's Instant Messenger Robot (AIM Bot) to access bus arrival times either online or with a mobile phone.

The Magic Bus project is run by students, funded by U-M's Parking and Transportation Services (PTS), and implemented by the U-M College of Engineering's Atmospheric, Oceanic, and Space Science (AOSS) Department. The project began in 2004 when David Miller, executive director of PTS, approached Christopher Ruf, an AOSS professor, about the possibility of creating a bus-tracking system. Miller says, "Although real-time bus-tracking systems, such as NextBus, had been on the market for some time, they were fairly expensive and contained only tracking, not prediction, software. We not only wanted to know where buses were at any given time, but also where they would be next, for all stops, not just for time points<sup>1</sup>."

Ruf brought the idea to students in a 400-level engineering class. They performed

PHOTOS: U-M COLLEGE OF ENGINEERING / DAVE BOPRIE



a feasibility study and determined that the Magic Bus was a suitable project. Over the next few years, undergraduate students in U-M's Departments of Electrical Engineering, Computer Engineering, and Computer Science, and the University's Undergraduate Research Opportunity Program, worked on the project. Ruf served as project leader and Prashanth Pandian, a student in the College of Engineering (now an alumnus), served as student lead. Jason Bidwell, bus operations supervisor for PTS, Steve Musko, senior engineer in research for U-M's Space Physics Research Laboratory, and Miller also worked on the project.

The student teams implemented the GIS tracking system on campus buses, designed and developed the predictive software to translate actual bus locations into predicted next-stop times, and programmed an interface for instant messaging and cell phone access. Miller says, "It's been amazing to see the students put together a comprehensive system from start to finish, including all phases of development, design, and hardware installation. It's been a pleasure working with the students, as well as with U-M faculty and staff members on the team."

Miller says students are continually coming up with ideas for system improvements, and the development and implementation of these enhancements should provide enough student projects for the next few years. Enhancements currently underway include connecting university hospital shuttle buses into the Magic Bus system and installing LED time displays at major bus stops. These changes should be implemented by fiscal year 2008. Miller says he would also like to provide additional publicity for the bus and create a survey for Magic Bus users.



For more information on the project, or to see real-time bus schedules, go to <http://mbus.pts.umich.edu>.

RR

**At left: A student assembles a circuit board for the Magic Bus project that will be installed on U-M buses. Inset: Students install the Magic Bus system on a U-M bus.**

<sup>1</sup> Time points are arrival times associated with major stops along a bus route. City bus systems often have many time points, but the University does not. For example, U-M's commuter route has over sixty stops but only three time points. Therefore, software that could predict times for all stops was critical.

Please contact the UMTRI library at 734-764-2171 or [umtridocs@umich.edu](mailto:umtridocs@umich.edu) to inquire about the availability of other publications listed here.

## Journal Articles

Bingham, C.R.; Eby, D.W.; Hockanson, H.M.; Greenspan, A.I. 2006. "Factors Influencing the Use of Booster Seats: A State-Wide Survey of Parents." *Accident Analysis and Prevention*, vol. 38, no. 5 (Sept. 2006), pp. [1028]–1037.

The research documented in this article was sponsored by the Michigan Department of Community Health, Injury Prevention Section and the Centers for Disease Control and Prevention, National Center for Injury Prevention and Control.

Bingham, C.R.; Shope, J.T.; Raghunathan, T. 2006. "Patterns of Traffic Offenses from Adolescent Licensure into Early Young Adulthood." *Journal of Adolescent Health*, vol. 39, no. 1 (July 2006), pp. [35]–42.

The research documented in this article was sponsored by the National Institute on Alcohol Abuse and Alcoholism.

Shope, J.T. 2006. "Influences on Youthful Driving Behavior and Their Potential for Guiding Interventions to Reduce Crashes." *Injury Prevention*, vol. 12, suppl. 1 (2006), pp. 9–14.

The research documented in this article was sponsored by the National Institute on Alcohol Abuse and Alcoholism.

van Roosmalen, L.; Reed, M.P.; Bertocci, G.E. 2005. "Pilot Study of Safety Belt Usability for Vehicle Occupants Seated in Wheelchairs." *Assistive Technology*, vol. 17, no. 1 (2005), pp. 23–36.

The research documented in this article was sponsored by the National Institute on Disability and Rehabilitation Research.

## Technical Reports

Baron, A.; Green, P. 2006. *Safety and Usability of Speech Interfaces for In-Vehicle Tasks While Driving: A Brief Literature Review*. 36 p. Report No. UMTRI-2006-5.

Blower, D.; Matteson, A. 2006. *Evaluation of Washington Crash Data Reported to MCMIS Crash File*. 43 p. Report No. UMTRI-2006-21.

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

Blower, D.; Matteson, A. 2006. *Evaluation of Iowa Crash Data Reported to MCMIS Crash File*. 36 p. Report No. UMTRI-2006-30.

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

Kostyniuk, L.P.; Nation, A.D. 2006. *Motorcycle Crash Trends in Michigan: 2001–2005*. 75 p. Report No. UMTRI-2006-22.

The research documented in this report was sponsored by the Michigan Office of Highway Safety Planning.

Kostyniuk, L.P.; Miller, L.L.; Molnar, L.J.; Nation, A.D. 2006. *Societal Costs of Traffic Crashes and Crime in Michigan: 2006 Update*. 196 p. Report No. UMTRI-2006-23.

The research documented in this report was sponsored by the Michigan Office of Highway Safety Planning.

Sivak, M.; Schoettle, B.; Reed, M.P.; Flannagan, M.J. 2006. *Body-Pillar Vision Obstructions and Lane-Change Crashes*. 15 p. Report No. UMTRI-2006-29.

The research documented in this report was sponsored by UMTRI's Industry Affiliation Program for Human Factors in Transportation Safety.

Sivak, M.; Schoettle, B.; Flannagan, M.J. 2006. *Recent Changes in Headlamp Illumination Directed Toward Traffic Signs*. 16 p. Report No. UMTRI-2006-31.

The research documented in this report was sponsored by UMTRI's Industry Affiliation Program for Human Factors in Transportation Safety.

Sivak, M.; Luoma, J.; Flannagan, M.J.; Bingham, C.R.; Eby, D.W.; Shope, J.T. 2006.

*Traffic Safety in the U.S.: Re-examining Major Opportunities*. Michigan University, Ann Arbor, Transportation Research Institute, Human Factors Division. 58 p. Report No. UMTRI-2006-26.

The research documented in this report was sponsored by Strategic Worldwide Transportation 2020.

Sivak, M.; Schoettle, B.; Flannagan, M. J. 2006. *Mirror-Mounted Turn Signals and Traffic Safety*. 14 p. Sponsor: Michigan University, Ann Arbor, Industry Affiliation Program for Human Factors in Transportation Safety. Report No. UMTRI-2006-33.

The research documented in this report was sponsored by UMTRI's Industry Affiliation Program for Human Factors in Transportation Safety. 

# Transportation Tidbits

- The Ford Model T (“Tin Lizzie”) was introduced in October, 1908. It had a four-cylinder, 20 hp engine and was the first Ford car with left-hand steering. The Model T, which was easy to drive and easy to fix, was in production until 1927. Over 16 million cars were sold, with a sticker price of \$260 at the end of its run.
- The Ford Motor Company introduced the continuous moving assembly line on December 1, 1913. Ford’s new assembly line could produce a complete car every two-and-a-half minutes. The efficiency and speed of Ford’s production lines allowed the company to sell cars for less than any competitor of the time.\*
- On November 22, 1927, Carl J.E. Eliason of Sayer, Wisconsin, obtained the first U.S. snowmobile patent.
- The world’s first “old” car club, the Veteran Car Club of Great Britain, was founded in November, 1930, in Brighton, England.

- On November 12, 1936, the San Francisco-Oakland Bay Bridge was opened to automobile traffic. Prior to this, passengers crossed the bay on ferry boat trips that took an hour each way.
- The first Los Angeles Freeway, the Arroyo Seco Parkway (also known as the Pasadena Freeway), was dedicated in December, 1940. Los Angeles developed into an urban environments that was greatly defined by the automobile.

## SOURCES:

All from *On the Move: A Chronology of Advances in Transportation* by Leonard C. Bruno, except \*, which is from *This Day in Automotive History*, [www.historychannel.com/tdih](http://www.historychannel.com/tdih). **RR**

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# CONFERENCES & EVENTS

**International Sustainable Transport Congress**  
October 16–17, Mexico City, Mexico  
[www.cts-ceiba.org/congreso2/ingles](http://www.cts-ceiba.org/congreso2/ingles)

**PCI Annual Convention**  
October 22–25, Grapevine, Texas  
[www.pci.org/convention](http://www.pci.org/convention)

**Annual SAFE Symposium**  
October 23–25, Reno, Nevada  
[www.safeassociation.com/symposium.htm](http://www.safeassociation.com/symposium.htm)

**SAE Commercial Vehicle Engineering Congress**  
October 31–November 2, Rosemont, Illinois  
[www.sae.org/events/cve](http://www.sae.org/events/cve)

**Toward Zero Deaths Conference**  
November 2–3, Duluth, Minnesota  
[www.tzd.state.mn.us](http://www.tzd.state.mn.us)

**Stapp Car Crash Conference**  
November 6–8, Dearborn, Michigan  
[www.stapp.org/2006.shtml](http://www.stapp.org/2006.shtml)

**Second European Road Congress**  
November 6–8, Brussels, Belgium  
[www.erf.be/section/congress](http://www.erf.be/section/congress)

**International Driving School Convention**  
November 9–11, Sarasota, Florida  
[www.thedsaa.org](http://www.thedsaa.org)

**Key Issues in Transportation Programming**  
November 12–14, Seattle, Washington  
[www.trb.org/calendar](http://www.trb.org/calendar)

**Highway Information Seminar**  
November 14–16, Arlington, Virginia  
[www.fhwa.dot.gov/policy/ohpi/hscourse3.htm](http://www.fhwa.dot.gov/policy/ohpi/hscourse3.htm)

**Commercial Vehicle Telematics**  
November 16–17, Chicago, Illinois  
[www.telematicsupdate.com/cvtusa06](http://www.telematicsupdate.com/cvtusa06)

**Conference on Public-Private Ventures in Transportation and FHWA Workshop on Project Finance**  
November 16–17, Washington, D.C.  
[www.artba.org](http://www.artba.org)

**TRANSPO 2006**  
November 27–30, Palm Harbor, Florida  
[www.itstranspo.org](http://www.itstranspo.org)

**Transportation Finance Summit**  
December 3–5, Washington, D.C.  
[www.ibtta.org/Events](http://www.ibtta.org/Events)

**Airbag 2006**  
December 4–6, Karlsruhe, Germany  
[www.airbag2000plus.de/a2006](http://www.airbag2000plus.de/a2006)

**Navigation USA 2006**  
December 5–6, San Jose, California  
[www.telematicsupdate.com/navigationUSA2006](http://www.telematicsupdate.com/navigationUSA2006)

**Transportation Engineering and Safety Conference**  
December 6–8, State College, Pennsylvania  
[www.outreach.psu.edu/C&I/TEESC2006](http://www.outreach.psu.edu/C&I/TEESC2006)

**International Conference on Child Restraints**  
December 6–8, Munich, Germany  
[www.driveandstayalive.com/info%20section/What's%20On/diary-of-events.htm](http://www.driveandstayalive.com/info%20section/What's%20On/diary-of-events.htm) [RR](#)



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