

CENTER FOR TRANSPORTATION STUDIES

Center for Transportation Studies

Annual Report 2009


UNIVERSITY OF MINNESOTA

Center for Transportation Studies

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(bottom). John Weeks: p. 8 (bottom). Faculty, staff, and students

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Center for Transportation Studies

2009 Annual Report

This publication contains highlights of transportation research, education, and outreach activities conducted by the Center for Transportation Studies and its affiliated programs for the period July 2008 through June 2009 (fiscal year 2009).

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Director's Message

The year 2009 was one of transition for transportation, and for CTS.

At the federal level, work was under way to replace SAFETEA-LU, the 2005 surface transportation funding bill. The new legislation is expected to be transformational, charting new directions in funding and finance and many other areas.

In Minnesota, policymakers prepared for the bill's impacts and continued the search for solutions to long-range funding needs. CTS provided resources to inform these discussions: for example, we coordinated an interdisciplinary study of "value capture" as a potential finance mechanism, and we hosted events about funding and finance. University leaders Max Donath and Lee Munnich also served as expert advisors for a national research investigation of mileage-based user charges.

SAFETEA-LU's successor is also expected to move toward a performance-based approach, offering states more flexibility than today's prescriptive federal program but requiring them to develop strategic plans and report achievements. Our Access to Destinations Study, scheduled to conclude in 2010, will provide new data and tools to help Minnesota leaders measure performance, develop policies and strategies, and make transportation investment decisions.

Within CTS, the change was more personal. Robert Johns, CTS director since 2001, accepted an offer from the U.S. Department of Transportation to be director of the Volpe National Transportation Systems Center in Cambridge, Massachusetts. Staff and supporters gathered at a farewell ceremony on September 21, 2009, to thank Bob for his years of leadership and commitment to CTS, to the University of Minnesota, and to innovative transportation research.

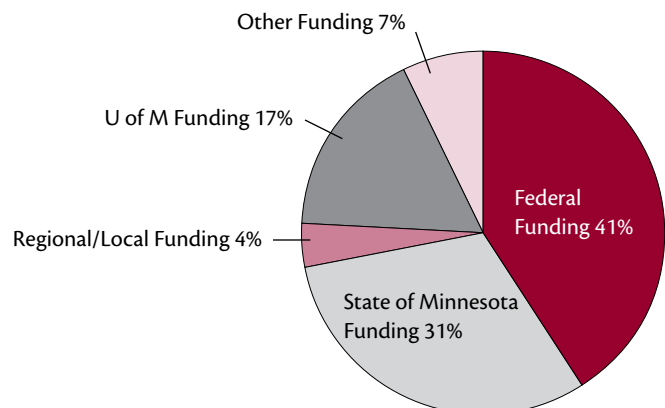
I was honored to be named acting director of CTS. As the University proceeds with a search for Bob's successor, it is clear there is a strong desire from many organizations for CTS to continue its growth and success. I look forward to working with you during this time of transition to carry on our programs and services and to build on the strong legacy that Bob leaves behind.



Laurie McGinnis

Laurie G. McGinnis
Acting Director

FY09 CTS Revenues



Research



The Hiawatha light-rail transit line runs from Minneapolis to a southern suburb.

www.cts.umn.edu/Research

FY09 research sampler

Value capture for transportation investment

Eight “value capture” strategies could help Minnesota pay for transportation infrastructure projects, according to the findings of an interdisciplinary study led by CTS.

In 2008 the state legislature commissioned CTS to study value capture as a potential finance mechanism. Value capture is a type of infrastructure financing in which increases in private land values generated by public investment are in part “captured” to help pay for infrastructure projects.

Lead investigators were David Levinson, the Braun/CTS Chair in Transportation Engineering; Zhirong (Jerry) Zhao, assistant professor in the Hubert H. Humphrey Institute of Public Affairs; and Adeel Lari, research fellow in the Humphrey Institute's State and Local Policy Program. The team also included Michael Iacono, a research fellow in the Department of Civil Engineering, and a number of graduate students.

The study identified eight value capture strategies for consideration: land value tax, tax increment financing, special assessments, transportation utility fees, development impact fees, negotiated exactions, joint development, and air rights. Some of the strategies target property owners, while others target developers. The strategies differ in how, when, and where they may be applied, and they also give different outcomes. Statutory changes would be needed to use some of them in Minnesota.



Mileage-based road user fees

Researchers in the Intelligent Transportation Systems (ITS) Institute proposed a system for charging mileage-based road user fees that could be implemented in the near term. Such fees are considered a potentially viable alternative to motor-vehicle fuel taxes for funding transportation.

The research was conducted by Max Donath, director of the ITS Institute; Craig Shankwitz, director of the Intelligent Vehicles Laboratory, which is part of the ITS Institute; and researchers Alec Gorjestani, Richard Hogle, Eddie Arpin, PiMing Cheng, Arvind Menon, and Bryan Newstrom.

The system can be plugged into technology already under the dashboard of roughly 90 percent of the current vehicle fleet. It communicates with cell phone towers, so no new wireless infrastructure is needed. And its independence from GPS means no location data are collected, alleviating privacy concerns.

In related work, Donath and Lee Munnich, director of the State and Local Policy Program at the Humphrey Institute of Public Affairs, served as expert advisors in a project that looked at strategies for shifting from fuel taxes to direct usage-based charges. The project, funded by the National Cooperative Highway Research Program, identified a range of alternative mileage-based fee mechanisms that could be implemented immediately in selected locations and fully deployed nationally before the end of 2015. RAND Corporation, working under ICF International, led the research team.

➤ Transitway impacts

Housing construction has grown significantly next to the Hiawatha light-rail transit (LRT) corridor, and the line attracts riders who depend on transit as well as those who use it by choice. These are some of the findings from the first two projects of the Transitway Impacts Research Program.

Professor Ed Goetz, director of the Center for Urban and Regional Affairs, examined the residential property values, housing mix, and land uses on the corridor, which runs from Minneapolis to a southern suburb. He found a significant amount of new housing construction next to the Hiawatha Line—183 percent more than would be expected based on the control area. The area along the Hiawatha Line realized an increase of \$47.1 million in residential property value between 2004 and 2007.

Assistant Professor Jason Cao of the Humphrey Institute evaluated transportation impacts from transitway investments, such as the type and mix of riders attracted by investment. He learned that the Hiawatha LRT has a much broader influence on the regional transportation network than local buses and express services.

The Transitway Impacts Research Program is intended to answer questions about the economic, travel, and community impacts of transitway corridors in the Twin Cities metropolitan area. The program was launched in 2006 by the Hennepin County–University of Minnesota partnership and has grown to include a mix of University, local, regional, and state partners.



Housing along the Hiawatha light-rail transit line

➤ Access to Destinations

Access to Destinations Study researchers came closer to completing a picture of the relationship between land use and accessibility in the Twin Cities region.

One team, under the direction of study co-leader David Levinson of the civil engineering department, used data on regional land use over the last 50 years to develop models of land use changes and their interactions with the growing transportation system.

Another team, led by study co-leader Kevin Krizek (now at the University of Colorado, formerly with the Humphrey

Institute), created a new high-resolution dataset of land uses using data on individual land parcels; the team incorporated this dataset into a geographic information system (GIS) layer that will aid in the development of an “accessibility matrix” covering the entire region.

Access to Destinations is an interdisciplinary research and outreach effort coordinated by CTS, with support from sponsors including the Minnesota Department of Transportation, Hennepin County, the Metropolitan Council, and the McKnight Foundation.

➤ Driver-assistive technologies for bus rapid transit

Researchers in the ITS Institute are instrumenting 10 Minnesota Valley Transit Authority buses with driver-assistive technologies for bus rapid transit service on one of the area’s most important commuter routes, the I-35W/Cedar Avenue corridor linking downtown Minneapolis to the southern suburbs. The team is also using a state-of-the-art simulator to train drivers to use the technology.

The project is part of Minnesota’s efforts to improve the performance of its transportation system under the U.S. Department of Transportation’s Urban Partnership Agreement (UPA) program. In June 2008, the federal agency selected Minnesota to receive \$133.5 million under the program to fund a variety of innovative congestion reduction measures along the corridor.

The research team is led by Craig Shankwitz, director of the Intelligent Vehicles Laboratory; Michael Manser, director of the HumanFIRST Program; and Max Donath, director of the ITS Institute.

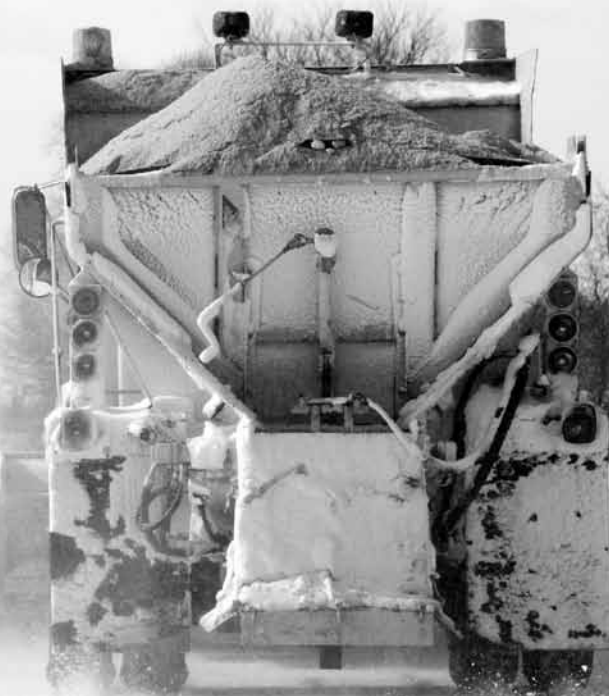


A visitor (seated) learns about driver-assistive bus technology from Craig Shankwitz.

In FY09, 55 different sponsors and sources provided more than \$14 million for transportation research.

➤ Effects of deicing salt on water quality

Researchers from the civil engineering department’s St. Anthony Falls Laboratory studied the environmental effects of deicing salt on water quality in the Twin Cities area and found higher-than-expected salinity in a number of local lakes and shallow groundwater aquifers. The study’s final report recommends that policymakers give serious consideration to measures that will mitigate the effects of salt in runoff, including changing how road salt is used, routing runoff away from lakes and groundwater recharge areas, and collecting and treating highly salinated runoff. The research, by Professor Heinz Stefan, Eric Novotny, Andrew Sander, and Omid Mohseni, was funded by the Minnesota Local Road Research Board.



Deployment and implementation



The SMART-Signal system has been installed in Edina, Minnesota (above), and on Trunk Highway 55.

➤ Traffic signal performance

A traffic signal performance measurement technology (SMART-Signal) developed by Assistant Professor Henry Liu of the Department of Civil Engineering was deployed by Mn/DOT at six intersections on Trunk Highway 55 to collect and archive traffic signal data, intersection queue length, and arterial travel time estimation. The University is in the patent application process to protect the intellectual property. Liu's team has also received a grant from the National Cooperative Highway Research Program to extend its work on SMART-Signal. In addition, the system is being used as an education module in a civil engineering course at the University. (The project won the 2009 CTS Research Partnership Award; see page 25.)

➤ Others

- Researchers in the Minnesota Traffic Observatory, led by director John Hourdos, designed a traffic simulation tool that will allow park managers to make informed decisions about vehicle trip limits in Denali National Park, Alaska.
- The St. Louis County, Minnesota, Highway Department is using nondestructive bridge evaluation equipment and procedures recommended by Brian Brashaw of the University of Minnesota Duluth Natural Resources Research Institute, based upon University research results.
- Mn/DOT District 4 has applied a new procedure of survey analysis for quantifying the distribution of invasive weed species in roadway rights-of-way. Professor John Nieber of the Department of Bioproducts and Biosystems Engineering developed the procedure.
- Cities and counties are implementing visual inspection methods developed by Professor John Gulliver during the research project "Water Quality Performance of Dry Detention Ponds." The work provided content for a workshop to train inspectors on visual inspection of ponds.
- Mn/DOT implemented a new procedure for prototype simulation models of median-crossing crashes developed by Professor Gary Davis of the Department of Civil Engineering.



Researchers designed a simulation tool to help park managers in Denali National Park.

- The City of Maplewood, Minnesota, implemented a design practice that uses spatial organization of street-tree master plans, best-species selection practices, siting decisions, and site preparation methods developed during an initiative led by Extension Professor Gary Johnson of the Department of Forest Resources.

Notable awards/grants received in FY09

Stream-restoration structures

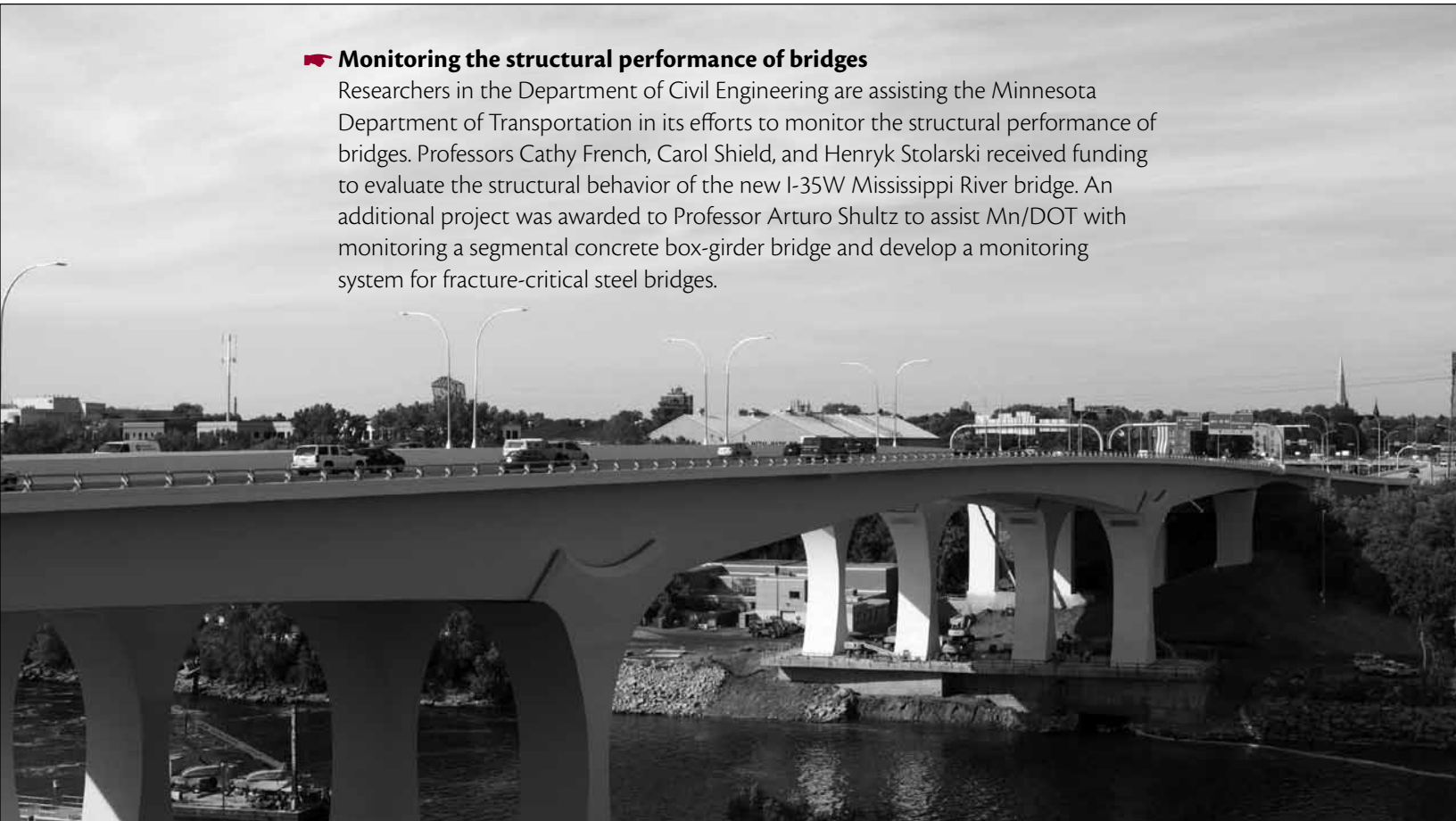
Fotis Sotiropoulos, director of the St. Anthony Falls Laboratory (SAFL) in the Department of Civil Engineering, secured a three-year, \$600,000 grant from the National Cooperative Highway Research Program to develop design methods for stream-restoration structures. Research associates Anne Lightbody and Omid Mohseni and Professor Panayiotis Diplas (Virginia Tech) were co-investigators in this project proposal. Efforts to stabilize and restore streams and rivers across the nation have grown dramatically, with more than \$1 billion spent every year since 1990. Results from the study will be incorporated into comprehensive quantitative engineering guidelines.



The SAFL outdoor StreamLab in Minneapolis

Monitoring the structural performance of bridges

Researchers in the Department of Civil Engineering are assisting the Minnesota Department of Transportation in its efforts to monitor the structural performance of bridges. Professors Cathy French, Carol Shield, and Henryk Stolarski received funding to evaluate the structural behavior of the new I-35W Mississippi River bridge. An additional project was awarded to Professor Arturo Shultz to assist Mn/DOT with monitoring a segmental concrete box-girder bridge and develop a monitoring system for fracture-critical steel bridges.



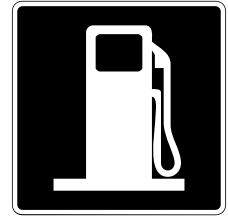
👉 Low-temperature cracking in pavements

Researchers in the Department of Civil Engineering received a grant for the second phase of an investigation of low-temperature cracking in asphalt pavements. Associate Professor Mihai Marasteanu is serving as the principal investigator for the work, with professors Joe Labuz and Henryk Stolarski as co-investigators. The research, in cooperation with three other Midwest universities, is supported by Mn/DOT and other state transportation pooled funds.



👉 Low-carbon fuel policy

CTS was part of an interdisciplinary research team that secured a grant from the Minnesota Department of Commerce's Office of Energy Security to investigate economic and environmental implications of instituting a low-carbon fuel policy. The team, led by Associate Professor Steve Taff from the Department of Applied Economics, consists of faculty and students from Applied Economics, Bioproducts and Biosystems Engineering, the Humphrey Institute of Public Affairs, and Mechanical Engineering.



👉 Traveler behavior

A multidisciplinary research team secured funding from the National Science Foundation and Mn/DOT to study traveler behavior in the wake of the I-35W bridge collapse. The team included expertise in transportation networks and traffic management from Associate Professor David Levinson, the Braun/CTS Chair in Transportation Engineering, and assistant professors Henry Liu and Nikolas Geroliminis of the Department of Civil Engineering, along with contributions in human factors from Kathleen Harder, director of the Center for Design in Health of the College of Design.

Photo used with permission. © John Weeks



Researchers studied traveler behavior after the I-35W bridge collapse.

Research reports published in FY09

Seventy-three research reports by University researchers were published in FY09. A few are highlighted below; see www.cts.umn.edu/Research for more.

Transportation and the Economy

- *College and University Campuses in Greater Minnesota as Traffic Generators* (CTS 09-17)
- *Advanced Acquisition of Right-of-Way: Best Practices and Corridor Case Studies* (Mn/DOT 2009-07)

Transportation Safety and Traffic Flow

- *Generational Perspective on Teen and Older Drivers on Traffic Safety in Rural and Urban Communities* (Mn/DOT 2008-36)
- *Development of Real-Time Traffic Adaptive Crash Reduction Measures for the Westbound I-94/35W Commons Section* (CTS 08-28)

Transportation Infrastructure

- *Effects of Seasonal Changes on Ride Quality at MnROAD* (Mn/DOT 2008-23)
- *Self-Compacting Concrete for Prestressed Bridge Girders* (Mn/DOT 2008-51)

Transportation Planning and the Environment

- *The Impact of Bicycling Facilities on Commute Mode Share* (Mn/DOT 2008-33)
- *Production and Wind Dispersal of Canada Thistle Achenes* (Mn/DOT 2008-39)



The number of media stories referencing U of M transportation research more than doubled in FY09.

Researchers



Associate Professor David Levinson with research assistants Pavithra Parthasarathi and Shanjiang Zhu at the base of the new I-35W bridge

www.cts.umn.edu/FacultyStaff

CTS Faculty and Research Scholars Program

CTS works with CTS Faculty and Research Scholars from a variety of University of Minnesota departments to address transportation issues. Scholars have joint appointments at CTS as well as in their own departments. Learn more about CTS Faculty and Research Scholars at www.cts.umn.edu/Scholars.

2009 Faculty and Research Scholars

Bridge Engineering



Catherine French
Professor,
Civil Engineering



Shashi Shekhar
Professor,
Computer Science and
Engineering



Zhirong (Jerry) Zhao
Assistant Professor,
Humphrey Institute of
Public Affairs



Kathleen Harder
Director, Center for Design
in Health, College of
Design



Arturo Schultz
Professor,
Civil Engineering



Economics and Management

Saif Benjaafar
Professor, Mechanical
Engineering



Environmental Impacts

David Biesboer
Professor,
Plant Biology



Michael Manser
Director,
HumanFIRST Program,
ITS Institute



Carol Shield
Professor,
Civil Engineering



Karen Donohue
Associate Professor,
Operations and
Management Sciences,
Carlson School of
Management



John Gulliver
Professor,
Civil Engineering



**Michael (Mick)
Rakauskas**
Research Fellow,
HumanFIRST Program,
ITS Institute

Data Systems



Taek Kwon
Professor,
Electrical and Computer
Engineering (Duluth)



Jerry Fruin
Associate Professor,
Applied Economics



Julian Marshall
Assistant Professor,
Civil Engineering



Pavement Engineering

Michael Darter
Director,
Pavement Research
Institute



Chen-Fu Liao
Educational Systems
Manager, Minnesota
Traffic Observatory,
ITS Institute



Diwakar Gupta
Professor,
Mechanical Engineering



Bruce Wilson
Professor,
Bioproducts and
Biosystems Engineering



Bojan Guzina
Shimizu Professor, Civil
Engineering



Vassilios Morellas
Director,
Safety, Security, and Rescue
Research Center, Computer
Science and Engineering



Alfred Marcus
Professor,
Carlson School of
Management



Human Factors

John Bloomfield
Research Associate,
Center for Design in
Health, College of Design



Lev Khazanovich
Associate Professor,
Civil Engineering



**Nikolaos
Papanikolopoulos**
Professor,
Computer Science and
Engineering



Gerard McCullough
Associate Professor,
Applied Economics



Janet Creaser
Research Fellow,
HumanFIRST Program,
ITS Institute



Joseph Labuz
Professor,
Civil Engineering



Mihai Marasteanu
Associate Professor,
Civil Engineering

Transportation Planning and Policy



John Adams
Professor Emeritus and
Co-Director, University
Metropolitan Consortium



Adeel Lari
Research Fellow,
State and Local Policy
Program, Humphrey
Institute of Public Affairs



Ignacio San Martin
Dayton Hudson Chair
of Urban Design and
Director, Metropolitan
Center, College of Design



Derek Tompkins
Associate Director,
Pavement Research
Institute



Jason Cao
Assistant Professor,
Humphrey Institute of
Public Affairs



Lee Munnich
Senior Fellow and Director,
State and Local Policy
Program, Humphrey
Institute of Public Affairs



Mary Vogel
Senior Research Fellow
and Director,
Center for Changing
Landscapes, College of
Design

Traffic Engineering and Management



Gary Davis
Professor,
Civil Engineering



Frank Douma
Assistant Director,
State and Local Policy
Program, Humphrey
Institute of Public Affairs



**Carissa Schively
Slotterback**
Assistant Professor,
Humphrey Institute of
Public Affairs



Vehicle Design and Fuels

Max Donath
Professor and Director,
Intelligent Transportation
Systems (ITS) Institute



**Demoz Gebre-
Egziabher**
Associate Professor,
Aerospace Engineering
and Mechanics



Yingling Fan
Assistant Professor,
Humphrey Institute of
Public Affairs



Ingrid Schneider
Professor and Director,
Tourism Center, Forest
Resources



David Kittelson
Professor,
Mechanical Engineering



John Hourdos
Director,
Minnesota Traffic
Observatory, ITS Institute



Ed Goetz
Professor and Director,
Center for Urban and
Regional Affairs



Thomas M. Scott
Professor and Director
Emeritus, Center for
Urban and Regional
Affairs



Rajesh Rajamani
Professor,
Mechanical Engineering



Eil Kwon
Director, Northland
Advanced Transportation
Systems Research
Laboratories, ITS Institute



Michael Iacono
Research Fellow, Civil
Engineering



Elizabeth Wilson
Assistant Professor,
Humphrey Institute of
Public Affairs



Craig Shankwitz
Director,
Intelligent Vehicles
Laboratory, ITS Institute



David Levinson
Braun/CTS Chair
in Transportation
Engineering,
Civil Engineering



Keith Knapp
Director of Transportation
Safety Engineering,
Center for Excellence in
Rural Safety, Humphrey
Institute of Public Affairs



Lance Neckar
Professor,
Landscape Architecture,
College of Design

Transportation and Urban Design



Henry Liu
Assistant Professor,
Civil Engineering

New faces

Seven principal investigators participated in the CTS research program for the first time: Yingling Fan and Keith Knapp (Humphrey Institute of Public Affairs); Gary Wyatt (University Extension); Roberto Ballarini (Civil Engineering); Carolyn Hayes (Mechanical Engineering); M. Imran Hayee (UMD Electrical and Computer Engineering); and Venkatram Mereddy (UMD Chemistry).



Panos Michalopoulos
Professor,
Civil Engineering

Awards & honors

Civil engineering professor Panos Michalopoulos received the 2007 IEEE Outstanding Intelligent Transportation Systems Application Award for his development of Autoscope,[™] a video detection sensor. The award was presented at the 2008 IEEE Conference on ITS.

Yingling Fan of the Humphrey Institute was a recipient of the Transportation Research Board's Patricia F. Waller award, recognizing outstanding papers in the field of safety and systems users.

Carissa Schively Slotterback of the Humphrey Institute and

Julian Marshall of the Department of Civil Engineering participated in the first cohort of resident fellows at the University of Minnesota's Institute on the Environment. Marshall was also a recipient of a 2009 McKnight Land-Grant Professorship.

Heinz Stefan, professor in the Department of Civil Engineering, was the recipient of the Environmental Leadership Award from the Freshwater Society. Stefan recently completed a study titled "Environmental Effects of Deicing Salt on Water Quality in Minnesota" (see page 5).

Affiliated faculty and research staff

Aerospace Engineering and Mechanics

Demoz Gebre-Egziabher*
William Garrard
Yiyuan Zhao

Agronomy and Plant Genetics

Roger Becker
Nancy Ehlke
Donald Wyse

Applied Economics

Jerry Fruin*
William Gartner
Gerard McCullough*
Tom Stinson
Douglas Tiffany

Biosystems and Agricultural Engineering

Jonathan Chaplin
John Nieber
Gary Sands
Bruce Wilson*

Carlson School of Management

Fred Beier
Karen Donohue*
Alfred Marcus*
Mahmood Zaidi

Child Development

Herbert Pick
Albert Jonas

Civil Engineering

Roberto Ballarini
Randal Barnes
Paul Bergson
Gary Davis*
Andrew Drescher
Cathy French*
Ted Galambos
John Gulliver*
Bojan Guzina*
Kimberly Hill
Miki Hondzo

John Hourdos*

Mike Iacono*
Lev Khazanovich*
Joseph Labuz*
David Levinson*
Chen-Fu Liao*

Henry Liu*
Mihai Marasteanu*
Bernadette Marion
Julian Marshall*
Panos Michalopoulos*
Ted Morris
Arturo Schultz*
Carol Shield*
Gene Skok
Karl Smith
Henryk Stolarski
Vaughan Voller

College of Design

John Bloomfield*
John Carmody
Kathleen Harder*
Lance Neckar*
Ignacio San Martin*
Robert Sykes
Mary Vogel*

Computer Science and Engineering

Mats Heimdahl
Ravi Janardan
Vassilios Morellas*
Nikolaos Papanikolopoulos*
Shashi Shekhar*
Jim Slagle
Richard Voyles

Economics

Patrick Bajari

Electrical and Computer Engineering

Vladimir Cherkassky
Ahmed Tewfik

Forest Resources

Ingrid Schneider

Geography

Francis Harvey
Rod Squires

Horticulture Science

Susan Galatowitsch

Humphrey Institute of Public Affairs

John Adams*
Richard Bolan
John Bryson
Jason Cao*
Barbara Crosby
Frank Douma*
Yingling Fan*
Ed Goetz*
Tom Horan
Keith Knapp*
Adeel Lari*
Greg Lindsey
Lee Munnich*
Emily Saunoi-Sandgren
Carissa Schively Slotterback*
Melissa Stone
Elizabeth Wilson*
Zhirong (Jerry) Zhao*

Kinesiology

Mary Jo Kane
Thomas Smith
Michael Wade

Law School

Stephen Simon

Mechanical Engineering

Lee Alexander
Ensar Becic
Saifallah Benjaafar*
Pi-Ming Cheng
Janet Creaser*
Max Donath*
William Durfee
Peter Easterlund
Alec Gorjestani

Justin Graving
Diwakar Gupta*
David Kittelson*
Perry Li
Michael Manser*
Arvind Menon
Bryan Newstrom
Rajesh Rajamani*
Mick Rakauskas*
Craig Shankwitz*
Patrick Starr

Pavement Research Institute

Mike Darter*
Derek Tompkins*

Plant Biology

David Biesboer*
Iris Charvat

Public Health

Judith Garrard

St. Anthony Falls Laboratory

Jeff Marr
Omid Mohseni
Peter Weiss

Soil, Water and Climate

Paul Bloom
Peter Graham
Satish Gupta
Thomas Halbach
Mark Seeley
Dong Wang

Urban and Regional Affairs

William Craig
Ed Goetz*
Thomas Scott*

Wood and Paper Science

Bob Seavey

University of Minnesota – Duluth

Chemistry and Biochemistry
John Evans

Civil Engineering

Eil Kwon*

Computer Science

Carolyn Crouch
Donald Crouch
Richard Maclin
Peter Willemsen

Electrical and Computer Engineering

Stanley Burns
Mohammed Hasan
Taek Kwon*
Hua Tang
Jiann-Shiou Yang

Geography

Stacey Stark

Mathematics and Statistics

Zhuangyi Liu
Harlan Stech

Mechanical/Industrial Engineering

Robert Feyen
Richard Lindeke
Ryan Rosandich
Xun Yu

Natural Resources Research Institute (NRRI)

Brian Brashaw
Kurt Johnson
Ron Moen
Gary Niemi
Lawrence Zanko

Physics

Michael Sydor

University of Minnesota – Morris

Division of Social Sciences
Stephen Burks

* CTS Faculty and Research Scholars as of November 2009

Education



ITS Institute director Max Donath, center, gave Patrick Henry High School students an introduction to robotics.

www.cts.umn.edu/Education

K-12

👉 Traffic engineering curriculum

The Intelligent Transportation Systems (ITS) Institute developed and piloted a traffic engineering curriculum for use with high school students. The curriculum, focused around a Web-based traffic control game named “Gridlock Buster,” has allowed staff to connect with students at University of Minnesota summer camps, Patrick Henry High School, and Mounds Park Academy.

Gridlock Buster lets students try their hand at working in the engineering and transportation fields. The game is based on work by Chen-Fu Liao, the Institute’s senior systems engineer and staff member in the Department of Civil Engineering. Gridlock Buster was featured in local media.



A screen shot from Gridlock Buster



CTS program coordinator Shawn Haag shows the remote aerial vehicle to Tech Fest visitors.

👉 Tours and exhibits

Over the last fiscal year, CTS staffed exhibits and participated in numerous classes and camps to introduce K–12 students to transportation and transportation-related fields of study. For example, CTS developed an exhibit for The Works Tech Fest event in Edina, Minnesota, for young children and adults. It showcased an uninhabited aerial vehicle prototype developed by Demoz Gebre-Egziabher, associate professor in the Department of Aerospace Engineering and Mechanics. More than 1,500 students and parents visited the exhibit.

Undergraduate and graduate students

👉 Interdisciplinary Transportation Student Organization

CTS assisted the Interdisciplinary Transportation Student Organization (ITSO) in planning its Fifth Annual Student Transportation Conference. Six students presented during the morning event, which concluded with remarks from Khani Sahebjam, deputy commissioner and chief engineer at Mn/DOT. ITSO, which has grown to more than 110 students since its formation in 2003, also sponsored periodic campus and field trip events.

👉 CTS student affiliates

A total of 154 undergraduate and graduate students participated in CTS research programs. The number of student affiliates held steady this year, reflected in the stability of the number of funded research projects on which these students work.

👉 Graduate Certificate in Transportation Studies

Enrollment in the Graduate Certificate in Transportation Studies Program continues to be strong, meeting the target of 20 students set by the Graduate School. CTS works with advisors in the civil engineering department and the Humphrey Institute of Public Affairs to ensure their transportation students are enrolled in the program. The program had five graduates in FY09: Reuben Collins, Ryan Gaug, Thomas More, Tyler Patterson, and Ryan Wilson.

The program also restructured its core course structure to include logistics classes. The new track, Engineering/Logistics, incorporates industrial engineering courses from the University's new Program in Industrial and Systems Engineering.

Student awards

👉 Huber and Adams Excellence in Transportation Awards

CTS revised its annual graduate award to provide additional recognition opportunities for exceptional students. Awards are now presented in two categories: the Matthew J. Huber Award, honoring students in engineering, science, and technology fields, and the new John S. Adams Award, honoring students in policy and planning fields. The Huber Award is named in honor of the late Professor Emeritus Matthew J. Huber (civil engineering); the Adams Award honors Professor Emeritus John Adams (geography, public affairs), a significant contributor to transportation-related research, education, and outreach activities.

Matthew J. Huber Award: Two students received awards this year. Shan Hu, advised by Xun Yu, 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. This project was one of four national finalists in the Third Collegiate Student Safety Technology Design Competition.

Evan Ribnick, advised by Nikolaos Papanikolopoulos, 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.



Gina Baas, Shan Hu, and Xun Yu



Gina Baas, Evan Ribnick, and Nikolaos Papanikolopoulos

John S. Adams Award: One student received the 2009 Adams Award: Katie Roth, a candidate in the Master of Urban and Regional Planning Program at the Humphrey Institute of Public Affairs. Her research, advised by Lee Munnich, focused on innovative parking pricing and public attitudes toward congestion pricing and other transportation finance mechanisms. She served as president of the University's Interdisciplinary Transportation Student Organization in 2007–08.



Lee Munnich, Katie Roth, and John Adams

ITS Institute Student of the Year

The U.S. Department of Transportation's Research and Innovative Technology Administration presents an outstanding student of the year award to each of its University Transportation Centers (UTCs). The recipient of the 2008 award to Minnesota's UTC, the ITS Institute, was Eddie Arpin. Arpin's master's thesis research focused on developing a vehicle-positioning system to work in urban environments. He was advised by ITS Institute director Max Donath.



ITS Institute student of the year Eddie Arpin (far right) receives the award from the USDOT's Paul Brubaker, former U.S. Secretary of Transportation Norman Mineta, and CUTC president Randy Machemehl.

Eno Fellow

The Eno Transportation Foundation named Katie Roth a 2009 Eno Fellow. She is one of 20 students selected nationally by Eno, a nonprofit charitable foundation dedicated to improving all modes of transportation. Roth was nominated by her advisor, Lee Munnich of the Humphrey Institute.

Travel Awards

- | | |
|------------------------|----------------|
| Sundeep Bhimoreddy | Patrick Phenow |
| Fay Cleaveland | Katie Roth |
| Xuan Di | Jory Schwach |
| Kyle Hoegh | Jie Sun |
| Feili Hong | Mugur Turos |
| Heng Hu | Brad Utecht |
| Kate Ko | Raul Velasquez |
| Dustin Kuchera | Hui Xiong |
| Jason Lim | Shanjiang Zhu |
| Pavithra Parthasarathi | |

Professional development

Technical assistance

The Minnesota Local Technical Assistance Program (LTAP), housed at CTS, honored 23 students who acquired the necessary credits to complete the Roads Scholar Program in 2008. More than 2,400 students are enrolled in the Roads Scholar Program, a structured curriculum of training options.

Minnesota LTAP and its associated programs, such as the mobile Circuit Training and Assistance program, served nearly 9,000 participants and provided 153 sessions, workshops, and seminars.

The Airport Technical Assistance Program (AirTAP), also

housed at CTS, produced two resources for small airports. *The Guidebook for Managing Small Airports*, published by the Transportation Research Board's Airport Cooperative Research Program, is designed to help operators and managers of small airports find resources and identify techniques to meet their responsibilities. *Agricultural Aircraft Operations on Municipal Airports* provides information to help municipal airport managers better understand and work with agricultural spraying operations. AirTAP and several partners updated the guide.



Mn/DOT commissioner Tom Sorel (far left) joined Minnesota LTAP director Jim Grothaus (second from left), LTAP coordinator Mindy Carlson (far right), and CTS acting director Laurie McGinnis (third from right) to congratulate 2008 Roads Scholars.

Customized training

Truck-Weight Compliance: CTS coordinates about 15 offerings each year of the Minnesota Truck-Weight Compliance workshop. In its eighth year, the program has educated more than 4,000 people. The program's goal is to promote voluntary compliance by the trucking industry to reduce damage to public roads. It is funded by the Minnesota Local Road Research Board (LRRB) and the Mn/DOT Office of State Aid for Local Transportation.

Flexible Design for 21st Century Challenges: State departments of transportation are turning to "flexible design" as a solution to a number of transportation challenges. Approaches to flexible design vary widely and are sometimes referred to as context-sensitive solutions, smart transportation, practical design, or practical solutions. To help plan its next steps in this direction, Mn/DOT held the "Flexible Design for 21st Century Challenges" forum in February. CTS conducted the event.

CTS managed a number of other customized training courses for Mn/DOT. Topics included cost estimating, public participation, project management, and utility coordination.



Seminars

The CTS Seminar Series featured presentations on topics as diverse as hybrid electric generators and transit fare collection. Seminars are broadcast live on the Web and are available for later viewing. The series combines the following seminars:

- CTS Research Seminars, held as part of CTS research council meetings
- Advanced Transportation Technologies Seminars, sponsored by the ITS Institute each fall semester

Each seminar qualifies for one professional development hour, and degree credit is available for ITS Institute seminars. CTS also became a provider of certification maintenance credits for American Institute of Certified Planners certification.

Alumni group

The CTS Transportation Alumni group held its first networking event: a homecoming football game tailgate. Alumni attended a breakfast celebration, watched the homecoming parade, and attended the football game. An Alumni Group Advisory Board was also created and held its first meeting.



University alumni Mike and Cheri Marti with Goldy Gopher

Outreach and Public Engagement



Attendees listen to Oliver Carsten (at podium) during the CTS Winter Luncheon.

www.cts.umn.edu/Events
www.cts.umn.edu/Publications
www.cts.umn.edu/LibraryServices

Events

👉 Funding and finance events

CTS planned and delivered several events for external clients related to funding and finance. “The Future of Transportation Funding and Financing Alternatives” forum in May provided an opportunity to hear from national, state, and local experts and explore options for Minnesota. CTS was one of several cosponsors of the event, which was the first of the education/outreach efforts resulting from the Mn/DOT Commissioner’s Forum on Innovative Transportation Finance held in December 2008. (CTS provided assistance for the December forum.)



Mn/DOT commissioner Tom Sorel

The “Transportation Long-Range Funding Solutions” symposium was held in June 2009. The symposium was one part of an effort mandated during the 2008 legislative session that directed Mn/DOT to evaluate the long-range needs of state highways, bridges, and transit and to investigate potential funding strategies to meet these needs. The proceedings from the symposium are part of a legislative report.

👉 CEO Forum on Performance-Based Management

CTS conducted the 2009 CEO Leadership Forum in cooperation with the American Association of State Highway and Transportation Officials (AASHTO), the Transportation Research Board (TRB), and the Federal Highway Administration (FHWA). The forum, on the topic of performance-driven management in state DOTs, was supported by funding from the National Cooperative Highway Research Program and held for the third time at the University of Minnesota.



Robert Skinner Jr. (TRB), John Horsley (AASHTO), and Jeff Paniati (FHWA) at the CEO Forum

👉 Community transportation workshop

Community transportation and human service providers gathered for a half-day workshop in April to learn about developments in the seven-county Twin Cities metropolitan area and across the nation. The workshop was sponsored by Hennepin County and hosted by CTS. Community transportation serves individuals who cannot drive or who lack access to private vehicles due to low incomes, language and cultural barriers, advancing age, physical disabilities, or other factors.

👉 Electric vehicle forum

CTS and the Center for Science, Technology and Public Policy at the Humphrey Institute of Public Affairs hosted a forum to discuss strategies for wide-scale adoption of electric car technology and supporting infrastructure in Minnesota. The electric vehicle forum also featured University of Minnesota researchers presenting the latest in electric vehicle technology research.

👉 Accelerating Transitway Development in the Twin Cities Region

Local government stakeholders came together at a January workshop to explore ways to accelerate transitway development in the Twin Cities metropolitan region. The workshop, focusing on finance and funding options, was sponsored by the Counties Transit Improvement Board, the Metropolitan Council, and the University Metropolitan Consortium. CTS hosted and coordinated the workshop in support of the sponsors.



Hennepin County commissioner Peter McLaughlin

📌 Luncheons, research conference

CTS luncheons and the annual research conference continued to attract diverse audiences.

CTS Fall Luncheon: Bruce Seely, Dean, College of Sciences and Arts, Michigan Technological University, “American Transportation Policy: Patterns of the Past, Implications for the Present”

CTS Winter Luncheon: Oliver Carsten, Professor, Institute for Transport Studies, University of Leeds, “Intelligent Speed Adaptation: Is European Research Relevant to the United States?”

CTS 20th Annual Transportation Research Conference: Opening session featuring lead researchers of the Access to Destinations Study (see page 4) and a reactor panel with Curt Johnson, Mariia Zimmerman, and Tim Henkel, and a luncheon speech by Tom Vanderbilt, author of *Traffic: Why We Drive the Way We Do (and What It Says About Us)*



Bruce Seely



Tom Vanderbilt



Oliver Carsten



Curt Johnson (Citistates Group), Mariia Zimmerman (Reconnecting America), and Tim Henkel (Mn/DOT)

📌 Policy seminars

CTS continued to be an information resource to state legislators. Four seminars were held in early 2009 to educate elected officials on transportation-related issues. Topics included historical roadway development and current road financing, alternatives to the gas tax, current transit funding, and the future of transportation finance.

Two seminars were held in FY09 related to the Value Capture study led by CTS for the Minnesota legislature. The first workshop, held at the beginning of the project, gathered input from stakeholders on the direction of the research. The second

workshop shared initial findings from the work. Additional workshops in FY10 will share final results.

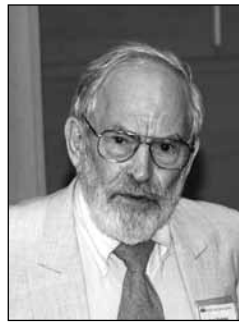
CTS also served as a resource for state and federal elected officials on the topic of mileage-based road user charging. CTS offered a legislative seminar on the topic; convened state leaders for a meeting with U.S. Congressman James Oberstar, chair of the House Transportation and Infrastructure Committee; and held a two-hour working session with Chairman Oberstar, Congressman Peter DeFazio, and Transportation and Infrastructure Committee staff members.



Value Capture study researchers Adeel Lari, David Levinson, Jerry Zhao, and Mike Iacono

Transportation Economics Conference

CTS hosted the third International Transportation Economics Conference in Minneapolis—the first time the event has been held in the United States. Nearly 100 participants attended from across the world to discuss transportation economics issues.



Herb Mohring

Associate Professor David Levinson, the Braun/CTS Chair in Transportation Engineering, led the planning efforts. The conference also featured a special plenary panel in honor of Professor Emeritus Herbert Mohring, credited with launching transport economics at the University of Minnesota.

Other events and services

CTS partners with and provides services for a number of organizations to offer transportation-related events. The following were held in FY09:

- Center for Excellence in Rural Safety (CERS) third Summer Institute
- Fifth Annual Airport Technical Assistance Program (AirTAP) Fall Forum
- Toward Zero Deaths (TZD) Conference
- Transportation Engineering Road Research Alliance (TERRA) Innovation Event: MnROAD Open House
- 12th Annual Freight and Logistics Symposium
- 13th Annual Minnesota Pavement Conference
- Minnesota Spring Maintenance Training Expo

CTS also provides program development and management services. An example is the CTS role for TERRA: CTS provides support for the TERRA board and coordinates events and communications.

Web sites and publications

The Center for Excellence in Rural Safety (CERS) launched an enhanced version of SafeRoadMaps.org to help drivers identify the most dangerous portions of upcoming trips. The online service flags the nation's Top 100 "Hot Zones," the rural areas that have experienced the most fatalities over the past five years. The hot zones are presented in a Google Maps-based format, where viewers can zoom from a national map showing all 100 zones down to a photo of each individual section of

the road. CTS collaborates with the Humphrey Institute of Public Affairs to provide CERS services.

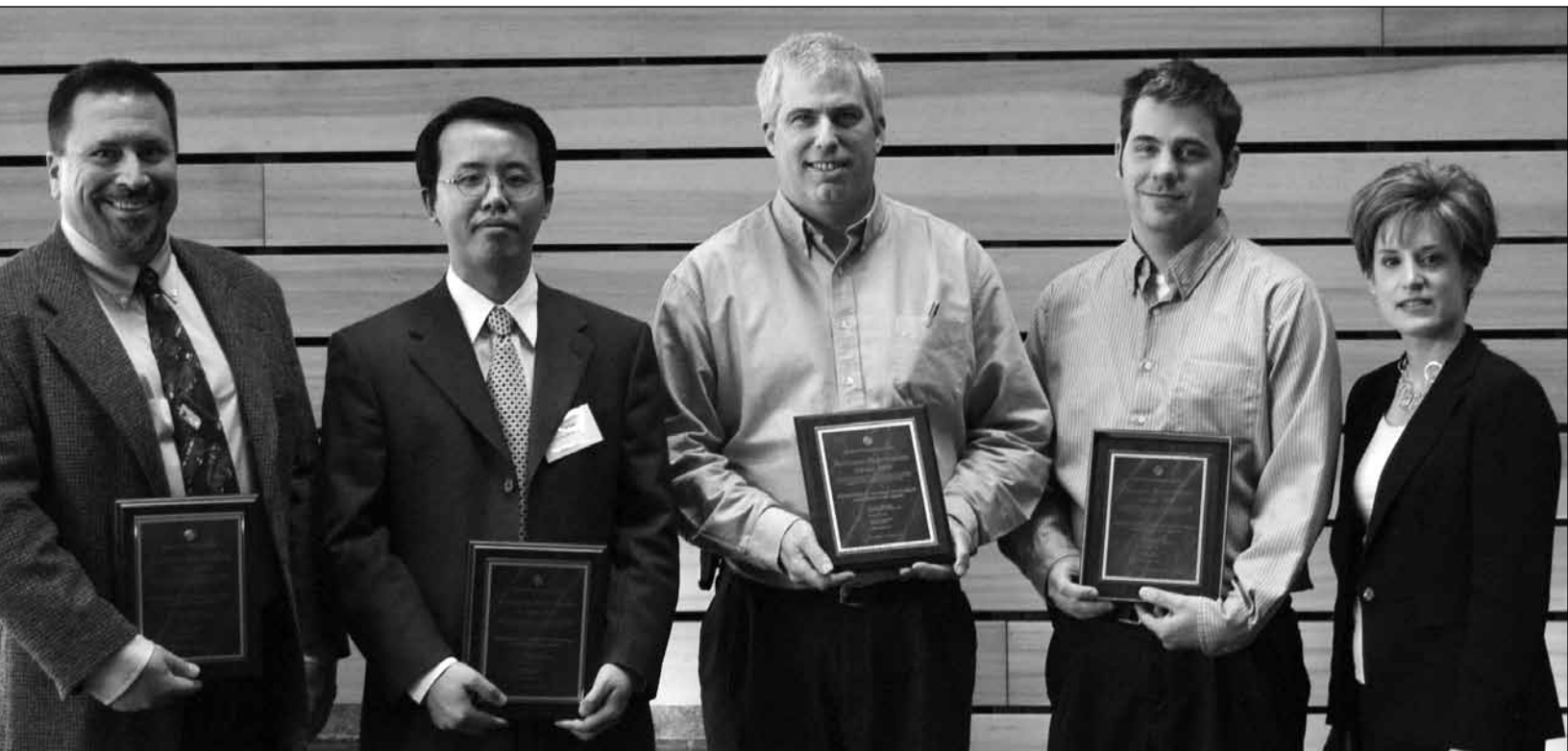
The Minnesota Toward Zero Deaths program launched a redesigned Web site: minnesotatzd.org. The new site features year-to-date tracking of traffic fatalities, a gateway to safety statistics, more user-friendly navigation, and expanded coverage of topics included in the Minnesota Strategic Highway Safety Plan. The site is managed by CTS.

CTS also manages a new Web site that helps Minnesota's transit providers and agencies find information and resources about how to coordinate transit services. CoordinateMNTransit.org is sponsored by Minnesota's Interagency Committee on Transit Coordination and its member agencies.

A logo developed by CTS for the Security in Transportation Technology Research and Applications (SECTTRA) Program won an award from Graphic Design USA. SECTTRA is a joint effort of the Department of Computer Science and Engineering and CTS. The ITS Institute FY08 annual report also received an award from Graphic Design USA. In addition, the policy summary of the "Reducing Greenhouse Gas Emissions From Transportation Sources in Minnesota" study received an award of merit from the Minnesota Association of Government Communicators.



About CTS



Research Partnership Award: Recipients Bob Green, Henry Liu, Steve Misgen, and Eric Drager, with Dawn Spanhake of CTS

www.cts.umn.edu/About

Annual awards

CTS presented the following awards at its Annual Meeting and Awards Luncheon in April.

CTS Research Partnership Award

A system to monitor the performance of urban arterials and improve traffic flow received the 2009 CTS Research Partnership Award. The system—known as SMART-Signal (short for “Systematic Monitoring of Arterial Road Traffic Signals”)—is a real-time arterial performance monitoring system that uses traffic data from existing signal systems.

The project was a joint effort of the University, Hennepin County, Mn/DOT, and the private sector. The research was funded by the Intelligent Transportation Systems (ITS) Institute at CTS, the Minnesota Local Road Research Board, and Mn/DOT, with significant in-kind support from Hennepin County and Mn/DOT.

SMART-Signal has been instrumented on 11 intersections along France Avenue in Hennepin County since February 2007 and on six intersections of Mn/DOT Trunk Highway (TH) 55 since January 2008; another test site will be instrumented on TH 13.

Project Partners

- University of Minnesota, Department of Civil Engineering: Henry Liu, Wenteng Ma, Xinkai Wu, Heng Hu
- Hennepin County: Eric Drager, James Grube, Roy Doron, Darryl Dobesh, Tom Switzer
- Alliant Engineering: Bob Green
- Mn/DOT: Steve Misgen, Ronald Christopherson, Mike Dittel, Shirlee Sherkow

Special partnership recognition was given to another project: “Pervious Concrete Research in Minnesota.” The purpose of the project was to study the performance of pervious concrete for cold climates and develop suitable mix designs and construction practices.

Project Partners

- Mn/DOT: Bernard Izevbekhai (also with University of Minnesota, Department of Civil Engineering), Benjamin J. Worel, Bruce Holdhusen
- University of Minnesota, Department of Civil Engineering: Lev Khazanovich
- City of Shoreview, Minnesota: Mark Maloney
- Holcim USA: Joe Clendenen
- Cemstone: Kevin MacDonald
- Iowa State University Concrete Pavement Technology Center: Paul Wiegand



Ray L. Lappegaard Distinguished Service Award: Doug Weiszhaar (center), vice president for special projects at WSB & Associates and previous deputy commissioner/chief engineer of Mn/DOT, with presenter Mike Sheehan (left) and former CTS director Robert Johns



William K. Smith Distinguished Service Award: Ron Have (center), president of Freightmasters, Inc., and chair of the Minnesota Freight Advisory Committee, with Robert Johns and Catherine Petersen



Richard P. Braun Distinguished Service Award: Gene Skok (center), retired research associate and adjunct professor in the Department of Civil Engineering, with Richard Braun and Robert Johns



Distinguished Public Leadership Award: Ron Erhardt (center), member of the Minnesota House of Representatives from 1991–2008 and chair of the Transportation Policy Committee from 2003–2006, with Richard Murphy Jr. and Robert Johns

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Executive Director,
Aggregate & Ready Mix
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Dean of Academic Affairs,
University of Minnesota



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Transit



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Department of
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Duluth Seaport Port
Authority



Andy Furco
Associate Vice President
for Public Engagement,
University of Minnesota



Larry Lair
General Manager, 3M
Traffic Safety Systems
Division



Khani Sahebjam
Deputy Commissioner,
Minnesota Department
of Transportation

Left during FY09:

Duane Crandall, Retired, AAA
Minnesota

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Engineering Development, URS

Linda Koblick, Commissioner,
Hennepin County

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