Technology Transfer

The Institute could not accomplish its goals without the transfer of its expertise and research results to local, national, and international audiences for use in real-world applications. Technology transfer also communicates to the world who we are, raising the profile of the Institute and its research, and serves to educate students, policymakers, and the general public about ITS issues and solutions.

Our efforts in this area are far-ranging in order to reach a broad and diverse audience of researchers, students, practitioners, policymakers, and others among the general public. Over the past year, we have provided tours and demonstrations of our research and facilities, sponsored seminars, published printed pieces, and maintained and updated our Web site. But perhaps the most direct method of transferring technology has been to send graduating students out into the workforce.

This section of the annual report highlights some of our technology transfer activities over the past year.

Lawmakers hear testimony about teen driving research

In January, ITS Institute director Max Donath testified before the Minnesota Senate Transportation Committee on teenage drivers and how ITS technology could play a role in improving their driving skills and reducing unsafe driving behavior.

Systems being evaluated by Institute researchers include seat belt and alcohol-based ignition interlocks that prevent operation of a vehicle, and methods for providing feedback on excessive speed or other unsafe operation as well as methods for logging these incidents for later analysis by parents or licensing officials.

Donath’s presentation generated a number of questions from committee members related to privacy and who might have access to the data collected.
UMD researcher receives patent for visibility measurement system

In February, a visibility measurement system developed by Dr. Taek Kwon received approval for a patent (no. 6,853,453) from the U.S. Patent Office. Kwon, whose work has been sponsored by the Institute for the past few years, is a professor in UMD's Department of Electrical and Computer Engineering and a NATSRL researcher. Kwon's research resulted in a video-camera-based visibility measurement system that can provide automated measurements of atmospheric visibility in daylight and at night.

Kwon's system overcomes the disadvantages and limitations of prior technology by providing a system that can accurately measure atmospheric visibility similar to how the human eye perceives it. The system can also interface with existing equipment that is used for other purposes, such as a video camera, allowing additional verification of automatic visibility measurements made by the system.

Visibility is a critical piece of environmental information in promoting safe traffic operation. Kwon's system may be used to allow traffic managers to make safety-related decisions, such as whether or not to close roads, reduce speed limits, or warn motorists with the goal of preventing visibility-related crashes.

Institute research featured in national, local news

The ITS Institute is recognized as a national leader in ITS research, as evidenced by the media coverage it received during the past year.

Research led by Institute director Max Donath was featured in an article published by the ITS Cooperative Deployment Network. The article described the Institute's work on Intersection Decision Support (IDS) systems, which will improve safety at rural through-stop highway intersections by providing better information about oncoming traffic to drivers stopped on secondary roads.

"Looking out for Minnesota's Wooden Bridges" was published in the August 19, 2004, issue of UMNnews, an electronic newsletter highlighting University work. The article described how researchers from NATSRL and UMD's Natural Resources Research Institute are working with the U.S. Department of Agriculture's Forest Service and county road departments to use innovative sensing technologies to save wooden bridges from rotting—a project funded through the ITS Institute. Researcher Brian Brashaw organized what was learned into training courses for Minnesota Department of Transportation (Mn/DOT) field inspectors and Minnesota county highway department inspectors. So far, more than 250 engineers and inspectors have been trained.

After heavy fog caused a multi-vehicle crash in Duluth, Minn., last winter, the local NBC television news affiliate highlighted UMD researcher Taek Kwon's work on trying to identify when and where fog might develop, for which no system currently exists. This capability could allow Mn/DOT to post appropriate warnings for drivers and head off potential pileups.

The University of Minnesota's student-run newspaper, the Minnesota Daily, ran a feature of the Twin Cities team that built a vehicle and competed in the Intelligent Ground Vehicle Competition.

Finally, HumanFIRST research on driver distraction was featured in an article in the St. Paul Pioneer Press and in segments airing on Minnesota Public Radio's All Things Considered and the local FOX television news affiliate. The research, conducted by HumanFirst director Nic Ward and research associate Mick Rakauskas, found that drivers in the simulator who were legally drunk often performed better than sober drivers who were talking on their cell phones or operating the car radio. Rakauskas was interviewed at length for the segments.
Rural safety meeting highlights technology-based solutions

In Minnesota, more than two-thirds of traffic fatalities occur in rural areas. Two Institute researchers shared how technology holds promise to reduce these tragic numbers at a special briefing held in March for U.S. Representative James Oberstar.

Those attending the event, held in Cambridge, Minn., represented Mn/DOT, the Cambridge city council, Isanti County, two local Toward Zero Deaths community groups, and other area organizations.

Institute director and professor Max Donath discussed research that focuses on how technology at unsignalized intersections can help drivers waiting to cross or merge onto a busy rural highway decide if the gap before an oncoming vehicle is large enough to proceed safely.

This intersection decision support (IDS) technology—made up of wireless communications and roadside radar units—works in ground fog and other low-visibility conditions. In their work, researchers are using an instrumented rural intersection south of the Twin Cities (see www.its.umn.edu/research), along with a driving simulator on the Minneapolis campus to test systems under more structured conditions.

Thomas Horan, research fellow at the University’s Humphrey Institute of Public Affairs, then discussed the role of technology in responding to rural crashes. The good news, he said, is that cell phone use and the related rise in communications mean more data are available; the bad news is the demand this places on dispatch systems. Minutes matter in emergency response, but calls must travel through an array of agencies, from 911 to dispatch to fire department and hospital. Horan’s research looks at how technology can improve end performance. “Using technology to respond in rural areas should be a top transportation, health, and economic priority,” Horan concluded.

Institute highlighted as Minnesota hosts rural ITS conference

Seventy-five speakers from across the nation discussed the latest technological solutions to rural multimodal transportation challenges at the 2004 National Rural ITS Conference, held in August 2004 in Duluth, Minn. The nearly 350 attendees heard presentations on a wide range of ITS applications—including Institute research—and toured research facilities.

The conference was sponsored by ITS Minnesota (the state chapter of the Intelligent Transportation Society of America), with the assistance of ITS America, the U.S. Department of Transportation, the Minnesota Department of Transportation, the Center for Transportation Studies, and the ITS Institute.

One of the conference sessions, “Rural Intersection Collision Avoidance,” featured presentations by Institute researchers on the intersection decision support research program. Craig Shankwitz, Intelligent Vehicles program director, presented “Assisting the Driver at Rural Intersec-
Institute researchers discuss driving behavior at traffic safety conference

Institute researchers presented a concurrent session at the Toward Zero Deaths: Integrating Minnesota’s Traffic Safety Agenda Conference, held in September 2004 in St. Cloud, Minn. The conference, which drew about 450 attendees, served as a forum on how to reduce the number of fatalities and injuries on Minnesota roads.

Janet Creaser, with the University’s HumanFIRST program, and Kathleen Harder, with the University’s Center for Sustainable Building Research, provided insights into driver behaviors and ideas on how to best deal with these from a human factors standpoint.

Creaser discussed the various characteristics of younger and older drivers. In both of these “at-risk” groups, there are several factors that, combined and individually, increase the number of fatalities in each of these groups. She explained how appropriate types of traffic and vehicle engineering, education, enforcement and licensing, and ITS can all be used to mitigate the risks of drivers in these two age groups.

Harder reported that driver aggression (separate from road rage) is a major threat to safety in roadway environments. She explained that there might be ways to alter the driving environment to change the behavior of people who are tripped into aggressive behavior. This could be done, she said, by designing roads that include traffic calming features, providing travel time information via changeable message signs, creating better roadway signage, and developing various mass transit options.

USDOT reps make site visit

In April, the Institute hosted three representatives from the USDOT’s Research and Innovative Technologies Administration for a day of meetings with staff, tours, and demonstrations. Robin Klein, university program specialist, Amy Sterns, university program specialist with the RITA Office of Research, Development, and Technology, and Ron Boenau, division chief of Advanced Public Transportation Systems, Federal Transit Administration, visited the Institute to see and learn about its work and operation.

Institute director Max Donath kicked off the day’s activities by giving an overview of the Institute’s management structure as well as examples of partnerships it has developed. Robert Johns, director of the Center for Transportation Studies, spoke about the organizational structure of CTS and its relationship with the Institute. Gina Baas, manager of outreach and education services, addressed technology transfer activities, and Dawn Spanhake, manager of research development and contract coordination, discussed education efforts and research highlights. Professor Nikos Papanikolopoulos with the Computer Science and Engineering Department spoke on his ITS-related research on vision-based techniques for computerized monitoring of human activity in public spaces. Finally, tours and demonstrations were given of their respective programs by ITS Lab manager Ted Morris, Intelligent Vehicles program director Craig Shankwitz, and HumanFIRST program director Nic Ward.

Institute director discusses technology’s role in transportation financing

Regional and national transportation officials, policymakers, and professionals joined U.S. Representative James L. Oberstar April 17–18 to discuss the future of transportation finance, especially alternatives to the gas tax in anticipation
for the day when gasoline is no longer the dominant fuel source for vehicles.

Among other speakers at this fourth annual Oberstar Forum, Institute director Max Donath discussed potential methods of charging users based on how much they drive. “There are technologies available...such that we can distinguish individual roads and allow each jurisdiction to recoup the cost of travel on its roads,” he said. These technologies include differential global positioning systems and digital maps, which could offer high enough accuracy to track vehicles as they move back and forth between a high-occupancy toll lane and a normal lane and apply road-use pricing accordingly.

Civil engineering assistant professor David Levinson described his research on the future of transportation networks and their financing, and Lee Munnich, director of the Humphrey Institute’s State and Local Policy Program, emphasized the need for political leaders to advocate for necessary changes.

**Transportation research highlighted at annual events**

University of Minnesota researchers from the Duluth and Twin Cities campuses shared their research findings with practitioners, policymakers, department of transportation staff, and other researchers at annual research events that drew attendees from across the state and region.

UMD researchers and their work were featured at the Northland Advanced Transportation Systems Research Laboratories (NATSRL) third annual Research Day, held November 4 at Mn/DOT District 1 Headquarters in Duluth.

Among the presenters were Stanley Burns, Richard Maclin, Taek Kwon, David Wyrick, Harlan Stech, and Emmanuel Enemuoh, who discussed topics ranging from traffic data warehousing to determining the most cost-effective life cycle for fleet assets in the Mn/DOT inventory. In addition, many of the students and researchers involved in the program presented poster sessions, during which they gave updates and answered questions on their specific project roles, along with the status of their findings.

In April, several ITS Institute researchers discussed their work at the Center for Transportation Studies 16th Annual Transportation Research Conference in St. Paul. Human-FIRST research scientist Mick Rakauskas presented the findings from a study assessing the risk of cell phone use compared to commonly accepted in-vehicle tasks, as well as driving while intoxicated—a topic that immediately generated media interest. John Bloomfield and Kathleen Harder discussed their research in the area of driver impairment as well. Nikos Papanikolopoulos presented his research on computer vision-based methods for data collection at traffic intersections, and Jiann-Shiou Yang, with UMD’s NATSRL, discussed special events travel-time prediction based on Kalman filtering.

**Visiting researchers help foster strategic partnerships**

During the past year, the Institute continued to work with visiting researchers and instructors.

The Advanced Transportation Technologies Seminar Series provided an opportunity to host Dr. David Shinar from the Industrial Engineering and Management Department at the Ben Gurion University of the Negev in Israel. Shinar spoke to the Institute on his current research, which is investigating how drivers maintain safe headways and how headway skills could be improved.

Dr. Thomas Horan, an associate professor at Claremont Graduate University and visiting scholar at the Humphrey Institute of Public Affairs, is part of the Sustainable Technologies Applied Research (STAR) Initiative. Horan is doing research on wireless EMS and telecommunication network planning and access in a rural context.

Other visiting researchers, all working with the Institute’s HumanFIRST Program, include Nobuyuki Kuge of Nissan, Erwin Boer of the University of California, Jeff Caird of the...
University of Calgary, Andras Kemeny of the College de France, Jason Laberge of Honeywell, and Dick de Waard of the University of Groningen.

Communications promote Institute work

The Institute’s electronic and printed communications continue to improve and evolve in order to better publicize Institute work and serve those looking for information. Staff completed the changeover to a database-driven system for publishing information on research projects. The transition to this system enables more rapid and accurate publication of the latest information on all ITS Institute research projects, as well as a greater variety of options for searching and displaying information. The new Web pages draw content directly from the research database at the Center for Transportation Studies.

Institute Web pages providing information on intersection decision support pooled-fund research projects (www.its.umn.edu/research/applications/ids) were praised as “a model for other lead agencies to follow” by the FHWA’s Transportation Pooled Fund manager working with the projects. The Web pages are used by pooled-fund participants to share information and presentation materials related to the project and to get updates on research progress.

The Web site continued to provide electronic distribution for Institute news, including the Sensor newsletter and articles covering research projects and seminars by faculty and visiting researchers.

On the print side, the fifth ITS Institute annual report, with photos and coverage of researchers, their students, and their projects, was published. Printed copies of the annual report were mailed to nearly 1,700 individuals (an increase of about 13 percent over last year), as well as distributed at TRB, the ITS America Annual Meeting, and other Institute-related events. In addition, the report was again made available as a PDF file for download from the Institute’s Web site.

Circulation of the ITS Institute’s Sensor newsletter increased slightly to around 2,300. The Sensor is one of the primary vehicles for increasing visibility of the ITS Institute, and its high circulation represents a wide interest in ITS research activities among academic and professional audiences. Subscriptions to the Sensor can now be requested online at www.its.umn.edu/publications/subscriptions/index.html.