



Middle schoolers prepare for transportation-themed robotics competition on campus

More than 250 young science enthusiasts from across Minnesota converged on the University of Minnesota campus October 13 for a morning of educational workshops and tours of research facilities. The event, hosted by the Institute of Technology, CTS, and educational nonprofit organization High Tech Kids, was planned to help the students prepare for “Smart Move,” the 2009 FIRST LEGO League robotics competition.



Max Donath

The theme of this year’s competition is transportation. During the competition, students will be challenged to build small autonomous robots from a kit of more than 1,000 parts including LEGO pieces and other elements such as sensors, motors, and gears, and accomplish missions related to transportation.

Participants must also complete an eight-week research project in which they identify a transportation problem in their community and create an innovative solution.

The campus event began with an address by **Max Donath**, director of the Intelligent Transportation Systems Institute and professor of mechanical engineering. Donath highlighted a variety of transportation research projects under way at the University, including the Teen Driver Support System (TDSS) and driver-assistive technology that allows snowplow operators to stay on the road in low-visibility conditions.

The TDSS, which takes advantage of the Global Positioning System (GPS) and data-processing capabilities of cellular “smart-phones,” monitors a driver’s speed and location to warn of unsafe driving and can report violations to parents via a text message—features

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Researchers demonstrate next-generation bus; fleet planned for USDOT congestion relief program

The next generation of Twin Cities transit took center stage at the 2009 ITS Minnesota Fall Forum, as Intelligent Vehicles Laboratory (IV Lab) director **Craig Shankwitz** presented a driver-assistive system for buses operating on bus-only shoulders and bus lanes. The IV Lab is part of the Intelligent Transportation Systems (ITS) Institute, which is housed at CTS.



Craig Shankwitz

The annual event, sponsored by the Minnesota chapter of ITS America, brings together companies, transportation professionals, and researchers to exchange information on ITS projects around the state.

A fleet of 10 buses equipped with the new system is scheduled to go into service next year as part of a new effort to reduce

congestion and improve public transportation in the Twin Cities region. The high-tech “Bus 2.0” vehicles will be operated by the Minnesota Valley Transit Authority along the I-35W/Cedar Avenue commuting corridor that connects downtown Minneapolis and the southern suburbs. The technology developed by the IV Lab will help bus drivers operate safely on narrow bus-only highway shoulders.

The project is one of several strategies to reduce congestion in the Twin Cities that are being implemented with funding from the U.S. Department of Transportation’s Urban Partnership Agreement program. Minnesota is one of five states selected by the USDOT to receive funding under the program. Local UPA stakeholders include the Metropolitan Council, the Minnesota Department of Transportation, the City of Minneapolis, the University of

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CTS launches alumni newsletter

CTS published its first issue of *TAG-line*, an electronic newsletter of the Transportation Alumni Group at the University of Minnesota, in September.

The newsletter included two feature articles. The first discussed the contributions of **Connie Kozlak**,



Connie Kozlak

a participant in the alumni mentor program at the Hubert H. Humphrey Institute of Public Affairs for the past 15 years. Kozlak is manager of transportation planning at the Metropolitan Council and chair of the CTS Transportation Planning and the Environment Council. She was one of 12 University of Minnesota alumni who received the University’s Alumni Service Award on October 8 for their long-time service and legacy of volunteerism. The awards were presented at a celebration hosted by the University of Minnesota Alumni Association as part of Homecoming 2009.

The second article described the work of **Sandra Cullen**, assistant director for transportation systems design at the University, to plan parking and

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Landscape center receives award; faculty news

The University of Minnesota Center for Changing Landscapes (CCL) received the Federal Highway Administration's Environmental Excellence Award for its North Shore Scenic Byway work.



Mary Vogel

In 2005 the CCL completed a comprehensive North Shore All-American Road corridor master plan and interpretive plan to help stakeholders and communities make better-informed decisions about future activities, growth, and development. The goal is to ensure that future actions will be ecologically and culturally sustainable while enhancing the intrinsic resources and scenic character and experiences of the North Shore. The researchers collaborated with the North Shore Scenic Drive Council, the Arrowhead Regional Development Commission, the Minnesota Departments of Transportation and Natural Resources, and CTS.

Mary Vogel, a CTS Scholar and senior research fellow in the Department of Landscape Architecture, is the center's co-director along with **Alan Ek** of the Department of Forest Resources.



Tom Scott

CCL is a partnership between the College of Architecture and Landscape Architecture and the College of Natural Resources.

The award was submitted to the FHWA for consideration by **Scott Bradley**, landscape architecture chief in Mn/DOT's Office of Technical Support.

The collaborative master planning has already led to funding (including National Scenic Byway discretionary funding grants) and in-progress development of more than a half-dozen Mn/DOT cooperative wayside restoration, gateway marker, interpretive signing, and trail-head projects with byway partners.

In other faculty news, CTS Scholar **Tom Scott** is retiring in December after 47 years of distinguished service. Scott, who served as director of the Center for Urban and Regional Affairs (CURA) for more than 30 years, has been involved in a number of transportation-related projects, including current research under the Transitways Impacts Research Program.

William Craig, CURA associate director, will be inducted into the Geographic Information Council Hall of Fame. **CTS**

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that made it well-received by parents in the audience.

Donath also guided the assembled students through an explanation of GPS technology, which is key to many of the University's transportation-related research projects.

Following the keynote address, the students and nearly 100 parents and coaches dispersed across campus for workshops covering a variety of transportation-related topics.

Numerous faculty members, researchers, graduate students, and CTS staffers led workshops in their areas of expertise.

- Minnesota Traffic Observatory director **John Hourdos** led a tour of his lab and demonstrated equipment for traffic visualization and modeling, and civil engineering professor **Joseph Labuz** explained how soil and pavement materials influence road performance.
- Graduate student presenters included

Eddie Arpin (driver-assistive systems), **Jesse Purvey** (robotics and computer vision), **Bulent Mercan**, **Keith Palmer**, and **Roberto Piccinin** (bridges), **James Flaten** (returning to the Moon) and **Michael Scharenbroich** (rail corridor decision making).

- CTS program coordinator **Shawn Haag** and graduate student **David Glick** demonstrated Gridlock Buster, the ITS Institute's new online traffic control game, and CTS assistant director for education and outreach **Gina Baas** led a presentation on road safety that featured **SafeRoadMaps.org**, an interactive Web site developed by University of Minnesota researchers.

Other University units participating in the day's events included the Academic Health Center, the Humphrey Institute of Public Affairs, and the Departments of Aerospace Engineering and Mechanics,

Research Partnership Award: nominees sought

CTS is accepting nominations for the 2010 Research Partnership Award. The award honors research projects within the CTS program that have resulted in significant impacts on transportation. Criteria and submission instructions are in the enclosed form and on the Web.

An evaluation committee will review the nominations and recommend a winning partnership to the CTS acting director for approval. The award will be presented at the CTS annual awards ceremony on April 7, 2010.

Please submit your nomination to **Shawn Haag** of CTS by January 31. **CTS**

New research reports available

The enclosed insert lists research reports written by University researchers and published by CTS, Mn/DOT, the Minnesota Local Road Research Board, and other sponsors since August 2009. **CTS**

Civil Engineering, Computer Science and Engineering, and Mechanical Engineering.

The FIRST LEGO League is an international competition for elementary and middle school students. It is arranged by FIRST, an organization founded in 1989 to develop ways to inspire students in engineering and technology fields. Each year the contest focuses on a different real-world topic related to the sciences.

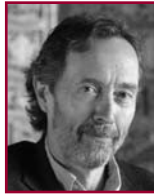
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Eddie Arpin described driver-assistive systems.

Researchers to create framework for measuring sustainable development

How a region grows and develops affects its transportation systems, economic health, environment, and quality of life. Currently, however, there are limited tools for understanding the impacts of various development policies. In a new study funded by the McKnight Foundation, a University team is conducting research and working with practitioners in the field to design a framework for measuring sustainable regional development.



Ed Goetz

Laurie McGinnis, CTS acting director, co-chairs the leadership of the effort with **Ed Goetz**, director of the University's Center for Urban and Regional Affairs. Members of the research team include assistant professors **Jason Cao**, **Yingling**

Fan, and **Carissa Schively Slotterback** and research manager **Kaydee Kirk** of the Hubert H. Humphrey Institute of Public Affairs.

The project is being guided by an advisory group made up of **Lee Sheehy** and **Eric Muschler** of the McKnight Foundation; **John Bailey** of 1000 Friends of Minnesota; **Caren Dewar** of the Urban Land Institute of Minnesota; **Jim Erkel** of the Minnesota Center for Environmental Advocacy; **Greg Lindsey** of the Humphrey Institute; **Lance Neckar** of the Department of Landscape Architecture; and **Will Schroeer** of Smart Growth America. (Dewar and Erkel are members of the CTS Executive Committee.)

The research team is also using focus groups and targeted interviews to reach out to other grantees, government officials, developers, and other interests to

incorporate a broad range of perspectives.

The goal of the project is to create a set of agreed-upon performance indicators and an initial set of performance measures. The team will also summarize data sources recommended for the performance measurement system and propose an analysis plan for development of baseline measures in 2010.

The McKnight Foundation, a Minnesota-based family foundation, seeks to improve the quality of life for present and future generations. In the Twin Cities region, this includes encouraging efficient development that creates livable communities and opportunities for all to thrive.

For more information, contact **Joe Barbeau** of CTS at 612-626-2862 or see www.cts.umn.edu/Research/Featured. **CTS**

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Minnesota, the Minnesota Valley Transit Authority, and Scott, Hennepin, Anoka, Dakota, and Ramsey Counties. (On September 28 state and federal leaders celebrated the opening of two new transit stations and the launch of a new MnPASS Express Lane on I-35W, elements of Minnesota's UPA.)

Forum attendees had a chance see how the system operates during the midday break. Shankwitz and research fellow **Eddie Arpin**, who developed a key component of the guidance system, welcomed visitors to a fully equipped bus parked outside and gave demonstrations of various onboard systems.

The driver-assistive system is intended to help bus operators use narrow bus-only shoulders and bus lanes. The Twin Cities has an extensive network of bus-only shoulders, which allow bus drivers to bypass congestion on the main roadway, especially during peak traffic hours when commuters crowd the roads. But operating a 9-foot-wide bus in a 10-foot-wide shoulder is inherently difficult, Shankwitz noted—especially during the winter, when drifting snow can obscure the lane boundaries, and at night.

The system keeps track of the bus's exact location down to a few centimeters using a combination of high-accuracy GPS, onboard sensors, and digital maps.

Forward-looking radar units and side-mounted laser scanners constantly track nearby vehicles. A head-up display, similar to those used in advanced military aircraft, projects lane boundaries and markers for other vehicles onto the driver's field of view, while a digital display shows vehicles alongside and behind the bus. The system also includes touch-based feedback mechanisms in the steering wheel and driver's seat that warn the operator if the bus begins to drift out of the shoulder lane.

By allowing bus drivers to use shoulder

lanes safely in inclement conditions, the driver-assistive system aims to improve bus schedule adherence—one of the most important factors for commuters on tight schedules, such as parents picking children up at day care centers, Shankwitz said.

In addition to better schedule adherence, another feature of Bus 2.0 likely to appeal to today's transit users is the onboard mobile wi-fi hotspot. The driver-assistive system requires a high-bandwidth connection to receive positioning data, but the system itself uses only a fraction of the available bandwidth—so the IV Lab researchers put the rest at the disposal of passengers, who will be able to check their e-mail, send files to the office, or just browse the Internet while they commute.

For more about the work of the IV Lab, see www.ivlab.umn.edu. **CTS**



A forum attendee views Bus 2.0 technology.

ITS Institute publishes annual report

The ITS Institute, directed by **Max Donath**, has published its 2008–2009 annual report. A PDF is available for download at www.its.umn.edu.

The previous two Institute annual reports received design awards from Graphic Design USA. **CTS**

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traffic flow for TCF Bank Stadium. Cullen and the University's athletics and traffic management staffs worked with city officials to mitigate traffic problems around the new stadium and get the message out about changes in traffic flow and parking availability.

The newsletter also shared highlights and photographs from two recent TAG events. On October 9 the group gathered at the McNamara Alumni Center before heading out for the Gopher football homecoming parade. Activities ended that evening with a pep fest at the new TCF Bank Stadium. The Alumni Group gave door prizes to several lucky winners. In August a dozen members and friends of the Alumni Group enjoyed an afternoon



Transportation alumni prepared for homecoming.

round of golf followed by social time.

To read the issue, please see www.cts.umn.edu/Education/Alumni/TAGline/2009/fall.

CTS initiated the Transportation Alumni Group in 2007 to provide University of Minnesota transportation-related alumni and friends ways to connect with each other, stay abreast of the latest news and research in transportation, sharpen professional skills, and participate in activities as part of the University community. The group has grown to about 80 members. Transportation is broadly defined, including disciplines ranging from engineering to plant biology.

If you're not already a member of the Alumni Group, CTS has made it easy for you to join (see www.cts.umn.edu/Education/Alumni/join). Graduates of other institutions and friends of the University are welcome to join. Joining also gives alumni and friends a venue to support current students by becoming a mentor or speaking to student groups.

The Alumni Group has assembled an advisory group to brainstorm ideas and help the organization grow. If you are interested, please contact **Stephanie Malinoff** of CTS at 612-624-8398, malinoff@umn.edu. **CTS**

Transportation Career Expo: exhibitors sought, registration under way

Students, employers, and professional organizations are encouraged to attend the annual Transportation Career Expo. The 2010 offering will be held March 2 from 4:30 to 7:15 p.m. at Coffman Memorial Union on the Minneapolis campus. Please see the enclosed form for details and registration information.

Companies and agencies are encouraged to set up exhibits at the expo, network with students and recent grads, and tell them about their organizations and job opportunities. The expo also offers an opportunity for professional organizations to reach out to students as potential members. A Call for Exhibits is enclosed with this *Report*. If your organization would like to participate, please register online by January 31.

For more information, contact **Shawn Haag** at 612-625-5608, haag0025@umn.edu. **CTS**

Upcoming events

To publicize your event, call CTS at 612-626-1077, fax 612-625-6381, or e-mail snopl001@umn.edu. Visit the CTS Web site—www.cts.umn.edu—for more comprehensive event information.

Nov. 23: Martin Olav Sabo Lecture

“Performance Driven: A New Vision for U.S. Transportation Policy,” hosted by the Humphrey Institute and CTS in cooperation with the Bipartisan Policy Center’s National Transportation Policy Project. See www.cts.umn.edu/Events/SaboLecture/2009.

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| Dec. 2 | Minnesota Association of Asphalt Paving Technologists’ Annual Asphalt Conference, Brooklyn Park. See www1.umn.edu/iree/e3/ . | Feb. 11 | 14th Annual Minnesota Pavement Conference, St. Paul. See www.terraroalliance.org/events . |
| Dec. 3 | Annual Concrete Conference, St. Paul. See www.cce.umn.edu/concrete . | March 2 | Transportation Career Expo, Minneapolis. See above. |
| Dec. 4 | Annual Freight and Logistics Symposium, Minneapolis. See www.cts.umn.edu/Events/FLOGSymposium . | March 3 | 54th Annual Asphalt Contractors’ Workshop/Quality Initiative Workshop, Brooklyn Center. See www.asphaltisbest.com/calendar.asp . |
| | | March 18–19 | Concrete Paving Association of Minnesota 49th Annual Concrete Paving Workshop, Breezy Point, Minn. See www.concreteisbetter.com . |
| | | Apr. 20–21 | Spring Maintenance Training Expo, St. Cloud. See www.mnltap.umn.edu/Events/SpringMaintenanceExpo . |
| | | Apr. 27–28 | 21st Annual CTS Transportation Research Conference, RiverCentre, St. Paul. CTS |