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.

Seminar series brings transportation experts from industry, academia to Minnesota

Hybrid electric generators, systems for high-speed intersection safety, and innovations in transit fare collection were several topics featured during the Fall 2008 Advanced Transportation Technologies Seminar Series. Minnesota faculty and visiting researchers presented their recent ITS-related work on a variety of transportation topics.

Among the presenters was visiting professor Nigel Wilson, who gave an overview of technological and policy issues related to transit fare collection. Wilson, professor of civil and environmental engineering, spoke on the topic of transit fare collection and its implications for transportation systems.
工程学在麻省理工学院，是主要研究和教育合作机构之间的MIT和公共交通机构在芝加哥和伦敦的负责人。

Wilson强调了几种新兴技术，这些技术在未来几年可能会变得更加普遍。新的“非接触式”车票卡，当它们被短暂地放在读卡器前时可以被读取，有望取代现有的读卡器技术，从而加快登机速度。

实施新技术也会引发重要的政策问题，Wilson提到。其中最重要的是与公平有关的问题。例如，需要乘客购买高容量预付车票的支付系统可能有效地将低收入的公共交通用户排除在外，因为他们无法承担初期的成本。

Wilson还讨论了适用于公共交通机构的多种商业模式。

其他系列中的报告包括：
- “平头优先和高级警告信号系统在高速信号交叉口的评估”，Henry Liu，助理教授，土木工程系
- “可持续移动研究综述”，Hesham Rakha，教授，土木工程系，可持续移动中心主任，弗吉尼亚理工大学
- “用于农村ITS应用的太阳能和风能混合生成器”，Taek Kwon，教授，电气与计算机工程系，明尼苏达大学多尔顿
- “智能交通系统和安全：利用信息系统改善实时性和紧急服务的创新使用”，Tom Horan，执行主任，克莱蒙信息技术研究院
- “对未来的影响预测研究”，Ted Morris，实验室经理，明尼苏达交通观测站
- “对交通运输部ITS研究的视角”，Shelley Row，主任，交通技术联合项目办公室，美国交通部
- “阿鲁皮是学生主管”

Eddie Arpin，最近毕业于明尼苏达大学机械工程硕士学位，于2009年1月在交通研究委员会（TRB）第88届年会上被ITSI认定为2008年度杰出学生。

Arpin于2006年1月开始在明尼苏达大学攻读研究生，主攻机器人学、控制和自动化。他于2006年9月在IV Lab工作，他参加的三队之一在智能地面车辆比赛中获得了第二名。与此同时，他开始了他的学位研究，旨在为城市环境开发车辆定位系统。
ITS Institute director Max Donath said Arpin was selected as Student of the Year for many reasons: he graduated with a 3.83 GPA in his graduate studies, he recently finished his thesis, “A High Accuracy Vehicle Positioning and Guidance System Fusing RFID and LiDAR,” and he is currently employed as a research fellow at the IV Lab, working on a driver-assist system for transit bus drivers. “It is truly remarkable what Eddie has been able to accomplish these past two years since he started working in his thesis research,” noted Donath.

Each year, the U.S. Department of Transportation (USDOT) honors an outstanding student from each UTC at a special ceremony held during the TRB Annual Meeting. Each student receives $1,000 and the cost of attendance for, and travel to, the annual meeting from his or her center, plus a certificate from the USDOT.

### Institute funds student travel

University of Minnesota students joined ITS Institute researchers at the TRB Annual Meeting in Washington, D.C. Eleven students received travel awards from the Institute to travel to the meeting, where they attended presentations and workshops by researchers from around the world and enjoyed networking with fellow scholars. The students sponsored were Eddie Arpin, Sundeep Bhimireddy, Xuan Di, Feili Hong, Heng Hu, Katie Roth, Jory Schwach, Jie Sun, Brad Utech, Hui Xiong, and Shanjiang Zhu. Additional travel awards were given to Feili Hong and Jory Schwach to attend the ITS World Congress in New York City and Zhiqiang Xing to attend the Institute of Navigation (ION) Technical Meeting in Anaheim, California.

### Engineering students honored with Huber award

Two ITS students received this year’s Matthew J. Huber Award, which is presented annually to University of Minnesota graduate students demonstrating an outstanding contribution in research, writing, and educational activities in the field of transportation.

Shan Hu is a master’s candidate in engineering management (mechanical engineering) at the University of Minnesota Duluth. Her work focuses on nonintrusive detection of driver drowsiness through a sensing system that monitors the heart rate of vehicle drivers (see related article on page 15). This project was one of three North American finalists in the 3rd Collegiate Student Safety Technology Design Competition. Her advisor is Xun Yu, assistant professor of mechanical and industrial engineering.

Evan Ribnick is a doctoral candidate in electrical engineering at the Twin Cities campus. His research, centered around computer vision and image processing, has focused extensively on transportation-related applications, including a specific project sponsored by the Department of Homeland Security to develop an automatic surveillance system to protect busy transportation hubs. His advisor, professor Nikolaos Papanikolopoulos, said Ribnick is a “dream student” who has been published in some of the best academic journals. Ribnick said that as a researcher, he wants to develop technology that’s useful and applicable in the real world. “This award indicates that we’re headed in the right direction,” he said.

### Duluth research earns spot in international student competition

A team led by Xun Yu, assistant professor of mechanical and industrial engineering at the University of Minnesota Duluth, was selected as one of three teams representing the North American region to participate in the 3rd
Collegiate Student Safety Technology Design Competition at the 21st International Technical Conference on the Enhanced Safety of Vehicles, held in Stuttgart, Germany, June 15–18. Senior Ryan Dowld and graduate student Shan Hu made up one of two teams selected from the United States; the other group was from Canada. With support from the Northland Advanced Transportation Systems Research Laboratories (NATSRL), Yu has been working to develop a Driver Drowsiness Detection System (see related article on page 15).

Online game lets students explore the world of traffic management

A new traffic control game developed by the ITS Institute and Web Courseworks lets high school students try their hand at working in the engineering and transportation field. The game is based on work by Chen-Fu Liao, the ITS Institute’s senior systems engineer, and his earlier “STREET” traffic control game. The goal of “Gridlock Buster” is to provide a fun way to engage students in the traffic engineering field, teach what is involved in traffic grid management, and make transportation interesting and relevant.

Gridlock Buster incorporates tools and ideas that traffic control engineers use in their everyday work. Players must pass a series of levels while acquiring specific skills to control the traffic and minimize delays. For example, a player might need to manage a high volume of traffic passing through an intersection, where long lines form if vehicles don’t get enough green-light time. The more drivers are delayed, the more the game’s “frustration meter” rises. Sound effects and animation simulate cars honking and drivers’ fists shaking to illustrate the realistic results of backed-up traffic queues.

Exhibits, camps engage pre-college participants with hands-on learning

Over the last fiscal year, the Institute has staffed exhibits and participated in numerous classes and camps to introduce K–12 students to transportation and ITS-related fields of study.

On May 15, Institute director Max Donath provided a group of multicultural students from Patrick Henry High School in Minneapolis with a University-level class experience—an introduction to robotics.

In March, the ITS Institute participated in Irondale High School’s first Science, Technology, Engineering, and Math (STEM) Career Fair. Around 200 students and parents met with representatives from local companies, government agencies, and universities promoting STEM careers. Shawn Haag, program coordinator for CTS and the Institute, and Randy Newman, traffic engineer for the City of Eden Prairie (Minn.), staffed the exhibit.

The Institute was also an exhibitor at the National American Indian Science and Engineering Fair in St. Paul in March and provided a $2,000 travel grant to help several Native American students and their families attend.
The annual event, sponsored by the American Indian Science and Engineering Society, offers students in grades 5–12 the opportunity to compete for scholarships and prizes and encourages them to prepare for careers in science and technology-related fields.

For the second year in a row, the Institute participated in TechFest, a one-day event focusing on engineering. The event, which drew about 1,200 people, was held in February at “The Works” museum in Edina, Minn. The Institute’s exhibit focused on remote aerial vehicle research by Demoz Gebre-Egziabher of the aerospace engineering department. The Institute is providing funding for Gebre-Egziabher to develop autonomous or semi-autonomous aerial vehicles that can monitor traffic movements, detect disruptions, and perform a wide variety of other surveillance and monitoring tasks under both normal and emergency conditions. Children and their parents were intrigued by the prototype vehicle on display and talked with Institute staff about its capabilities.

The ITS Institute teamed up with CTS, the Minnesota Local Road Research Board, the Minnesota Local Technical Assistance Program, WTS Minnesota, and the Council of Supply Chain Management Professionals to put on the 14th annual Transportation Career Expo, held February 5 in Minneapolis. This year’s event featured a new, shorter format with a single general-session panel discussion. Speakers from the public and private sectors shared advice with the 82 students on transportation-related careers and offered tips and advice. Also new this year, each of the 20 exhibitors introduced themselves to the full group and said a few words about their organizations.

Over the winter, students at Patrick Henry High School got an extra lesson in the science of traffic management when program coordinator Shawn Haag visited the school to teach a curriculum unit on traffic engineering. Approximately 25 students from the 11th and 12th grades worked through curriculum developed by the ITS Institute as part of its outreach efforts to high school students. The curriculum unit is designed to teach students about fundamental traffic management issues with an intelligent transportation systems perspective.

“It was a very diverse group of students, and they all really dove into the curriculum,” says Haag, who coordinates outreach efforts to pre-college students, including school visits and student tours of transportation research facilities on the University of Minnesota campus.

About 75 students participating in the Fond du Lac Community College Summer Transportation Camp spent a day in July 2008 learning about traffic and transportation at the University of Minnesota. Each summer, the University hosts the group as part of an effort to educate young people about transportation.

The campers began their day with a lesson in traffic engineering as they tried out the STREET traffic signal control game (the predecessor of Gridlock Buster), followed by tours of Institute labs. CTS program coordinator Shawn Haag said the youth, who were between the ages of 11 and 18, seemed interested and excited about their day at the University. “The students really enjoyed learning about transportation technologies being researched at the U of M and they were energized throughout the entire time,” he said.

Also that summer, the Institute provided assistance and funding for a Technology Camp for middle school students organized by computer science professor Nikolaos Papanikolopoulos and his graduate students. (The camp was sponsored by the National Science Foundation’s Center for Distributed Robotics.) Kids from across the Twin Cities region came to the Minneapolis campus to engage in hands-on learning activities related to ITS applications, robotics, and other technology topics during the series of day camps.

The Institute partnered with CTS and the Institute of Technology Center for Educational Programs (ITCEP) to host the transportation portion of Exploring Careers in
Engineering and Physical Science, a day camp for high school students. Participants were given traffic engineering lessons centered on the STREET traffic control game. “It’s pretty cool,” said 15-year-old Taysha Martineau. “I’ve always wanted to see how [traffic control] really works.”

“We have a wide variety of kids who all understand transportation on a different level,” said camp chaperone Cameron Lindner. “Some of them have been here for a couple years so it’s cool for them to see the progress that the ‘U’ makes.” The campers also visited the ITS Institute’s Minnesota Traffic Observatory, where lab manager Ted Morris showed them the tools used to track traffic in the metro area.

According to CTS outreach and education services manager Stephanie Malinoff, the camp is a good way to help kids learn about the world of transportation. “The curriculum offers students a chance to get excited about engineering at an early age,” she said. “The simulation provides a real-world example of traffic engineering at work.” The long-term goal of the camp is to integrate curriculum into high school classrooms as part of an ongoing course and to increase the number of students enrolling in transportation engineering and ITS courses.

The Institute also hosted a tour and demo of current research technologies to students in the St. Cloud Summer Transportation Academy and students from Blaine High School Center for Engineering, Math and Science.