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.

Institute researchers discuss traffic safety at TZD conference

Institute research was highlighted at concurrent sessions of the annual Toward Zero Deaths Conference, held in November 2005 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.

Professor Max Donath, director of the ITS Institute, described innovative education programs to coax teens into driving more safely, and in-vehicle technologies to prevent them from driving if they are not buckled up or are intoxicated.

Researcher Mick Rakauskas of the University’s Human-FIRST Program discussed a recent study that showed that sober drivers talking on a cell phone or operating in-vehicle controls such as the radio or fan performed worse than drivers who were intoxicated.
Transportation research presented at annual UMD event

In November 2005, the fourth annual Research Day event was held at the Mn/DOT District 1 headquarters in Duluth. This year’s program featured a half-day look at UMD’s ongoing research work in transportation. Taek Kwon, a professor in the electrical and computer engineering department, provided an update on his work in rural ITS applications. In addition to his renewable energy light pole that is on Mn/DOT property, he discussed his work in developing a gravel road traffic counter and his initial design efforts for an intersection traffic movement counter.

Rich Maclin, a professor in the computer science department, presented an update on the department’s project in developing an automatic process to detect Road and Weather Information System (RWIS) sensor malfunctions. John Evans, a professor from the chemistry department, presented results from his work to explore a low-cost, optical fiber-based spectrophotometry and surface acoustic wave device for remote sensing of road conditions. Brian Brashaw, program director for the Natural Resources Research Institute (NRRI), provided an update on his development of inspection techniques to assess the conditions of rural bridge systems.

Other UMD presenters included Jiann-Shiou Yang, who provided an update on his study of short-term arterial travel time models; David Wyrick, who discussed his work in fleet management life-cycle cost analysis; and Stanley Burns, who presented his work in using magneto-resistive sensors for vehicle classification.

Intersection research travels to ITS World Congress

ITS Institute researchers traveled to the 12th ITS World Congress in San Francisco to demonstrate the sensing and communications technologies used in the intersection decision support system. Led by Intelligent Vehicles (IV) program director Craig Shankwitz, the team conducted technology demonstrations over multiple days for attendees at the prestigious international conference. Several hundred conference attendees participated in the technology demonstrations facilitated by Shankwitz and other researchers involved in the project. Topics covered in the demonstrations included sensing and vehicle tracking using multiple radar and video camera detectors, wireless communication, and human factors issues involved in designing effective variable information signs for drivers.

International visitors tour U of M research labs

Officials from 17 countries across the globe—from Norway to Uganda, Japan to New Zealand—came to Minnesota in April for a meeting of the Performance of Roads Administration Committee of the World Road Association (known as PIARC).

PIARC is a world leader in the exchange of knowledge on roads and road transportation policy and practices within an integrated, sustainable transportation context.

In addition to attending the meeting and touring other sites, the group visited ITS Institute facilities at the University of Minnesota. Craig Shankwitz, director of the IV Lab, gave an overview of the lab’s activities, including a demonstration of driver-assistive technologies on the TechnoBus. Mike Manser, research associate with the HumanFIRST Program, provided an overview of the University’s driver behavior research and provided a demo of the driving simulator.

ITS Institute board member Randy Halvorson, Mn/DOT Program Management division director, hosted the meeting as the United States’ representative on the committee.

ITS Institute helps attract funding for security research

In recent years, the University of Minnesota has successfully attracted federal funds to address transportation security issues, in part due to seed funding from the ITS Institute and UMD grad student Fenghuan Wang, Professor Harlan Stech, and grad student Joseph Erickson at NATSRL’s annual Research Day.

IV program director Craig Shankwitz describes the intersection decision support system to ITS World Congress attendees.

A group of international visitors toured the IV Lab’s TechnoBus.
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the Center for Transportation Studies (CTS). To expand the transportation security research, education, and outreach funding at the University, a new program is being developed to communicate University expertise to various federal funding agencies and take advantage of increased funding for research on transportation security technologies.

SECTTRA—Security in Transportation Technology Research and Applications—is a joint program of the Department of Computer Science and Engineering (CSE) and CTS. It will aim to earn recognition for the University of Minnesota as a world leader in the development and application of technologies for transportation security.

CSE professor Nikolaos Papanikolopoulos will lead SECTTRA, working with CTS and sponsors to attract funding, involve faculty and department staff in research activities, provide national and state leadership, and guide the delivery of research, education, and outreach efforts.

A joint memorandum of understanding was signed for SECTTRA in March by Robert Johns, CTS director; Papanikolopoulos; Max Donath, director of the ITS Institute; Vipin Kumar, CSE department head; and Steven Crouch, dean of the Institute of Technology.

The SECTTRA program will collaborate with the ITS Institute and the Safety Security Rescue Research Center (SSR-RC) in CSE. Funded by the National Science Foundation, SSR-RC is a cooperative research center that coordinates research with a spectrum of large general homeland security contractors, companies with a specific market share, and start-up companies with key enabling technologies.

SECTTRA's mission complements SSR-RC's goal of attracting private sector funding for a broad range of security-related research. It also complements the ITS Institute's goal of attracting funds for other transportation technology research.

Institute research featured in 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.

University of Minnesota research designed to help drivers avoid crashes was featured July 2005 in a story aired by Minnesota Public Radio (MPR). Professor Max Donath, director of the ITS Institute, was interviewed about several types of technology. In one segment, Donath discussed adaptive cruise control (ACC) systems now available on some higher-priced cars. The ACC technology, which is the subject of ITS-funded research led by Professor Rajesh Rajamani of the Department of Mechanical Engineering, can take control of a vehicle to keep it from rear-ending the one ahead of it. Donath also described intersection decision support technologies that help drivers at rural intersections decide when it's safe to enter or cross a roadway.

The local NBC television news affiliate in the Twin Cities, KARE-TV, covered research by Kathleen Harder and John Bloomfield on driver aggression. The local FOX television news affiliate, FOX9 News, aired segments highlighting research by Professor Shashi Shekhar on evacuation route planning and research led by Professor Stephen Simon, Max Donath, and Shawn Brovold on the Teen Driver Support System project. In addition, the teen driver research was covered by the University's student-run newspaper, the Minnesota Daily.

The Minneapolis Star Tribune covered the ITS Institute's research and reauthorization in September 2005.


Finally, the University of Minnesota's UMNnews, an electronic newsletter highlighting University work, featured HumanFIRST Program cell phone research as well as the Institute's Teen Driver Support System research. The latter
article also mentioned the Institute’s $16 million grant from the U.S. Department of Transportation as part of SAFETEA-LU, and how the funding will allow the Institute to conduct research on a wide array of safety and transportation topics.

Evacuation project wins award
Institute researcher Shashi Shekhar was one of the recipients of this year’s CTS Research Partnership Award, presented at the CTS Annual Meeting and Awards Luncheon held in Minneapolis April 18.

The winning project, “Metro Evacuation Traffic Management Plan,” developed a system to coordinate local emergency evacuation plans in multiple communities.

Seventy public and private agencies in the nine-county metro area, including the Minnesota Department of Transportation, were invited to create the plan, including transportation, fire, law enforcement, and emergency management officials.

Shekhar, a professor in the Department of Computer Science and Engineering, explained that the goal of his research team was to create a tool that would run more efficiently than the standard programming approach and allow users—such as transportation professionals and first responders—to quickly find the best escape routes, even for large scenarios.

Mn/DOT has already used the algorithm to develop a metro evacuation traffic management plan for the Twin Cities area.

Institute researchers put their expertise in print
Mechanical engineering professor Rajesh Rajamani is the author of the recently published Vehicle Dynamics and Control (Springer, 2005). The textbook, one in the publisher’s Mechanical Engineering Series, provides information on vehicle control systems including adaptive cruise control, automated highway systems, automated lane keeping, engine control, tire models, and tire-road friction estimation. The textbook is meant primarily for engineering faculty, graduate-level students, and researchers.

Associate Professor David Levinson, civil engineering, is the co-author with William Garrison of The Transportation Experience: Policy, Planning, and Deployment (Oxford University Press, 2005). The 460-page book explores the genesis of transportation systems; the roles that policy plays as systems are planned, innovated, deployed, and reach maturity; and how policies might be improved.

Visiting researchers foster beneficial partnerships
During the past year, the Institute continued to work with visiting researchers and instructors, allowing for an exchange of information and dissemination of research results to the visitors’ students and colleagues.

The Advanced Transportation Technologies Seminar Series provided an opportunity to host Derek Caveney from the Toyota Technical Center in Michigan. Caveney spoke to the Institute on his current research project, “Multiple Model Techniques in Automotive Estimation and Control.”

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 investigating 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.

Web, publications promote Institute work
The Web continued to be an important tool for the ITS Institute to provide public information about its research, outreach, and education activities in 2005. Notable Web-related activities and milestones this year included the following:
- The database-powered research project publishing system introduced last year continued to perform well, with information on newly funded projects being added.

- Twenty-five ITS-related research projects were featured in articles in the Center for Transportation Studies’ Research E-news electronic newsletter, available on the Web at www.cts.umn.edu/news/renews/. Many of these stories provided links to download final research reports.

- Electronic mail was used to publicize upcoming events, including Advanced Transportation Technologies Seminars, conferences, luncheon presentations, and other ITS-related events.

- Online subscription forms, on the ITS Institute Web site and the Center for Transportation Studies Web site, were revised to make it more convenient for Web users to sign up for electronic and print newsletters and event announcements.

- The new Human Factors and Topographic Mapping Web-based research modules developed for high-school students (described in the Education section of this annual report) were also added to the ITS Institute’s Web site so students can use them directly online.

On the print communications side, Institute publications helped raise the profile of the ITS Institute in academic and professional communities and disseminate the results of research.

The sixth 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 over 1,600 individuals as well as distributed at TRB, ITS World Congress, 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 Sensor newsletter remained steady at 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 knowledge of and interest in ITS research activities among academic and professional audiences.

For the ITS World Congress in San Francisco, the Institute produced an informational fact sheet giving an overview of the sensing, communications, and human factors research involved in developing a viable intersection decision support system. Institute staff distributed 500 copies of the fact sheet to interested conference attendees during their technology demonstration. The fact sheet was also made available as a PDF document on the Institute’s IDS Web page (www.its.umn.edu/research/applications/ids/). Because transportation agencies from several states participate in pooled-fund research on IDS carried out at the University of Minnesota, generating additional awareness nationally and internationally is important for the success of IDS technology.