The ITS Institute’s education activities consist of a multidisciplinary program of coursework and experiential learning that supports the Institute’s theme. The educational program includes the disciplines of computer science and engineering, electrical and computer engineering, civil engineering, mechanical engineering, human factors, public policy, and others.

By supporting and sponsoring a variety of educational initiatives for students, the Institute is generating interest in its core ITS science and technologies. These initiatives include developing new curriculum and courses, involving undergraduate and graduate students in research projects, sponsoring students to attend national conferences, giving awards that recognize outstanding students, and offering research assistantships to help attract more students to the study of transportation. This section of the annual report highlights some of our efforts in the area of education.

New video showcases ITS-related careers

The Institute produced a 10-minute video designed to attract potential students to a future in transportation technology. The video, titled Intelligent Transportation Systems: Your Road to the Future, provides students with a glimpse of ITS Institute research projects, ITS-related projects and deployments in Minnesota, and a snapshot of Minnesota professionals who use ITS in their jobs.

The video is informative, entertaining, and visually appealing. It includes interviews with ITS professionals and organizations as well as current students planning ITS-related careers. By watching the video, potential students (and their parents) will gain an understanding of the breadth of ITS-related opportunities and gain familiarity with ITS-related careers.

A student views the ITS Institute careers video.
The field of transportation technology includes traffic engineering, policy and planning, vehicle and infrastructure design, and human and environmental factors. The video explains why this field is important to both the transportation of our nation and the economy as a whole. It also explains how these careers have longevity in the future of the world economy.

The video is intended primarily for middle and high school students who have an interest in math, science, or engineering. It is the latest Institute effort to attract K-12 students to this field of study. The video is posted on the Institute’s website and YouTube channel and will be used in settings such as career fairs and campus summer camps.

**Transportation experts from industry, academia share findings in seminar series**

During the 2010 Advanced Transportation Technologies Seminar Series, four visiting researchers presented ITS-related research on topics ranging from evaluating signal coordination to integrating driver privacy. The series also included three presentations from University of Minnesota faculty members on intelligent decision-support systems, analysis methods for data collected in a study of driver behavior, and camera network systems.

In the second presentation of the series, visiting researcher Luca Delgrossi outlined the role of communications in cooperative safety systems that enable vehicles to exchange safety information with other vehicles and roadside infrastructure. Delgrossi is the senior group manager of driver assistance and chassis at U.S. Mercedes-Benz Research and Development.

Communications technology for cooperative safety systems must have the ability to function at high speeds and work in a matter of seconds, Delgrossi said. Other requirements include two-way communication between vehicles and a protocol for short messages using a common data language. According to Delgrossi, the most promising communications technology for use in such systems is 5.9 GHz dedicated short-range communications (DSRC).

A challenge for the deployment of cooperative safety systems is that initial users will likely be paying for an extra feature that won’t come into use until other cars on the road have the same technology. This process could take 10 years or more if the systems are only available in new vehicles, Delgrossi said. To address this challenge, researchers are currently studying how to equip vehicles already on the road. The two most likely approaches are partnering with automotive manufacturers to retrofit existing vehicles with DSRC equipment or using after-market devices (such as smartphones) to accelerate deployment.

Other presentations in the series were:
- “Intelligent Decision-Support Systems Inside the Vehicle: Can ‘They Help Drivers to Make Safer Driving Decisions?” Caroline Hayes, professor, Department of Mechanical Engineering
- “A Causal Model of Traffic Crashes and Conflicts,” Gary Davis, professor, Department of Civil Engineering
- “Avoiding the Matrix: How to Build Privacy into Intelligent Transportation Systems,” Dorothy Glancy, professor of law, Santa Clara Law
- “Camera Networks for Security and Traffic Applications,” Nikolaos Papanikolopoulos, professor, Department of Computer Science and Engineering
- “Automation Mania in the Time of Reason: Considerations for Complex Transportation Problems,” Stephen Popkin, director, Human Factors Research and System Applications Center of Innovation, Volpe Center, Research and Innovative Technology Administration, U.S. Department of Transportation
- “Visualization and Assessment of Arterial Progression Quality Using High-Resolution Signal

Darcy Bullock was one of four visiting researchers who gave presentations in the Advanced Transportation Technologies Seminar Series.
Event Data and Probe Vehicle Travel Time Data,”
Darcy Bullock, professor, Department of Civil Engineering, Purdue University

This was the tenth year the Institute sponsored the multidisciplinary seminars, during which researchers report on findings from their work and bring new information to the ITS community. The series is offered as a one-credit graduate-level course, or attendees can earn one professional development hour for each seminar. Presentations are recorded and available for viewing on the web.

Institute students awarded travel funds

The ITS Institute gave travel awards to 12 students to support their attendance at national meetings and conferences.

WTS International Conference in San Francisco, Calif. (May 15–17)
- Department of Civil Engineering: Xuan Di

90th Annual Meeting of the Transportation Research Board, Washington, D.C. (January 2011)
- Department of Civil Engineering: Indrajit Chatterjee, Yiheng Feng, Heng Hu, Arthur Huang, Carlos Madera, Nick Ollrich, Pavithra Parthasarathi, Jie Sun, Hui Xiong
- Humphrey School of Public Affairs: Avital Barnea
- Department of Electrical Engineering and Computer Science, University of Minnesota Duluth: Buddhika Maitipe

One of the graduate students funded to attend TRB was Indrajit Chatterjee, who presented at a poster session on surrogate measures for safety. “The overall feedback from other peers was quite encouraging. I got some additional suggestions to improve and extend my work,” he says of the experience. He adds that it was also helpful to see the wide spectrum of cutting-edge research on traffic safety and operations. “Overall, the whole TRB experience was quite insightful and I hope it will benefit me in my future research efforts,” he says.

Engineering, planning students honored for ITS research

Three graduate students conducting ITS-related research received awards at the Center for Transportation Studies’ annual meeting and awards luncheon, held April 27 on the Twin Cities campus.

Hai Quang Dinh, who completed his master’s degree in electrical and computer engineering at the Duluth campus in February, received a Matthew J. Huber Award (given to students in engineering, science, and technology fields). In his research, Hai worked to develop a tracking-based traffic performance measurement system for roundabouts and intersections. He was advised by Assistant Professor Hua Tang.

David Coyle received a John S. Adams Award (given to students in policy and planning fields). Coyle is a master’s candidate in the Department of Applied Economics. His thesis, “Minnesota Highways: Revenue Source or Revenue Sink,” explores the potential of mileage-based user fees; these fee systems require ITS technologies for operation. Coyle’s advisor is Associate Professor Gerard McCullough.

Saif Jabari, a doctoral candidate in civil engineering, was honored as the ITS Institute Student of the Year Award for 2010. Jabari’s doctoral work concentrates on the development of mathematical models for estimating and predicting traffic conditions along freeways and signalized arterials. Associate Professor Henry Liu, Jabari’s advisor, said Jabari “may be the best student in his cohort” and noted that he contributed greatly to Liu’s research projects.
Career Expo draws record attendance

The ITS Institute teamed with the Center for Transportation Studies, the Minnesota chapter of the Women’s Transportation Seminar, the Minnesota Local Road Research Board, the Minnesota Local Technical Assistance Program, and the Council of Supply Chain Management Professionals to host the 2011 Transportation Career Expo on March 1. The event drew more than 100 students eager to learn about transportation-related careers, receive job-hunting tips, and network with potential employers.

The expo featured a general-session panel discussion with transportation industry experts presenting career alternatives and preparation strategies. Among those serving on the panel was past ITS Institute Student of the Year award recipient Fay Cleaveland, now a transportation planner with the Minnesota Department of Transportation.

An exhibitor fair offered networking and employment-seeking opportunities with representatives from the public and private sectors and professional organizations.

K-12 students try technology at camps, exhibits, and tours

Throughout the past fiscal year, Institute staff participated in several events, camps, and high school visits to introduce pre-college students to transportation and ITS-related fields. Among those efforts:

- The ITS Institute exhibited for the fourth year in a row at TechFest, a one-day event focusing on engineering, held at The Works, a hands-on science and technology museum in Edina, Minn. This year, the Institute’s exhibit featured Scout reconnaissance robots developed by computer science and engineering professor Nikos Papanikolopoulos and graduate students Jesse Purvey and Alex Hambrock in the Center for Distributed Robotics. Scouts are robots roughly the size of a soda can that have multiple mobility modes (e.g., jumping, rolling) and carry a variety of sensors (e.g., camera, microphone). Young visitors enjoyed maneuvering the robots around the exhibit space. In addition, kids and their parents tried their hand at managing traffic by playing Gridlock Buster, the Institute’s traffic control game. Other students staffing the exhibit were Nick Ollrich and Xuan Di with the Interdisciplinary Transportation Student Organization. About 2,000 people attended the event.

- The Institute and the Center for Transportation Studies hosted 25 students from the Leech Lake
Tribal College Summer Transportation Camp, presenting an overview of transportation careers and providing tours of lab facilities at the University of Minnesota.

• In July 2010, Institute staff demonstrated traffic simulation tools as well as Gridlock Buster to about 55 attendees during the CSE Exploring Careers in Engineering and Physical Science Summer Camp, hosted by the University’s College of Science and Engineering. The annual day camp is designed to introduce high school students to careers in science, engineering, and math.

• Institute staff and civil engineering graduate students Xuan Di and Nick Ollrich also assisted in teaching two summer camp courses to fifth and sixth graders at The Works in Edina, Minn., in July and August of 2010.

• In August, the Institute assisted the Center for Distributed Robotics and the Digital Technology Center with a Technology Day Camp, organized by the center’s director, Nikos Papanikolopoulos, and his graduate students. The program gives primarily underprivileged middle school students from the Twin Cities the chance to explore technology and robotics. The 125 participants in the camp, who attend free of charge, toured the MTO and aerospace engineering lab, built robots, and played Gridlock Buster.

• In November, the Institute participated in Mahtomedi Science and Engineering Night, an event for about 100 high school students. The Institute also participated in the Irondale High School STEM Career Fair 2011, during which industry representative Brian Smalkoski talked to students about engineering and planning careers. Another event the Institute took part in was the TwinWest Chamber of Commerce’s STEM Summit in March in Hopkins, Minn., to promote STEM careers to middle school students.

• In May of 2011, high school students from the Osseo (Minn.) school district toured the MTO with lab manager Ted Morris and aerospace engineering lab with Associate Professor Demoz Gebre-Egziabher.
Students find value in simulation program

Students gained valuable perspectives on highway design and urban planning through using the Simulating Transportation for Realistic Education and Training (STREET) program this last academic year. Students in Civil Engineering 3201: Introduction to Transportation Engineering used the program in the lab portion of class to design roadways and understand how different road configurations affect traffic through the Roadway Online Application for Design (ROAD) and Agent-based Demand and Assignment Model (ADAM) STREET modules.

“Both the ROAD and ADAM modules allowed us to have a more hands-on approach to real-life situations than simply solving textbook problems alone,” said Thomas Hall, a junior civil engineering student, adding that STREET gave him experience in creating models for proposed road infrastructure improvements.

Furthermore, students found the software program user-friendly and insightful compared to other programs they used in other classes. “Overall, I enjoyed my time using the program,” Hall said.

The experience with STREET provided students with experiences similar to those they would have as a transportation practitioner. “[STREET] gave me an insight on what projects a transportation engineer may work on, which was helpful in guiding me to make a decision on which emphasis of civil engineering I would like to pursue,” said Christina Caouette, a junior civil engineering student.

Funding for the STREET project comes from the National Science Foundation with matching support from the ITS Institute.

More players try Institute’s traffic game

“Gridlock Buster,” a traffic control game developed by the ITS Institute and Web Courseworks, continues to gain popularity. Gridlock Buster is an online traffic control game based on tools and ideas that actual traffic control engineers use in their everyday work. The goal of Gridlock Buster is to provide a fun way to teach students what is involved in traffic grid management and make transportation interesting and relevant.

Since its original posting online, Gridlock Buster has received more than 3 million game plays and has garnered national interest; for example, in April the game was used during Construction Career Day, an event that drew about 1,000 students in grades 6 through 12, at the University of Rhode Island. Locally, the game continues to be used as a recruiting tool by several area high schools, as a featured activity at related University of Minnesota summer camps and by elementary school children at education events, and as a teaching tool for university undergraduates as part of their coursework. Numerous camps and exhibits that the Institute hosted over the past year also incorporated Gridlock Buster into their activities.